THURSDAY, JUNE 29, 1871

RAMBLES ROUND LONDON

Saturday Afternoon Rambles Round London. Rural and Geological Sketches. By Henry Walker. (London: Hodder and Stoughton. 1871.)

THE title of this book is suggestive of one of the movements of modern times, the Saturday Half-holiday, a movement in the right direction, if the recipients of the boon fully appreciate and understand how to use it beneficially. This may be done in various ways, either in the study of the subjects contained in the different museums in the Metropolis devoted to Art, Manufactures, or Natural Science; or in excursions in the vicinity, either for obtaining health or becoming acquainted with the various natural objects met with in the rambles, thus adding to the stock of intellectual and physical enjoyment, enlarging knowledge, and, perhaps, adding some new fact to the already rich stores of local observation. The institution of Field Clubs and Naturalists' Societies is not altogether new in principle, but their steady increase is a marked feature of late years; and while they have largely contributed to stimulate more systematic researches, they have at the same time exercised a social influence in bringing together persons whose tastes and pursuits have generally for their common object the investigation of the varied manifestations of creative intelligence. To those whose love of natural history leads them into the field, this small volume will be found a useful companion and guide, as it gives in a very able and pleasant manner much useful information respecting the more favoured spots easily accessible by the naturalist around London.

We can believe that these "Saturday Half-Holiday Rambles" have been the means of emancipating many young men from the gas-light hours on the Saturday to a good long afternoon of daylight. Many of them who have rural tastes, and even tastes for natural history, have never heard of the Quekett, the Geologists' Association, the South London Microscopical, and other London societies, part of whose programme consists of natural history rambles on the Saturday afternoon. So huge a place is London that there is danger of the amateur naturalist foregoing much that he might profit by, for want of such knowledge. The more we know of London life, the more do we see that this is the kind of work for young men closely engaged in the exhausting pursuits of a great city. Natural history pursuits are just the recreation they need; and the movement inaugurated by the energetic Secretary of the Saturday Half-holiday Committee of the Early Closing Association appears to fill up a gap in the previously existing modes for employing their time.

The Saturday Afternoon Rambles comprise London park and forest trees, Battersea Park, with its subalpine and tropical floras, Kew Gardens, visits to Burnham and Knockholt Beeches, Hampstead Heath and Hornsey, and autumn tours round Godalming. Interesting, however, as is the present landscape scenery of these districts, the author carries us back to the more ancient geography of the London area: the old sea-bed in Middlesex, and the subsequent changes it has undergone, and by which the present physical features have been produced.

Among the many interesting geological features to be noticed in the neighbourhood of London, the Thames valley is one, and is fully described in the work before us. Few of us are aware, except those acquainted with Mr. Prestwich's work, "The Ground beneath Us," that the familiar Thames of to-day has a pre-historic history distinct from its association with man and his fortunes, from which it is too commonly supposed to derive its sole interest and charm Still, the Thames, if we trace it from its source to the sea is replete with considerable interest, especially when we take into consideration the origin and character of the strata over which it flows in its onward course. These rocks reveal to us successive changes in the physical features and distribution of land and water during long past periods in the history of the globe; they tell us of successive oceans, or perhaps to some extent of a continuous ocean, more or less tropical in character, abounding in various forms of life adapted to the then existing conditions, which forms were successively replaced either by evolution or by new creations, coincident with the different inorganic changes which that area has undergone.

Without entering into a description of these changes (which we feel will be fully illustrated in the forthcoming work by Prof. Phillips), we will attempt to trace from the book before us the origin and condition under which the deposits in the Thames valley were accumulated, such as those which may be observed from the neighbourhood of Kew to Erith, and beyond it. The present stream, the parent of commerce and of civilised life, with its valley so rich in interesting landscapes, is but a diminished representative of a pre-historic larger river, by the agency of which, to a considerable extent, the present valley was formed. Even in the vicinity of London we have traces of older sea beds, such as the chalk, the London clay with its subordinate estuarine beds of the Woolwich series, and its overlying marine strata of middle Eocene age represented by the Bagshot sands, capping here and there the summits of the adjacent hills, and these again overlain by deposits of much later age, and indicating considerable change in the climatal conditions of the period, namely, the beds of glacial age which abut upon the northern heights of the valley, as at Highgate and elsewhere. That the present physical features of the Thames valley are of remote antiquity there can be little doubt, and many have been the opinions suggested as to its origin and age. Some have considered it partly of preglacial or glacial age, others as due to the torrential action of vast bodies of water produced by the summer thaws when the winters of England were of an arctic severity, or that the river itself was the agent by which the valley was formed. Suffice it, however, to say that from the corresponding nature of the strata on each side, which shows they were once continuous, for instance between Highgate and Norwood, it is evident, as suggested by Mr. Prestwich, that the valley of the Thames acquired its present dimensions in a period of greater atmospheric waste than the present, and of river erosion of greater intensity. Whether or not its features were partially moulded previous to the glacial period, it is probable that during the emergence of the land

from the glacial sea, its present contour was more prominently determined, and it has been subsequently further modified and enlarged by the older river and its tributaries. There is even some reason for believing that its present outflow was not its former one, but that, acording to Mr. S. V. Wood, jun. (whose researches are so well known) the river probably drained southward into the Weald, being barred in by a ridge of lofty land *now* cut through by the Thames river.

The deposits of the ancient river afford memorials of considerable interest, for they tell us that along its forest-clad margins lived numerous mammalia, most of which have become extinct in the British area, although some of the genera are now restricted to the Europeo-Asiatic continent. Thus we find remains of the rhinoceros, elephant, hippopotamus, bear, and lion entombed in the valley deposits, affording a proof that at that period or previously England was joined to the Continent, over which land these animals probably migrated, so that the insular position of England is but of comparatively modern date. A further study of these remains yields to us the important evidence that in this area there were representatives of a northern and southern fauna,—the commingling of which, as the reindeer and musk ox with the hippopotamus and rhinoceros, may have arisen from the Thames area having been on the borders of two distinct zoological provinces. While, however, the majority of the Mammalia belong to extinct species, the Mollusca with which they are associated are, with two or three exceptions, still found in Britain; one shell, however, the *Cyrena fluminalis*, is at present restricted to the Nile; this assemblage in the old brick-earth deposits of the Thames valley indicating a greater tenacity of life in the molluscan than in the mammalian fauna.

WEINHOLD'S EXPERIMENTAL PHYSICS

Vorschule der Experimental physik. Von Adolf F. Weinhold, Professor an der Königl. höheren Gewerbschule zu Chemnitz. Erster Theil. (Leipzig, 1871. London: Williams and Norgate. Pp. 208.)

THIS is by far the best school-book of Physics we have ever seen. Its leading characteristic will be understood by many readers from the statement that it is intended to be for Physics what Stöckhardt's well-known "Vorschule der Chemie" is for Chemistry. The author endeavours, as far as possible, to bring the reader into personal contact with physical experiments and phenomena. He does this by describing in detail, not only how to produce the phenomena and make the experiments of which he speaks, but also, in most cases, how to make the necessary apparatus with such materials as are to be got in almost any country-town. The result is that we cannot imagine a boy who possesses, in any degree, what is called a "mechanical turn" reading this book, without wanting to set to work at once to make experiments for himself. One of the main objects of the book is, in fact, to give a definite and useful direction to the "taste for making all sorts of things," which, as the author says, is so common amongst boys. With this intention he has made a careful choice of such experiments as, "by their pleasing nature, are adapted to awaken an interest in physical studies, but has avoided, as far as possible, the introduction of mere playthings, and has altogether excluded everything like conjuring tricks." With regard to the expenditure required for making the experiments described, the author estimates it at about fifty thalers (7*l.* 10*s.*) or a little more, but points out to those who are unwilling or unable to incur the gradual outlay of this sum, how much may be done for far less. A hammer and pair of pliers, "a small vice, a hand-vice, a few files, some sheet brass and wire, a spirit-lamp, a stock of glass tubing, and one or two retort-stands, suffice for a great deal, and should be provided before everything else."

We are glad to think that there are nowadays in this country a considerable and increasing number of schoolmasters who are anxious to introduce Experimental Physics as a regular part of school work, but who are deterred partly by the expense of the apparatus commonly thought necessary, and partly from the want of clear and full instructions as to how it should be used when they have got it. To any such we can do no greater service than to recommend them immediately to obtain Prof. Weinhold's book, and to follow implicitly the directions he gives.

We must not, however, leave it to be supposed that this work is simply a collection of practical instructions for making apparatus and experiments. Although each subject, even in the part now before us (which includes the general properties of bodies, statics, dynamics, hydrostatics, and hydrodynamics) is discussed from the point of view afforded by the particular experiments which it is intended that the reader should make for himself, the general conclusions to which the results of these experiments lead are always clearly and carefully pointed out; and a student who would work patiently through the book would lay a broad and sound foundation for a more special study of Physics, and would certainly know far more of the subject than the majority of those who have gone through in the ordinary way books of much greater pretensions. Above all, he could not fail to acquire one indispensable qualification for further progress, namely, the faculty of thinking about physical phenomena as of things which actually exist, and are just as fit subjects for the exercise of common sense as any of the facts of everyday life. This we consider is in itself no small excellence; for whoever has had any experience in teaching the elementary parts of Physics, must have become aware that very often the chief result of the *à priori* method, adopted in nearly all English books on the subject, is to make students think that the forces and motions of which Natural Philosophers talk are, if not fictions invented on purpose to puzzle them, at least so unlike anything that is ever met with in common experience, that it is useless to try to understand anything about them. In fact we believe that, except for students whose previous training has accustomed them to recognise the special cases that are included under general mathematical expression, the majority of English treatises on the fundamental parts of Physics are rather a hindrance than a help to a clear conception of the ideas they profess to explain. The true method of teaching Physics, at least to beginners, we believe to be the one adopted in this book, whereby the learner is made to acquire an actual personal acquaintance with all the most important facts of the science, through the observations which establish them having been brought within the range of his personal experience.

If this is done at all thoroughly, the modes of expressing the laws of physical phenomena in technical mathematical language may almost be left to suggest themselves when the requisite progress shall have been made in pure mathematics.

BOOK SHELF

The Sub-tropical Garden; or Beauty of Form in the Flower-Garden. By W. Robinson, F.L.S. With Illustrations. (London: Murray, 1871.)

THIS volume is a sequel to the valuable works which Mr. Robinson has already given us—"The Wild Garden," and "Alpine Flowers for English Gardens." The title is a misleading one, and is thus defined by the author:—"Sub-tropical gardening means the culture of plants with large and graceful or remarkable foliage or habit, and the association of them with the usually low-growing and brilliant flowering-plants now so common in our gardens, and which frequently eradicate every trace of beauty of form therein, making the flower-garden a thing of large masses of colour only." It is a pity that Mr. Robinson has assisted to perpetuate so erroneous a designation, which conveys the idea of the culture of tender plants fitted only for our hothouses. The greater part of the volume is occupied with an alphabetical list of plants suitable for the above purpose, with description of the peculiarities of their foliage, mode of cultivation, and propagation, &c. The accompanying cut is intended to suggest the effects to be obtained from young and vigorous specimens of hardy, fine-leaved trees. In all these points Mr. Robinson

AILANTUS AND CANNAS

may be safely followed as a guide, combining great practical knowledge of gardening, an extensive acquaintance with the native habits of plants, and an artist's eye to the beauty of form and combination. The following sentence gives his idea of what gardening should be. "Nature, *in puris naturalibus*, we cannot have in our gardens, but Nature's laws should not be violated; and few human beings have contravened them more than our flower-gardeners during the past twenty years. We should compose them from Nature, as landscape artists do. We may have in our gardens, and without making wildernesses of them either, all the shade, the relief, the grace, the beauty, and nearly all the irregularity of Nature." A. W B.

The Meteoric Theory of Saturn's Rings, considered with Reference to the Solar Motion in Space; also a paper on the Meteoric Theory of the Sun. By Lieut. A. M. Davies, F.R.A.S. (London: Longmans & Co.)

PROF. CLERK MAXWELL, in his remarkable essay "On the Stability of Saturn's Rings," which gained the Adams Prize in 1856, exhaustively examines the various theories of the constitution of these rings, and decides what are the impossible mechanical conditions for their maintenance and what is the possible one. He shows that they cannot be solid or rigid; he disposes of the possibility of their being continuously fluid, and he concludes that "the only system of rings which can exist is one composed of an indefinite number of unconnected particles revolving round the planets with different velocities according to their respective distances." Lieut. Davies appears not to have seen Prof. Maxwell's work, as he ascribes to the perusal of a derived exposition of it the enlistment of his interest in favour of the Satellite theory of the rings. Having espoused this theory, he has sought an explanation of Saturn's possession of a ring system in the supposition that the planet has picked up streams of meteors in its path through space; this path being a spiral resulting from the planet's orbital motion in conjunction with the proper motion of the solar system. The spirals traversed by the four planets beyond Mars are projected in accordance with Lieut. Davies's assumption of the solar motion, in order to show that Saturn is (excepting Jupiter) more favourably circumstanced than other planets for encountering wandering streams of meteors that are drawn towards the sun; while, from consideration of the masses and the distances of the two planets from the sun, it is argued that Saturn is better circumstanced than Jupiter for attaching such streams permanently to his system in the form of rings. The details of Lieut. Davies's work can only interest those who are closely concerned with cosmical hypotheses. We will merely remark that he appears to place too great faith in figures: he gives the hourly rate of the solar motion in space to a mile, and quotes the solar parallax to four places of decimals! The velocity is a very uncertain element of the solar motion, and a small alteration of the rate assumed by Lieut. Davies would greatly modify his conclusions. The book includes a paper on the meteoric theory of the sun, a theory with which the author is blindly enraptured. He claims that it "accounts for every phenomenon hitherto observed on the solar surface" He holds that the "willow leaves" are meteoric flights just falling into the sun; that the spots are spaces upon which no meteors are raining; that the periodicity of spots is due to the action of the planets in pulling "the meteoric matter outwards from the surface of the sun into larger orbits, thus temporarily delaying its precipitation," and that "the form of the spots bespeaks their origin as extraneous to the solar machinery. Were they cyclones in the atmosphere, they would invariably present a rotatory appearance . . . . This must result were the origin of the spots in a plane parallel to the tangential plane at the sun's surface; but would not do so if their origin lay in the normal to that plane, as it does in the meteoric theory. A careful study of Mr. Carrington's valuable series of observations of solar spots is decidedly unfavourable to the conclusion that they have forms of rotation." Lieut. Davies is either innocently or wilfully ignorant of the palpably cyclonic appearance which spots frequently present, and which has been frequently depicted by observers who have studied the characteristic features of individual spots. This study did not concern Mr. Carrington. The devotees of the meteoric theory of the sun's maintenance will not feel that it has been much advanced by Lieut. Davies's over-straining advocacy.

LETTERS TO THE EDITOR

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

The Eclipse Photographs

In his letter published in NATURE on the 1st of June, and to which Mr. Brothers courteously replies in your issue of the 15th, the writer briefly touched upon four different points bearing on the value of the eclipse photographs. Those points are :—1st, The possibility in a comparatively cloudless sky of a luminosity akin to that represented under the name of the corona on page 370 of the number of NATURE issued on March 9, but caused only by moisture in our atmosphere, as illustrated by his instance of what he termed a lunar halo; 2ndly, The presence of a luminosity on what he apprehends should have been the dark disc of the moon, as represented in the photograph of the American observers at Cadiz; 3rdly, The indifferent definition of the published photograph; and 4thly, The evidence as presented by the photograph of the identity of the coronal rifts. Referring to the first of these points, Mr. Brothers "fails altogether to see the connection between the solar corona and a lunar halo." If the term halo, as applied to any appearance pertaining to the moon, is confined to the ring of light so frequently to be observed apparently surrounding the lunar disc, the writer would substitute the word "luminosity" for halo. The appearance he alluded to resembles Mr. Brothers's woodcuts of the corona already mentioned, more than anything else to which he can compare it, and in common phraseology may be described as a patch of light surrounding the apparent position of the moon, extending from it to a distance varying from about one degree to two or two and a-half, and having an irregular or rifted outline. The phenomenon in question was observed by the writer when the atmosphere was in such a condition that no trace of cloud whatever was visible for a distance round the moon of some thirty or forty degrees. He mentions this merely to show that even when no visible condensation of moisture is present, an appearance—attributable to nothing but atmospheric moisture, and analogous to what is termed the solar corona—is not to be regarded as out of the common, and nothing to be wondered at. Touching the second point, Mr. Brothers would seem to be of opinion that a solar corona may be seen even when the dark disc of the moon intervenes between it and the observer's eye; for he says of the luminosity in question that if caused by our atmosphere it would extend all round and all over that disc. The point at issue here is a very simple optical question, in the discussion of which space would be merely wasted, and in reference to which the writer would simply reiterate the opinion he has already expressed, that the luminous appearance as seen extending on to the disc of the moon in the Cadiz photograph, is (if it were visible outside the camera) attributable to nothing but the influence of the terrestrial, or of a lunar atmosphere. Whilst speaking of the American observer's picture, he would remark in answer to two observations by Mr. Brothers, first, that he is not in "possession of exclusive information" concerning the circumstances of its production; and secondly, that he does not assume that it was taken under conditions less favourable than those prevailing at Syracuse. He does, however, assume that that photograph either represents only the phenomenon to which the instrument used in its production was directed, or that it represents something in addition to that phenomenon. If its representation is confined to the phenomenon, then upon the grounds already shown, he considers that what is called the coronal light in the Cadiz picture not only may be, but most certainly is, in part at any rate, merely the result of atmospheric moisture. If, however, the American observers were unfortunate enough to represent in their photograph a luminosity not belonging to the eclipse at all, then he considers that what did belong to the eclipse is not distinguishable in their picture from what did not. In short, whether the Cadiz picture does or does not represent only what it should do, the writer is of opinion that any evidence it can afford respecting the identity of the coronal rifts must be other than *satisfactorily* conclusive.

Concerning the third point, namely the "indifferent definition," to which he directed attention, Mr. Brothers admits the validity of his remarks, so far as Syracuse picture No. 5 is concerned; and this picture, it may be observed, Mr. Brothers would seem to consider the best of his series, inasmuch as it is the only one procurable of the opticians in Manchester, and also is the one selected for an engraved representation in the pages of NATURE.

Respecting the last of the four points on which the writer has taken the liberty to remark, viz. the evidence afforded by the photographs of identity in the coronal rifts as seen at Cadiz and Syracuse, he is of opinion that he has already said sufficient to justify his observation that that evidence is not "satisfactorily conclusive." If, however, Mr. Brothers should entertain a different opinion, and the Editor of NATURE think the matter worthy of further space, he will make a few other remarks, looking at the subject from an altogether different point of view.

In conclusion, the reader should be reminded that the subject under discussion is not the astronomical question—Is the sun surrounded by a medium which is illuminated by his rays and rendered visible under favourable circumstances to the eye of a terrestrial observer? but, assuming this to be the case—Is the luminosity indicated in the photographs under consideration a representation of that medium or is it not?

The writer does not doubt the existence of such a medium round the body of our great luminary (though, assuming it, ought there not to be some trace of it visible above the western horizon, immediately after sunset in a dry climate?), but he does doubt whether the patch of light depicted in the photographs of the late solar eclipse is in the main other than a phenomenon of terrestrial meteorology.

D. WINSTANLEY

The Solar Parallax

MR. PROCTOR entirely misunderstands me if he thinks that my criticism on his account of the solar parallax had reference to any failure on his part to give prominence to the discussion between Mr. Stone and myself, or to correctly apprehend that discussion. To point out all the imperfections and inaccuracies in his account would take a whole column of NATURE, and I have neither the time nor the disposition to make such a display of the accidental errors of a fellow-worker in the astronomical field. But, if Mr. Proctor desires it, I will constitute him judge in his own case in form and manner as follows: I will send him privately the list of specifications on which my criticism was founded. If, in his opinion, this list fails completely to sustain the proposition that his history of recent researches on the solar parallax is "imperfect and inaccurate in a remarkable degree," he is to publish it with any defence he chooses to make. Otherwise he may keep it for his own private use in case he brings out a second edition of his work. The kind spirit in which he has taken my remarks is highly appreciated, and I shall be happy to hear from him privately on the subject.

SIMON NEWCOMB

Halo in the Zenith

AT 20 minutes to 6 P.M. on Saturday 10th inst., I witnessed a natural phenomenon which I understand is very unusual. It was a portion of a halo around the zenith. Take the zenith as centre, and with a radius of 20° describe an arc of 120° parallel to the horizon, and having 60° on each side of due west. This gives the position in the heavens, as nearly as I could determine, using no other means of observation except my eyes. The convex surface was red, concave blue. Other colours were also apparent, and were very distinct towards the centre of the arc of 120°, becoming much diluted at a greater distance. The horns of the arc gradually faded away amid the cirri with which the whole sky was covered, its blue colour being only partially obscured. You could tell at a glance that the zenith was the centre of the halo. The phenomenon only continued five minutes from the time I first saw it, until it disappeared altogether. It has been suggested to me that probably the azimuth of the sun and that of the centre of arc of 120° coincided. I think this is very likely, but I did not note it particularly at the time. The wind was easterly, and the sun shone brightly where I was standing. If any of your numerous correspondents would favour me with an explanation of the above I would be greatly obliged. No other halo or portion of a halo was visible at the time.

R. M. BARRINGTON

Fassaroe, Bray, Co. Wicklow, June 26

What is Yellow Rain?

THE letter of Mr. A. Ernst in NATURE, May 25, on a recent case of "yellow rain," possesses considerable interest to all who have paid any attention to early prodigies; because his deter-

mination of the nature of that phenomenon, if true, serves to confirm the statements of others who have observed similar occurrences. The confirmation, however, only extends so far, as proving that, a yellowish substance has been seen on bodies after a fall of rain. I can mention instances where sudden appearances have taken place, and would be called *yellow* rain, without the aid of ordinary rain.

The earliest case I am acquainted with occurs in Pliny,* who says :—

"In like manner it rained iron in Lucania, the year before that in which M. Crassus was slain by the Parthians; and together with him all the Lucani, his soldiers, of whom there were many in his army. That which came down in the rain resembled in some sort sponges; and the aruspices gave warning to take heed of wounds from above."

This records two kinds of showers, viz., iron and sponges, but they were, I believe, one shower, although I have never seen any explanation of this curious passage. An account of a few "preternatural showers," I have lately come across, seems to contain exactly the information I have been seeking to clear up this difficulty. As it is novel, and was written in apparent ignorance of Pliny's record, it has at the present time some value. It says, in attempting to explain the cause of "red snow" :—

"This singular phenomenon, which has been observed in the Arctic regions, seems to be owing to the presence of oxide of iron in a state of minute division, and also of a resinous vegetable principle of an orange-red colour, belonging apparently to some lichen, of which too, perhaps, the iron may form one of the immediate principles."†

This explains Pliny to a certain extent; in the common ignorance of both ascribing the redness of the snow to iron rust, or oxide of iron, and the matter that remained after the dissolution appearing of a sponge-like texture, and called a sponge or sponges by Pliny, and a resinous vegetable principle of an orange-red colour by Phillips.

This I think is the most probable meaning, and is, perhaps, the earliest "yellow" shower on record. The colour, as stated by the latter, is nearly correct, as shown by the investigation of MM. De Candolle and Prevost, who discovered, microscopically, that the red snow was due to the presence of small globules of a bright red colour, which were surrounded by a gelatinous membrane, transparent and slightly yellow, and were mixed with fragments of moss and dust. "An examination of the crimson snow found by Captain Ross in the Arctic regions by M. De Candolle proved it to be identical with the Alpine red snow; the globular bodies are of a vegetable nature, and were once thought to belong to the *Uredo*, but M. Bauer disproved this, and named the plant *Protococcus nivalis*. There are cases, however, in which the presence of animalcules gives a reddish tinge to snow."‡

Honeydew is mentioned by Pliny (Bk. XVIII. c. 28), who states that a great many of the ancients affirmed that dew burnt up by the scorching sun is the cause of honeydew on corn.

In the *Chronicum Scotorum* is the earliest direct record of a "shower of honey" I know of.§ It says: "A.D. 714 . . . . it rained a shower of honey upon Othan Bec. . . . ."

When it is known that any sudden appearance, giving a colour to the ground, or prominent places, or on trees, &c., is generally thought to have descended from above, this passage is quite intelligible. The "shower of honey" was nothing more than a "secretion of *aphides*," whose excrement has the privilege of emulating the sugar and honey in sweetness and purity."‖ Some contend that it is due solely to the exudation of the saccharine juices of trees; but, feasible as this may seem, it is not sufficient to account for this phenomenon, which often extends over very large tracts of land. If the exudation is promoted by the aphides, and the dew increased by their own excrement, then this explanation is, I believe, the true one. The former view is not to be discarded without some consideration; for one observer states that, in the course of thirty years he had attended to this subject, he had never met with any honeydew which did not seem to him to be clearly referable to aphides as its origin.¶ This view does not go counter to what I conceive to be the correct one; for exudations do take place, and the quantity of "dew" can be increased by the aphides.

There is a very curious account given in a now little known work of what was considered the real cause of "honeydew," but I will not trespass further upon the valuable space of this journal in quoting it. I give the title at foot.*

More can be said upon this interesting subject; and on another occasion I hope to resume the investigation, by attempting to explain the "yellow rains" of a different kind to those treated of in this letter.

JOHN JEREMIAH

43, Red Lion Street

Black Rain

THE following notice of a shower of black rain, which has been sent to me by my friend Mr. G. J. A Walker, of Norton Villa, near Worcester, though not so exact in its description as I could have wished, may call attention to the subject, and elicit a more detailed account, if in this ungenial season rain of a similar nature has fallen elsewhere. Mr. Walker's residence is about three miles south-east of Worcester, and he says, that after three or four hours of common rain on Tuesday June 6, it became suddenly dark about seven o'clock, P.M., and shortly after a rain like ink poured down for a quarter of an hour, after which light returned upon the scene. The following morning the sheep at Woodhall (an adjacent farm) appeared as if their fleeces had been dyed black; also the dog and a grey pony that Mr. Walker had out in a field close by appeared as it they had been rolling in soot or in a coal hole. The black matter brought down with the rain was of an adhesive nature, and at Littleworth, within a mile of Norton, where this rain fell into some tubs, it was observed to be as black as ink. This black rain was particularly remarked, as clear ordinary rain had been falling for some hours on the day mentioned, but had ceased an hour previously to the commencement of this black downfall. The actual rain of that evening did not extend to Worcester, but I have a note taken at my residence here at the time, that "the gloom was singular and overpowering all the evening." I regret that, going into Herefordshire the next day, I was not aware of this occurrence till some days after, and none of the black rain or the adhesive matter it brought down had been preserved for microscopical examination.

EDWIN LEES

A New View of Darwinism

I HAVE noticed that NATURE is very catholic in its sympathies, and allows all views which are not palpably absurd to be discussed in its pages, and I therefore venture to ask for some space in which to present a few of the difficulties which have been suggested by Mr. Darwin's theory of Natural Selection, and which have not, so far as I know, been as yet discussed. I have not the taste for the language nor the arguments which were used by a *Times* reviewer, and I have much too great a reverence for one of the most fearless, original, and accurate investigators of modern times, to speak of Mr. Darwin and his theory in the terms used by that very ignorant person. Approaching the subject in this spirit, and knowing how very small a section of biologists are now opposed to Mr. Darwin, I may be very rash, but hardly impertinent, in stating my difficulties.

I cannot dispute the validity and completeness of many of Mr. Darwin's proofs to account for individual cases of variation and isolated changes of form Within the limits of these proofs it is impossible to deny his position. But when he leaves these individual and often highly artificial cases, and deduces a general law from them, it is quite competent for me to quote examples of a much wider and more general occurrence that tell the other way. In this communication I shall confine myself to Mr. Darwin's theory, and shall not trepass upon the doctrine of evolution, with which it is not to be confounded.

The theory of Natural Selection has been expressively epitomised as "the Persistence of the Stronger," "the Survival of the Stronger." Sexual selection, which Mr. Darwin adduces in his last work as the cause of many ornamental and other appendages whose use in the struggle for existence is not very obvious, is only a by-path of the main conclusion. Unless by the theory of the struggle for existence is meant the purely identical expression that those forms of life survive which are best adapted to survive, I take it that it means in five words the Persistence of the Stronger.

Among the questions which stand at the very threshold of the

* Bk. II. c. lvi.

† Lectures on Natural Philosophy, 1st series, by Montagu Lyon Phillips. London, 1839, pp 47-48

‡ Vegetable Physiology, by Dr. W. B. Carpenter, 1858, p. 580.

§ This I take to be equivalent to "honeydew."

‖ Kirby and Spence's "Entomology," 1867, p. 119.

¶ Kirby and Spence, foot-note, p. 119.

* Rohault's "System of Nat. Phil.," by John Clarke, D.D., vol. ii. p. 217. London, 1723.

whole inquiry, and which I have overlooked in Mr. Darwin's books if it is to be found there, is a discussion of the causes which produce sterility and those which favour fertility in races. He no doubt discusses with ingenuity the problem of the sterility of mules and of crosses between different races, but I have nowhere met with the deeper and more important discussion of the general causes that induce or check the increase of races. The facts upon which I rely are very common-place, and are furnished by the smallest plot of garden or the narrowest experience in breeding domestic animals. The gardener who wants his plants to blossom and fruit takes care that they shall avoid a vigorous growth. He knows that this will inevitably make them sterile; that either his trees will only bear distorted flowers, that they will have no seed, or bear no blossoms at all. In order to induce flowers and fruit, the gardener checks the growth and vigour of the plant by pruning its roots or its branches, depriving it of food, &c., and if he have a stubborn pear or peach tree which has long refused to bear fruit, he adopts the hazardous, but often most successful, plan of ringing its bark. The large fleshy melons or oranges have few seeds in them. The shrivelled starvelings that grow on decaying branches are full of seed. And the rule is universally recognised among gardeners as applying to all kinds of cultivated plants, that to make them fruitful it is necessary to check their growth and to weaken them. The law is no less general among plants in a state of nature, where the individuals growing in rich soil, and which are well-conditioned and growing vigorously, have no flowers, while the starved and dying on the sandy sterile soil are scattering seed everywhere.

On turning to the animal kingdom, we find the law no less true. "Fat hens won't lay," is an old fragment of philosophy. The breeder of sheep and pigs and cattle knows very well that if his ewes and sows and cows are not kept lean they will not breed; and as a startling example I am told that to induce Alderney cows, which are bad breeders, to be fertile they are actually bled, and so reduced in condition. Mr. Doubleday, who wrote an admirable work in answer to Malthus, to which I am very much indebted, has adduced overwhelming evidence to show that what is commonly known to be true of plants and animals is especially true of man. He has shown how individuals are affected by generous diet and good living, and also how classes are so affected. For the first time, so far as I know, he showed why population is thin and the increase small in countries where flesh and strong food is the ordinary diet, and large and increasing rapidly where fish or vegetable or other weak food is in use; that everywhere the rich, luxurious, and well-fed classes are rather diminishing in numbers or stationary; while the poor, under-fed, and hard-worked are very fertile. The facts are exceedingly numerous in support of this view, and shall be quoted in your pages if the result is disputed. This was the cause of the decay of the luxurious power of Rome, and of the cities of Mesopotamia. These powers succumbed not to the exceptional vigour of the barbarians, but to the fact that their populations had diminished, and were rapidly being extinguished from internal causes, of which the chief was the growing sterility of their inhabitants.

The same cause operated to extinguish the Tasmanians and other savage tribes which have decayed and died out, when brought into contact with the luxuries of civilisation, notwithstanding every effort having been made to preserve them. In a few cases only have the weak tribes been supplanted by the strong, or weaker individuals by stronger; the decay has been internal, and of remoter origin. It has been luxury and not want; too much vigour and not too little, that has eviscerated and destroyed the race. If this law then be universal both in the vegetable and animal kingdoms, a law too, which does not operate on individuals and in isolated cases only, but universally, it is surely incumbent upon the supporters of the doctrine of Natural Selection, as propounded by Mr. Darwin, to meet and to explain it, for it seems to me to cut very deeply into the foundations of their system. If it be true that, far from the strong surviving the weak, the tendency among the strong, the well fed, and highly favoured, is to decay, become sterile, and die out, while the weak, the under-fed, and the sickly are increasing at a proportionate rate, and that the fight is going on everywhere among the individuals of every race, it seems to me that the theory of Natural Selection, that is, of the persistence of the stronger, is false, as a general law, and true only of very limited and exceptional cases. This paper deals with one difficulty only, others may follow if this is acceptable.

Derby House, Eccles HENRY H. HOWORTH

Ocean Currents

MR. PROCTOR concludes his letter on Ocean Currents, in NATURE for June 15, with the remark that in theories respecting oceanic circulation "the vast distance separating the Polar from the Equatorial regions must not be overlooked." Will you allow me to point out to him that in the experiment he suggests, that vast distance is entirely overlooked; that, in fact, any such experiment, with whatever difference of detail it may be performed, whether in his cylinder or in Dr. Carpenter's trough, in no way illustrates the natural condition of things, and in no way tends to answer that objection to the "temperature" theory of currents which is founded on the infinitesimal nature of the thermometric gradients. The difference of temperature between Arctic and Equatorial water is about 50° F., or 1° F. in 100 miles; or, reducing it to smaller units suitable for an experiment, is $\frac{1}{600000}$ of a degree in one foot; this, if the experimental trough is five feet long, or if the cylinder is ten feet in diameter, gives an extreme difference of $\frac{1}{120000}$ of a degree of Fahrenheit's scale. Can such a difference be represented in any experiment? I think not; but no experiment which shows a much greater relative difference can be accepted as satisfactory; for it is the infinitesimal nature of the thermometric gradient existing in the ocean that constitutes the physical objection to the temperature theory. There are other objections which I will not allude to now; but it is manifestly no answer to this one objection to show that under certain other circumstances—which bear no resemblance in degree to those of nature—hot water and cold will establish a circulation. I, for one, have, for a good many years, been perfectly well aware that they will; but I doubt if it has ever been shown that a sensible motion will result from a thermometric gradient of $\frac{1}{600000}$ of a degree in a foot.

J. K. LAUGHTON

Alpine Floras

THE fact mentioned in last week's NATURE of the absence of any Alpine flora on the Atlas Mountains, Morocco, though disappointing, is interesting. It seems to show that, during the glacial period, icebergs did not drift to the Atlas. This, however, must have been from local causes only. Mr. Wallace found a European flora on a mountain in the Eastern Archipelago—I think in Borneo—which, most probably, must have got there during the glacial period. JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim, June 19

A Suggestion

Is it possible that the following facts may account for the presence of *Elastrus dolosus* in the Azores? At all events, I offer them as suggestive, and for the information of Messrs. Wallace, Godman, Murray, Crotch, &c.

Lawrence Almeida, son of the first Portuguese Viceroy in India, was the first European known to visit the coast of Madagascar in the year 1506. The Portuguese circumnavigated the whole island within two years, and subsequently constantly anchored at it in their voyages to the East Indies. They also established a settlement on a steep rock on the bank of the river Franchere and near the village of Hatore, in the province of Anosi (*i.e.*, at the south-eastern extremity of the island). The valuable timber, as ebony, as well as the rich dye-woods, would be well worth taking to Europe, and thus doubtless afforded a conveyance for living larval or pupal Elaters, without any rare or improbable concurrence of events, to the Portuguese islands in the Atlantic. Many of the extremely beautiful and attractive flowering shrubs and plants would also not improbably be forwarded to Europe by the same route, in which some Elateridæ might find shelter. Is the lapse of 300 years sufficient to account for change of development? S. P. OLIVER

Southsea

HYDROUS SILICATES INFECTING THE PORES OF FOSSILS

DR. T. STERRY HUNT directed attention some time ago* to a remarkable limestone of Silurian age from Pole Hill, New Brunswick, in which I had found the

* Proceedings of the Natural History Society of Montreal.

cavities of fossil crinoids to be filled with a siliceous substance perfectly injecting their most delicate cellular structure, and which Dr. Hunt, on chemical analysis, found to be a hydrous silicate allied to jollyte. I have since, in examining with the microscope various specimens of limestone in the collection of McGill College, met with a British example of this kind of injection, to which I would wish to direct the attention of your microscopists. It is a specimen of olivaceous, imperfectly crystalline limestone, labelled Llangedoc, Wales. The only distinct fossil which it contains is a small body having the characters of the genus *Verticillopora*. It is filled, however, with crinoidal fragments and fragments of shells, and, when sliced, displays a few very minute univalves, probably of the genus *Murchisonia*, and also portions of a sponge-like organism with square meshes. The pores and cavities of many of these fossils are filled with a greenish or brownish finely crystalline silicate, which must have been introduced when the organic bodies were still recent, and which Dr. Hunt has ascertained to have the following composition :—

Silica	35·32
Alumina	22·66
Protoxide of Iron	21·42
Magnesia	6·98
Potash	1·49
Soda	0·67
Water	11·46
	100·00

So that this mineral is almost identical with jollyte. The fact that it fills the minute pores and cavities of the fossils can be seen in transparent slices, especially under polarised light, and also in decalcified specimens. The filling is not, however, so perfect as in the New Brunswick specimens above alluded to. The best, which I suppose to be Upper Silurian, is worthy of the attention of those who may have access to it, as presenting an interesting example of Silurian fossils preserved in the same way with the Laurentian Eozöon. It affords another palæozoic illustration of a mode of preservation of the structures of fossils, which, though perhaps more prevalent in the Laurentian and Cretaceous than in any intervening periods, is to be met with here and there throughout the geological series, and is of equal interest to the palæontologist and the chemical geologist.

J. W. DAWSON

Montreal, June 8

NEW THEORY OF SUN-SPOTS

A LATE number (1,835) of the *Astronomische Nachrichten* reproduces from the notices of the Royal Saxon Scientific Society a paper on the above subject by Professor Zöllner. The author believes that he is the first who has attempted to account for the periodicity of the spots by agencies confined to the sun itself, while he rejects the notion of planetary influence to which the phenomenon has been commonly attributed. In this, however, he is not quite correct, for in the April numbers of *Cosmos* last year there appeared a transcript of a paper read before the Belgian Academy of Sciences, by M. Bernaerts, who tries to explain the various phenomena of the sun spots without reference to any extra-solar action.

Prof. Zöllner, like M. Bernaerts, accepts the theory of a liquid forming the surface of the sun; but while the Belgian *savant* considers the spots as perforations in the liquid layer traversed by downpouring currents of gases that had previously risen through the liquid from the gaseous nucleus, Prof. Zöllner believes the spots to be formations of slag or scoriæ caused by a certain local cooling of the liquid surface. Over this glowing liquid is a glowing atmosphere, which contains, in a vaporous state, a portion of the matter belonging to the liquid. The same as on the earth, if this atmosphere is cloudless and calm, radiation and cold are induced; and where this occurs the slag-like products are formed, and spots become visible. But vaporous condensation is also a consequence of the cold. Clouds, therefore, are developed, the radiation is checked, the liquid surface regains its former heat, and the spots are dissolved and disappear; so that the very cause that effects their formation also tends to their dissolution. The repetition of the same operations gives the spots the character of "intermittent phenomena;" but their occurrence, as well as their duration, depends on such a complication of meteorological processes that those phenomena cannot be considered otherwise than as perfectly casual.

The action of a spot on the atmosphere in cooling it, and causing cloudlike condensations that oppose radiation and restore the heat, makes the presence of a great spot unfavourable to the formation of other spots, and Prof. Zöllner arrives at the conclusion that "a sun-spot exerts within a certain area, and according to its size, an influence that prevents or obstructs the formation of other sun-spots." Thus, it appears, he explains the *isolation* of the spots. But they occur also in groups over a wide extent of surface, and he infers that "the same conditions of the solar atmosphere that induce the formation of a spot in any one place, prevail in general over a larger space than that occupied by the spot, so that within the area influenced by those favourable conditions, the simultaneous production of other spots is more likely than elsewhere." The size of the spots depends plainly not on the amount of radiation alone, for the slag-like products have cohesive properties like our ice-flakes.

I candidly admit that all this is by no means so very plain to me after reading the theory of the isolation of the spots; and I would refer the reader to the original for a better understanding of the two theories relating to the isolation and the grouping, than I have been able to attain to. I would also refer to the original for the Professor's views of the oscillations of solar temperature and the periodicity of the spots, which he discusses in several paragraphs.

The appearance of the spots in certain zones on both sides of the equator he explains as the effect of currents in the liquid stratum. He asks us to imagine, in the first place, a motionless, atmosphere-enveloped globe maintained at a constant high temperature; and, after explaining the results, he tells us to fancy such a globe with a liquid envelope heated at bottom by contact with the surface beneath it, and cooled above by radiation. The lower parts of the liquid have a tendency to rise on account of their lower specific gravity, but their ascent anywhere is impossible unless somewhere else a sinking takes place. With equal conditions everywhere prevailing, no motion in either direction could occur; but those equal conditions do not exist on the sun, whose axial rotation diminishes the force of gravity at the equator. This therefore favours an ascent of the heated lower portions of the liquid at the equator, and a sinking of the cooler upper parts in the regions of the poles. Two streams are thus induced; one below flowing toward the equator, and one above in a contrary direction. The former as it progresses gains in temperature by contact with the hot surface of the globe; while the latter in its sub-aerial route loses heat by radiation. Thus the polar regions of the sun are made cooler than the equatorial, as has, in fact, been shown by Secchi's investigations.

These movements in the enveloping liquid (*flüssigen Umhüllungen*) are the cause of atmospheric disturbances, producing in certain places a lowering of temperature and condensation. The fall in temperature is favoured in two ways—by the mixing of the equatorial and polar streams in high latitudes, and by the ascent of an air-current at the equator. As this air-current cools in rising its vaporous constituents are partly condensed in the form of clouds. Yet these clouds need not at all be of so low a temperature as to appear to us

like darkened areas; but, on the contrary, when we consider the high temperature of the sun, we may conceive them to be formed of matter in a glowing state, so that products of condensation such as these could scarcely, if at all, be perceived on the luminous disc of the sun. On the other hand, the author believes that in the cases of the great and still warm planets, Jupiter and Saturn, we see the sun-illumined aqueous clouds that rise in bright belts at the equator. We believe the author's object is to show that, while the visible effects of condensation appear in the atmospheres of Jupiter and Saturn, it is only on the liquid surface that they are exhibited by the sun, and thus its atmosphere remains transparent.

We have, accordingly, in the equatorial zone and in the higher latitudes distinct regions of preponderating atmospheric cloudiness, and between them, like the zones of the trade winds on the earth, lie areas of relative clearness. All this, if I rightly understand the author, is not apparent to the observer, but its effects are seen on the glowing liquid solar surface, where, beneath the unclouded areas, radiation is more induced than in other places, and the formation of sun-spots is the consequence.

To the foregoing causes of atmospheric disturbance must be added the eruptions of hydrogen that are shown by the spectroscope.

On the whole it is the *stillness* and *clearness* of certain parts of the atmosphere that induce the formation of spots; and, as the final result of his arguments, Prof. Zöllner sums up as follows:—

"The sun-spots are slag-like products of a cooling process caused by the radiation of heat from the glowing liquid surface, and they dissolve again in consequence of disturbances of equilibrium in the atmosphere which are brought on by themselves. If these disturbances are not merely local, but of more general extent, then, at the times of such general atmospheric disturbances, the formation of new spots is but little favoured, because the essential conditions of a considerable lowering of temperature are wanting, namely—*stillness* and *clearness* of the atmosphere. When the atmosphere, after the dissolution of the spots, gradually tranquillises, the process begins anew, and it assumes a *periodic* character, while the conditions of the solar surface are to be regarded as constant in the *mean* of lengthened periods. The local distribution of the spots must, according to this theory, depend on the zones of greatest atmospheric clearness, which, as has been shown, are generally coincident with the zones of the greatest development of the spots."

Such, as they appear to me, are Prof. Zöllner's views of the sun's spots; and if, as is quite possible, I have not everywhere succeeded in comprehending him, I freely admit that any misconstruction I have made may be attributable to my own shortcomings rather than to his. At the same time I cannot but regard his style as considerably difficult and diffuse, and not perfect in the logical concentration which is so necessary for the clear enunciation of a theory. In some points his conclusions seem, undoubtedly, to agree with observations—for instance, as regards the vaporous masses that are formed over the spots, and which appear sufficiently attested by their strong absorption lines in the spectrum. In the main, however, I cannot say, so far as I may venture to give an opinion, that he has been more successful than other theorists on the same subject; and among several objections which have occurred to me as affecting his views, I will venture to state the following:—

1. Regarding the establishment of currents in the liquid envelope, Prof. Zöllner affirms that in this way alone could the more heated and specifically lighter portions of the liquid at the bottom make their way to the surface; but this appears to me incorrect when we consider that in freezing water there is an interchange of the upper and lower strata until congelation begins, and this without the intervention of currents.

2. He defines the spots as scoriaceous products floating on the liquid surface. The liquid, however, is moving in a current from the equator poleward, and, if so, I would ask how is it that the spots show no tendency to be carried along with it in that direction? I do not believe that any such general tendency has been observed.

3. He makes no attempt to account for the very striking and suggestive appearances of the penumbra, which led Wilson to regard the spots as openings or depressions in the photosphere. Neither does he try to explain the distinct boundaries of the nucleus, the umbra, the penumbra, the light bridges, nor the deeper shading of the penumbra round its exterior limits.

4. The current cools in its advance poleward, and the polar regions are, as the professor tells us, the coolest parts of the sun. Then if, according to his theory, the spots are the products of cold, why do they not increase in development up to the poles? He assumes, indeed, that the cold induced in the polar regions produces clouds in the atmosphere, which are unfavourable to the production of spots; but they are so only as they check radiation and contribute to heat, and if, notwithstanding this, the polar regions are still found to be the coldest, and if cold is the cause of the spots, there seems a defect in the hypothesis. The professor points to an analogy between the spot zones and the clear zones of the trade winds of the earth. The cases are, however, very different; for our own atmosphere is subject to external influences, namely, the action of the sun, as well as those belonging to the earth itself.

Of course, anything from the eminent pen of Prof. Zöllner must be received with the utmost respect, but I conceive that his theory of the sun-spots, as I have attempted partly to show, presents many difficulties; and I cannot avoid stating my humble belief that, notwithstanding all that has been thought and written on the subject, and in spite of the modern discoveries of some of the constituent elements of the sun, we are but little nearer a true conception of its organisation or economy than the theorists of the days of Hipparchus.

J. BIRMINGHAM

PROFESSOR TYNDALL ON THEORIES OF DISEASES

WE reprint this article from the *British Medical Journal*, since it shows how closely connected are the most abstract inquiries with the most practical questions:—

"The surest basis for Medicine is upon the broad foundations of exact scientific observation; and we shall all welcome such contributions as so able a physicist as Professor Tyndall can make either to our knowledge or to our facilities for testing the foundations of our beliefs. The electric beam, which has in his hands played a large part in many able investigations and demonstrative experiments, was lately brought into play to demonstrate the ubiquity of dust in the atmosphere. To some very charming experiments Mr. Tyndall joined some theories which, if capable of proof, were yet not demonstrated by anything which he said or did. The ubiquity of these airborne particles was perfectly well known, and their illumination by the electric beam, while it has given a more complete demonstration of their presence than was otherwise obtainable, has not added anything to our knowledge of their chemical or biological relations. His experiments, however, have had the valuable effect of demonstrating the uses of cotton-wool as a filter for them, and the advantage of inspiring him with interest in a subject in which we can but be pleased that one of the most brilliant of investigators and expositors of physical science should be interested — the investigation of the origin of zymotic disease.

"In many respects the address shows a considerable advance over previous discourses by the same lecturer on this subject. The fact that the dirt or dust is in large part inorganic and in large part 'dead,' is now put prominently forward. Prof. Tyndall has, in fact, profited greatly by the lessons of Dr. Gull—we shall not venture to assume that it is by anything which we have had to say by way of comment upon his previous addresses—and does not now assume to tell us anything more about the nature of this dirt than we knew before. He proceeds only to reason upon the subject, deriving his information, however, chiefly from chance communications from various physiologists and medical correspondents. One correspondent tells him that 'blood free from dirt' will take longer to putrefy out of the body, and Von Recklinghausen's experiments are brought in reinforcement of the still more striking results and experiments of Prof. Lister; another informs him that vaccination through a bleb raised by blistering is less likely to produce secondary abscesses than by the ordinary method; and Dr. Budd assures Prof. Tyndall that, 'from the day when he first began to think of these subjects, he has never had a doubt that the specific cause of contagious fevers must be living organisms.' The last is, of course, a very interesting proof of early wisdom, but is not of the nature of a strict demonstration. The circumstance mentioned by Mr. Ellis reminds us that we have, on the other hand, seen it stated in print by one gentleman that he had to abandon vaccination by blistering because it was, in his practice, more productive than any other of suppurative and inflammatory accidents. But all this is really beside the question. The whole course of subcutaneous surgery, the whole range of Prof. Lister's experience, the daily experience of the difference in progress between simple and compound fractures, a thousand facts and observations, and the accepted and proved theories of surgical practice, have long convinced every surgeon that, in proportion as air and that which air bears are excluded from the fluids of open wounds, and from the organic fluids of the body, suppurative and putrefactive processes will be lessened and warded off. So much Prof. Tyndall might, so far as our profession is concerned, have taken for granted; and if he chooses to read, for instance, such papers as those we have published of Adams on subcutaneous osteotomy, he will see how largely this knowledge affects our practice in other directions than those to which he has referred. But, after proving to us what we know, Prof. Tyndall takes a leap, and assumes precisely those conclusions which we are desirous of his aid in testing. All these facts are as much accordant with the doctrines of Liebig and the experiments of Bastian, as with the doctrines of Schwann and the experiments of Pasteur. Granted that air-borne particles are prime agents in initiating putrefactive and fermentative change, is this by a development of pre-existent living germs, a growth of deposited ova, or by a communicated molecular motion of dead organic matter in a state of change? Is it from germs or from fermentative organic particles? We wish we could see that Prof. Tyndall had advanced our knowledge at all concerning this, the central knot of the tangle. It does not help us when he quotes certain known examples of parasitic disease, such as arises from pébrine. Because the itch is the result of the activity of the acarus, it does not follow of course that all skin-diseases are parasitic. Mr. Tyndall declares indeed, that the successful workers and profound thinkers of the medical profession are daily growing more convinced that 'contagious disease generally is of the same parasitic character' as the silk-worm disease. We cannot find on what he bases that very broad statement. Where are the works of the 'most successful workers and profound thinkers' which support that statement? It will be very kind of the lecturer to inform us whom he thus dignifies, and to what growing series of authorities he refers. Certainly not to the researches on cholera of Gull, Baly, or Cunningham and Lewes: these negative the parasitic theory. Salisbury started a parasitic theory for measles, but his observations have been generally discredited, if they were ever accepted. Hallier's observations have certainly not gained in authority by the results of many recent investigations such as those of Burdon Sanderson. We are not aware of a parasitic theory of scarlet fever being held by any one. The theory concerning typhoid fever, which Dr. Budd holds strongly and defends ably on purely logical grounds, is as distinctly controverted by Dr. Murchison.

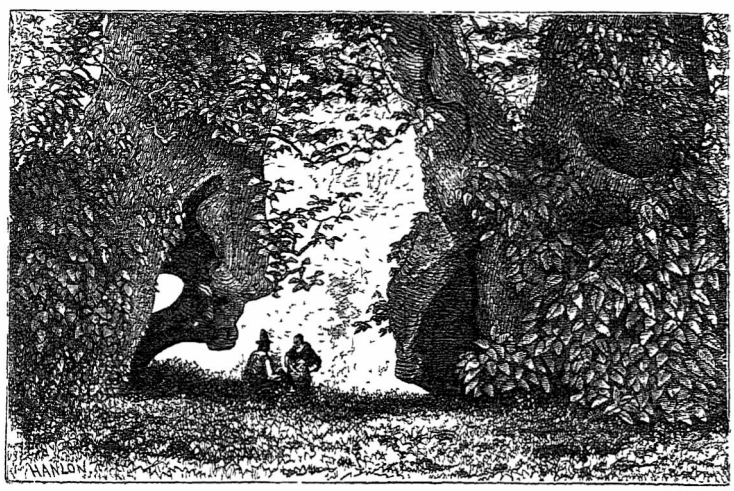
"Prof. Tyndall, however, lays just stress upon one important aspect of the question, which is precisely that which has long fascinated medical observers, and which is of the deepest importance. To it also, however, he adds nothing; and from it he draws, with admirable and unquestioning boldness, precisely the conclusions as to which we have all been debating whether they be the true and only conclusions. Small-pox and scarlatina are, to use the graphic words of Miss Nightingale, in ordinary medical experience, 'dog and cat,' so that one cannot change into the other any more than Tabby can give birth to Fido. When she says that she has seen with her own eyes one or other spring up in a corner of a room from neglected dirt, Miss Nightingale uses, of course, a purely figurative language, and her evidence must be taken *quantum valeat*. But when Mr. Tyndall declares, on the other hand, that zymotic diseases are all of primal inheritance—long descended primeval germs, never changing, never dying out, and ever passing on by lineal descent—he treads also upon ground less secure than he supposes. That this is the ordinary observed mode of extension of contagious diseases no one will dispute. That they have no other many will dispute. When he declares that, for the similarity or identity of effect of like particles acting on like fluids, we have no physical parallel, he obviously leaves out of view the whole series of phenomena of crystallisation from saturated fluids.

"To sum up: The tendency of modern research is certainly not so favourable as Mr. Tyndall believes and expects it to be to the theory of the parasitic origin of contagious disease. We should rather declare it to be unfavourable to that theory. The theory of the permanency and unrelated individuality of zymotic types of disease is not, as he assumes, an undisputed or unquestioned theory. We have to set against it, first, the theory of the correlation of zymotic diseases, which is growing into importance, and likely to attract more attention now than heretofore; second, the observations of statisticians of the complementary character of epidemics of zymotic diseases, and their apparent interchangeability in periods of decline; the theories of the spontaneous origin of zymotic disease by no contemptible observers, and in diseases as distinctly communicable as typhoid; and the observations, experiments, and reasonings of Pouchet and of Bastian, which have not yet been met, and which cannot be disposed of by a few words of philosophic doubt. We appreciate very highly the value of Prof. Tyndall's assistance in solving these questions. We entirely concur in his opinion that, as a physicist, he has a great power of usefulness in this field of investigation; and, if we refer him to the work of Gull, Baly, Cunningham and Lewes, Farr, and Murchison, it is because we are desirous that he should not be content to win easy triumphs with audiences uninstructed in the questions he discusses, or with the partisans of the theory he has adopted, but that he should enter into the heart of the question and face its real difficulties. It would be infinitely satisfactory if we could all arrive at as simple a sole theory of disease as that which Prof. Tyndall accepts entire, symmetrical, and rotund, from the supporters of the germ-theory; but we fear the solution is not yet in hand. It is satisfactory to have enlisted his sympathies, and we shall all be glad of his solid and sincere assistance."

THE CHESTNUT TREE OF MOUNT ETNA

THE traveller in Sicily will recollect the little village of Giarre, about half way between Messina and Catania; and since the opening of the railway between these cities, with a station at no great distance from its principal street. On the sea-side below the town is the shipping port of Riposto, and between Riposto and Giarre lies a fertile plain, rich in olive and vine-yards. Giarre itself has not much to boast of, except perhaps it might do so of the glorious views to be seen from the slight elevation on which it stands. One long principal street, a large plain chapel, a very second-rate inn, and then there is nothing more to be said of the village. It is, however, the nearest town with an inn to the famous giant chestnut tree of Mount Etna, and as such is visited by tourists. This fine old tree grows in the Bosco or woody region close above the town and on the slope of Mount Etna. A narrow, steep road, gradually ascending, leads from Giarre to La Macchia, the broad bed of a river now (in the end of May) rolling down nought but clouds of dust, is passed, and the lava beds formed by the eruptions of 1689 and 1735 are traversed, and at last S. Alfio is reached. This village is about four and a half miles from Giarre, and from it a very fine view of Etna is obtained. The mountain, however, from this side looks low and by no means as imposing as when seen from the sea. A little beyond S. Alfio the road turns to the left still leading upwards; until all of a sudden the giant tree breaks upon the view, the road itself running through its very midst. It stands about 4,000 feet above the sea level, and it requires a good three and a half hours to walk to it from Giarre.

It has been calculated that this tree is about 1,000 years of age. It is a tree, therefore, old enough to have its early history lost in myth; but still it has its story; and this story tells us that long ago a certain Queen of Aragon was passing by this way, when, from the effects of the weather, she and her suite, which consisted of one hundred mounted persons, took shelter under the shadow of its trunk and boughs, and so to this day and from this fact it is known as the Castagno di Cento Cavalli. This story is said to be generally believed, and, at any rate, does not appear to have been much discussed. Not so the tree; and very many opinions may be quoted all more less differing as to its age and size. Some believe, or have believed, that the tree was as large as the story tells us it was, that the interior of the vast trunk has since then decayed away; leaving a number of separate pieces, each large enough to



THE CHESTNUT TREE OF MOUNT ETNA

form a big tree, which pieces are covered with bark only on their outer surface. Others assert that there were here several large trees, more or less joined together, and demonstrate on the pieces of these trees still standing the barky layers surrounding the whole of their stems.

Not very long ago there were still four pieces standing, each of them of the dimensions of a very large tree. In the space surrounded by these pieces stood a hut, in which the annual crop of chestnut fruit was stored. One of these trees, or portions of the tree, has since disappeared. The hut has now been removed, and the road, sufficiently wide to allow of a carriage, runs between the remaining pieces and over the ground on which the hut was built. As you approach, one large piece of the tree is to the left-hand side of the road, and two larger pieces are to the right. It is very probable that many of the pieces believed to have belonged to the one original vast stem, were really stems themselves of independent trees, and such would appear to be the case with the large trunk to the left of the present roadway. But there is a strong probability that the two immense pieces to the right of the road were at one time united, and that they form part of the original tree. The annexed woodcut is from a photograph of these pieces. Both of them are deeply hollowed out. The base of the trunk to the right of the woodcut is very much decayed away, and several men could shelter in it; and the portions of the stems seen on looking at the picture are devoid of true bark. If these two portions once formed a single stem, then, indeed, though it might not have thrown a shadow sufficiently large to shade a hundred horsemen, yet it must have been a very giant among all the forest trees. Even now, in its decadence, the three stems are objects of sufficient interest to lead us to ask for them the reader's attention. E. P. W.

SCIENCE IN PLAIN ENGLISH

II.

IN considering the importance of Technical Education with reference to the practical arts, and the claims of Science as an element of culture, we are led to study the methods of teaching.

It has been the custom in English to borrow the technical terms of Science from the so-called "learned languages," particularly Latin and Greek. To such an extent has this been carried that unless a term bears the marks of such a derivation it is hardly recognised by the public as a technical term.

The Germans, on the other hand, in teaching science, employ their own language to a large extent, and impose a definite scientific meaning upon common words. It is a remarkable evidence of the formative power of the German language, that it should have been able to produce an imitation of the systematic chemical nomenclature of the French school so complete that it is used in Germany as familiarly as the original system is in France and England. The fact that the most cultivated nation in the world, the Germans, find that they can teach science in their vernacular, deserves the most careful consideration—it seems to furnish at once an argument and an example.

In discussing this question, it is necessary to examine the capabilities of the English language with reference to the purposes of public instruction, but in the first instance we may glance at the development of scientific language in some of the countries of Europe during the last three hundred years.

When the progress of science rendered it necessary to employ new terms in order to express new ideas, two different methods were adopted by different nations. Let us compare the French and English with the German and Dutch method. When, for instance, the French wanted to express in one word the "knowledge of the stars" or the "study of the stars," they borrowed the Greek word *astronomia*, and called it *astronomie*. In like manner the English said *astronomy* but the Germans expressed the meaning of the term in their own language, calling it *Stern-kunde* or "star-knowledge;" similarly the Dutch said *Starre-kunde*, and they have continued using such words to the present day.

In English, then, it has been the custom to take Latin or Greek compounds ready made, although in many instances we might have translated them if we had chosen to do so. If we look to the literal meaning, the original difference between *sphere*, *globe*, and *ball* is that the first is Greek, the second Latin, and the third Saxon. So the Germans call a *hemi-sphere* a "half-ball," and the *globe* upon which we live the "earth-ball."

Now if, in any language, the compound words are, to a great extent, derived from other tongues, such words will be comparatively unintelligible to those who are not conversant with foreign languages. In such a case, the common people will learn the words rather by practice and association than by any exact knowledge of the original meaning; and to the same degree the learned must enjoy a privilege which the illiterate do not possess. Hence there is, in English, a broad distinction between the speech of the general public and the language of science.

Suppose that a working man, in this country, wishes to study Botany, he cannot read one of the ordinary works on that subject, without having his attention distracted by scores of new words which are either Latin or Greek, or else are derived from those languages. Thus he is often disheartened; or, if he succeeds, it is a long time before he overcomes the check which he experienced at the outset, and many a likely student is thus discouraged at the very threshold of his studies.

But the German writers, when they make books for their people, proceed upon a different plan. For if they give the Latin and Greek terms, it is only in brackets, and by way of parenthesis; while in the body of the work they use plain German words, and keep on employing such terms throughout the whole work. Hence, at the first reading, a German youth may go straight on, without paying attention to the Latin terms, and so make himself master of the facts. Afterwards, at a second or third reading, he may study the learned terms, which are repeated in brackets, from time to time, in order to catch the eye of the reader, and thus imprint themselves upon his memory.

For instance, in describing the parts of a flower, the writer does not begin by talking about a "calyx," but speaks of the *cup* (calyx), and calls the leaves of the cup *cup-leaves* (sepals). Similarly, the "corolla" is the *crown*, and its leaves are *crown-leaves* (petals). Thus, when he wishes to tell the learner that a *crown* (corolla) has several leaves, he does not tell him that the "corolla is polypetalous," but that the "crown is many-leaved," or that the "crown-leaves are many."

There is a danger that some of the terms thus employed may not be quite accurate. But the Germans are willing to risk the chance of misapprehension for the sake of making an impression on the mind of the reader, and gaining his attention. If then, half a loaf is better than no bread, it seems more advisable that an unlettered man who wishes to study science, should go through a book which is intelligible, though not absolutely accurate, rather than attempt to read a treatise which is admirably correct, but so full of hard words, that he is tempted at every line to throw down the book in despair.

We have to consider whether such a method can be carried out in English. There can be no doubt that the public would welcome any proposal for the publication of elementary scientific works written in a simple style. Some steps have already been taken in this direction, and scientific writers appear to be cautiously feeling their way. But the plan has not been carried out systematically or boldly, nor has the language of science been fully examined in reference to popular instruction.

Nor are scientific men entirely convinced that the proposed simplification is practicable, or even desirable. Some of them deny that the English language is equal to the task, because we have lost that power of making compound words which confessedly existed in Old English, and which still exists in German. Others contend that even in German the method is characterised by want of precision, and gives rise to confusion; hence they maintain that it is better to frame the scientific terms in words which are not familiar to the common ear, in order to ensure precision and to guard against error.

But in arguing this question two points may be observed. First—That men of high attainments are less averse to the proposed method than men of inferior ability. Secondly—That all are more disposed to see it tried in some other science than in the one which they themselves profess. The grammarian, or the mathematician would not greatly object to a plan for simplifying Botany; "for that," they say, "is a science of hard names." But the botanist replies, "No, you must not touch Botany; suppose you were to try Mathematics." The argument cuts both ways. It is evident that each acknowledges the value of fixed technical terms in his own science, and yet is not unwilling to see a simplification introduced in other branches of study.

The objections urged against the proposed method are of two kinds:—(1) that the system itself is misleading, and the method inaccurate; (2) that even if the plan be practicable in German it is not possible in English.

We shall, in the next article, review these objections in their order.

WM. RUSHTON

NOTES

WE are glad to learn that steps are being taken to bring about such a general application from men of science to the Government for further deep-sea explorations as we referred to some little time ago. This is as it should be. We hear also, that, on the invitation of some of the leaders of science there, Mr. Gwyn Jeffreys will proceed to America in the middle of August, to inspect, in company with Prof. Agassiz, the collections obtained in the American dredgings. Such a proceeding will be of the utmost value to science, and no one is more fitted than Mr. Gwyn Jeffreys to perform such an important work.

As we are going to press we hear of the death of M. Claparède, one of the most distinguished naturalists whom Switzerland has produced. We hope in a future number to give an account of his labours, now unfortunately ended at an early age.

THE "Scheme of Education" Committee of the London School Board have sent in their report recommending science teaching in primary schools. We shall take an opportunity of referring to it on a future occasion.

FORTY of the teachers under the Science and Art Department are now in London for the purpose of undergoing practical training in Biology. For the last two or three years chemical courses of a similar nature have been given. These, however, have been suspended this year. It is impossible to overestimate the good which is being done by the department in this way, and the Government deserves the best thanks, not only of every scientific man, but of every one who cares for the best interests of the country, for what they are doing. There will be similar teaching in Physics next month.

AT a meeting of the Senate of the University of London held on Monday last, Sir Edward Ryan was elected to the office of Vice-Chancellor *pro tem.*, in the place of the late Mr. George Grote.

NOTWITHSTANDING the alleged increased severity of the Matriculation examination at the University of London, and the large proportion who have failed of recent years, the number of candidates presenting themselves at the examination held during the present week is larger than in any previous year, being over six hundred.

THE Ladies' Educational Association has now been definitely connected with University College, London, where all the lectures will in future be held, an arrangement which will doubtless be of great advantage to both students and teachers. The Association has already issued its syllabus for the Michaelmas and Lent Terms of next winter session. The curriculum includes courses for ladies by the professors of Latin, Hebrew, English, French, Italian, German, Philosophy of Mind and Logic, Jurisprudence, Hygiene, History, Constitutional Law and History, Mathematics, Physics, Practical Chemistry, Geology, and Architecture. There will also be classes for Drawing and Painting in connection with the Slade School of Fine Art; and, during the Lent term, Prof. Oliver will deliver a course of ten lectures on the Structure of Plants and General Phenomena of Vegetation, with reference more especially to the general bearing of vegetation upon landscape.

DR. HOOKER and party returned last week from their visit to North Africa. The number of species of plants brought home is estimated at about 1,200, among which it is expected there will be a considerable number entirely new.

A MEETING of the friends and pupils of the late Prof. Goodsir was held in Edinburgh, in June, 1867, under the presidency of Dr. Dunsmure, and it was resolved, "That steps be taken to form a lasting memorial of Prof. Goodsir's distinguished career as an original investigator, and teacher of Anatomy and Physiology, and that the most appropriate manner of commemorating Prof. Goodsir's services, was to establish in the University of Edinburgh a Fellowship in Anatomy and Physiology, to be called the Goodsir Fellowship." A Committee was formed, and subsequently added to, to collect subscriptions, and to decide as to the conditions on which the Fellowship should be awarded. Honorary secretaries were appointed in various parts of the country, and in the Colonies. It was expected that a sufficient fund would have been collected within two years to found the Fellowship. At the present date, however, not more than 620*l.* has been subscribed. The hope of establishing an endowment in the University on the scale of a Fellowship has, therefore, been abandoned, and it is now proposed to institute a Scholarship in Anatomy and Physiology. In order to carry out this project worthily, it is necessary to raise the sum already collected to 1,000*l.*, and renewed efforts are accordingly being now made to provide this amount.

THE Harveian oration on the Progress of Therapeutics was delivered last week in the Royal College of Physicians by Dr. T. K. Chambers, after which the biennial Baly medal for the most distinguished researches in physiological science prosecuted during the past two years, was presented by the president to Dr. Lionel S. Beale.

THE Royal Agricultural Society has decided on appointing a Consulting Botanist, at a salary of 100*l.* per annum, the engagement to be an annual one. It will be the duty of the botanist to examine plants, seeds, &c., for members of the society, and to report the principal work performed from time to time for its members, and to undertake the work at fixed rates, to be arranged before his appointment, and to furnish papers to the Journal on special subjects of botanical interest. The appointment of an Entomologist to the Society has also been in contemplation.

AN International Congress, for the progress of Geographical Science, will be held at Antwerp from the 14th to the 22nd of August. A number of questions in Geography, Meteorology, Navigation, Ethnology, &c., will be submitted for discussion. An exhibition will also be held of objects connected with the purpose of the Congress, maps, plans, instruments used in navigation, &c., and prizes will be awarded for the best object exhibited in each class.

THE excursion of the Geologists' Association to Yeovil and neighbourhood on the 29th of May and three following days was a very successful one. Near Yeovil Junction station the Yellow Micaceous sands, considered by Dr. Wright to be of Upper Liassic Age, were examined, and characteristic fossils obtained. The large collection of Mesozoic fossils collected by the Rev. Edward Bower, at Closworth Rectory, was inspected, as well as that of the Rev. T. C. Maggs, of Yeovil. The next morning, under the guidance of Prof. Buckman, the party ascended the fine escarpment of Babylon Hill, where bands of concretionary sandstone contain fossils essentially Oolite and not Liassic. The characteristic fossils of the well-known "Cephalopod-bed," considered by Prof. Buckman to be at the top instead of at the base of the series, as generally supposed, were obtained at the celebrated Half-way House Quarries, and at a small but very prolific quarry on the Professor's own estate at Bradford Abbas. The following day the far-famed quarries of Ham Hill were visited, and the great bed of Inferior Oolite Freestone, which has supplied material for the churches and other buildings of the district for centuries, was carefully examined. The Middle and Upper Lias were also investigated at South Petherton; and on the fourth day the interesting and picturesque Keuper Cliffs at Seaton were examined, and the coast section followed until the "Landslip" was reached, extending for a distance of about six miles.

THE thirty-seventh Anniversary Meeting of the Statistical Society was held on Thursday, the 22nd of June, Mr. William Newmarch, F.R.S., president, in the chair. The following is the list of president, council, and officers elected to serve for the ensuing twelvemonths, viz. :—President—Dr. William Farr, F.R.S. Council—Dr. T. G. Balfour, F.R.S., R. Dudley Baxter, Samuel Brown, Dr. Hyde Clarke, L. H. Courtney, W. Fowler, M.P., F. Galton, F.R.S., Robert Giffen, Rt. Hon. W. E. Gladstone, M.P., W. A. Guy, M.B., F.R.S., Archibald Hamilton, J. T. Hammick, F. Hendriks, J. Heywood, F.R.S., F. Jourdan, Prof. Leone Levi, Sir Massey Lopes, Bart.,

M.P., W. G. Lumley, Q.C., J. MacClelland, Dr. F. J. Mouat, W. Newmarch, F.R.S., R. H. I. Palgrave, R. H. Patterson, F. Purdy, W. H. Smith, M.P., T. Sopwith, F.R.S., Col. W. H. Sykes, M.P., F.R.S., Ernest Seyd, W. Tayler, Prof. Jacob Waley. Treasurer—J. T. Hammick. Honorary secretaries—W. G. Lumley, Q.C., F. Purdy, Jacob Waley.

THE Winchester College Natural History Society, founded on March 12, 1870, has just issued its first Report, which includes some useful papers, and botanical, entomological, and palæontological lists of the neighbourhood. It gives promise of good and useful work to be done in future years.

WE have received the thirty-eighth annual report of the Royal Cornwall Polytechnic Society. As might be expected from the locality of the society, the majority of the papers bear on subjects connected with mining and metallurgy; though there are also some meteorological tables, and a useful list of addenda to the fauna of the county. A marked feature of the report is the number of woodcuts illustrative of various adaptations of machinery, &c., connected with the subjects of the papers.

DR. LAUDER LINDSAY has reprinted his essay on the Physiology and Pathology of Mind in the Lower Animals, in which he insists that the mind of the lower animals does not differ in kind from that of man; and that they possess the same affections, virtues, moral sense, and capacity for education, and are liable to the same kinds of mental disorders.

MR. W. ROBINSON, author of "The Wild Garden," "Alpine Flowers for English Gardens," &c., publishes a useful Catalogue of Hardy Perennials, Bulbs, Alpine Plants, Annuals, Biennials, &c., intended as a help to exchanges between cultivators of hardy plants, analogous to those that have long been common among botanists.

WE have received Nos. 203-206 of the "Bücher-Verzeichniss" of Friedländer and Son, of Berlin, comprising the following subjects—"Geology, Mineralogy, and Crystallography," "Botany," "Zoology," and "Mathematics, Physics, Astronomy, and Technology."

MR. PENGELLY has reprinted two papers read before the Devonshire Association for the Advancement of Science, Literature, and Art, "On the rainfall received at the same station by gauges at different heights above the ground," and "On the supposed influence of the moon on the rainfall," in which he thus sums up the conclusions arrived at:—"1. That under unobjectionable conditions, and at the same station, less rain will be received by a gauge high above the ground than by one nearer the surface; 2. That the total defect will increase with increase of height; 3. That the defect will not increase so rapidly as the height." And again:—"The result of my observations then may be briefly summed up thus: At Torquay, the second quarter of the moon, or that which terminates on the day before each full moon, had the least number of wet days, the heaviest average daily rate of rain, and the greatest aggregate rainfall; whilst the third quarter, or that commencing on the day of each full moon, had the greatest number of wet days, the lightest average daily rate of rain, and the second greatest aggregate rainfall. The differences are but slight; but it must be borne in mind that the moon's meteorological influence can be but slight. The results, however, do not accord with any of those mentioned by the authors so largely quoted at the commencement of this paper, yet they are such, and only such, as are calculated to induce any one to pause before giving an opinion for or against the alleged connection of the moon with our rainfall. Perhaps I cannot better conclude than by echoing the words of M. Arago, 'The subject requires to be examined afresh.'"

IT is reported that about June 7, an earthquake took place on the south coast of Asia Minor, opposite Rhodes, resulting in the almost total destruction of the small town of Marmaritza.

STRONG earthquakes continue in Peru. There was one in Arequipa on April 11. The movements were from east to west, and the duration forty to fifty seconds. It is worthy of notice that on the same April 11 two slight shocks of earthquake were felt at Rangoon, in Burmah, the direction being from north to south. On the night of the 16th another earthquake was felt.

EARTHQUAKE shocks were felt on May 21st in the vicinity of Rochester and Buffalo, in the state of New York; at Augusta, in Georgia; and at Quebec, Ottawa, and other points in Canada.

THE remote island called Sunday Island, in the Pacific, has been subjected to a terrible volcanic eruption so that the inhabitants have been removed to Norfolk Island, to join the descendants of the *Bounty* Mutineers.

ON February 22 several shocks of earthquake were felt at Puno, in Peru, and on March 4 a slight earthquake of thirty seconds at Arequipa after several rainy days.

ON February 7 two distinct shocks of earthquake were felt in the department of Minititlan, in Mexico, followed by a wave rising one foot.

AMONG the late remarkable disturbances in the Pacific basin are to be numbered those affecting the waters of the ocean around the guano Islands of Guanape on the Peruvian coast, which took place on the 5th of February. During the whole of that day the sea was much agitated, though nothing particular was noted in the tides. On the morning of the 6th there was something strange about the currents, with a westerly wind freshening with dangerous force. The winds and currents ruling along the Peruvian coast are from the S.E., but on the 6th this was not so, for they veered round and came from the W. at six miles an hour (? currents). Then it was noticed that as the day grew on the currents seemed to flow in from all directions, forming numerous whirlpools, while alarm for the shipping was caused by the increasing strength of the west wind. The nights of the 6th and 7th were consequently times of alarm to the masters of the guano ships, which were dashed against each other. The phenomena had a great resemblance to those at Arica and the Chincha Islands on the 15th of August, 1868. On the 9th of February the appearances were calmer, and the wind veered round to S.E.

AT Pichicani, in Peru, an extraordinary meteor appeared on February 12. It was of a red colour, balloon-shaped, with the end or neck pointed to the earth, and exploded as it reached the surface, leaving a dark cloud on the plain, injuring the roofs of several huts, and knocking down a fence of about 500 yards belonging to a farm. Among the fragments of this meteorite were found dead fish of several species, supposed to have been lifted out of the river. Similar phenomena had been observed near Huacochullo and Atucachi.

INDIAN papers report that the tea prospects in Darjeeling this year are so favourable that up to the present time (May) the crop has been from twice to three times what it was at that date last season.

THE report of the Curator of the Natal Botanic Garden for 1870 states that there had been shipped to various public and private gardens 5 Ward's cases, 22 boxes, and 11 parcels, and that there had been received 13 Ward's cases, 9 boxes, and 22 parcels.

IT is reported from Chile that the Planchon Pass across the

Andes, the main line from Chile to Buenos Ayres, has been disturbed for about three miles by the eruption of hillocks.

An Australian paper states that a live frog had been brought to the office that had been found three or four days before incased in the solid rock, in the drive of the Sultan mine, Barry's Reef, at a depth of 400ft. below the surface. The little animal looked bright-eyed and very lively, and was apparently none the worse for its long term of solitary imprisonment.

SCIENCE IN AMERICA *

THE forthcoming number of the *American Journal of Science* will contain an extremely interesting announcement in regard to American palæontology, namely, the discovery by Prof. Marsh in the Cretaceous beds of the Rocky Mountain region, of a huge pterodactyl, or flying lizard. This form has long been known as characteristic of the deposits of Europe, and has always attracted much attention from its combination of the characters of the bird and reptile; but until this announcement by Prof. Marsh the family was not supposed to be represented in the New World. The addition therefore of the pterodactyl, to the list of American genera, shows a marked increase in palæontological affluence, and gives additional point to the statements made some time ago, that America, instead of being greatly inferior to the Old World in the variety of its vertebrate fossil remains, now bids fair to greatly exceed it in this respect. The name assigned to this new species is "Pterodactylus Oweni" (in honour of Prof. Richard Owen of London), and it is believed to have had an expanse between the tips of the wings of at least twenty feet.—We regret to learn that during the recent revolution on the Isthmus of Tehuantepec a large number of valuable collections in natural history, made for the Smithsonian Institution by its correspondent in that region, Prof. Sumichrast, were entirely destroyed in the course of the conflicts of the opposing parties.—The annual report of the Smithsonian Institution for 1869 has, after an unusual delay, just made its appearance from the public printing-office, and contains the customary variety of interesting matter, which has made this report so much sought after by persons of scientific tastes in the United States. Preceded by the secretary's usual report of the operations of the Institution for the year, it contains in an appendix numerous articles, partly original, and partly translations from such foreign journals as are not readily accessible to the American student. Among these may be mentioned biographies of Thomas Young, Augustus Bravais, Von Martius, and Marianni; an important original paper by Dr. Sterry Hunt on the chemistry of the earth; and one by Marey on the phenomena of flight in the animal kingdom; an extended paper by General Simpson, upon the march of Coronado in search of the seven cities of Cibola; one by Sir John Lubbock, on the social and religious condition of the lower races of man, &c. The report is in no way inferior in interest to its predecessors. —Salt Lake City has lately been the scene of considerable activity, in connection with the arrival there of several government exploring parties, for the purpose of fitting out for their summer's campaign. Among these may be mentioned Mr. Clarence King, who continues his geological and topographical exploration of the fortieth parallel eastward through Colorado; Major Powell, who renews his examination of the canons of Green River and the Colorado, and who is detained at Salt Lake City in consequence of the late melting of the mountain snows, the low stage of water preventing him from passing through the canons; and a portion of Prof. Hayden's party is also at the same place collecting animals and supplies for a visit to the Yellow Stone region.—By advices from South America we learn that on the 25th of April last Chili was visited by two of the severest earthquakes that have been experienced in the country since 1851. The first shock in Valparaiso was not preceded by any warning sound, and its suddenness and intensity created considerable alarm, the streets of the city being filled in a short time by people who rushed out from their dwellings in a state of indescribable confusion.—Many of our readers are familiar with the names of Mr. Thomas Say, of Philadelphia, and Mr. C. A. Leseur, as having been among the most prominent of our naturalists during the early part of the present century, and as having added many new species to the lists. The labours of Mr. Say were directed largely toward the invertebrata, embracing more particularly the insects, shells, and crustaceans. Many of his explorations were in the vicinity of Beesley's Point, New Jersey, where species were obtained by him that have ever since remained almost unknown to science. Several examinations have been more recently made on the New Jersey coast, for the express purpose of recovering these forms; and one of the most successful was prosecuted last spring, under the direction of Prof. Verrill, of Yale College, who, with several companions, spent a week at Somers Point and Beesley's Point. The results of their labours were much greater than they had anticipated, as they not only obtained a large proportion of all the missing forms, but secured quite a number of new species, and detected the occurrence, for the first time, of others previously known as belonging much farther south, among them two echinoderms, of which Cape Hatteras was the limit previously ascertained. Their "catch" for the week summed up about 175 species of marine animals—about 25 of fishes, 50 of crustaceans, 25 of worms, 50 of mollusks, and 15 of radiates and sponges.

* Communicated by the Scientific Editor of *Harper's Weekly*.

MR. BENTHAM'S ANNIVERSARY ADDRESS TO THE LINNEAN SOCIETY

(*Continued from page* 152)

GERMANY, or rather Central Europe from the Rhine to the Carpathians and from the Baltic to the Alps, is, as to the greater part of it, a continuation of that generally uniform but gradually changing biological region which covers the Russian empire. It is not yet affected by those peculiar western races which either stop short of the Rhine and Rhone or only here and there cross these rivers with a few stragglers; the mountains, however, on its southern border show a biological type different from either of those which limit the Russian portion, indicating in many respects, as I observed in 1869, a closer connection with the Scandinavian and high northern than with the Pyrenean to the west or the Caucasian to the east. The verifying and following up these indications gives a special interest to the study of German races, their variations and affinities. In so far as formal specific distinctions are concerned, all plants and animals, with the exception of a few of those whose minute size enables them long to escape observation, may now be considered as well known in Germany as in France and England; and in Germany especially the investigation of anatomical and physiological characters has of late years contributed much to a more correct appreciation of those distinctions and of the natural relations of organic races. But much remains still for the systematic biologist, and especially the zoologist, to accomplish. Among the very numerous floras of the country, both general and local, there are several which have been worked out with due reference to the vegetation of the immediately surrounding regions, but corresponding complete faunas do not appear to exist. A few in some branches have been commenced; but in these, as in the numerous papers on more or less extended local zoology, as far as I can perceive, animals, and especially insects, seem to be considered only in respect of the forms they assume within the region treated of, frequently with a very close critical study of variations or races of the lowest grades, but neglecting all comparison with the forms a species may assume or be represented by in adjoining or distant countries.

Germany holds a first rank amongst civilised nations in respect of her biological works in most departments; they probably exceed in bulk those of any other country. Her publishing scientific academies and other associations, her zoological museums and gardens, her botanical herbaria and university gardens, her zoologists and botanists of world-wide reputation, are far too numerous to be here particularised. She excels all other nations in the patient and persevering elaboration of minute details, although she must yield to the French in respect of clearness and conciseness of methodical exposition. Her speculative tendencies are well known, aud the great impulse given to them since the spread of "Darwinismus" appears to have thrown systematic biology still further into the background; the sad events of the last twelvemonth have also temporarily suspended or greatly interfered with the peaceful course of science. Thus the zoological works contained in the lists I have received are almost all dated in 1868 or 1869, and have been already analysed in the reports of Wiegmann's "Archiv" and in the 5th and 6th volumes of the "Zoological Record," and the principal ones relating to exotic zoology will have to be referred to further on. In Systematic Botany also but little of importance has been published within the last ten years beyond the great "Flora Brasiliensis," which, since the death of Dr. v. Martius, has been

actively proceeded with under the direction of Dr. Eichler, and to which I shall recur under the head of South America. Rohrbach has published a carefully worked-out conspectus of the difficult genus *Silene*, and, in the "Linnæa," a synopsis of Lychnideæ; and Böckeler, also in the "Linnæa," is describing the Cyperaceæ of the herbarium of Berlin, a work very unsatisfactory, considering the detail in which it is carried out, as it takes no notice whatever of the numerous published species not there represented, nor of any stations or other information relating to those described other than that what are supplied by that herbarium. It is not a monograph, but a collection of detached materials for a monograph.

Switzerland comprises the loftiest and most extensive mountain-range of which the biology has been well investigated—the Alps, which have lent their name to characterise the vegetation and other physical features of mountains generally, when attaining or approaching to the limits of eternal snows. The relations of this Alpine vegetation, both in its general character due to climatological and other physical causes, and in its geographical connection with other floras, has been frequently the subject of valuable essays, several of which I have mentioned on former occasions; and it is most desirable that the results obtained should be verified by or contrasted with those which might be derived from zoological data, and more particularly by the observation of insects and terrestrial mollusca. As a first step it is necessary that the plants and animals of the country should be accurately defined and classed in harmony with those of adjoining regions. This has been done for plants. The Swiss Flora has been well worked up both by German and by French botanists; it is included in Koch's Synopsis and some other German Floras. De Candolle and other writers on the French Flora had to introduce a large portion of the Swiss vegetation, and the compilers of the rather numerous Swiss Floras and handbooks* have generally followed either the one or the other, so that there remains but little difficulty in the identification of Swiss botanical races; but here, as elsewhere, methodical faunas of the country are much in arrear. I have the following notes from M. Humbert of what has been published in this respect during the last three years.

V. Fatio, "Faune des Vertébrés de la Suisse," 8vo, vol. i. Mammifères, 1869 (reported on in "Zoological Record," vi. p 4): the second volume, Reptiles, Batrachia, and Fishes, to appear in the course of the present year, the 3rd and 4th vols. (Birds) to follow. This fauna is the first which has been published on the Vertebrata of Switzerland. Hitherto there have only been partial and incomplete catalogues. The species are carefully described, and there are numerous notes on their distribution and habits, from the author's observations made in all the Swiss collections and in the field. There are also interesting historical details upon certain animals which have more or less completely disappeared from Swiss territory, such as the stag, the roebuck, and the wild boar, as also on the mammifers, whose remains have been found in recent deposits. G. Stierlin and V. de Gautard, "Fauna Coleopterorum Helvetica," in the Nouveaux Mémoires of the Helvetic Society, xxiii. and xxiv., a catalogue with stations and often limits in altitude, supplementing Heer's "Fauna Coleopterorum Helvetica." H. Frey's catalogues of and notes on Swiss Microlepidoptera, in the "Mittheilungen" of the Swiss Entomological Society. P. E. Müller, Note on the Cladocera of the great lakes of Switzerland, from the "Archives" of the Bibliothèque Universelle, xxxvii., April, 1870 In his excellent memoir on the Monoclea of the neighbourhood of Geneva, Jurine had only described the small crustacea of ponds and swamps. He had not investigated the species which inhabit the Lake of Geneva, and he had also neglected some very interesting forms which are only to be met with in large expanses of water, such as *Bythotrephes longimanus* and *Leptodora hyalina*. M. Müller points out the differences there are between the Cladocera of the centre of the lakes and those of the margins. The former, which float freely over the lake, have a peculiar stamp, marking also the marine crustacea of open sea; their bodies have an extreme transparency, and they show a great tendency to the development of long and rigid balancing organs. The latter, on the contrary, are little transparent, have stunted forms, and are without balancing or other elongations which might interfere with their movements amidst solid objects, such as stones and aquatic plants near the shores; most of these littoral species show, moreover, a development of some organ that assists them in moving upon solid bodies. M. Müller finds also a very great connection between the Cladoceral faunas of Switzerland and Scandinavia.

The Association zoologique du Léman, founded upon the model of the Ray Society, has for its object the publication of monographs relating to the basin of the Léman or Lake of Geneva, that is, the region comprised between Martigny and the Perte du Rhone, with the valleys of the affluents received by the Rhone in this portion of its course. It has been carried on as successfully as could have been expected from a scientific undertaking of this nature, reckoning at the present moment nearly 200 members. It has already published papers by A. Brot on the shells of the family of Naiadæ, with nine plates; by F. Chevrier on the Nyssæ (Hymenoptera); by V. Fatio on the Arvicolæ, with six plates; by H. Fourniet on the Dascillidæ (Coleoptera), with four plates; and is now issuing a more important work, the result of long and patient investigation, G. Lunel's "Histoire Naturelle des Poissons du Bassin du Léman," in folio, with twenty plates beautifully executed in chromolithography. Two parts, with eight plates, have already appeared, and the work is in rapid progress. A specimen of the plates, received from M. Humbert, lies on the tables of our library. I have also a rather long list of papers on the zoology of the same district or of the Canton de Vaud, inserted in the Bulletin of the Société Vaudoise of Natural History, and of others on the zoology of other districts, from various other Swiss Transactions, all of which are noticed in our "Zoological Record," vols. v. and vi. To these must be added J. Saratz's "Birds of the Upper Engadin," from the 2nd volume of the Bulletin of the Swiss Ornithological Society, 1870. The valley of the Upper Engadin commences at 1,860 metres above the level of the sea, and ends at 1,650 metres, where commences the Lower Engadin. The list therefore given by M. Saratz includes no point situate below that elevation. He classes the birds of this valley and of the mountains which enclose it into—1, sedentary birds; 2, birds which breed in the Upper Engadin, but do not spend the winter there; and 3, birds purely of passage. He enumerates 144 species, and gives upon every one notes of its station, times of passage, abundance or rarity, &c.

Meyer-Dür has a short note in the "Mittheilungen" of the Swiss Entomological Society (iii. 1870) on certain relations observed between the insect faunas of Central Europe and Buenos Ayres—a question worthy perhaps of some consideration in connection with the above-mentioned coincidence of a Chilian and East-Mediterranean *Geum* and a very few other curious instances of identical or closely representative species of plants in the hot dry districts of the East Mediterranean, the central Australian, and the extratropical South American regions.

Swiss naturalists continue their activity in various branches of biology. E. Claparède's very valuable memoirs on Annelida Chætopoda and on Acarina have been fully reported on in the "Zoological Record," as well as Henri de Saussure's entomological papers, which have been continued in the more recently published volumes of the Memoirs of the Société de Physique of Geneva and of the Swiss Entomological Society. In Botany, since I last noticed De Candolle's "Prodromus," the sixteenth volume has been completed by the appearance of the first part, containing two important monographs—that of Urticaceæ, by Weddell, and of Piperaceæ, by Casimir De Candolle, together with some small families by A. De Candolle and J. Müller. The social disturbances of the last twelvemonth have much delayed the preparation of the seventeenth volume, which is to close this great work; but it is hoped that it will be now shortly proceeded with. Of Boissier's "Flora Orientalis," mentioned in my address of 1868, the second volume is now in the printer's hands. Dr. G. Bernouilli, who had resided some time in Central America, has published, in the

* In the list of publications of the last three years only, sent me by M. A. De Candolle, are the following new Swiss Botanical Handbooks:—J. C. Duemmun, "Taschenbuch für den Schweizerischen Botaniker," 1 vol. 8vo of 1024 pages, with some analytical woodcuts: few details on stations. R. T. Simler, "Botanischer Taschenbegleiter der Alpenclubisten," 1 vol. 12mo, 4 plates: alpine species only. Tissière (late Canon of St. Bernard, now deceased), "Guide du Botaniste au Grand St Bernard" 1 vol. 8vo: a catalogue with detailed localities. J. Rhiner, "Prodrom der Wallstätter Gefässpflanzen," 1 vol. 8vo: a catalogue with details as to localities. Mortimer, "Flore analytique de la Suisse," 1 vol. 12mo: imitated from an older German "Excursions Flora fur die Schweiz," by A Gremli A new (3rd edition of L. Fischer's "Flora von Bern" and Fischer-Oosters "Kubi Nemenses;" the latter work, together with some contributions to the Swiss Flora of A. Gremli, adding 98 pages to the volumes of Batological literature we already possess, without advancing a step either in giving us a clear notion of what is a species of Bramble, or in facilitating our naming those we meet with, unless in the precise localities indicated by the several authors.

Memoirs of the General Helvetic Society (vol. xxiv.) a review of the genus *Theobroma*, after having compared his specimens in the herbaria of Kew, Berlin, and Geneva.

The biological interest of the Mediterranean Region, which includes Southern Europe, the north coast of Africa, and those lands vaguely termed the Levant, is in many respects the opposite of that of the great Russian empire. Extending from the Straits of Gibraltar to the foot of the Caucasus and Lebanon, over 40 to 45 degrees of longitude, by 10 to 12 degrees of latitude, from the southern declivities of the Pyrenees, of the Alps, the Scardus, and the Balkan, to the African shores, it shows, indeed, a certain uniformity of vegetation through the whole of this length and breadth; but it has evidently been the scene of great and frequent successive geological convulsions and disturbances, which, whilst they have wholly or partially destroyed some of the races most numerous in individuals, have at the same time so broken up the surface of the earth as to afford great facilities for the preservation or isolation of others represented by a comparatively small number of individuals. The consequence is that there is probably no portion of the northern hemisphere in the Old World, of equal extent, where the species altogether, and especially the endemic ones, are more numerous, none, I believe, which contains so many *dissevered* species (those which occupy several limited areas far distant from each other), and certainly none where there are so many strictly local races, species or even genera, occupying in few or numerous individuals single stations limited sometimes to less than a mile. In all these respects the Mediterranean region far exceeds, absolutely as well as relatively, the great Russian region, which has three times its length and twice its breadth; it presents, also, perhaps almost as great a contrast to a more southern tract of uniform vegetation extending across the drier portion of Africa and Arabia as far as Scinde. This diversified endemic and local character exemplified in the plants of the Mediterranean region has, as far as I can learn, been observed also in insects.

Of the three great European peninsulas which form the principal portion of the region, the Italian is the narrowest and has the least of individual character in its biology, but it is the most central one, and, including its continental base with the declivity of the Alps, may be taken as a fair type of the region generally; it is also by far the best known. Italy was the first amongst European nations to acquire a name in the pursuit of natural science after emerging from the barbarism of the middle ages; and although she has since been more devoted to art, and has allowed several of the more northern states far to outstrip her in science, she has still, amidst all her vicissitudes, produced a fair share of eminent physiologists as well as systematic zoologists and botanists; and within the last few years the cultivation of biology appears to have received a fresh impulse. It is only to be hoped that it may not be seriously checked by local and political intrigues, which appear to have succeeded, in one instance at least, in conferring an important botanical post on the least competent of the several candidates. Amongst the various publishing academies and associations mentioned in my address of 1865, the Italian Society of Natural Sciences at Milan issues a considerable number of papers on Italian zoology; and a few others in zoology and palæontology are scattered over the publications of the Academies of Turin and Venice and of the Technical Institute of Palermo. From the lists I have received, there appear to have been recent catalogues of Sicilian and Modenese birds by Doderlein in the "Palermo Journal," of Italian Araneida and Modenese fishes by Canestrini in the "Milanese Transactions," and of Italian Diptera, commenced by Rondani in the Bulletin of the Italian Entomological Society. Malacology, so peculiarly important in the study of the physical history of the Mediterranean region, has produced numerous papers, chiefly in the Milanese Transactions, and in Gentiluomo's "Bulletino Malacologica," and "Biblioteca Malacologica" published at Pisa. I also learn that at the time of the decease of the late Prof. Paolo Savi, in the beginning of April, the manuscript of his "Ornitologia Italiana" was complete, and had just been placed in the printer's hands.

In Botany, Parlatore's elaborate "Flora Italiana" has continued to make slow progress. We have received up to the second part of the fourth volume, reaching as far upward as Euphorbiaceæ, having commenced with the lower orders. The old Journal of Botany ceased with the year 1847, as I presumed to have been the case when I mentioned it in 1865, and has since been replaced by a "Nuovo Giornale Botanico Italiano," which continues, with tolerable regularity, issuing four parts in the year, the last received being the second of the third volume. The most valuable of the systematic papers it contains are Beccari's descriptions of some of his Bornean collections. Delpino, well known for his interesting dichogamic observations, as well as for some rather imaginative speculations, has also contributed to systematic botany a monograph of Marcgraviaceæ, but, unfortunately, without sufficient command of materials for the compilation of a useful history of that small but difficult group, and with a useless imposition of new names to forms which he thinks may have been already published, but has not the means of verifying. De Notaris, under the auspices of the municipality of Genoa, has published a synopsis of Italian Bryology, forming a separate octavo volume of considerable bulk.

Of the other two great European peninsulas I have little to say, notwithstanding their great comparative biological importance. The Western or Iberian Peninsula is the main centre of that remarkable Western flora to which I specially alluded in 1869, and which, more perhaps than any other, requires comparison with entomological and other faunas. But Spain is sadly in arrear in her pursuit of science. With great promise in the latter half of the last century, and certainly the country of many eminent naturalists, especially botanists, she has now for so long been subject to chronic pronunciamentos that she leaves the natural riches of her soil to be investigated by foreigners. Willkomm and Lange's "Prodromus Floræ Hispanicæ," which, when I last mentioned it, was in danger of remaining a fragment, has since been continued, and, it is hoped, will shortly be completed by the publication of one more part. I have no notes on any recent zoological papers beyond Steindachner's Reports on his Ichthyological tour in Spain and Portugal, and the Catalogues of the Zoological Museum of Lisbon publishing by the Lisbon Academy of Sciences. The Eastern Peninsula, Turkey, and Greece, with the exception of some slight attempts at Athens, has no endemic biological literature, and, with its present very unsatisfactory social state, affords little attraction to foreign visitors. The Levant, in respect of Botany at least, has has been much more fully investigated; but there, as in Turkey, much yet remains to be done; and pending the issue of Boissier's second volume already mentioned, I know of nothing of any importance in the biology of the East Mediterranean region as having been worked out within the last two or three years. As a hiatus, however, and yet a link between the Indian and the European Floras and Faunas, it will amply repay the study to be bestowed upon it by future naturalists.

(*To be continued*)

ASTRONOMY

On the Great Sun-spot of June 1843 *

ONE of the largest and most remarkable spots ever seen on the sun's disc appeared in June 1843, and continued visible to the naked eye for seven or eight days. The diameter of this spot was, according to Schwabe, 74,000 miles; so that its area was many times greater than that of the earth's surface. Now, it has been observed during a number of sun-spot cycles that the larger spots are generally found at or near the epoch of the greatest numbers. The year 1843 was, however, a *minimum* epoch of the eleven-year cycle. It would seem, therefore, that the formation of this extraordinary spot was an anomaly, and that its origin ought not to be looked for in the *general cause* of the spots of Schwabe's cycle. As having a possible bearing on the question under consideration, let us refer to a phenomenon observed at the same moment, on the 1st September, 1859, by Mr. Carrington, at Redhill, and Mr. Hodgson, at Highgate. "Mr. Carrington had directed his telescope to the sun, and was engaged in observing his spots, when suddenly two intensely luminous bodies burst into view on its surface. They moved side by side through a space of about thirty-five thousand miles, first increasing in brightness, then fading away. In five minutes they had vanished. . . . It is a remarkable circumstance that the observations at Kew show that on the very day, and at the very hour and minute of this unexpected and curious phenomenon, a moderate but marked magnetic disturbance took place, and a storm, or great disturbance of the magnetic element, occurred four hours after midnight, extending to the southern hemisphere." The opinion has been expressed by more than one astronomer that this phenomenon was produced by the fall of meteoric matter upon the sun's surface. Now the fact may be worthy of

* From the "American Journal of Science and Arts," vol. i., April 1871.

note that the comet of 1843, which had the least perihelion distance of any on record, actually grazed the solar atmosphere about three months before the appearance of the great sun-spot of the same year. The comet's least distance from the sun was about 65,000 miles. Had it approached but little nearer, the resistance of the atmosphere would probably have brought its entire mass to the solar surface. Even at its actual distance it must have produced considerable atmospheric disturbance. But the recent discovery that a number of comets are associated with meteoric matter, travelling in nearly the same orbits, suggests the inquiry whether an enormous meteorite following in the comet's train and having a somewhat less perihelion distance, may not have been precipitated upon the sun, thus producing the great disturbance observed so shortly after the comet's perihelion passage.

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SCIENTIFIC SERIALS

OF the *Sitzungsberichte der naturwissenschaftlichen Gesellschaft Isis in Dresden* we have received the concluding part of the volume for 1869, containing the proceedings of the Society for the months of October, November, and December. Its contents are as usual of the most varied character, and we shall therefore notice only a few of the more prominent papers. In the section for prehistoric archæology Dr. Mehwald gave an interesting notice of the researches made in Norway by a young student, M. Lerange, and further a general account of ancient mining and mining implements. Under the zoological section we find an abstract by Prof. Günther of the faunistic results of recent deep-sea dredgings, founded of course chiefly upon the reports of MM. Pourtales and Agassiz, and our countrymen Messrs. Thomson, Jeffreys, and Carpenter. Under the head of mathematics, physics, and chemistry, is a paper by M. F. Otto on the calamine deposits in Upper Silesia, which would have better taken its place as a geologico-mineralogical paper. An important botanical paper is the revision by Dr. L. Rabenhorst of the Cryptogamia collected in the East (especially in Persia) by Prof. Haussknecht, in which the author catalogues a considerable number of Fungi and Lichens, and describes several new species and a new genus of the former class. The new genus *Seirosporium* belongs to the Discomycetous family Phacidiacei, and the species *S. ocellatum*, which is figured, lives upon dry stems of *Astragalus deinacanthus* Boiss. The new species described belong to the genera *Synchytrium* (2), *Ustilago* (2), *Uromyces* (1), *Puccinia* (2), *Cyathus* (1), *Montaguea* (1, figured), *Coprinus* (1), *Dothidea* (1), *Melogramma* (1), *and Rhytisma* (1).

THE fourth part of vol. xxii. of the *Zeitschrift der deutschen geologischen Gesellschaft* (1870) contains several very important memoirs. The first of these is upon new and little known Crustacea from Solenhofen by Prof. Kunth, illustrated with two plates, and includes detailed descriptions of the Stomatopod *Sculda pennata* (Münst), and of two new species of the same genus; and among the Isopods of *Urda rostrata* (Münst) forming the type of a new family *Urdaidæ*, *Reckur punctatus* (Münst), also referred to the genus *Urda*, *Narauda anomala* (Münst), and a species of *Æga*.—From M. Lemberg we find a detailed and valuable chemico-geological investigation of some calcareous deposits of the Finnish Island of Kimito, in which the author not only describes the chemical composition and mechanical condition of the rocks under consideration, but discusses at considerable length some interesting points connected with the general theories of rock-formation.—M. E. Kayser commences a series of studies of the Devonian of the district of the Rhine with a disquisition on the deposits of that age in the neighbourhood of Aix la Chapelle.—M. C. Weiss publishes an investigation of the Odontotopterides, in which he discusses the forms to be referred to that group, and comes to the conclusion that the whole may be placed under the genus *Odontopteris*, which he divides into two sections, *Xenopterides* and *Callipterides*, the former including as sub-genera, *Mixoneura*, *Xenopteris*, and *Lescuropteris*; and the latter *Callipteris*, *Anotopteris*, *Cullipteridium*. He gives a list of the species referable to each of these sub-genera, with remarks upon their characters and distribution; several of them are described as new and figured, with others, in the three plates with which the memoir is illustrated.—These papers are followed by some mineralogical notices by Prof. Rammelsberg treating of the meteoric stone of Chantonnay, of the sulphide of iron of meteoric irons, the composition of Lievrite, and the Anorthite rock of the Basto.—In the concluding paper of this number M. G. Berendt notices the occurrence of Cretaceous and Tertiary deposits near Grodno on the Niemen.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 15.—"On the Fossil Mammals of Australia. Part V. Genus *Nototherium* Ow." By Prof. R. Owen, F.R.S. The genus of large extinct Marsupial herbivores which forms the subject of the present paper, was founded on specimens transmitted (in 1842) to the author by the Surveyor-General of Australia, Sir Thomas Mitchell, C.B. They consisted of mutilated fossil mandibles and teeth. Subsequent specimens confirmed the distinction of *Nototherium* from *Diprotodon*, and more especially exemplified a singular and extreme modification of the cranium of the former genus. A detailed description is given of this part from specimens of portions of the skull in the British Museum, and from a cast and photographs of the entire cranium in the Australian Museum, Sydney, New South Wales. The descriptions of the mandible, and of the dentition in both upper and lower jaws, are taken from actual specimens in the British Museum, in the Museum of the Natural History at Worcester, and in the Museum at Adelaide, S. Australia, all of which have been confided to the author for this purpose. The results of comparisons of these fossils of *Nototherium* with the answerable parts in *Diprotodon*, *Macropus*, *Phascolarctos*, and *Phascolomys*, are detailed.

Characters of three species, *Nototherium Mitchelli*, *N. inerme*, and *N. Victoriæ*, are defined chiefly from modifications of the mandible and mandibular molars. A table of the localities where fossil *Nototherium* has been found, with the dates of discovery, and the names of the finders or donors is appended. The paper is illustrated by subjects for nine quarto Plates.

"On the Organisation of the Fossil Plants of the Coal-measures. Part II. *Lepidodendra* and *Sigillariæ*." By Prof. W. C. Williamson, F.R.S. The *Lepidodendron selaginoides* described by Mr. Binney, and still more recently by Mr. Carruthers, is taken as the standard of comparison for numerous other forms. It consists of a central medullary axis composed of a combination of transversely barred vessels with similarly barred cells; the vessels are arranged without any special linear order. This tissue is closely surrounded by a second and narrower ring, also of barred vessels, but of smaller size, and arranged in vertical laminæ which radiate from within outwards. These laminæ are separated by short vertical piles of cells, believed to be medullary rays. In the transverse section the intersected mouths of the vessels form radiating lines, and the whole structure is regarded as an early type of an exogenous cylinder; it is from this cylinder alone that the vascular bundles going to the leaves are given off. This woody zone is surrounded by a very thick cortical layer, which is parenchymatous at its inner part, the cells being without definite order, but externally they become prosenchymatous, and are arranged in radiating lines, which latter tendency is observed to manifest itself whenever the bark cells assume the prosenchymatous type. Outside the bark is an epidermal layer, separated from the rest of the bark by a thin bast-layer of prosenchymna, the cells of which are developed into a tubular and almost vascular form; but the vessels are never barred, being essentially of the fibrous type. Externally to this bast-layer is a more superficial epiderm of parenchyma, supporting the bases of leaves, which consist of similar parenchymatous tissue. Tangential sections of these outer cortical tissues show that the so-called "decorticated" specimens of *Lepidodendra* and of other allied plants are merely examples that have lost their epidermal layer, or had it converted into coal; this layer, strengthened by the bast-tissue of its inner surface, having remained as a hollow cylinder, when all the more internal structures had been destroyed or removed.

From this type the author proceeds upwards through a series of examples in which the *vessels* of the medullar become separated from its central *cellular* portions and retreat towards its periphery, forming an outer cylinder of medullary vessels, which are arranged without order, and enclose a defined cellular axis. At the same

time the encircling ligneous zone of radiating vessels becomes yet more developed, both in the number of its vessels and in the diameter of the cylinder relatively to that of the entire stem. As these changes are produced, the medullary rays separating the laminæ of the woody wedges become more definite, some of them assuming a more composite structure, and the entire organisation gradually assuming a more exogenous type. At the same time the cortical portions retain all the essential features of the Lepidodendroid plants. We are thus brought, by the evidence of internal organisation, to the conclusion that the plants which Brongniart has divided into two distinct groups, one of which he has placed amongst the vascular Cryptogams, and the other amongst the Gymnospermous Exogens, constitute one great natural family.

Stigmaria is shown to have been much misunderstood, so far as the details of its structure are concerned, especially of late years. In his memoir of *Sigillaria elegans*, published in 1839, M. Brongniart gave a description of it, which, though limited to a small portion of its structure, was, as far as it went, a remarkably correct one. The plant, now well known to be a root of *Sigillaria*, possessed a cellular pith without any trace of a distinct outer zone of medullary vessels, such as is universal amongst the *Lepidodendra*. The pith is immediately surrounded by a thick and well-developed ligneous cylinder, which contains two distinct sets of primary and secondary medullary rays. The primary ones are of large size, and are arranged in regular quincuncial order. They are composed of thick masses of mural cellular tissue. A tangential section of each ray exhibits a lenticular outline, the long axis of which corresponds with that of the stem. These rays pass directly outwards from pith to bark, and separate the larger woody wedges which constitute so distinct a feature in all transverse sections of this zone, and each of which consists of aggregated laminæ of barred vessels, disposed in very regular radiating series. The smaller rays consist of vertical piles of cells, arranged in single rows, and often consisting of but one, two, or three cells in each vertical series. These latter are very numerous and intervening between all the numerous radiating laminæ of vessels that constitute the larger wedges of woody tissue. The vessels going to the rootlets are not given off from the pith, as Gœppert supposed, but from the sides of the woody wedges bounding the *upper* part of the several large lenticular medullary rays; those of the *lower* portion of the ray taking no part in the constitution of the vascular bundles. The vessels of the region in question descend vertically and parallel to each other until they come in contact with the medullary ray, when they are suddenly deflected, in large numbers, in an outward direction, and nearly at right angles to their previous course, to reach the rootlets. But only a small number reach their destination, the great majority of the deflected vessels terminating in the woody zone. A very thick bark surrounds the woody zone. Immediately in contact with the latter it consists of a thin layer of delicate vertically elongated cellular tissue, in which the mural tissues of the outer extremities of the medullary rays become merged. Externally to this structure is a thick parenchyma, which quickly assumes a more or less prosenchymatous form, and becomes arranged in thin radiating laminæ, as it extends outwards. The epidermal layer consists of cellular parenchyma with vertically elongated cells at its inner surface, which feebly represents the bast-layer of the other forms of Lepidodendroid plants. The rootlets consist of an outer layer of parenchyma, derived from the epidermal parenchyma. Within this is a cylindrical space, the tissue of which has always disappeared. In the centre is a bundle of vessels surrounded by a cylinder of very delicate cellular tissue, prolonged either from one of the medullary rays, or from the delicate innermost layer of the bark, because it always accompanies the vessels in their progress outwards through the middle and outer barks.

The facts of which the preceding is a summary lead to the conclusion that all the forms of plants described are but modifications of the Lepidodendroid type. The leaf-scars of the specimens so common in the coal-shales, represent tangential sections of the petioles of leaves when such sections are made close to the epidermal layer. The thin film of coal of which these leaf-scars consist, in specimens found both in sandstone and in shale, does not represent the entire bark as generally thought, and as is implied in the term "decorticated," usually applied to them, but is derived from the epidermal layer. In such specimens, all the more central axial structures, viz., the medulla, the wood, and the thick layer of true bark, have disappeared through decay, having been either destroyed, or in some instances detached and floated out; the bast-layer of the epiderm has arrested the destruction of the entire cylinder, and formed the mould into which inorganic materials have been introduced. On the other hand, the woody cylinder is the part most frequently preserved in *Stigmaria;* doubtless because, being subterranean, it was protected against the atmospheric action which destroyed so much of the stem.

It is evident that all these Lepidodendroid and Sigillarian plants must be included in one common family, and that the separation of the latter from the former as a group of Gymnosperms, and as suggested by M. Brongniart, must be abandoned. The remarkable development of exogenous woody structures in most members of the entire family indicates the necessity of ceasing to apply either to them, or to their living representatives, the term Acrogenous. Hence the author proposes a division of the vascular Cryptogams into an Exogenous group, containing *Lycopodiaceæ*, *Equisetaceæ*, and the fossil *Calamitaceæ*, and an Endogenous group containing the Ferns; the former uniting the Cryptogams with the Exogens through the *Cycadeæ* and other Gymnosperms, and the latter linking them with the Endogens through the *Palmaceæ*.

"Contributions to the History of the Opium Alkaloids. Part II. On the Action of Hydrobromic Acid on Codeia and its derivatives." By C. R. A. Wright, D.Sc. It has been shown in Part I. of this research* that the action of hydrobromic acid on codeia gives rise, without evolution of methyl bromide, first to bromocodide, and secondly to two other new bases termed respectively deoxycodeia and bromotetracodeia, the latter of which, under the influence of hydrochloric acid, exchanges bromine for chlorine, yielding a corresponding chlorinated base, chlorotetracodeia; when, however, the action of hydrobromic acid is prolonged, methyl bromide is evolved in some little quantity. By digesting codeia with three or four times its weight of 48 per cent acid for five or six hours in the water-bath, vapours were evolved which, condensed by the application of a freezing-mixture to a colourless mobile liquid, the boiling-point of which was found to be 10°·5 to 11°·5, and the vapour of which burnt with a yellow-edged flame, exploded violently with oxygen, forming carbonic and hydrobromic acids. It becomes, therefore, of interest to examine in detail the action of hydrobromic acid on each of the three bodies produced from codeia under its influence.

"On the Physiological Action of the foregoing Codeia derivatives." By Michael Foster, M.D. The hydrochlorate of chlorotetracodeia and the hydrobromate of bromotetramorphia, in doses of a decigramme by subcutaneous injection or by the mouth, produced in adult cats in a very few minutes a condition of great excitement, almost amounting to delirium, accompanied by a copious flow of saliva and great dilatation of the pupils. Micturation and defæcation occurred in some instances, and vomiting was observed on two occasions with the morphia-salt, but was very slight. The excitement was very peculiar, being apparently due partly to increased sensitiveness to noises, and partly to an impulse to rush about.

The same doses of the morphia-salt given to a young kitten produced the same flow of saliva, dilatation of pupils, and excitement (without vomiting); but the stage of excitement, which in adult cats passed gradually off in a few hours, was followed by a condition marked by a want of co-ordination of muscular movements, and presenting the most grotesque resemblance to certain stages of alcoholic intoxication. This stage was followed in turn by sleepiness and stupor, in which the kitten was left at night; in the morning it was found dead.

Two observations have shown that these salts paralyse (in dogs and cats) the inhibitory fibres of the pneumogastric; they also seem to lower the internal tension, but want of material has prevented me from ascertaining how this is brought about.

On rabbits neither salt, even in doses of a decigramme, seems to have any effect, except perhaps a slight excitement. There is no dilatation of the pupils, no flow of saliva, and, if one observation can be trusted, no paralysis of the inhibitory fibres of the pneumogastric.

No marked difference was observable between the two salts, except that the morphia salts seemed rather more potent than the corresponding codeia bodies.

The salts of deoxycodeia and deoxymorphia given by mouth or by subcutaneous injection in doses of a decigramme, produced in adult cats, almost immediately after exhibition, a series of con-

* Proc. Roy. Soc. vol. xix. p. 371

vulsions much more epileptic in character than tetanic. In one case there was a distinct rotatory movement.

In a few minutes these convulsions passed away, leaving the animal exhausted and frightened. Then followed a stage of excitement with dilated pupils and flow of saliva, very similar to the effects of the tetracodeia and tetramorphia salts, but less marked.

Doses of half a decigramme given to adult cats produced the stage of excitement only, without the convulsions.

In no case, with any specimen of product, has vomiting been witnessed.

Trials with rabbits gave only negative results. Like the tetracodeia and tetramorphia products, the deoxycodeia and deoxymorphia salts appear to paralyse the inhibitory fibres of the pneumogastric.

No marked differences could be observed between the hydrochlorates and hydrobromates of deoxycodeia or deoxymorphia.

"On the Calculation of Euler's Constant." By J. W. L. Glaisher, F.R.A.S.

Zoological Society, June 20.—R. Hudson, F.R.S., vice-president, in the chair. The Secretary read a report on the additions made to the Society's Menagerie during the month of May, 1871. Amongst these particular attention was called to a Tamandua Ant-eater (*Tamandua tetradactyla*) from Santa Martha, obtained by purchase, May 29, being the first specimen of the singular Mammal ever exhibited alive in the Society's collection. —Prof. Macdonald, of the University of St. Andrew's, Scotland, exhibited and made remarks on a series of specimens illustrative of the cranial bones of Fishes.—An extract was read from a letter received from Mr. Walter J. Scott, giving notice of a living specimen of the Australian Cassowary which had been lately captured in Queensland by Mr. Haig, and which Mr. Haig was anxious to present to the Society.—Prof. Newton exhibited and made remarks on some supposed eggs of the Sanderling (*Calidris arenaria*), procured by the North German Polar Expedition.—A communication was read from the Rev. O. P. Cambridge, containing notes on the Arachnida collected by Dr. Cuthbert Collingwood during his recent travels in the Chinese seas.—A communication was read from Dr. John Anderson, Curator of the Indian Museum, Calcutta, containing notes on some rare species of Rodents collected by Mr. Forsyth during his recent expedition to Yarkand.—Messrs. Sclater and Salvin read a revised List of the species of Laridæ which have been found to occur within the limits of the Neotropical region. These were stated to be 32 in number, whereof one belonged to the sub-family Rhynchopinæ, 14 to the Sterninæ, 16 to the Larinæ, and one to the Lestridinæ. —A communication was read from Dr. J. E. Gray, F.R.S., containing notes on the Bush-bucks (*Cephalophi*) contained in the collection of the British Museum, together with the descriptions of two new species of the genus from the Gaboon.—A second communication from Dr. J. E. Gray contained some notes on the skull of a roebuck in the British Museum, originally received from the Museum of the Zoological Society of London.—Mr. Sylvanus Hanley communicated the description of a new species of *Monocondylæa* from Sarawak, Borneo, which he proposed to call *M. Walpolei*.—Mr. D. G. Elliot read a review of the genus *Ptiloris*, Sw.—Mr. D. G. Elliot also read a description of a supposed new species of Guinea-fowl from Ugogo, Central Africa, founded on a drawing made by Colonel Grant during the expedition of Messrs. Speke and Grant, which he proposed to name *Numida Granti*.—Mr. R. B. Sharpe read a paper on the Birds of Cameroons, Western Africa, based upon collections recently formed by Mr. A. Crossley in that locality. The Avi-Fauna of the country was shown to be almost identical with that of Gaboon. A species of Thrush was believed to be new to science, and was proposed to be called *Turdus Crossleyi*.—Mr. John Brazier communicated some notes on the localities of *Dolium melanostoma*, *Conus rhododendron*, and other species of land-shells found in Australia and in the adjacent islands of the Australian seas.—Mr. W. Saville Kent read a paper on two new Sponges from North Australia, the principal peculiarity of which consisted of their being arranged round a central stem or axis. These he referred to a new genus proposed to be called *Caulispongia*.— Prof. Flower communicated a paper by Mr. J. B. Perrin on the myology of the limbs of the Kinkajou (*Cercoleptes caudivolvulus*), to which were added some remarks on the myology of the limbs of the *Paradoxurus typus* and *Felis caracal*, and more particularly with reference to the chief points of difference between these animals.

BRISTOL

Observing Astronomical Society.—Observations to May 31, 1871. *The Sun*.—Mr. T. W. Backhouse writes that on March 19 at 21h. 30m. a spot on the sun's S. hemisphere had an umbra 19,000 miles long, but its greatest width was but 3,500 miles. This spot passed the centre of the sun on the 21st. On the 22nd at 3h. there was a curious curve of numerous small spots starting from it. An extensive group which passed N. of the sun's centre on the 23rd contained on the 27th at 5h. the largest spot then on the sun. Its penumbra was 29,000 miles in diameter, and its umbra 14,000 miles long; yet if it existed at all on the 24th at 21h. it must have been quite small. A spot in the sun's S. hemisphere which passed the middle of the sun on April 11, and which was not large on the 6th, on the 7th at 21h. 35m. had a penumbra 63,000 miles long. On the 9th at 21h. 15m. it was about 41,000 miles long, and its chief umbra 13,000 miles in diameter, and mostly of a light shade. On April 20 at 21h. 45h. a spot also in the southern zone had an umbra 25,500 miles long; but its *f* part was very narrow, its *p* part was very irregular. Its *f* part became broader, and on the 24th at 20h. was separated from the *p* part. The umbra had previously shortened, being only about 21,000 miles long on the 23rd; at 21h. on the 23rd it passed the same centre. On the 28th at 3h. 20m. the penumbra was 38,000 miles long. At that time there was another large solar spot also in the S. zone, which had a penumbra 33,000 miles in diameter then; but on May 4 at 5h. 15m. it was 43,000 miles long and 35,000 miles wide, and it is now (May 8) larger still. Its umbra was roundish and much mottled, and on May 4 at 4h. was 17,000 miles long and 14,500 wide. On the 5th at 21h., however, there was a very slender bridge of light across it towards the southern part, and another farther north two-thirds across it. The latter still remains (May 8, 3h. 30m.), and nearly cuts the umbra in two; but the former has disappeared. Mr. Albert P. Holden, of London, reports as follows:—"April 10, 1871. A large spot, surrounded by an extensive penumbra, has recently appeared, which I observed at 2h. this day. The chief spot was rather long and narrow, except at one end, which was considerably wide, and the narrow portion was crossed by three complete (and one partial) bridges. The penumbra was unusually pale, and the umbra of a decided light-brown hue. In the upper part of the broad portion of the umbra was a large nucleus intensely black, and so large and dark as to be visible with a very low power. Almost joining the 'yawning gulf' of the nucleus was a light triangular patch, not quite so light as the penumbra. From the great ease with which the nuclei have been seen on this and other occasions it would seem as if they increased in visibility with the approach of the maxima of the sun-spot period. When they are visible, as on the present occasion, the windward penumbra of the spot in which they occur are always unusually light in colour."—Mr. William F. Denning, of Bristol, observed the sun with his 10½in., and 4in. reflector on May 26, but with the exception of a large scattered group the spots were neither large nor interesting.

Jupiter.—Mr. Albert P. Holden says: "On February 20 at 7h. 30m. I observed this planet, and found the usual equatorial belts to present a most remarkable appearance. The whole equator was covered by what appeared to be great masses of clouds stretching across the planet in four parallel, but rather irregular, rows, each row containing about four or five distinct masses of cloud. As I was using a diagonal eyepiece I thought at first the mirror had become covered with moisture, but found the phenomenon to be really on the planet's surface. With a low power the whole equator had a mottled appearance, but higher powers brought out the masses of cloud very distinctly. The clouds coming over prevented my observing whether the rotation of the planet would change the scenery of the disc at all." Edmund Neison, of London, writes with regard to Jupiter: "The only result worth mentioning is the gradual deepening of the tinge of the equatorial belts and the increase in the general orange tinge of the whole disc. In fact, on May 15 it appeared to have changed to a distinct red. This is probably due merely to the low altitude of the planet, and its immersion in the orange mists of sub-sunset."

Mars.—Mr. Albert P. Holden, with his 3in. refractor, has obtained some very good views of this planet. He writes: "The Kaiser Sea and Dawes Ocean come out very distinctly. This planet seems to bear magnifying much more readily than other objects, eighty to the inch of aperture giving most excellent views."

PARIS

Academie des Sciences, June 19.—M. Claude Bernard in the chair. M. Claude Bernard read a letter from Mr. Alexander Herschel, noticing the death of his father on behalf of himself and of his eldest brother now in India. The lamented Sir John Herschel was the senior foreign associate member of the Institute. The foreign associate members are only five in number; it is considered the highest honour the Academy can offer to a foreigner. The President noticed also the death of the celebrated General Probert, who was an academician of long standing, and had devoted his whole life to the study of projectiles. His memoirs are numerous in the *Comptes Rendus*, but more numerous at the War Office. He was of opinion that the Prussian steel gun should be adopted by the French artillery, but his Imperial Majesty being a great artillerist, his opinion was totally disregarded. The vacancies to be filled amongst members and associates are now six. They have never been so numerous. There were twelve correspondents to elect before the investment of Paris took place. M. Dumas presented a memoir on the reciprocal action of magnetism and electricity circulating in a vacuum. The memoir was written by M. De La Rive, a foreign associate member of the Academy, and describes experiments tried with an apparatus analogous to the magnificent instruments exhibited by M. De La Rive at the "Champ de Mars" universal exhibition.—M. Elie de Beaumont, the other perpetual secretary, has directed public attention to the extraordinary cold experienced on the 18th May and 3rd June 1871, and asked for observations relating to it. Every information must be directed to him, and will be mentioned in the *Comptes Rendus*. Several other communications are duly acknowledged, and will be printed. Some of them relate to other severe depressions of temperature witnessed late in the season in former years; hoar frost was observed as late as in July 1802, which appears to have been one of the worst years ever known for low temperature in the summer.—M. Grèmand de Lany, the senior member of the Scientific Staff of the Parisian papers, has published an interesting book on the Academy of Sciences during the siege of Paris, giving a fair idea of the amount of work executed by members resident in Paris during that eventful period of its annals. The Academy has to appoint a committee for reporting upon the memoirs sent to compete for the great prize of mathematics proposed by the government. The subject proposed belongs to the theory of elliptical functions. No qualification of nationality is required. The names of the competitors are kept sealed and opened only if successful. MM. Bertrand, Hermite, Serret, Leonville, and Bonner were appointed.—A most interesting discussion took place on a paper relating to the treatment of typhus during the Mexican campaign, showing that typhus is unquestionably contagious, as well as many other diseases of the same kind. The cold and moisture is not so much to be feared as stagnant hospital air, and treatment under canvas even in cold weather is perhaps the best that can be imagined.—M. Campion, the first assistant to M. Payen, presented a memoir on the manner of blasting rocks with dynamite. That paper is a kind of *résumé* of M. Campion's experiments during the first investment of Paris. He was closely engaged in dangerous operations, practised for protecting the town. According to every probability, he will be appointed a member to fill the chair of his professor.—Five or six other papers were read, too long to report.

VIENNA

I. R. Geological Institution, May 2.—Dr. Gümbel, of Munich, gave an account of his investigations of the different forms of Dactylopora, found chiefly in the Triassic limestones of the Alps. Notwithstanding some differences in the structure, he recognised in them a strong resemblance to living and tertiary Dactylopora. Great and constant varieties in the forms led him to distinguish a large number of different species.—Mr. F. Pick, who had visited the Isle of Milo in the month of March, made a report of the numerous earthquakes which had been observed there since the beginning of the year. From the middle of January up to the month of March they continued incessantly, and during the time between the last days of February till the 3rd March more than twenty shocks were felt daily, not seldom two or three in one hour. The St. George volcano on Santorin was seen on March 20 in continuous, but feeble activity.—M. v. Lill discovered the rare Ullmannite (Nickel-Antimon-Pyrites) at a new locality in Carinthia, the Rinkenberg, near Bleiburg, where it is imbedded in slaty schists and crystalline dolomite.—Another mineralogical discovery of interest communicated by T. Niedzwiedski is the occurrence of Trinkerite at Gams, near Hieflau, in Styria. This fossil resin, which contains more than 4 per cent. of sulphur, was first described a few months ago by Dr. Tschermak, of Carpano, in Istria, where it was found in a coal of Eocene age. At Gams it is imbedded in a dark coloured rock, which belongs to the Gasau (Upper Cretaceous) formation.—Prof. E. Suess on the Tertiary land fauna of middle Italy. The study of the rich collections of fossil mammalia in the museums in Pisa and Florence enabled the author to parallelise the different faunæ of the Upper Tertiary beds of middle Italy, which had been distinguished quite correctly by Falconer, Lartet, &c., with those of Austria. The first mammalian fauna of the Vienna Basin, the fauna of Eibiswald, with Amphicyon intermediaries, Hyotherium Sömmeringi, Palæomerix, Crocodilus, Trionyx, &c., is represented in Italy by the fauna of the lignites of Monte Bamboli. The second fauna of the Vienna Basin, the fauna of Eppelsheim with *Mastodon longirostris*, *Hippotherium gracile*, &c., is not yet known in Italy. The fauna of the Arno Valley, on the contrary, which is represented in a marvellous richness in the museum of Florence, seems to be wanting in the Vienna Basin. This third fauna is characterised by *Elephas meridionalis*, *Machairodus*, *Bos etruscus*, *Hippopotamus major*, &c.; traces of it M. Suess thinks he has recognised in some fossils from the caverns of the Karst (Istria). The fourth fauna, with *Elephas primigenius* which is to be found everywhere in our loess, has been discovered also in some localities of Tuscany in the so-called Pauchina, a clay similar to the loess.—M. Schwackhöfer exhibited a series of rocks rich in phosphoric acid, which occur in the Silurian, as well as in the Cretaceous beds of Eastern Gallicia, the discovery of which he hopes will be of great use for agricultural purposes.

BOOKS RECEIVED

ENGLISH.—The Homing or Carrier Pigeon: W. B. Tegetmeier (Routledge).

AMERICAN.—The Monthly Reports of the Department of Agriculture for 1868-69; The Annual Report of the Commission of Agriculture, 1868; The Annual Report of the U.S. Department of Agriculture, 1862: Government Printing Office, Washington.—The Elements of Physics: Prof. Hinrichs.

FOREIGN.—Die Pflanzenstoffe, &c.: Drs. A. and Th. Husemann (Schluss).—(Through Williams and Norgate)—Discussion der während der totale Sonnenfinsterniss am August 1868 angestellten Beobachtungen und der daraus folgenden Ergebnisse: Prof. E. Weiss.—Elektrodynamische Mass-bestimmungen: W. Weber.—Physische Zusammenkünfte der Planeten: C. von Littrow.

DIARY

MONDAY, JULY 3.

ENTOMOLOGICAL SOCIETY, at 7.

ROYAL INSTITUTION, at 2.—General Monthly Meeting.

FRIDAY, JULY 7.

GEOLOGISTS' ASSOCIATION, at 8.—On the Upper Limits of the Devonian System: J. R. Pattison.

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