THURSDAY, MARCH 13, 1873

## HERBERT SPENCER'S PSYCHOLOGY*

*The Principles of Psychology.* By Herbert Spencer. Second edition. (Williams and Norgate.)

II.

TO the healthy scientific mind the fine-spun arguments and the wonderful logical achievements of metaphysicians are at once so bewildering and so distasteful that men of science can scarcely be got to listen even to those who would undertake to show that the arguments are but cobwebs, the logic but jingle, and the seeming profundity little more than a jumble of incongruous ideas shrouded in a mist of words. Hence, it is hardly known that one of the two living thinkers who in philosophy stand head and shoulders above all their contemporaries, has put forth all his strength in a grand effort to demonstrate the baselessness, the inconsistency, the unreality of all anti-realistic metaphysics. The disciples of Berkeley and Hume, skilful in argument, and generally armed with a psychology superior to that of their antagonists, have hitherto gained easy victories over the hosts of theologians, who, confident in the truth of their cause, have stood forward, as one might say, unarmed and with naked breast, to fight for the reality of mind and matter. So easily and so invariably have the sceptics and idealists remained masters of the field against all-comers that they have agreed among themselves to regard realism as an exploded superstition "altogether unworthy of the name of philosophy" (Prof. Bain). But the end is not yet. They will have once more to look to their weapons. In Mr. Spencer realism has for the first time found a champion that can do it justice. Nothing behind the acutest idealist in subtlety and force of intellect, he brings to bear on the great metaphysical question of the reality of an external world a psychology as much superior to that of the idealists, as their mental science was superior to that of the divines they so easily vanquished.

Of course we shall not attempt to sketch the argument that occupies nineteen chapters of Mr. Spencer's volume; which has for its groundwork his whole system of psychology, and on the issue of which he considers that his entire philosophy is at stake; for, in his own words, 'should the idealist be right, the doctrine of evolution is a dream." It may, however, not be altogether profitless to dip into this elaborate argument at one or two places. "The argument of the Realist," says Mr. Spencer, "habitually fails from not having as a fulcrum some universally-admitted truth which the Idealist also has to admit." This necessary fulcrum, he alleges, is to be found in the Universal Postulate, which is, that we must accept as true that of which the negation cannot be represented in thought. But, it would almost seem no more easy to obtain universal assent to the doctrine, that the ultimate appeal must be to the inconceivableness of the negation of a proposition, than to establish the truth of realism by argument without the aid of such a fulcrum. At least, Mr. Mill and Mr. Spencer have been battling over this question for twenty years, without coming much nearer agreement than at the beginning. But though they may have done little towards their mutual instruction, many students of philosophy must have profited greatly from what they agree in describing as their "amicable controversy." And in venturing briefly to review the discussion, our justification must be that we do so as a disciple, who studies with reverence the works of both these imperial intellects. We shall first endeavour to outline in as few words as possible what appears to us an important part of Mr. Spencer's argument, leaving his full meaning to become apparent when we proceed to notice some of Mr. Mill's strictures thereon. Propositions, says Mr. Spencer, "are the ultimate components of knowledge. The simplest intuition equally with the most complex rational judgment, has the same fundamental structure: it is the tacit or overt assertion that something is or is not of a certain nature—belongs or does not belong to a certain class—has or has not a certain attribute." "Propositions, then, constitute the common denomination to which all systems of belief, simple or complex, have to be reduced before we can scientifically test them." But propositions are of many kinds; some are relatively simple, some are highly complex. "There are some propositions which tacitly assert little more than they avowedly assert; while there are other propositions in which what is tacitly asserted immensely exceeds in amount what is avowedly asserted." Accordingly, to "compare conclusions with scientific rigour, we must not only resolve arguments into their constituent propositions, but must resolve each complex proposition into the simple propositions composing it." When intelligence is thus resolved into its simplest elements, it is found that there are cognitions of which the terms cannot be separated. Such cognitions we necessarily accept. To ascertain that the predicate of a cognition invariably exists along with its subject, all we can do is to make a deliberate and persistent effort to conceive the negation of the proposition, and having done this, "to assert the inconceivableness of its negation, is at the same time to assert the psychological necessity we are under of thinking it, and to give our logical justification for holding it to be unquestionable." Further, as it is only by the aid of cognitions of this class, and for the trustworthiness of which no higher warrant can be given, that propositions are linked together so as to form what we call proof or disproof, since "logic is simply a systematisation of the process by which we indirectly obtain this warrant for beliefs that do not directly possess it," it must follow that an attempt to invalidate a cognition of this class by a process of reasoning must somewhat resemble the mechanical absurdity of trying to lift the chair on which one sits. Now, the belief that a universe exists apart from and independently of our states of consciousness, is, according to Mr. Spencer, a cognition possessing this quality of highest certainty. When a man looks at a book without speculating, "he feels that the sole content of his consciousness is the book considered as an external reality, . . . he feels that do what he will he cannot reverse this act; . . . while he continues looking at the book, his belief in it as an external reality possesses the highest validity. It has the direct guarantee of the Universal Postulate."

Against this Mr. Mill has argued that the proposed warrant of the truth of propositions cannot be accepted, if for no other reason, because we know as a matter of

* Continued from p. 300.

history that some propositions the negation of which was at one time inconceivable are now known to be false. His examples are—that in sunrise and sunset, it is the sun that moves; that gravitation cannot act through space absolutely void; and that there cannot exist antipodes—men sticking on by their feet to the under side of the earth. For the truth of each of these propositions Mr. Mill thinks that our forefathers had the warrant of what Mr. Spencer calls the Universal Postulate. "To this criticism of Mr. Mill," says Mr. Spencer, referring to the first and last of these propositions, "my reply is that the propositions erroneously accepted because they seemed to withstand the test, were complex propositions to which the test is inapplicable." Unfortunately, in his anxiety to "leave no possibility of misapprehension," Mr. Spencer mentioned, among other things, that we cannot by simple comparison of two states of consciousness know that the square of the hypothenuse of a right-angled triangle equals the sum of the squares of the other two sides. The strange result has been that Mr. Mill has, we cannot help thinking, fallen into a complete misapprehension of his meaning. In the eighth edition of his Logic, Mr. Mill has had the opportunity of replying to Mr. Spencer's argument as it stands in the volu me before us. He there says: "It is but just to give Mr. Spencer's doctrine the benefit of the limitation he claims—viz. that it is only applicable to propositions which are assented to on simple inspection, without any intervening media of proof. . . . But in all the three cases which I have just cited (those mentioned), the inconceivability seems to be apprehended directly; no train of argument is needed, as in the case of the square of the hypothenuse, to obtain the verdict of consciousness on the point." We submit that the quality of being "assented to on simple inspection, without any intervening media of proof" is not the distinguishing characteristic of what Mr. Spencer calls a simple proposition. The propositions that can be properly brought to the test of the inconceivableness of their negation are not such as are assented to on simple inspection, but such as "are not further decomposable." Until this misconception on the part of Mr. Mill furnished conclusive evidence to the contrary, we were inclined to think that here, as elsewhere, Mr. Spencer had been needlessly tedious in stating and re-stating, illustrating and re-illustrating his meaning. That after all Mr. Mill should have so completely missed the true nature of his distinction of propositions into simple and complex is very remarkable. Had not Mr. Spencer declared that the propositions in dispute were examples of what he considered complex propositions? There is no intervening media of proof when we automatically interpret our sensations of sight into such a cognition as —"There is an old man." Yet this is one of the propositions tediously analysed by Mr. Spencer, "to show distinctly the number of propositions included in an ordinary proposition which appears simple. Again, "On a cold winter's night a gas-light seen through the window of a cab, or a light in a shop looked at through a pane that has been much rubbed, is surrounded by a halo. Whoever examines will see that this halo is caused by scratches on the glass, the curves of which are arcs of circles having the light for their centre. The proposition which expresses the result of his observation, and seems to assert no more than the result of his observation, is that on the part of the glass through which he looks the scratches produced by rubbing are arranged concentrically with the light." Included in this apparently simple proposition, however, is this other—"that there does not exist on the same spot scratches otherwise arranged, immeasurably exceeding in number the concentric scratches." The truth is that "the scratches on any part of the glass have no concentric arrangement at all, but run in countless directions with multitudinous curvatures." The propositions in question obviously belong to this class. In the assertion, the sun moves from east to west, there is included the other proposition—the earth does not revolve on its axis from west to east. We scarcely think that Mr. Mill will assert that any human being ever found it impossible to conceive, in Mr. Spencer's sense, that a sphere should so revolve. Thus far, then, we are bound to say that Mr. Spencer's argument remains intact.

With regard to gravitation we cannot do better than quote the note in which Mr. Mill replies to Mr. Spencer on this point:—

"In one of the three cases, Mr. Spencer, to my no small surprise, thinks that the belief of mankind 'cannot be rightly said to have undergone' the change I allege. Mr. Spencer still thinks we are unable to conceive gravitation acting through empty space. 'If an astronomer vowed that he could conceive gravitative force as exercised through space absolutely void, my private opinion would be that he mistook the nature of conception. Conception implies representation. Here the elements of the representation are the two bodies and an agency by which either effects the other. To conceive this agency is to represent it in some terms derived from our experiences—that is from our sensation. As this agency gives us no sensations, we are obliged (if we try to conceive it) to use symbols idealised from our sensations—imponderable units forming a medium.' If Mr. Spencer means that the action of gravitation gives us no sensations, the assertion is one than which I have not seen, in the writings of philosophers, many more startling. What other sensation do we need than the sensation of one body moving towards another? 'The elements of the representation' are not two bodies and an 'agency,' but two bodies and an effect; viz. the fact of their approaching one another. If we are able to conceive a vacuum, is there any difficulty in conceiving a body falling to the earth through it?"

We are compelled to say that Mr. Mill could not have been much more surprised at Mr. Spencer's statement than we are at his answer. What was it that Newton could not conceive, but which, Mr. Mill says, we have no difficulty in conceiving? Was Newton incapable of forming a mental representation of "one body moving towards another?"—an experience that in common with everybody else, he had hundreds of times every day of his life. No. To put it in plain rough language, he was unable to conceive how one body could move another without in some way pushing or pulling at it. Hence, when he tried to represent in thought the action of the sun upon the earth he found it necessary to imagine a medium—an unbroken line of physical connection between the two bodies. Have we got beyond Newton in this respect? or is it not rather, as Mr. Spencer says, that our scientific men have simply "given up attempting to conceive how gravitation results." Nay, are there not

at the present moment some indications that before long scientific men may return to this very problem?

Let us now advance a step. When it is found that we cannot conceive the negation of a proposition—that the subject and predicate cannot be separated in thought; "then, indeed," says Mr. Mill, "the inability to separate the two ideas proves their inseparable conjunction, here and now, in the mind which has failed in the attempt: but this inseparability in thought does not prove a corresponding inseparability in fact; nor even in the thoughts of other people, or of the same person in a possible future." No matter for the present, how we come by our cognitions, this is surely admitting what Mr. Spencer calls the psychological necessity of thinking the proposition. In the next place, we must confess that we have never been able intelligibly to translate into the language of idealism those anti-realistic arguments that appeal to "fact" and to the experiences of "other people." But, whatever may be meant by fact, and whatever may have a place in the minds of other people, it must for ever remain nothing to those in whose consciousness it can be neither presented nor represented. Our science of numbers is not likely to be disturbed because it can be written in words that, perhaps in some inaccessible corner of the universe, or in some mind of a different make from the human, twice two makes five. We have already examined the examples given by Mr. Mill of propositions that have, as he thinks, passed from the condition of being inconceivable to that of being both conceivable and believed, and therefore we do not think it necessary to discuss the probability of any really simple and inconceivable proposition becoming conceivable in the mind of the "same person in a possible future."

We must pass to the next step in the argument as sketched above. Does reasoning rest on the postulate? We cannot help thinking with regret that Mr. Mill has not felt it necessary to put forth his full strength on this point; and we are by no means sure that we have grasped his full meaning. His words are:—"To say that when I apprehend that A is B and that B is C, I cannot conceive that A is not C, is to my mind merely to say that I am compelled to believe that A is C. If to conceive be taken in its proper meaning, viz., to form a mental representation, I may be able to conceive A as not being C. After assenting with full understanding to the Copernican proof that it is the earth, and not the sun, that moves, I not only can conceive, or represent to myself, sunset as a motion of the sun, but almost everyone finds this conception of sunset easier to form than that which they nevertheless know to be the true one." This, as we understand it, seems open to the reply that, had sunset, considered as a motion of the sun, been inconceivable to begin with, no argument would have been needed to disprove it. Having followed the Copernican proof, we cease to believe that the sun moves, we remain, however, still able to conceive its doing so; for though we cannot help believing that of which we cannot conceive the negation, it does not follow that we are unable to conceive the negation of everything that argument has compelled us to believe. But, whether by following a sound argument we are or are not rendered incapable of conceiving the reverse of the conclusion, has, in reality, nothing to do with the question whether reasoning rests or does not rest on the postulate. To invalidate Mr. Spencer's argument by the method he has adopted, Mr. Mill would require to be able to represent in thought, not the sun moving through the heavens, in spite of the Copernican proof to the contrary but that at any step in the argument the conclusion need not follow from the premises. If he could do this he might still be convinced by argument, but we do not see how he must necessarily be so. Mr. Spencer's contention is that reasoning rests on the postulate, not because a valid argument makes the reverse of the conclusion inconceivable, but because the axioms of logic have no higher warrant.

Want of space forbids us entering further into the controversy. For the same reason we are unable to enter upon the inquiry whether we can properly be said to believe that of which we cannot form a mental representation. Mr. Spencer's opinion is that we cannot, and accordingly "that anti-realelistic beliefs have never been held at all. They are but ghosts of beliefs, haunting those mazes of verbal propositions in which metaphysicians habitually lose themselves. Berkeley was not an idealist; he never succeeded in expelling the consciousness of an external reality, as we saw when analysing his language and his reasonings. Hume did not in the least doubt the existence of matter or of mind; he simply persuaded himself that certain arguments ought to make him doubt. Nor was Kant a Kantist: that space and time are nothing more than subjective forms was with him, as it has been and will be with every other, a verbally-intelligible proposition, but a proposition that can never be rendered into thought, and can never therefore be believed."

DOUGLAS A. SPALDING

## *GEIKIE'S PRIMER OF PHYSICAL GEOGRAPHY*

*Physical Geography.* By Prof. Geikie. Science Primer Series. (Macmillan.)

IT must not be supposed that this is the Physical Geography which we have been expecting from Prof. Geikie. It is a little book of 110 pages, truly a primer, and only makes us more eager to get a larger work.

The primer is written in a vivacious style; the style of a man really interested in what he is talking to his readers about; and in all respects suitably written for its purpose. It would be a little too patronising if it were intended for any but the very young, who like being taken into the confidence of the writer, and spoken to as young friends. It is to be hoped that a larger work may be equally vivacious and vigorous without this characteristic, which is, to repeat, not a fault in the primer, but would be a serious fault in the larger work intended for older boys and readers generally. It is a fault that pervades Kingsley's scientific books: it is a small annoyance at first, but finally "aggravates" one beyond all endurance. Moreover, the book is well illustrated with new, good, and unconventional woodcuts, and is thoroughly well-arranged and printed.

Now for its contents. After its introduction, which is in fact on "eyes and no eyes," we have the shape of the earth, day and night, the air, wind, vapour, dew, mist, rain, snow; the circulation of water on the land, springs, hard and soft water, atmospheric denudation (in shorter words than these), brooks, rivers, snow-fields, glaciers;

then the sea, stratification, coral; and lastly earthquakes and volcanoes.

Now this is just right. Physical Geography ought to contain the dynamics of geology, and not be a mere description of the physical condition of the globe. A description of the plateaus and primary mountain chains, and secondary mountain chains, and plains and river systems of all the countries in the world, and distribution of birds, beasts, and fishes, used to be what was called physical geography: and in it the dynamical element, all idea of change and progress was almost entirely left out. All this description constitutes geographical knowledge, but is of the nature of information pure and simple, and has absolutely no value in education except as an exercise in memory, and as a basis for reasoning, supposing that this reasoning is ever superposed. But what Prof. Geikie gives us is the very life and soul of geological science, observation on what the natural forces around us are doing, information as to what they are doing of the like kind elsewhere, and reasoning on the effect of these forces. It is a book which will at once rouse the curiosity of a child, and train it as far as it goes in sound scientific method.

It is admirably adapted to be a reading book in elementary schools, and it is much to be hoped that it will be largely used. But for this purpose a cheaper edition ought to be published. J. M. W.

## OUR BOOK SHELF

*Exalted States of the Nervous System.* By R. H. Collyer, M.D. (H. Renshaw.)

It can only be with a feeling of regret that anyone can see so many pages, nearly 150, occupied with matter and arguments most of which had much better have been retained only among the oral traditions of the author's acquaintances, for by publishing them he lays himself open to the severe criticisms of a non-appreciating scientific public. That Dr. Collyer was among the first to propose and employ anæsthetics, we will not question, but he cannot expect to increase the number of his supporters by the publication of such a work as the above, in which his want of knowledge of the first principles of scientific method and physiological fact is rendered too clear. An instance or two will suffice to indicate the manner in which the subject is treated. Speaking of chloral, he says—"It is administered by the stomach. . . . It seems that the action is immediate on the brain, through the eighth pair of nerves." This is very different from the explanation of the discoverer of that substance, and quite contrary to any explanation of value that has been since proposed. The physiological dogma on which the author bases many of his arguments is that "the lungs at every respiration send vital electricity to the brain, which has been thus assimilated to subserve the purposes of life." In a newspaper account of the relative chances of the Oxford and Cambridge crews for 1871, the author finds sufficient to justify the following valuable generalisation:—"thus endurance *does not belong* to mere size." We think these quotations sufficient.

*The Botanists' Pocket-book:* containing in a tabulated form the chief characteristics of British plants. By W. R. Hayward. (Bell and Daldy, 1872.)

A book of modest pretensions, and not without its value. As a rule there is no class of scientific literature to be more carefully avoided than that which professes to compress the whole of the elements of a science into a small portable volume; nowhere is the master's hand more urgently required than in the compilation of text-books. Mr. Hayward we do not recollect to have met with before as a botanical writer; this little book, however, evidences great care in its preparation, and the author is careful not to claim for it too high a place. Its object is to "afford information to the tyro, and also to refresh the memory of the more advanced botanist who, by examining on the spot any doubtful plant, may be saved the trouble of carrying home specimens of little value; it is not intended as a book for the study, nor as a rival to the many excellent and complete manuals of our leading botanists; but to be accepted for what it is, viz., 'A Botanist's Pocket-book.'" This purpose it may well serve; occupying not much over 200 pages of thin paper in limp cloth binding, it will be no great burden to the pocket or knapsack, and may frequently be usefully resorted to by a young botanist on the tramp, leaving more careful study till he gets home. A. W. B.

## LETTERS TO THE EDITOR

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

### Perception in the Lower Animals

As several persons seem interested in Mr. Wallace's suggestion that animals find their way home by recognising the odour of the places which they have passed whilst shut up, you may perhaps think the following little fact worth giving. Many years ago I was on a mail-coach, and as soon as we came to a public-house, the coachman pulled up for the fraction of a second. He did so when we came to a second public-house, and I then asked him the reason. He pointed to the off-hand wheeler, and said that she had been long completely blind, and she would stop at every place on the road at which she had before stopped. He had found by experience that less time was wasted by pulling up his team than by trying to drive her past the place, for she was contented with a momentary stop. After this I watched her, and it was evident that she knew exactly, before the coachman began to pull up the other horses, every public-house on the road, for she had at some time stopped at all. I think there can be little doubt that this mare recognised all these houses by her sense of smell. With respect to cats, so many cases have been recorded of their returning from a considerable distance to their homes, after having been carried away shut up in baskets, that I can hardly disbelieve them, though these stories are disbelieved by some persons. Now, as far as I have observed, cats do not possess a very acute sense of smell, and they seem to discover their prey by eyesight and by hearing. This leads me to mention another trifling fact: I sent a riding-horse by railway from Kent *viâ* Yarmouth, to Freshwater Bay, in the Isle of Wight. On the first day that I rode eastward, my horse, when I turned to go home, was very unwilling to return towards his stable, and he several times turned round. This led me to make repeated trials, and every time that I slackened the reins, he turned sharply round and began to trot to the eastward by a little north, which was nearly in the direction of his home in Kent. I had ridden this horse daily for several years, and he had never before behaved in this manner. My impression was that he somehow knew the direction whence he had been brought. I should state that the last stage from Yarmouth to Freshwater is almost due south, and along this road he had been ridden by my groom; but he never once showed any wish to return in this direction. I had purchased this horse several years before from a gentleman in my own neighbourhood, who had possessed him for a considerable time. Nevertheless it is possible, though far from probable, that the horse may have been born in the Isle of Wight. Even if we grant to animals a sense of the points of the compass, of which there is no evidence, how can we account, for instance, for the turtles which formerly congregated in multitudes, only at one season of the year, on the shores of the Isle of Ascension, finding their way to that speck of land in the midst of the great Atlantic Ocean?

Charles Darwin

### The Sense of Smell in Animals

The hypothesis put forward by Mr. Wallace in Nature of the 20th ult., to explain the power possessed by some animals of

finding their way back to their homes after having been conveyed from them in such a way as to preclude the possibility of their seeing the road by which they travelled, contains, I think, the solution of a hitherto perplexing problem. To ascribe this power, as is usual, to instinct in the customary sense of the term, is to give what Mr. Bain calls "an illusory explanation of repeating the fact in different language," and it is manifestly impossible to ascribe it to instinct, as that term is understood in the evolution theory of mind. I am glad to see a psychologist like Prof. Robertson giving in his adhesion to Mr. Wallace's view. But while in the main accepting it, and arguing forcibly in its favour, Prof Robertson hesitates to affirm that it affords an explanation of the whole of the facts in question. Is this failure, if failure there be, inherent in the explanation itself, or does it lie in our imperfect knowledge of the facts to be explained? That there are difficulties cannot be denied. For example, it is difficult, to say the least, for the human mind to form the conception of a sense of smell, so acute, so objective, and furnishing sensations so strongly persistent in the ideal, as to enable an animal by its means alone, to retrace unerringly long and devious roads travelled over but once, and under circumstances rendering impossible the co-ordination of sights and smells habitual to the animal. In such cases smell must be a much closer second, if second at all, to sight, than touch is in man. No blindfolded man could perform a like feat by means of unaided touch, nor, do I think, could a blind man, though with the blind this sense becomes, by the cultivation it receives through a hard necessity, greatly more acute than it is in normal cases. But difficulties like these are such, I believe, only because of our very limited acquaintance with the psychology of the lower animals. One of the chief desiderata in mental science is, it seems to me, such a psychology, based upon principles generalised according to strict inductive methods, from a body of numerous, varied, well-authenticated, and scientifically made observations of the domestic and other animals. A work of this kind we have not, but, I believe, the lines upon which it should be constructed are already laid down in Mr. Spencer's truly great work, the "Principles of Psychology." When this branch of psychological science has been brought into something like parallelism with human psychology, difficulties, such as I have hinted at, will, I venture to say, be effectually removed, and Mr. Wallace's explanation will, as he claims for it, "cover all the well-authenticated cases of this kind."

In the extended scope claimed for this hypothesis by Prof. Robertson, viz., as explanatory of the nature of external perception in dogs, there appears to be a difficulty raised. The most refined and deep-penetrating psychological analysis, of both the empiristic and evolution schools, have incontestably established that our mature visual presentations are but symbols of the earlier and really genetic presentations acquired through touch combined with muscular feeling. Granting, as seems undeniable, that smell in dogs holds, in many respects, a place analogous to that of touch in man, would the earliest and the genetic presentations of externality in these animals be those furnished by smell, with or without the aid of muscular feeling?

Before concluding my letter, I should like to offer a remark upon the supposed *experimentum crucis* of Mr. Wallace's hypothesis, suggested by Mr. Bennett. The smell of stale fish would undoubtedly interfere with and overpower ordinary smells in the human organ. But is it not an anthropomorphical fallacy to assume, as Mr. Bennett appears to do, that such would be the result in the case of a cat? From the almost purely subjective and comparatively undeveloped sense of smell possessed by man, there appears to me to be no conclusive argument to the highly objective and extremely acute sense of smell possessed by certain animals. We are not warranted from our own experience in inferring of a sense, quantitatively, if not qualitatively, so very different, that one powerful sensation must necessarily exclude fainter sensations of a like order. Normally, vivid sensations of a particular order do tend to exclude with more or less completeness fainter like sensations. But the animal, in the circumstances in which it is placed, is as Mr. Wallace shows, in an abnormal condition. Its attention is concentrated on the unfamiliar succession of smells it is encountering, and under such a stimulus these ordinarily fainter sensations may not unreasonably be supposed to become unwontedly vivid, and capable of powerfully affecting the animal's consciousness, despite the resistance of what under common circumstances would prove an effectual obstacle to their conscious presentation. A complete *experimentum crucis* would require that the animal shoul', during the whole journey, be entirely smell-muffled, and Mr. Bennett's expedient could not, I think, be relied upon to produce this effect.

Camberwell, March 3 W. H. BREWER

## External Perception in Dogs

THE following somewhat remarkable instance of a dog finding its way back was told me by the owner, who lived 20 or 25 miles up (and on the left bank of) the river Canumá, in Brazil; a small river just east of the river Madeira. He took the dog by boat down the river Canumá and up the Madeira to Borba, a small town on the right bank of the latter river; a distance of 70 or 80 miles round; and left the dog there. The dog ran away from Borba and made its way back to its former home on the river Canumá. More exactly, it was making its way back, for my informant being out in the wood some little way inland, and S. W. of his cottage, fell in with it. It was in bad condition, having been some weeks—the exact time could not be ascertained—in working its way back through the forest, and of course had lived by hunting. I cannot give with any exactness the distance overland from Borba: perhaps it is less than 25 miles; and in this respect the return is not remarkable. It seems to me that the dog during its journey by water must have had a constant perception of the bearing of its old home; and on the other hand that it made its way back not by any blind instinct but by trial and error and by recognition of the character of the forest. F. R. G. S.

## Sight in Dogs

I THINK Mr. Kingsley rather underrates the exercise of the organs of vision by the dog when, in comparing it with the horse, he writes,—"The dog, who has smelt everything, but looked at very little." Now it is true that the dog does not look about him when on his travels, in the popular sense, by turning his head about, but close observation shows the eyeball in constant movement, taking in everything in front and on both sides, although, to all appearance, with his head close to the ground, his whole attention is concentrated on the reception of external impressions through his nose. This is particularly noticeable in the terrier, which, on meeting you, however intently he may seem to be engaged in smelling, gives a quick glance at your face without moving his head, or apparently lessening the attention he is paying to something else with his nose. Note, also, how quickly a dog going down wind sees another a long distance off.

The horse not only sees and smells acutely but also frequently touches any object with his upper lip.

In reference to the quotation from "Boswell's Life of Johnson," given by Mr. Nicoll, I may mention that it is well known to huntsmen that horses are very prone to kick if led near the hounds when a fox is being broken up, the explanation always given being that it is the smell of blood which irritates them.

Faringdon, March 9 J. HOPKINS WALTERS

## Selenium

VITREOUS selenium may be considered a non-conductor of electricity. It is only when in a crystalline condition that it becomes a conductor.

A bar now in my possession, $2{\cdot}25 \times {\cdot}5 \times {\cdot}05$ inches, tested with an electromotive force of $\frac{1}{10}$th of a Daniell's cell, gives a deflection of 140 divisions on the scale of an ordinary astatic mirror galvanometer. The same deflection produced under the same conditions through a known resistance, shows the resistance of the selenium to be 360,000 ohms. By the well-known Bridge system the resistance of the same plate of selenium is 359,500 ohms, the two different tests thus confirming each other.

I have to leave this evening for Valentia to report on the electrical condition of the Anglo-American Company's cable, or would write you more fully on the effect of light on the conductibility of selenium.

If selenium be exposed to the direct rays of the sun, it gradually becomes crystalline. May not the explanation of the phenomenon be found in this fact?

All the bars I have experimented upon have been supplied by Mr. H. Bassett, No. 215, Hampstead Road.

WILLOUGHBY SMITH.

Wharf Road, City Road, March 11

## Brighton Aquarium

I ADDRESSED a letter some weeks ago to the chairman of the Brighton Aquarium Company, in which, amongst other matters, I suggested that a stand with a few microscopes exhibited therein, which had been offered by a London maker, would be a source of great additional attraction, without being any expense to the company.

I also suggested that it might very likely be the nucleus of a school of marine zoology, if for a separate subscription the directors could set aside a room to be used by students, who might form themselves into a kind of club, and work with their miscroscopes and tanks in quiet. The nearness to London of the Brighton Aquarium might, I remarked, prove the inducement to many non-residents to join; whilst a library, and a few demonstrations, would give increased means of gaining information.

I think, sir, that the importance of my suggestions warrants my requesting you to make them public, since other aquaria might also take the matter up, without damage to the Brighton Company, in the success of which I take the warmest interest.

MARSHALL HALL

New University Club, March 7

## General Travelling Notes

I BELIEVE F. G. S. P. would find some of the information he wishes, in a small pamphlet which is to be obtained at the Royal Geographical Society, 1, Savile Row, price 1*s*. There is also an excellent little work (very portable) which has been recently published by some Fellows of the Anthropological Institute for the use of travellers, which would be found useful; price 1*s*.

J. RAE

## New Guinea

THE *Academy* for July 15, 1872, contains a note on New Guinea, from *Petermann's Mittheilungen* in which there are two slight mistakes. Perhaps you will allow me to correct them in your journal.

It is said, "The London Missionary Society founded a number of stations on the south-eastern peninsula" in 1871, and that these stations were "in charge of educated natives of the Tongan Archipelago."

The stations founded by the agents of the London Missionary Society in 1871 were not on the large island of New Guinea, but on the small islands of Erub, Tauan, and Saibai in Torres Straits. The Society's vessel has, however, sailed this year with a staff of English and Polynesian missionaries on board, who hope to be able to occupy stations on New Guinea itself.

The "educated natives" placed as pioneers in the first settlements are not "natives of the Tongan Archipelago," but of the Loyalty Islands near to New Caledonia, and they belong to the black Polynesian, or Papuan race. The Tongan Islands are entirely under the care of the Wesleyan Missionary Society.

The missionaries who touched at New Guinea in 1871 believe they saw people similar to the brown Polynesians as well as the black frizzly haired Papuans proper. Hence, evangelists from both races of Polynesians have been sent to New Guinea this year.

S. J. WHITMEE

Samoa, Nov. 6, 1872

## Flight of Projectiles

YOUR correspondent, "Robert Reid," asks for an impossibility. There is no impossibility in calculating the theoretical deflection in the flight of a bullet due to a theoretical wind pressure, but the formula could not be "simple." However, Mr. Reid need not be distressed, for it is difficult to conceive any intellectual occupation which would be a more complete waste of ingenuity. Let us consider the real conditions of the problem.

Mr. Reid has not stated them with completeness. It is not sufficient to know the time of flight of the bullet, its size, and weight, the theoretical pressure of the wind, and the angle at which that pressure is exerted. It would be necessary, also, to know the angle at which the rifle is fired, the initial velocity of the bullet, and the space travelled over in its flight. It is obvious at once that the vertical line of flight, if I may be permitted the expression, is not a straight line, but a curve, rapidly accelerating towards the end. If we assume certain arbitrary theoretical figures for initial velocity and strength of wind, there would be no great difficulty in calculating the curve, but it would be a purely imaginary curve, and an utterly useless and deluding calculation. Let us consider the disturbing elements. First, the powder. It would be difficult, if not impossible, to get two charges of precisely and absolutely the same strength. Then the state of foulness would vary. Then the pressure of the wind would always vary in a distance of 500, or 1,000, or 1,500 yards, and in a flight of several seconds; even its very direction would vary at different points in the line of flight, unless in the case of a perfectly open exposed plain.

To all soldiers tempted to indulge in calculations of this nature I would venture to say that there is nothing so likely to mislead. Science and practice should be one and the same thing. If what professes to be science cannot be carried out in practice, it is not true science but bastard science, or pedantry, and the unpractical pedant is even more mischievous in war than the so-called "practical man" in matters of civil life.

Army and Navy Club, March 10 W. HOPE

## Glacial Action

IN NATURE of vol. vii. p. 241, you say, "Dr. Dawson thinks that the fiords on coasts, like the deep lateral valleys of mountains, are evidences of the action of waves, rather than that of ice. No glacialist, as far as we know, holds the extravagant belief that fiords have been cut out by ice. They are undoubtedly submerged valleys, and were hollowed out by streams and other atmospheric influences in ages long anterior to the glacial epoch."

A true fiord, like those of Norway, Scotland, and, we may add, the west of Ireland, is nothing but a mountain valley sufficiently depressed for the sea to enter it. I am not a practical geologist, but I have read what appeared to be strong arguments in favour of the belief that the valleys of the Alps have been hollowed out by glaciers. I do not see how any one who sees the quantity of mud that glacier streams bring down, can doubt the great power of glaciers as excavating agents; and the argument is strengthened by the vast moraines, thousands of feet below the present lower limit of the glaciers, and now overgrown with trees, which are to be observed throughout the Alps.

If mountain valleys have not been, in at least a great proportion of cases, excavated by glaciers, how are we to account for the fact that fiords and mountain lakes are almost, if not quite, confined to the higher latitudes? This is especially observable on the west coast of America, which is remarkably unbroken from Vancouver's Island to Chiloe, but broken into fiords from Vancouver's Island northward, and from Chiloe southward.

This observation throws no light on the very different question of the origin of great lowland lakes like those of North America and Africa.

JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim

## The Feeding Habits of the Belted Kingfisher

ON page 48 of Mr. Darwin's "Expression of the Emotions," I find the assertion, "Kingfishers when they catch a fish always beat it until it is killed." We have, in New Jersey, one species of kingfisher, the *Ceryle alcyon*, which is exceedingly abundant for about seven months of the year. For several years I have observed them carefully, both feeding and breeding about the banks of Crossweeksen Creek, and I feel certain that I am correct in saying that I have never seen a kingfisher take its food otherwise than by swallowing it whole, while yet upon the wing. The fish having been swallowed, or at least, having disappeared, the kingfisher will then alight upon the branch of a tree, and will then, frequently, stretch out its neck, and go through a "gulping motion," as though the fish was not entirely in the bird's stomach, or perhaps was only in the œsophagus. In the thousands of instances that I have witnessed, of these birds catching small fish, I never once saw a fish taken from the water, and killed, before being devoured.

So far as my recollection serves me, in the large majority of instances, the kingfisher, after darting into the water and securing a small cyprinoid, will emerge from the stream, uttering its shrill cacophonous scream, as if rejoicing over the delicate morsel it had captured and not scolding at its ill-success, as has been thought; for we have frequently shot them as they rose from the water, and *invariably* found a fish, still alive, in the stomach or œsophagus. Indeed, I cannot see how this characteristic cry of the kingfisher could be accomplished with a fish struggling in its beak. When the fish, from its size or other cause, is retained in the œsophagus until the bird alights, the movements of the bird, to effect the swallowing, are very

similar to those of a pigeon while feeding her young. The neck shortens and swells; the feathers are ruffled and the wings slightly open and shut, two or three times.

So far as my observations of the *Ceryle alcyon* extend, Mr. Darwin's remarks will not apply to that kingfisher.

CHAS. C. ABBOTT

Trenton, New Jersey, Jan. 14

## *A PETRIFIED FOREST IN THE LIBYAN DESERT*

ON the western horizon of the Libyan Desert, as viewed from the summit of the Great Pyramid of Ghizeh, a conical hill stands in solitary grandeur, far removed from the route of desert travellers. This has long been supposed to be the ruins of a pyramid, yet nowhere is it recorded to have been visited by any but the Bedouin tribes who pass within a few miles of it, on the old caravan route to the Faioom. It is enumerated by Lepsius as one of the Pyramids of Egypt, and in a recent work on the Great Pyramid* it is called Dr. Leider's Pyramid, "until a better name be found for it," merely from its having been pointed out to the author by the late Dr. Leider of Cairo, who, however, had never visited it.

The following narrative of a visit to the eminence by Mr. Waynman Dixon, engineer, and Dr. Grant of Cairo, and of their discovery of a very remarkable petrified forest near its base, whose gigantic trees lie scattered about the desert in profusion, has been communicated to us by the former gentleman :—

Leaving the pyramids behind and lighted by the clear silvery moonlight, we set out into the desert by the caravan route to the Faioom, leading up a solitary valley, in the rocks of which are cut ancient Egyptian tanks and mummy-pits. Presently we turn off from the regular track and take our way into the unfrequented desert, steering straight westward for the distant pyramidal hill. The sand of the desert is here hard and compact, and travelling easy, indeed, with the exception of one or two places where the sand is soft and heavy, a wheeled carriage might drive all the way, and to most travellers would be much preferable to camel or even donkey riding.

After many hours hard riding, we at last reach the top of a slight eminence, and across the wide valley in front of us is the place of our destination.

These long valleys, or "wadys," have much of interest about them; throughout may be seen the dry water-courses where the rare rain-showers carry down the sand into the bed, and leave all the little hills and eminences covered with flints as big as potatoes and with surfaces so brightly polished as to give the desert a silvery look by moonlight, or by day to cause the appearance of rippled water where they reflect the sunlight. The zoology and botany, too, of the desert are very interesting. There are numbers of the little "jerboa," a species of rat, with long hind legs and long tail with a tuft of hair at its end, which hops about like a kangaroo. Now and then may be seen a gazelle or two scampering off at the unusual sight of a caravan. A few small birds get a precarious existence, and in the sky an eagle or vulture sometimes wings its way. The insects are few, and the herbage is extremely scant, and it is a marvel what the animals live on. There are here and there in the water-courses small tufts of camel-thorn—a little shrub not unlike a whin, another with a coral-like growth, and now and then a handful of a tough wiry sort of grass, but what these again subsist on it is hard to say, for there is not a shower more than once or twice a year, and for nine months there is no dew while the heat of the sand at midday in summer is over 100 degrees.

Arrived at our destination before daybreak, we dismount from our camels, and while the Bedouins are unloading the baggage, we hasten as fast as our legs, stiff with camel riding, will permit, up the heaps of sand and flints to the summit of the so-called Pyramid, to find on attaining it that it is but the conical end of a prism-shaped hill, stretching westward, and standing boldly out of the desert plain.

Near the top the rock crops out, and appears to be a species of friable sandstone fretted by the weather into curious shapes; but the actual summit is covered with flints and sand, and, what strikes one as being very strange, many fragments of petrified wood.

Taking a general survey from this quoin of vantage, we choose the best spot to the north of the hill to pitch our camp, exposed to the slight north wind which blows incessantly here, and descending its steep sides, at the bottom are surprised to find near the chosen spot three large stone trees lying prostrate on the sand. The largest is 51 ft. in length and 3 ft. 6 in. in diameter at its widest end, and 2 ft. at its smallest; they are branching exogenous trees, apparently a species of pine, and the one before us has the fork of a large branch very complete.

Wandering on up the wady to the north of the hill, named by us "Kôm el Khashob"—the hill of wood—we find the whole desert littered with fragments of petrified wood, from twigs the size of one's finger to pieces of large branches or trunks of trees; and on the flank of the hill to the north are hundreds of immense trees, lying half buried in the sand, some 70 ft. long, and in many instances with part of the bark still attached. All of them are exogenous trees—no single instance of a palm could we discover—and from the absence of roots it may be presumed have been drifted here by the sea. The stratum is apparently sandstone, overlying the limestone of the Nile valley; there are also here and there patches of a dark chocolate-coloured friable mineral with specks of green which looked like copper, but proved on subsequent analysis to be carbonate of iron; beds of what the Arabs call "Gyps" or gypsum, and nodules of an intensely hard black granulated looking stone—not unlike emery stone. The whole geological character suggesting the—possibly delusive—suspicion of the existence of coal under the surface.

Having carefully surveyed this neighbourhood we again climbed the "Kôm el Khashob," taking instruments to measure its height and determine its position; the former of which we found to be 752 ft. above the Nile level at Cairo, 602 ft. above the north-east socket of the Great Pyramid, and consequently about 140 ft. higher than its summit.

Having secured one or two sketches of the hill, and the sun being now near setting, we "fold up our tents like the Arabs and silently steal away." Mounting our camels again, and taking a slightly different route on our return, we pass some ancient solitary well-tombs away in the desert, but without mark or hieroglyphic inscription on them. All the way we notice fragments of petrified wood, and near to the pyramids extensive beds of oyster shells. This forest may almost be said to be a continuation—doubtless going much farther westward than we penetrated—of the well-known petrified forest in the Abbasieh Desert to the east of Cairo, which extends a long way in the direction of Suez, but is inferior both in extent and in the size and perfectness of the trees to that of the newly-discovered forest. The formation of the land here would lead to the supposition that it has been the ancient coast line, and that the trees drifted to where they are now found, and were then left in the briny waters of an evaporating sea or salt lake; and as the fibre of the wood decayed slowly away, the space of each cell has been filled up by the crystallising silica held in solution in the water.

Since the discovery of this forest it has been visited by many Europeans in Cairo, and English travellers, and to geologists especially it is well worthy of a visit. It may easily be reached from the Great Pyramid

* "Life and Work at the Great Pyramid," by Prof. Piazzi Smyth, F.R.S.

either by donkey, camel, or horse, and is distant under three hours from it—a journey which in the winter may with comfort be accomplished in one day from Cairo. Indeed, if his Highness, the Khedive, who has done so much for the comfort of travellers in making a magnificent road to the pyramids, were to extend it for some half mile farther through the tract of soft sand, carriages could easily drive all the way to the Kôm el Khashob. The locality is now well known to the Pyramid Arabs, and most able and intelligent guides will be found in Ali Dobree, Omar, or others of this Bedouin tribe.

## *HUNTERIAN LECTURES BY PROF. FLOWER*

### LECTURES VII. VIII. IX.

THE family Edentata includes the Bradypodidæ, Dasypodidæ Myrmecophagidæ, Manidæ, and Orycteropodidæ, the first three being from the new world and the last two from the old. Considering them shortly, the Bradypodidæ are leaf-eaters; they have five molars above and four below, no other teeth being present, each tooth is a cylindroid column with a persistent pulp, and is surrounded externally by a harder layer, which causes the free surface to become cupped during wear. There is a peculiar descending process from the incomplete zygoma. The number of the vertebræ is great, their spinous and other processes are but little developed as the back is not much employed in supporting the body. There are extra articular surfaces on the lumbar vertebræ of the three-toed sloth, not found in the two-toed species. The clavicles are sometimes rudimentary, never complete. A bony arch joins the acromial process of the scapula to the coracoid, and the distal end of the clavicle in Bradypus is attached to the latter, a peculiarity which has been explained by Mr. Parker. The supra-spinous notch is converted into a foramen by a bony arch running over it, and there is a supra-condyloid foramen in the humerus of Cholopus only. Considerable rotation of the radius is possible; the hand is peculiarly modified, the fingers being bound together. It is generally stated that the trapezium is anchylosed to the scaphoid, which is very long, but that such is not the case is proved by the examination of the young animal; the trapezium, in fact, anchyloses with the first metacarpal bone. In Cholopus the second and third toes are only present. The ilia are broad, the femur short and with no ligamentum teres; some peculiar small bones are found round the knee. The tibia and fibula are firmly united, but not anchylosed; both genera have three toes on the hind foot. The inner surface of the fibular maleolus sends inwards a conical process, which acts as the pivot in which the externally cupped astragalus is hinged, and thus allows of a great range of movement of the foot. The peculiarities in the number of the cervical vertebræ are well known, no similar abnormalities are found in the fossil genera.

The other Edentata are not purely vegetable feeders; they eat ants and other animal food. In the Dasypodidæ the teeth are numerous, and the cervical vertebræ tend to anchylose together. As in the whole family the sternal ribs are ossified. The degree of development of the carapace is indicated by the size of the vertebral processes, and an extra series of articulations, as in the ant-eater and sloth, occurs in the lumbar region. In Myrmecophaga there are no teeth; the hind feet are quite normal, the front very peculiar, possessing five toes, and claws on the middle three. In the Old World forms, Manis and Orycteropus, there is no extra interlocking of the lumbar region, and in the former no teeth. Orycteropus possesses teeth, each of which may be said to be a compound tooth, each element of which has a persistent pulp.

Hitherto no true sloths have been found fossil in South America; they were then represented by the Gravigrada, which are so termed in contra-distinction to the Tardigrada; they abound in the Pampas of Buenos Ayres, and are found as far north as the United States. *Megatherium* was the first of these large animals discovered, and the original skeleton, obtained in 1789, is now at Madrid. Since then several entire skeletons have been obtained, of which two very fine specimens are to be seen at the Museums of Turin and Milan. Those of the College and of the British Museum are partly from casts. Leidy has placed the North American animal in a distinct species (*M. mirabile*), on account of its geographical distribution, but he is unable to detect any osteological peculiarities, The only teeth in this animal are five molars with persistent pulps above, and four below on each side, as in Bradypus; and they form a continuous series. Each tooth has a double transverse ridge, the hollow of which fits the ridges in the opposite jaw. These ridges do not disappear as the animal gets old, but are permanent on account of the dentine not being uniform in density, the middle being softer than the sides, and therefore wearing away more readily. The teeth in the middle of the series are the largest. The skull is small considering the size of the animal, and the brain-case remarkably so. The brain itself, as known from a cast of the interior of the cranium by Prof. Gervais, closely resembles that of the sloths. The skull is very much elongated, the anterior condyloid foramina being large, it is probable that the tongue was so also. The palate was extremely narrow, and the premaxillary portion extensive. An enormous bony process descended from the zygoma which is also a peculiarity of the other members of the same family. The ramus of the lower jaw was immensely high. In the megatherium only is the molar portion of the mandible of unusual depth, and this is to hold the continually growing teeth. There are seven cervical, sixteen dorsal, three lumbar, five sacral, and eighteen caudal vertebræ; the lumbars, as in Myrmecophaga and Bradypus, possess interlocking processes; the whole column resembles that of the former of those animals more than the latter. The tail was strongly developed, and chevron bones existed on the neural surfaces of the caudal vertebræ. As several scutes were found with the bones of Megatherium, and as the different processes of the vertebræ were strong, it was at one time supposed that this animal possessed a shield, but there is no doubt that the scutes were those of Glyptodon, and the vertebræ do not resemble those of the Armadillo. The sternum was composed of seven pieces, and the clavicles large and well developed, being the only examples of these bones, which are bigger than those of man. As in the sloths, the acromion joined the coracoid, and the supraspinous foramen was strongly bridged over. In its distal limb segments the animal was peculiar. There was no supracondyloid foramen to the humerus; the radius and ulna were free; all the bones of the carpus were represented; the pollex was lost, and the other digits were present; the fourth and fifth metacarpals were elongated, the proximal phalanges very short, and the distal of the index, middle, and ring fingers constructed to carry huge claws, which differed from those of the cats in being flexed instead of extended when they were not in use, upon which depends the difference in the shape of their articular surfaces. The second and third phalanges of the middle finger were anchylosed, and a phalanx was missing in the fifth finger, which did not carry a nail. The pelvis presented the peculiarities of the sloths, and was very large. The femur had a small pit for the insertion of the ligamentum teres. The tibia and fibula were anchylosed at both ends. All the leg bones were massive. The foot was very peculiar, the animal must have rested on its outer edge. The os calcis was very large, with the calcarcaneal process going nearly as far backwards as the toes forwards. The

ankle, as in Megalonyx and the other allies of Megatherium, was not pivoted as in the sloths, but the inner maleolus was quite cut away and replaced by a slightly concave articular surface looking downwards and a little inwards, which was continuous with that of the lower ends of the tibia, a ridge intervening. The superior surface of the astragalus was consequently of a peculiar form, possessing a longitudinal median groove. The first and second digits of the foot were missing, and a claw was present only on the third, in which the middle and distal phalanges were anchylosed ; there were two phalanges on the fourth toe, and only one was present on the fifth. As to its habits, there is no doubt that Megatherium was not a burrower as supposed by Pander, nor arboreal as suggested by Lund, but that Prof. Owen's hypothesis is correct in which he considers that it was terrestrial, feeding on trees, which it uprooted or broke boughs off.

*Mylodon* possessed the same number of teeth as its allies and the sloths, but the anterior pair in the upper jaw were separated by a considerable interval from those behind. All the teeth were more or less cylindrical and had persistent pulps ; the worn surfaces were cupped and not ridged, because the dentine was softest in the centre ; the fourth lower molar was elongated and grooved. Several species of this genus have been found, one only in North America. Gervais has divided off some with more separated anterior molars into a new genus, but Burmeister does not think this justifiable. The College of Surgeons possesses a very good skeleton, almost perfect, obtained in 1841. The skull was very slothlike, the fore part being truncated and the nasal fossae open. There was a large descending process of the zygoma and an ascending one ; the bony arch was complete. There was no enlargement of the molar region in the lower jaw like that of Megatherium. Air cavities existed all round the brain-case, as in the elephant, but to a less degree The vertebræ were C. 7, D. 16, L. 3, S. 7, and Caud. 21. The lumbar vertebræ were anchylosed together to the last dorsal and to the sacrum. The tail was long and powerful ; the limbs much like those of Megatherium, but differed in the radius and ulna being separate, as were the tibia and fibula. In the fore-foot Mylodon had the five digits, with claws on the first three. The ankle was as in Megatherium ; the hallux only was missing, and the fourth and fifth toes did not carry claws.

*Scelidotherium* was smaller and altogether lighter built than those mentioned above ; the teeth were equidistant and elongated from before backwards as was the head. The rest of the skeleton much resembled Mylodon, but the lumbar vertebræ were not anchylosed.

*Megalonyx* was a North American form. Prof. Leidy has described it fully. There was a great gap between the anterior tooth, which was large and much like a canine, and the other molars, whose number were the same as in the sloths. The animal had longer and slenderer limbs than those described above and therefore more nearly approached the sloths.

[In last week's report of these lectures, *Thylacoleo* is misprinted *Thylacoles*, and the animal is stated to have 32 instead of 2 molar teeth in the lower jaw.]

## *FAUNA OF THE NEW ENGLAND COAST*

PROF. VERRILL, in discussing the collections made by the parties of the United States Commissioner of Fish and Fisheries upon the Coast Survey steamer *Bache* during her cruise off the coast of New England, in the summer of 1872, sums up by stating that they represent six distinct faunas and sub-faunas as follows :—

(1) The surface fauna outside of the banks, and, at certain times, even extending over their outer slopes. This is essentially the same as the fauna prevailing over the entire surface of the central parts of the Atlantic Ocean, and shows very clearly the direct effects of the Gulf Stream.

(2) The surface fauna inside of the Banks, which is decidedly northern in character, very similar to that of the Bay of Fundy. The contrast between the two shows that the Gulf Stream is almost entirely turned aside by the Banks, and has comparatively little effect upon the fauna between them and the coast.

(3) The fauna of the St. George's Bank itself. This is decidedly boreal in character, and essentially identical with that of the Bay of Fundy at corresponding depths, on similar bottoms, and in regions swept by strong currents. The fauna of the south-western part, however, is less boreal than that of the north-western.

(4) The fauna of the Le Have Banks, and off Halifax. This, even at the moderate depth of twenty fathoms, is decidedly more arctic in character than that of the St. George's or the Bay of Fundy at similar or even greater depths.

(5) Between the St. George's and Le Have Banks and the coast there is a great region of cold and comparatively deep water—in places more than 100 fathoms in depth—with a bottom of mud and fine sand, and communicating with the great ocean-basin by a channel between the St. George's and Le Have banks, which is comparatively narrow and, in some places, at least 150 fathoms deep. This partially inclosed region has, physically and zoologically, the essential features of a gulf, and may be called the St. George's Gulf. The deeper waters of the Bay of Fundy are directly continuous with those of this area. The fauna of this Gulf and of its outlet is peculiarly rich in species new to the American coast, and nearly identical with that of the deeper waters of the Gulf of St. Lawrence, and agrees very closely with that found on muddy bottoms, and at similar depths, on the coasts of Greenland, Finmark, and Norway.

He also presents additional generalisations as follows :—

(6) The deepest dredging, in 430 fathoms, was outside of the St. George's Banks, on the slope of the actual continental border, and within the limits of the true Atlantic "basin." The fauna there is especially rich and varied, decidedly northern in character, and agrees closely with that of similar localities and depths on the European side. The animals were mostly such as inhabit bottoms swept by strong currents in the Bay of Fundy.

(7) Everywhere over the banks, and especially on the southern slopes, the difference between the bottom and surface amounts to from 15° to 20°, or even more ; the surface temperature being usually from 60° to 72°. The temperature of the air was very near that of the water, generally one or two degrees higher.

(8) No such contrast of temperature was found inside of the Banks in the St. George's Gulf or the Bay of Fundy ; the difference seldom being more than ten degrees, and often, especially in the Bay of Fundy, less than five. The surface temperature at corresponding dates in the Bay of Fundy were 48° to 53°, showing an average difference of about 20° for the surface temperature in the two regions, while the average bottom temperatures do not appear to differ materially.

(9) The high surface temperature of the Banks is evidently due chiefly to the direct influence of the Gulf Stream.

(10) The very low surface temperature of the Bay of Fundy is largely due to its *geographical position*, and the *absence* of any appreciable influence from the Gulf Stream, but it is no doubt intensified by the powerful tides, which are constantly mixing the cold bottom water with that of the surface.

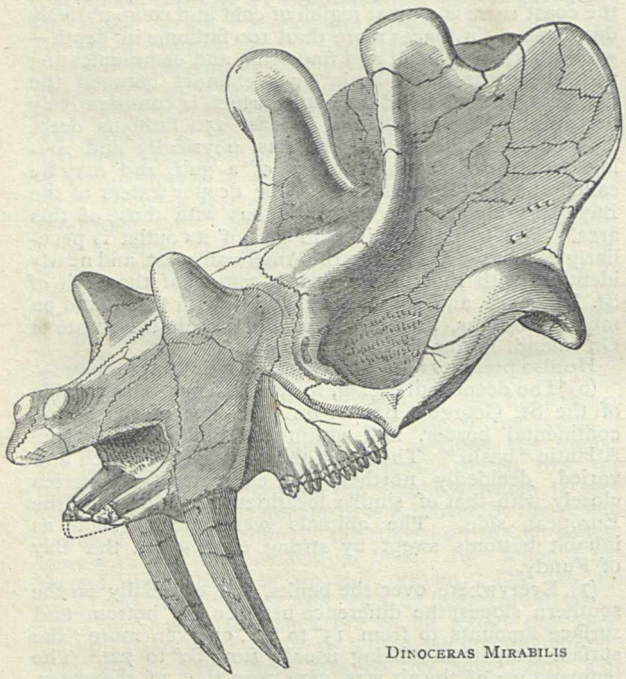
The facts hitherto observed do not seem to warrant the assumption that an "arctic current," properly so-called, as distinguished from the tidal currents, enters the St. George's Gulf or the Bay of Fundy. The action of

the tidal currents in bringing up the cold bottom waters of the ocean is perhaps a cause sufficient to produce most of the coldness of the water in this region.

## ON DINOCERAS MIRABILIS (MARSH)

A SHORT time ago we gave a note respecting one of the recently-discovered gigantic fossil mammals from the Eocene of Wyoming in the region of the Rocky Mountains; the accompanying woodcut, copied from a paper by Prof. Marsh, on this extraordinary extinct animal, named by him *Dinoceras mirabilis*, will further assist in making its peculiarities easily understood.

The animal must have been nearly as large as the elephant, to which its limb-bones were very similar. The only teeth it possessed in the upper jaw, were a pair of well-developed canine tusks, and six pairs of small molars, whose crowns were formed of two transverse ridges, separated externally, but meeting at their inner extremities. The frontal region of the skull was concave, on account of the lateral projection upwards of a bony ridge or crest on each side, which posteriorly developed into a large osseous process that may have been a horn core but perhaps was only covered with thick skin, and acted like the fibrous pads on the cheeks of the wart-hog, to shield the thinner skull from direct blows. Behind these the crest extended back beyond the level of the occipital condyles. The maxillaries each bore a conical process, which in a profile view is evidently seen to be directly above the root of the canine tusk, and supported it; it probably carried a horn. At the anterior extremities of the nasals were also two smaller horn cores. The horns must have been of a character very different from those in the rhinoceros, in which animal, however long they may be, they are only supported on a roughened surface of bone; if they resembled those of the cavicorn ungulata, from analogy we must suppose that they were small, for in those animals there is a close relation between the size of the core and that of the horn which it carried.



DINOCERAS MIRABILIS

There were no postorbital processes to the frontal bones. The zygoma was completed in front by the malar, the lachrymal was large, and formed the anterior border of the orbit; its foramen was exserted. The infraorbital foramen must have been behind the zygomatic ridge, as it does not appear in any of the drawings. The premaxillaries did not carry teeth; they sent forward two branches, which partially enclosed the sides of the external nares; the upper branch joined the nasal, and the lower, as in the Ruminants, continued free, and probably carried a pad. Prof. Marsh gives no illustration of the mandible, and only remarks of it that "the lower jaw was slender and the tusks small." The limbs were short, the fore limbs shorter than those behind. The radius did not cross the ulna so obliquely as in the elephant. In the head of the femur there was not any pit for the insertion of the round ligament. The great trochanter was flattened and recurved; the third trochanter was absent. The tail was short and slender. The ribs had rudimentary uncinate processes.

Prof. Marsh feels justified in placing Dinoceras in an order Dinocerata, distinct from the Proboscidia, on account of the absence of upper incisors; the presence of canines and horns; the absence of large cranial air cavities; the malar forming the anterior portion of the zygoma; the absence of a proboscis, which could not have been necessary in an animal that could easily touch the ground with its nose, and other less important differences.

This *Dinoceras* of Marsh is the *Eobasileus* of Cope and the *Uintatherium* of Leidy. The shortness of the published descriptions prevents us saying more about it at present.

## THE TROGLODYTES OF THE VEZERE *

### III.

Our Troglodytes of the latest epoch had, in fishing, another resource unknown to their predecessors. Their different stations contain a large number of fish bones; but it is remarkable that all these fish were salmon. Now the salmon in these days neither frequent the Vézère nor the part of Dordogne where that river joins the sea. At some leagues below the confluence, not far from Lalinde, in the centre of Dordogne, there is a bank of rocks, which, at high water, forms a rapid, and at low water a regular fall, called, The Leap of the Gratusse. The salmon do not pass this boundary, and, as it did not stop them at the epoch of the Troglodytes, we must conclude that, since that time, the level of the Dordogne has fallen, either by hollowing out its bed so as to lay bare the bank of rocks, or by losing part of its volume of water. We are led to believe that the fishermen of that time did not use nets, for with a net could be caught fish of all sizes. We thus understand why they could only catch large fish, and why they chose, among these, the kind they preferred. Had they any fishing boats? We have as yet found no proof of such. And besides, the Vézère is sufficiently enclosed for the large fish to swim along the banks within reach of the harpoons.

The harpoon of our Troglodytes was a small dart of deer-horn, very similar to the large barbed arrows, except that it was only barbed on one side. A little notch at the base enabled the fisherman to secure the cord which he held in his hand (see above, Fig. 10). The barbs are intended to secure the fish which it has struck. Why are these barbs all placed on the same side? Is it to diminish the width of the dart and make it more penetrating? This I cannot venture to affirm.†

* Continued from p. 325.

† One of my colleagues of the French Association, M. Lecoq de Boisbeaudrau, who did me the honour of being present at this lecture, communicated, the following day, to the Section of Anthropology, a very interesting note on the mode of action of the unilateral barbs of the harpoon. While the harpoon is traversing the air, these barbs cannot make it deviate sensibly; but directly it enters the water, the unequal resistance it meets there must necessarily change its direction. It seems, then, that the fisherman who aims straight ought the most frequently to miss his aim. But M. Lecoq de Boisbeaudrau reminds us of the well-known experiment of the straight

After fishing and hunting, they returned to the cave for their meals.

In the whole extent of the floor of the caves, at every level, the stratum which encloses broken bones contains likewise an enormous amount of particles of coal. This mixture is so universal, so uniform, that it is difficult to believe that the Troglodytes only made fires for warming themselves. They must have lit their fires every day, and in all seasons; and hence it is more probable that they used them for cooking their food.

We do not know how they produced fire, whether they drew it from flint or from wood heated from friction.

FIG. 13.—Bone harpoon of the Terra del Fuegans.

Neither do we know how they cooked their food. They had no earthenware, and could not boil their meat on the fire. They did not roast it, for hardly a solitary calcined bone has been found, and then it has evidently been accidentally reduced to this state. Perhaps they boiled it in wooden vessels, in which water can be brought to the boiling point by putting into it pebbles made red hot in the fire. But it seems to me more probable that they cooked it under the ashes, as many uncivilised nations do to this day.

They enjoyed the brains of animals and the marrow in the long bones, for all the heads are broken, and all the medullary bones (to the exclusion of all others) are methodically divided. The marrow in bones is a dish relished by all savage nations. They break the long bone in a particular manner, and the chief sucks the marrow first. Our Troglodytes had little flint maces with cuneiform edge; these were a kind of hatchet for breaking the bones. There is, besides, another utensil in deer-horn, which was probably used for extracting the marrow (Fig. 14)

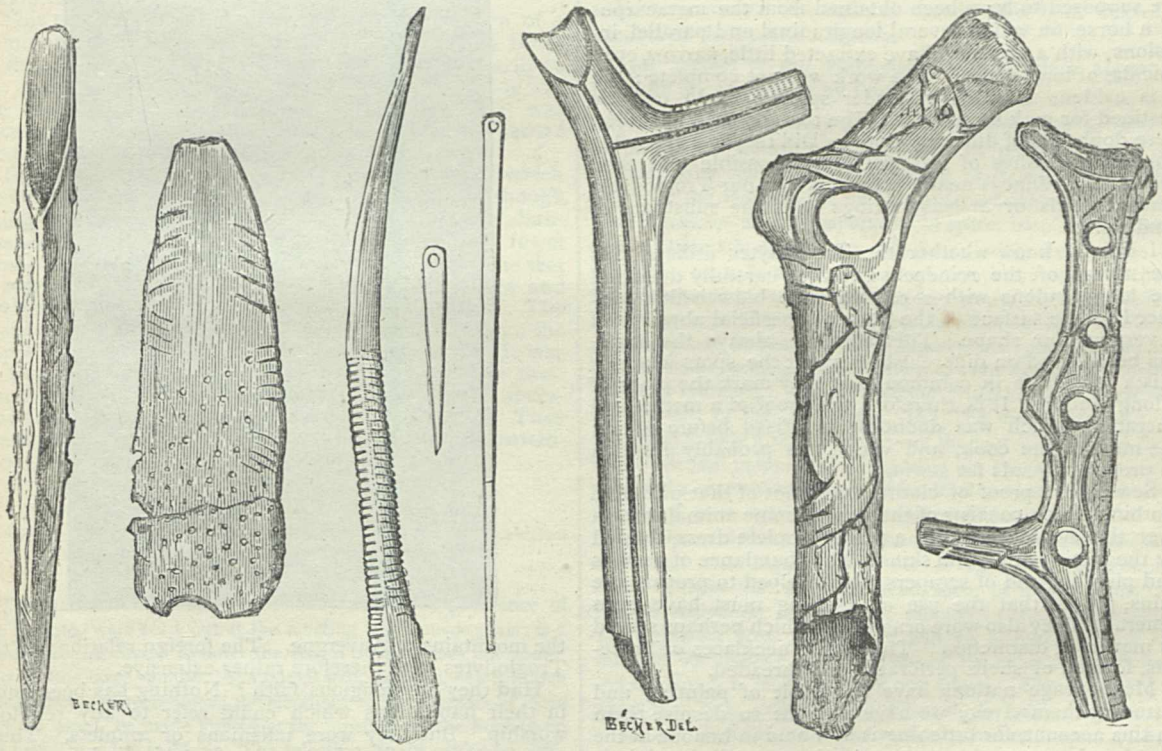



FIG. 14. FIG. 18. FIG. 17. FIGS. 15, 16. FIG. 21. FIG. 19. FIG. 20.

Fig. 14.—The marrow spoon. Figs. 15 and 16.—Needles. Fig. 17.—Hunting tablet. Fig 18.—Account tablet. Fig. 19.—Baton of command with a single hole (reduced a third). Fig. 20.—Baton of command with four holes (reduced a third). Fig. 21.—The pogamagan of the Esquimaux (reduced a fourth).

The Troglodytes, after their meals, left the bones spread about the floors of their caves. In a warm climate, these remnants would have exhaled an insufferable odour, but we must not forget that the temperature was then lower than it is now, and we must likewise confess that cleanliness was not the predominant feature of the men of those days.

Thanks to this uncleanly habit, the floor of their caves furnishes us with complete information as to their food. The flesh of the reindeer was their principal nourishment; they ate besides horses, aurochs, several kinds of oxen, chamois, wild goats, and even some carnivora; their predecessors did the same; but these had fish in addition, and the improvement in their bows and arrows enabled them to bring down game on the wing. Among

stick which appears broken when plunged obliquely in the water. In consequence of the refraction of the rays of light, the image of the fish is displaced, and in aiming straight at that image, one would miss one's aim. Here, then, are two causes of error. Now it is clear that, if they act inversely, they may compensate each other; and M. Lecoq de Boisbeaudrau demonstrates that when the unilateral barb is turned upwards, it brings back the harpoon towards the object. This arrangement in the harpoon would then be intended to rectify the aim, and this would credit our Troglodytes with a great power of observation.

The inhabitants of Terra del Fuego [still use a harpoon] with unilateral barbs (see Fig. 13).

the remains of their repasts are found a variety of birds.

Among these innumerable *debris* of bones, there is not a single fragment of a human bone. Our good Troglodytes were, therefore, not anthropophagi. They must have fought occasionally to defend or enlarge their hunting territory; nevertheless, their equipment was more that of huntsmen than of warriors.

In reviewing their panoply, it is evident that the most dangerous weapons, those which could be available in a hand-to-hand fight, are the most rare, and we remain convinced that they were a pacific race.

It might be concluded that they wore no clothing, because all the men represented by their artists are completely naked; but that proves absolutely nothing. Do we not know that the Greeks often represented their gods and their heroes in a state of nudity?

In the Troglodyte caves have been found all the requisites for needlework. They had needles of bone and of deer-horn. Some were only piercers, like a shoemaker's awl, others were provided with an eye for holding the thread (see Figs. 15 and 16). There were some very fine ones. A small needle case has been found, made of a bird's bone, which could contain a number of them. They are supposed to have been obtained from the metacarpus of a horse, on which several longitudinal and parallel incisions, with a fine saw, have extracted little, narrow, even spiculæ of long bones. The work was not complete; but it is evident that these slender spiculæ could only be destined for making needles. The threads used in sewing were doubtless of different kinds. Did they use vegetable fibre or fine lashes of leather? It is possible and even probable. What is nearly certain is that our Troglodytes made threads or at least strings with the substance of tendons.

I do not know whether the Troglodytes utilised thus the nerves of the reindeer, but they carefully detached the long tendons with a certain little blow which produced on the surface of the bone a superficial abrasion of a very regular shape. This abrasion, always the same, has been found on different bones, but the spots where it exists have this in common, that they mark the place of a long tendon. It is, therefore, the proof of a methodical operation, which was doubtless practised before giving the meat to the cook, and which was probably destined to prepare threads for sewing.

Sewing is a proof of clothing, and not of that primitive clothing which consists of the skin of some animal thrown over the shoulders, but of a more complete dress, formed by the joining of several skins. The abundance of needles and piercers, and of scrapers which helped to prepare the skins, proves that the use of clothing must have been general. They also wore ornaments, which perhaps served as marks of distinction. These were necklaces or bracelets, formed of shells perforated and threaded.

Most savage nations have the habit of painting and tattooing themselves; we have no right to despise them on this account, for tattooing is still held in honour in the popular classes of the most civilised countries, and it is even hinted that ladies in the upper circles have not quite forgotten the art of pencilling. We must not then wonder at finding similar fashions among the Troglodytes. Their caves contain numerous fragments of the red stone which we call *red ochre*; the stripes frequently found on these fragments prove that they have been scraped. They therefore prepared a red colour, which was in constant use, and which probably served to ornament the body with pictures.

I have already said that Troglodytes were not nomads. Some individuals may doubtless have undertaken voyages, but the entire tribe never went far from their caves. It was then by means of barter or commerce that certain foreign articles were imported. The numerous perforated shells of which the necklaces and bracelets were composed, were all foreign to the locality. Most of them belonged to the species *Littorina littorea*, and came from the shores of the Atlantic, where they are still very abundant. They were brought quite fresh, for they had their natural colours, which are preserved to this day in the floors of the caves. Other shells pierced in like manner with one hole, belong to five extinct species only to be found in *faluns*, and which date from the Miocene epoch. They are quite discoloured and broken into molecules; and the traces of rolling which they sometimes present, prove that they were fossils long before they were extracted from their tertiary beds to ornament man. Now the *faluns* which contain these five species are not found in the region of the Vézère. The nearest are those of Touraine, and it was from thence, in all probability, that our Troglodytes imported this toilet necessary. There have been likewise found in three stations, and principally at Upper Laugerie, little pieces of rock crystal; this substance must have come from the Pyrenees, the Alps, or

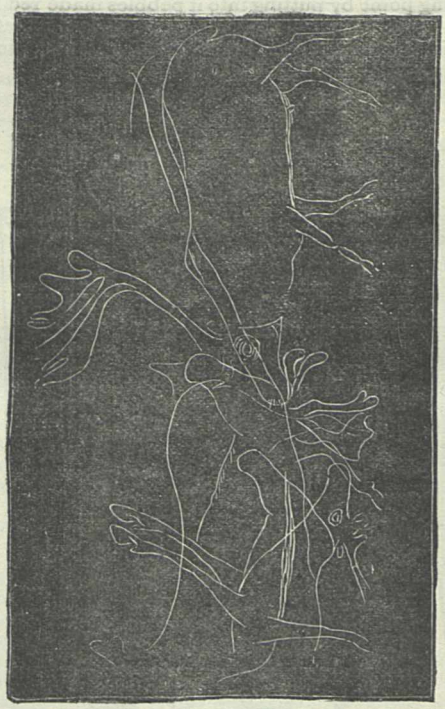


Fig. 22.—Combat of Reindeer.

the mountains of Auvergne. The foreign relations of the Troglodytes were therefore rather extensive.

Had they any religious faith? Nothing has been found in their habitations which could refer to any religious worship. But they wore talismans or amulets. These were a canine or incisive tooth of wolf, reindeer, ox, or horse. A hole, carefully bored at one extremity of the tooth, served for passing the string by which it was suspended.

At the same epoch, but in a different spot, certain funereal rites were observed. They placed the dead in a cave, whose narrow opening was closed by a flag-stone. In front of this stone was a little esplanade on which the afflicted relatives consoled themselves with feasting. This kind of consolation has been perpetuated from age to age, and it has not yet disappeared from among us.

At present we know of but one burying ground of the Troglodytes of the Vézère; it is that of Cromagnon. It is under a shelter and not in a cave; by the side of the corpses were placed carved flints and ornaments in shells, but there is no trace of a stone door.

The society of the Troglodytes was numerous, and hierarchically organised. There were several orders of dignitaries. The proofs of this organisation are to be found in the three stations of the last epoch—the Eyzies, Lower Laugerie, and the Madelaine. They are large pieces of deer-horn, carved artistically, and designated in general terms under the name of "batons of command." These batons are numerous. Here are several, and you can see that they have a uniform type. Their whole surface is richly adorned with various drawings, representing animals or hunting scenes. They are less thick than wide, and the care that has been taken to diminish the thickness proves that they sought lightness rather than solidity. Then, again, the greater number, though not all, are pierced with large round holes, varying in number from one to four (see Figs. 19 and 20). The purpose of these very curious objects is still a disputed point, but most probably they were used as insignia. They indicate the sceptre, borne among the ancients, not only by the king, but by the chiefs of a less elevated rank. The dignity of marshal is to this day characterised by a baton. The batons of command are too numerous to allow of their being considered a sign of royalty. They are only signs of hierarchical distinction. The holes indicate the grade.

This superposition of grades or ranks, a sure sign of a numerous society, might doubtless be utilised in times of war, but it is very probable that it referred primarily to the appointment of hunting expeditions, for the chase was the essential element of public prosperity, and it was necessary to organise it systematically in order to secure food for the community.

Thanks to the organisation and administration of which we recognise the proofs, the society of Troglodytes, though numerous, lived in comfort. Food was sufficiently abundant to enable them to choose the best pieces, and reject those of an inferior quality. Thus, they despised the feet of animals, which nevertheless contain, in the bones and tendons, a remarkable quantity of alimentary matter. The destruction of dangerous animals had given security; the improvement in hunting had given abundance. It was no longer necessary for the entire tribe to devote their whole time, energy, and intelligence to the urgent necessities of daily life. They could rest occasionally. They could have leisure hours, and leisure, joined to intelligence, produces the arts.

(*To be continued.*)

## NOTES

THE names of fifty-three candidates which, in pursuance of the Statute, were read out at the meeting on Thursday last, is a proof that the desire to enter the Royal Society does not abate. Out of this large number the Council will, in April, select fifteen whom they will recommend for election; and the names of these will, as usual, be made known at the meeting of the Society on the first Thursday in May. The selection ought not to be difficult, notwithstanding that in perusing the names we mark not a few instances of misplaced ambition, and indications that an obvious misunderstanding as to the qualification for membership exists on the part of the candidates. It must not be forgotten that the Royal Society is *not* a kind of superior College of Surgeons or Physicians or Preceptors; in fact, that something higher even than the art of healing or teaching must be looked for, namely, research, and the enlargement of the boundaries of knowledge. As in the majority of cases non-election is inevitable, it is as well that the number should be large: disappointment is, thereby, reduced to a minimum. But here is the list, and our readers may judge for themselves. The election day is fixed for June 12. W. Aitken, M.D.; Sir Alexander Armstrong, K.C.B., M.D.; R. Stawell Ball, LL.D.; Rev. A. Barry, D.D., D.C.L.; E. Middleton Barry, R.A.; J. Beddoe, B.A., M.D.; I. Lowthian Bell; G. Bishop, F.R.A.S.; F. J. Bramwell, C.E.; W. Lawry Buller, Sc.D.; Capt. E. Kilwick Calver, R.N.; A. Carte, M.A., M.D.; W. Chimmo, Commander R.N.; H. Davies, M.D.; Henry Dircks; R. L. J. Ellery, F.R.A.S.; J. Fayrer, M.D.; P. Le Neve Foster M.A.; T. Minchin Goodeve, M.A.; L. D. Brodie Gordon, C.E.; Lt.-Col. J. A. Grant, C.B.; J. Eliot Howard; Rev. A. Hume, LL.D.; Edmund C. Johnson, F.R.C.S.; Lord Lindsay, F.R.A.S.; Clements R. Markham, C.B.; W. Mayes, Staff-Commander R.N.; E. J. Mills, D.Sc.; R. Stirling Newall, F.R.A.S.; G. E. Paget, M.D., D.C.L.; F. Polkinghorne Pascoe, F.L.S.; O. Pemberton, M.R.C.S.; Rev. S. J. Perry; J. A. Phillips, F.G.S.; W. O. Priestley, M.D.; C. B. Radcliffe, M.D.; A. Rattray, M.D., R.N.; E. J. Reed, C.B.; W. Chandler Roberts, F.C.S.; G. W. Royston-Pigott, M.A., M.D.; W. Westcott Rundell; Osbert Salvin, M.A.; Major-General H. Y. Darracott Scott, R.E., C.B.; J. Spiller, F.C.S.; Hon. J. W. Strutt; G. J. Symons, F.M.S.; Sir Henry Thompson, F.R.C.S.; E. T. Truman, M.R.C.S.; F. H. Wenham; Capt. C. W. Wilson, R.N.; H. Woodward, F.G.S.; Lieut.-Col. A. H. P. Stuart Wortley; J. Young, F.C.S.

M. BERTHELOT, the eminent chemist, has been elected a member of the French Academy.

THE reports of the Hunterian Lectures which appear in NATURE are not written by Prof. Flower.

THE Belgian Academy announces the following as subjects for prizes to be awarded in 1874:—1. To perfect in some important point, either in its principles or its applications, the theory of the functions of an imaginary variable. 2. A complete discussion of the temperature of space, based upon experiments, observations, and the calculus, stating the grounds for the choice made between the various temperatures which have been attributed to it. 3. A complete study, theoretic and, if necessary, experimental of the specific absolute heat of simple and compound bodies. 4. New experiments upon uric acid and its derivatives, principally in relation to their chemical structure and their synthesis. 5. (*a.*) A succinct critical *résumé* of existing observations of the *Mucedineæ*. (*b.*) The exact determination—applied to only a single species—of the part which is due, first, to the essential nature of the vegetable (its specific energy), and next to the external conditions of its development. (*c.*) A positive proof, or a satisfactory disproof, of the statement that the fungi of fermentation in certain circumstances, can be transformed into fungi of a higher class. 6. A paper on the Plutonic rocks, or those that are considered such, of Belgium and the French Ardennes, especially in relation to their composition. The prizes for Nos. 1, 4, and 5 will be a gold medal of the value of 600 francs; for No. 6, one of the value of 800 francs; and for No. 3, a medal worth 1,000 francs. The manuscripts, which may be in either French, Flemish, or Latin, must be sent to M. Ad. Quetelet, perpetual secretary, before August 1, 1874.

WE understand that Mr. F. J. M. Page, B.Sc., Assoc. R.S.M., F.C.S., has been appointed chemical assistant to the Brown Institution, under Dr. Burdon Sanderson. It is with much pleasure that we announce this, as it argues well for the attention which will be paid to physiological chemistry, a subject which of late years has received comparatively little attention in England.

AN examination for a Natural Science Scholarship for 60*l.* per annum will be held at Gonville and Caius College, Cambridge, on April 3 and 4. The subjects:—chemistry and experimental physics, zoology with comparative anatomy and physiology, botany with vegetable anatomy and physiology. The Scholarship is tenable for two years, but the tenure may be prolonged for another year if the Scholar sufficiently distinguish

himself in the annual College examinations. No person will be eligible who has commenced residence in the University, and the successful candidate will be required to enter his name at the College forthwith, and begin residence in October next. For further particulars apply to Dr. Drosier, Gonville and Caius College.

We have received from the Science and Art Department a thick pamphlet containing the prospectus of Sir Joseph Whitworth's Scholarships for mechanical science. These Scholarships are of the value of 100*l.* a year, and are tenable for three years, and the competition is open to all Her Majesty's subjects, at home, in India, and in the Colonies, who have not completed their 26th year, though we see that after the next examination (May 1873) the limit of age will be 22 years. Ten Scholarships will be competed for this year, at examinations which will be partly in practical workmanship, and partly in theoretical subjects. Those who desire detailed information, should procure a copy of the very full prospectus.

The examiners for the Burdett-Coutts Scholarship, Prof. Phillips, Prof. Odling, and Mr. E. Chapman, M.A., have recommended to the trustees for election, Mr. Edward Cleminshaw, Postmaster of Merton College. The Scholarship was founded by Miss Burdett Coutts for the promotion of the study of geology and of natural science as bearing on geology. The Scholarship is tenable for two years. Mr. Cleminshaw was placed in the first class by the examiners in the Natural Science School in December last. He received his Scientific training in the Applied Sciences department of King's College, London.

Mr. J. J. Taylor, of Giggleswick Grammar School, has been elected to the Junior Studentship in Natural Science at Christ Church, Oxford. This studentship is of the annual value of 100*l.* Mr. Taylor's scientific training has been under the direction of Dr. W. Marshall Watts, the Science Master of the School.

We understand that Mr. Osbert Salvin, F.Z.S., is about to return to his old collecting quarters in Guatemala for a short period. Mr. Salvin's valuable contributions to the fauna and flora of Central America are well known, but we trust that he will still be able to add to his former discoveries, extensive as they have already been.

The Russian Government has determined to send a scientific expedition with the military force to Khiva. It will leave in the course of the present month.

We have received a copy of the syllabus of a course of lectures on botany to be delivered in the Royal College of Science, Stephen's Green, Dublin, by Prof. W. R. McNab. It differs from most other similar courses of lectures in its arrangement, being closely modelled after Sachs's "Lehrbuch." Commencing at once with the morphology of the cell, it proceeds then to the morphology of tissues and the external morphology of plants; then to the special morphology of the various groups of Thallophytes, Characeæ, Muscineæ, Vascular Cryptogams, and Phanerogams; and finally to physiology. Though, perhaps, erring on the side of two great minuteness for a short course of lectures, it is admirable in its comprehensiveness and scientific arrangement.

Dr. David Moore, the Director of the Botanic Garden of the Royal Dublin Society at Glasnevin, has made a successful attempt to propagate the well-known parasite of the South of Europe, *Loranthus europæus*, on oak-trees in the gardens. This has frequently been attempted previously by horticulturists in this country and in Ireland, and Dr. Moore deserves great credit for the energy and perseverance with which he has carried his efforts to a successful issue. The common mistletoe, which is not a native of Ireland, has also been successfully introduced by Dr. Moore and others into that country, and is now rapidly spreading; and in the Botanic Gardens *Lathræa squamaria* and two species of *Orobanche* have also been permanently established, and six species of *Cuscuta* or dodder more transitorily.

Two fine plants, both from Moreton Bay, are at present objects of interest at Kew. The tree of *Araucaria Bidwilli*, in the temperate house, has produced cones for the first time in Europe. It was one of the two original plants brought to this country in 1842 by Mr. Bidwill, the other having been purchased for 100 guineas by the Duke of Northumberland. The Kew tree is about 26 ft. high, and its branches cover a circumference of about 60 ft. The seeds are very important articles of food to the aboriginal inhabitants, and the property of the tribes in individual trees of the Bunya-bunya is the only possession they have, and is the commencement of a communal system amongst them. *Dendrobium Hillii* is the principal feature in the orchid house. The large mass in flower has as many as twenty pale yellow racemes, some being as much as 2 ft. in length.

The Report of the Ashmolean Society for 1872 shows that a little more life has been infused into that society during the past year, though we think there is still considerable room for improvement, and hope that next year's report will be able to speak of a considerably greater amount of work of permanent value having been done. During the year 1872 the Society has held four General Meetings, at which the following communications have been received:—A paper "On House Temperatures," by Prof. Phillips; a note "On the Meteors of April 19, 1872," by Mr. Lucas; a paper "On the Breaks of Continuity in the Mean Daily Temperature in the months of April and May," by the Radcliffe Observer; a paper "On the Sulphur Compounds in Coal Gas, and the means of removing them," by Mr. A. G. Vernon Harcourt, F.R.S.; a paper "On the Flint-implement-bearing beds of St. Acheul," by Mr. James Parker; a paper by Mr. Heathcote Wyndham "On the Recent Eruption of Vesuvius," illustrated by oil paintings of sketches made by the author on the spot.

Mr. R. W. Thomson, C.E., the inventor of the road steamer, and a man in many ways remarkable, died at Edinburgh on the 8th inst., in the 50th year of his age.

The new strip of garden belonging to the Zoological Society on the north side of the Regent's Canal, is now being put into order. The bridge over the canal is already finished, and the new lodge opposite Primrose Hill only wants the entrance gates and turnstiles to make it complete. We understand that it will be open to the public on Easter Monday.

We see from a leader in the *New York Tribune* of February 26, that the astounding number of almost 200,000 copies of the three cent reprint of Prof. Tyndall's lectures on light has already been sold, and that orders are still pouring in for them from all parts of the States. The *Tribune* also publishes a large number of letters from people throughout the States asking the letters to be sent them, and justly praising the enterprise of the paper in so energetically and wisely meeting a wide popular want. It reminds one of the demands occasionally seen on this side of the water for the last sensation novel or the latest news of the most recent poisoning case. Such a wide-spread taste for *Light* literature of the stamp purveyed by the *Tribune* to its multitudinous readers, is a healthy sign, and bodes well for the future of the country among whose people it exists.

We have received a copy of a letter from Prof. Hayden, United States geologist, to his Government, asking a further appropriation of 100,000 dols. for the purpose of continuing the geological survey of the territories of the United States during the approaching season. His request is at once granted. For the coming season, the field of labour of the survey is to be

transferred to the eastern portion of the Rocky Mountain Range, in Colorado, and New Mexico.

GENERAL BANKS has introduced into the U. S. House of Representatives a resolution instructing the Secretary of the Navy to make an examination and survey of that section of the American isthmus which lies between Valencia Point and the Changenola River, on the Atlantic side, and the Boca Chica, the Rio Pedrigal, and the upper part of Golfo Dolce, on the Pacific side. This is to include an examination of the intervening country, of the two cordilleras, and exploration of the courses of the rivers from their outlets to their sources, within the above limits, for the purpose of ascertaining the possibility of such a connection as may be feasible for the construction of an inter-oceanic canal.

MISS HANNAH BRAKENBURY has, among other large legacies, left 12,500*l.* to the Owens College, Manchester, and 9,000*l.* to Durham University.

WE learn from the *Times of India* that Mr. Pogson, the Government Astronomer of Madras, has written a long letter to the local Government, suggesting that some special arrangements should be made for observations of the Transit of Venus in December 1874, in Northern India, independently of the Madras Observatory. The letter has been forwarded to the Government of India for consideration.

*Les Mondes* says that M. Calombel, Procureur-Général of Missions in China, after careful inquiry, gives it as his opinion that Shanghai is one of the most favourable spots for observing the forthcoming transit of Venus. The climate there is somewhat moist, but the month of December is in general very fine; and *Les Mondes* says that without doubt Shanghai will be the scene of M. Janssen's "third glorious campaign." Nankin is also a favourable station, but the inhabitants are not yet sufficiently accustomed to strangers, and the presence there of a scientific expedition might lead to a popular riot.

THE Chinese take a curious method to prevent their pigeons from being attacked by birds of prey while circling over the cities or moving from place to place. This consists in the employment of small, short cylinders of bamboo, arranged so as to form a whistle or reed pipe, in groups of three or four, or more. These are attached to the back of the bird, and so adjusted that as it flies through the air a very sharp sound is produced. Varying lengths of the bamboo give variety of tones to this instrument; and when a large number of birds are flying together in a single flock, as is very frequently the case, the sound produced by them is distinctly audible for a great distance. It is said that rapacious birds are effectively repelled by this precaution, so that the pigeons make their flights with perfect safety from one point to another. Varnish is used for coating these bamboo whistles to protect them from moisture This practice is said to have been in vogue among the Chinese for a great many years.

THE temperature of February of this year has shown some very curious peculiarities, and a marked contrast to that of the earlier part of the winter, as may be seen from Mr. Glaisher's tables of observations at Blackheath, published weekly in the *Gardener's Chronicle*. While, during the whole of the three preceding months there were only twelve frosty nights, with the temperature of the twenty-four hours almost uniformly above the average of the last fifty years, the thermometer fell below the freezing point in eighteen nights in February, and the temperature was below the average on every day except two, the total depression for the month being 4°·3 Fahr. The records of very few winters will show so high a minimum as 25°·0 Fahr., the lowest temperature of the past winter at Blackheath, which occurred on February 24 and 25, the thermometer falling below 30°·0 on only seventeen nights during the whole winter. Since March 2 the temperature has been again uniformly above the mean.

A VERY important extension of the work of the U.S. signal-office, as far as its system of weather telegraphy is concerned, is about to go into operation. It is proposed to call the post-offices of the country into requisition as intermediate agents for disseminating weather intelligence, for which purpose the territory east of the Mississippi has been divided into districts of about two hundred miles in extent each way, and each having a point of distribution near its centre, to which the "probabilities" will be telegraphed from Washington, and from which two copies of the report are to be sent to all post offices within the district which can be reached by mail as early as six o'clock P.M. each day. It is well known that country post-offices are the centres of intelligence to rural districts, and in order to afford the farmers in the community, especially, an opportunity of profiting by this information, postmasters receiving these despatches are to place a copy as soon as furnished in a conspicuous situation, where the public can see and read it.

*Apropos* of the correspondence going on in our columns on "Inherited Instinct," we take the following from the *Evening Standard* of March 8, though it would have been more satisfactory had the *Standard* named its authority for the statement:—During a recent gale the brig *Blue Jacket*, of West Hartlepool, from Rouen to Shields, was abandoned off Flamborough Head. The crew were taken off, but a cat was left on board. This cat had been given as a kitten to the captain twelve months ago by a lady named Mowbray, living at West Hartlepool, and had never been ashore since that time. On Wednesday last the cat made its appearance at Mrs. Mowbray's house, having swum ashore from the wreck, and travelled thence on foot. It was in a very emaciated condition.

DR. ELSNER, of Berlin, has found that iron is volatilisable at a temperature of at least 3000° centigrade. He experimented with a small piece at this heat, and on uncovering the crucible, distinguished small needles of crystallised iron, says *Les Mondes*.

WE are glad to note that *Ocean Highways* has been so successful that next month it is to be considerably increased in bulk, as also in price, the size of the page being at the same time, wisely, we think, somewhat reduced. It is to be hereafter published by Messrs. Trübner.

THE Japanese Government proposes to have an institution for the study of practical engineering, and have instructed their agents to procure a set of machinery and tools similar in all respects to that which the Crystal Palace Company last autumn constructed, for the purposes of their admirable school for practical engineering, under the supervision of Prof. Wilson, as Principal.

THE additions to the Zoological Society's Gardens during the last week include a puff adder (*Vipera arietans*), a horse-shoe snake (*Zamenis hippocrepis*), and a lacertive snake (*Cœlopeltis lacertina*) from Morocco, presented by Sir John Drummond-Hay, K.C.B.; a Rose Hill parakeet (*Platycercus eximius*), from N. S. Wales, presented by Mrs. Hewett; two Moorish tortoises (*Testudo mauritanica*), and three Spanish terrapins (*Clemmys leprosa*), from Algeria, presented by Mr. E. C. Taylor; a crested porcupine (*Hyrtrix cristata*), born in the gardens; a Malayan bear (*Ursus malayanus*), deposited; a pig-tailed monkey (*Macacus nemestrinus*), from Java; a white-cheeked monkey (*Cibus lunatus*), from Brazil; a talapoin monkey (*Cercopithecus talapoin*), and a pluto monkey (*C. pluto*), from West Africa; a Bonelli's eagle (*Aquila bonellii*), from Morocco; two canary finches (*Serinus canarius*), from the Canary Islands; and an Iceland falcon (*Falco islandus*); all purchased.

## SCIENTIFIC SERIALS

THE *American Naturalist* for February, among others, contains an article by Dr. Gill on "The Limits of the Class of Fishes," in which he endeavours to modify their generally accepted classification by dividing them up into two classes and three sub-classes, of equal significance with the reptiles and birds. The names he proposes are (1) Pisces; (2) Marsipobranchii; and (3) Leptocardii, which sufficiently indicate the genera he includes in each class. Such an amount of division we think excessive, and it would undoubtedly necessitate the removal of the crocodiles from the reptilia, among other changes. Mr. A. S. Packard gives an account of one of the beaks of a cuttle-fish, probably *Architeuthis dux*, which is four and a half inches long; he also describes other colossal specimens. There is a paper by Prof. Jordan on the colours of vegetation, one by Dr. Abbott on the habits of certain crawfish, and another by Dr. Foster on the pottery of the mound-builders, which is fully illustrated.

THE Munich *Zeitschrift für Biologie*, Bd. 8, Heft 4, contains the following papers of purely medical interest: on the occurrence of enteric fever in the Bavarian army, by Dr. Port, with charts of the mortality in the different barracks and of the amount of subsoil water; On the present state of the cholera problem, by Prof. von Pettenkofer; and on the processes of decomposition which result from venesection, by Dr. J. Bauer.

*Schriften der Naturforschenden Gesellschaft in Danzig*, New Series, vol. 3, Part I. The first paper in this publication of the Danzig Society is a contribution to primitive German history by Dr. Lissaicer of Danzig, being a very careful and elaborate monograph on some skulls found at Meisterswalde and Krissau, a short distance from Danzig. The paper is accompanied by some capitally executed photographs of the skulls. The next paper is also a contribution to the history of the early inhabitants of Pomerania, being a description by Herr Kasiski of the numerous and varied contents of some of the ancient graves which abound in the district around the village of Persanzig, on the river Persante, a short distance west of Neustettin. The district abounds with material for the archæologist. The paper is accompanied with numerous illustrations of the contents of the graves. The next paper is a long one by Dr. C. J. H. Lampe, of Danzig, on the Movement of Water in pipes, accompanied by some calculations as to the pressure and speed of the water in the pipes by which Danzig is now supplied with water from a considerable distance. This paper is also illustrated, as is also the last one, which is the fifth part of A. Menge's Catalogue of Prussian Spiders.

*Der Zoologische Garten* (Frankfurt a. M.), January 1873, contains an excellent article, with maps in illustration, of the geographical distribution of the Birds of Paradise, with which are included *Epimachus* and Ptiloris. There is also an article by Dr. H. Dorner on the tongue of the Ka-ka Parrot (*Nestor meridionalis*), in which he shows clearly that in structure it presents none of the characters of the *Trichoglossinæ*, and in other points his results quite agree with those read before the Zoological Society of London in June last, although he, following Dr. Finsch, does not feel disposed to remove this parrot from among those with trichoglossal tongues, because of a supposed similarity in their beaks, which we find it difficult to appreciate, the Ka-ka's being black and ribbed, whilst that of Lorius is smooth and with an orange tint. There is not the least doubt that, now it has been doubly demonstrated that their tongues are not similarly constructed, there is not any good reason for associating the Nestors with the Lories.

## SOCIETIES AND ACADEMIES

### LONDON

Royal Society, March 6.—"On the Vapour-density of potassium."—Preliminary notice. By James Dewar and William Dittmar.

The results of their observations conclusively show that the density of potassium-vapour, as produced in the process described, cannot exceed 45 times that of hydrogen, and that therefore the molecule of potassium consists of *two atoms* ($K_2$).

"On New Sources of Ethyl- and Methyl-Aniline." By John Spiller, F.C.S.

"On a new genus of Amphipod Crustaceans. By Rudolph von Willemoes-Suhm, Ph.D., Naturalist to the *Challenger* exploring expedition.

In lat. 35° 47′, long. 8° 23′, off Cape St. Vincent, the traw was sent down to a depth of 1090 fathoms on the 28th of Januaryl and brought up among other very interesting things a larg, transparent Amphipod with enormous facetted eyes. The animale evidently hitherto unknown, will be the type of a new genus, having the following characters:—

THAUMOPS, nov. gen.

Caput oblongum, inflatum, oculis maximis superiorem capitis partem tegentibus. Segmenta thoracica 6, abdominalia 5. Antennarum in feminis par unum, maxillarum par unum, pedum paria duo minima maxillarum locum tenentia. Mandibulæ nullæ. Pedes thoracici 5, abdominales 3 in quoque latere. Appendices caudales 4. Gangliorum pectoralium paria 5, abdominalium 3.

*T. pellucida*, n. sp.

Corpus longitudine 14 mm., latitudine 21 mm., pellucidum.

It could not be made out whether *T. pellucida* inhabits the deep sea, or whether it is, like *Phronima*, a pelagic animal, having been caught by the trawl only as the latter came up from the depth.

Geological Society, February 26.—Prof. Ramsay, F.R.S., vice-president, in the chair.—The following communications were read:—"On the Jurassic Rocks of Skye and Raasay," by Dr. James Bryce. In this paper the author described numerous sections of Jurassic rocks exposed chiefly in the sea-cliffs of Skye and Raasay, indicating the presence in those islands of a complete series of beds ascending from the Lower Lias to the middle of the Middle Oolite. He noticed the occurrence in these sections of fossils belonging to the zones of *Ammonites angulatus* and *A. Bucklandi* in the Lower Lias, to the zones of *A. Jamesoni*, *A. capricornus*, *A. margaritatus*, and *A. spinatus* in the Middle Lias, of Upper Lias fossils, including *Ammonites communis*, *falcifer*, *heterophyllus*, and *bifrons* and of others indicating beds belonging to the Inferior Oolite and Cornbrash, and to the Oxford Clay. The Loch Staffin beds were described as an estuarine series, nearly approaching the Oxford Clay in geological age, and including a bed almost entirely made up of shells of *Ostrea hebridica*. The whole series of Jurassic rocks in these islands reposes on the Toridon sandstone of Cambrian age; and the author discussed the question whether or not the intervening beds have ever existed in this locality, and came to the conclusion that they probably existed, and have been swept away by denudation. He remarked further upon the resemblance in lithological characters of the beds described with the corresponding deposits elsewhere in Britain. The traprocks intruded between the Jurassic deposits he regarded as of post-oolitic date.—"Observations on the more remarkable Boulders of the North-West of England and the Welsh Borders," by Mr. D. Mackintosh. In this paper the author described the situation and indicated the probable origin of many of the more striking known boulders in Westmoreland, Cumberland, Lancashire, Cheshire, and on the borders of Wales. The northern boulders seem to have orignated chiefly from Wastdale Crag, Criffel, Ennerdale, and Eskdale; those of Cheshire chiefly from the Lake District and South of Scotland; and many of those on the Welsh borders from the mountains of Wales. Many of the boulders noticed by the author exhibit glacial striæ. The author also especially referred to the occurrence of boulders at high levels.

Linnæan Society, March 6.—Mr. Bentham made some observations on the homology of the perigynium or utricle of the female flowers of Carex and Uncinia, with a view to calling to the disputed points in question the attention of botanists used to microscopical investigation, who may have the opportunity of examining living specimens in the earliest stages of flowering. Two principal explanations of the homology of the perigynium of Carex have been given. Brown, relying upon its being composed of two squamæ, considered that it represents a perianth, and Payer and Schleiden have adopted the same view, after an examination of its appearance at a very early stage. Kunth, on the contrary, believed it to be formed of a single scale, and to be an ordinary glume subtending the female flower on a secondary axis, of which the seta of many species of Carex, and of

all the species of Uncinia, is the continuation. If the perigynium is really formed of a single scale, Kunth's view is very plausible, but the two keels or principal nerves, which in most species end in two points or lobes, are strong evidences of its double nature. Kunth explains that circumstance by the suppression of the central nerve or keel owing to pressure, of which, however, there is no appearance in any species examined. Payer states also positively that the two are distinct at an early stage, and unite as they grow up; but implicit reliance is not always to be placed upon his having always clearly seen the minute microscopic and obscure protuberances he delineates. Schleiden delineates the two parts of the perigynium and the seta as forming three parts of one whole; but his drawing is not to be depended upon, as he places them in a wrong position with relation to the axis and the subtending glume. Kunth confirms his views by a comparison with the palea and occasional seta of Gramineæ, but here the position of the two parts in the two orders is by no means homologous. Independently of the relation to the other parts of the flower, the seta or prolonged axis in Gramineæ is outside the paleæ, in Carex inside the perigynium. A stronger confirmation is taken from two South African species of Schœnoxiphium (not generically distinct from Carex) in which the seta occasionally bears a spike of male flowers. This spike appears to be sterile, and may be a case of prolification, but requires further investigation. If it be a normal spike, we must conclude the perigynium or subtending glume to be formed of one scale; for two opposite scales at the base of an alternate inflorescence is a derangement of the ordinary course of change from the alternative vegetative organs to the opposite or whorled floral organs, which is believed to have no example at least in Monocotyledons. If the perigynium is formed of two scales they must belong to the floral whorls. They are not subtending bracts analogous to the two free bracts of Diplacrum, or the united ones of Hoppia, for in both those cases the female flowers are terminal without any other subtending glume, and in Carex the female flower is lateral, and the perigynium is within one outer subtending glume. That they are two out of three parts of a real perianth is rendered improbable by their great development in one sex in an order where it is in all other genera suppressed or rudimentary, and without any trace of it in the other sex. The only remaining supposition is that the perigynium and seta represent the stamens of the male flowers, and are therefore in fact staminodia. The position with relation to the axis and subtending glume is the same, and although they are very different in form and texture, that difference is much diminished in *Uncinia longifolia* where the dilated filaments of the males assume the aspect nearly of the perigynium of the females. The lobes of the perigynium in *Carex subulata*, and occasionally in some Unciniæ, have the look of the seta of Uncinia, and in one instance that seta bore a perfect anther. Brown confirmed his view of the perianth-nature of the perigynium by a specimen of *Carex acuta* with stamens within the perigynium. An examination of beautiful specimens of this form of *Carex acuta*, gathered by Mr. Spruce in Yorkshire, shows, from the position and structure of the stamens bearing perigynia, that they are altered female flowers in which more or less imperfect stamens replace the carpellary leaves of which the pistil is formed. If this homology of the perigynium with the androecium of the male flower is thought plausible, it is still doubtful, and the doubt can only be solved by a careful repetition of Payer's observations, and a repeated study of the anomalies of Schœnoxiphium, and of those species of Carex in which the seta is variously developed, many of the forms delineated in the late Dr. Booth's splendid illustrations of the genus requiring a special study on the specimens themselves.

Zoological Society, March 4.—Mr. John Gould, F.R.S., V.P., in the chair.—Mr. Edwin Ward exhibited the original leg-bones of *Dinornis maximus*, from Glenmark Swamp, near Christchurch, New Zealand, described by Prof. Owen in the Society's "Transactions," belonging to Col. Michael.—A communication was read from the Rev. O. P. Cambridge on the spiders of St. Helena, founded on the collections made in that island by Mr. Melliss. The total number of known spiders of St. Helena was stated to be forty, of which eleven were now described for the first time. The species were mostly European in form.—A communication was read from Dr. John Anderson, F.Z.S., Curator of the Indian Museum, Calcutta, on the species and dentition of the Southern Asiatic Shrews, preliminary to a proposed monograph of the group.—A communication was read from Mr. M. R. Butler, being the description of a remarkable new species of butterfly, of the genus *Tanaëcia*, from Penang.—Messrs. P. L. Sclater and O. Salvin read a paper on the birds of Eastern Peru, with notes on the habits of the birds by Mr. E. Bartlett. The total number of species hitherto recorded as met with in the district was stated to be 473, of which 108 were unknown elsewhere.—A communication was read from Surgeon-Major Francis Day on some new or imperfectly known fishes of India.—A communication was read from Mr. G. E. Dobson, M.B., on secondary sexual characters in the Chiroptera. Mr. Dobson pointed out that, contrary to what Mr. Darwin had believed to be the case, special structural characters existed in the males of species of the genera *Phyllorhina Taphozous*, and other genera of bats.

Anthropological Institute, Feb. 18.—Prof. Busk, F.R.S., president, in the chair. Sir John Lubbock, Bart. exhibited two heads of Macas Indians, and contributed a note of the mode of their preparation. Mr. W. Topley read a paper "On the Relation of Parish Boundaries in the south-east of England to Great Physical Features, particularly to the Chalk Escarpment."

March 4.—Prof. Busk, F.R.S., president, in the chair.—A paper was read by Dr. A. Campbell "On the Looshais," a people inhabiting the hill district of Chittagong. They are fairer in complexion than the people of the plains, and their features resemble those of the Malays rather than the Tartar-like people of Mumpore. They have no distinction of caste; marriage is a civil contract, dissolvable at the will of both husband and wife. The men live by hunting, whilst the women are engaged in household work.—Sir Duncan Gibb read a paper on "Stone Implements and Pottery from Canada." After describing a collection of arrow and spear heads, some hatchets, and pottery collected by himself in various parts of Canada, he considered the first two as the most ancient implements found in that country, for reasons which he gave, and placed the period of their use at about 200 B.C., although he saw no reason why they might not have been employed 4,000 years ago.—Mr. Hodder M. Westropp contributed a short paper on "The Ventnor Flints," descriptive of fragments of flint and other stone, bearing resemblances to the true arrow-heads and implements of ancient manufacture; and it was shown that the specimens exhibited were wanting in the bulb of percussion and the chipping at the edge which characterised the genuine articles.—The President described an Australian skeleton from the Murray River, which had been sent to the museum of the institute by Dr. Robert Peel, of Adelaide. It was announced that further committees had been appointed for Physical Characters of Mankind; Priscan Archæology; and Descriptive Ethnography.

Chemical Society, March 6.—Dr. Gladstone, F.R.S., vice-president, in the chair. The following communications were read: "On the action of hydrochloric acid on codeine," by Dr. C. R. A. Wright, being a continuation in the codeine series of the author's former researches on morphine. "On new processes for mercury estimation with some observations on mercury salts," by J. B. Hannay. "On a method of estimating nitric acid," by T. E. Thorpe, F.R.S.E., the process depending on the ease with which nitric acid is converted into ammonia by the copper-zinc couple of Messrs. Gladstone and Tribe. "Note on a reaction of the acetates upon lead salts with remarks on the solubility of lead chloride," by F. Field, F.R.S. "Observations on the nature of the black deposit in the copper-zinc couple," by J. H. Gladstone, F.R.S. and A. Tribe, F.C.S. "On an air-bath of constant temperature between 100° and 200° C.," by Dr. H. Sprengel. This consists of a bath similar to the ordinary chemical hot-water oven but made of sheet-lead and filled with dilute sulphuric acid of such a strength as to boil at the desired temperature.

Entomological Society, Feb. 17.—Prof. Westwood, president, in the chair.—Mr. Bond exhibited bred specimens of *Acronycta tridens* and *A. Psi*, showing the differences between the two species.—Mr. Müller exhibited some spiral cases of a species of *Psyche*, and also the egg-case of a species of *Mantis*, both sent from Calcutta by Mr. James Rothney.—Prof. Westwood exhibited two dipterous larvæ preserved in spirits, discharged by a woman in a clot of phlegm, which were probably larvæ of *Psila rosæ*, swallowed with raw carrots. After they had been immersed in spirits for three or four days he took them out for examination, and was surprised to find that they were still alive. He also showed drawings of vine-stems, with excrescences caused by a beetle (*Otiorhynchus*).—Mr. H. W. Bates read a paper on the geodephagous beetles of Japan, col-

lected by Mr. George Lewis.—Mr. Müller read a list of entomological works and papers, no notice of which was to be found in Dr. Hagen's "Bibliotheca Entomologica."—Mr. F. Smith read some remarks by Prof. Siebold, on the salivary organs of the honey-bee.

March 3.—Prof. Westwood, president, in the chair. Mr. Vaughan exhibited a box containing about 200 specimens of Japanese *Lepidoptera* collected by Mr. Henry Pryer, near Yokohama.—Mr. T. Smith exhibited insects bearing a remarkable resemblance to each other, although belonging to different orders. *Euglossa dimidiata*, a bee, had a striking resemblance to a species of the Dipterous Genus *Asilus* from South America. Also *Abispa splendida*, one of the *Vespidæ*, resembled an insect of the Dipterous genus *Laphria*; both from N. Holland. Also a bee of the genus *Megachile* resembled an *Asilus*. The two last-mentioned resembled each other, not only in general appearance, but the *Asilus* was also furnished on the under side with a pollen brush, in the same manner as in *Megachile*, although it was not apparent for what purpose the insect required it. The president remarked that when he was at Ancona he observed several insects of the genus *Osmia* and *Megachile* extracting pollen from black poppies, and on the sandy shore he noticed the same insects collecting the sand. He therefore concluded that the pollen brushes were used, not only for collecting the pollen, but also for carrying the grains of sand to their nests. It was probable, therefore, that the *Asilidæ* that were furnished with brushes might use them for a similar purpose. Mr. Champion exhibited *Bagous brevis*, taken in this country for the first time by Dr. Power.—Mr. Müller directed attention to an article in the *Petites Nouvelles* explaining a method of obtaining silk from cocoons which had been eaten through by the insects—and that the silk so obtained from the damaged cocoons was equal in quality to that obtained from the perfect cocoons.

**Royal Horticultural Society**, March 5.—Scientific Committee.—J. D. Hooker, M.D., C.B., F.R.S., in the chair. A note was read from Dr. Boswell Syme on the intra-palear fertilisation of wheat. He found that the anthers are *empty* when they are extended, and that the stigmas are never extended beyond the pales at all.—Mr. A. W. Bennett read an abstract of a paper by Hildebrand, on the same subject.—The Rev. M. T. Berkeley exhibited specimens of a fungus, *Cladosporium herbarum*, from the inner surface of the shell of a boiled egg.—General Meeting.—W. Wilson Saunders, F.R.S., in the chair. Prof. Thiselton Dyer made some remarks on a cone of *Araucaria Bidwilli* from the tree in the temperate house at Kew, on specimens of *Dendrobium Hillii* and *Clematis indivisa*, a fine species from New Zealand, and also on *Amorphophallus Rivieri*, a remarkable Aroid with inflorescence, shown by Mr. Bull. It had been introduced by the French into the Jardin d'Essai at Algiers, from Cochin China.

**Royal Microscopical Society**, March 5.—Chas. Brooke, F.R.S., president, in the chair. Mr. E. J. Gayer contributed some further notes on the micro-spectroscope and microscope, in continuation of his paper upon the same subject, read at the December meeting of the Society.—A paper by Dr. Maddox, on a minute plant found in an incrustation of carbonate of lime, was also read to the meeting, and was illustrated by drawings and prepared specimens exhibited under the microscope, by Mr. Reeves.—The secretary stated, with reference to some crystals shown at the previous meeting, obtained from the condensed vapour of coke, that they had been examined by Mr. Bell, and found to consist chiefly of protosulphate of iron.—A new metallic chimney for microscope lamps was introduced by Mr. Wenham, its merits being explained by the secretary, and discussed by the meeting.

### CAMBRIDGE

**Philosophical Society**, Feb. 3.—Professor Humphry, president, in the chair. It was decided to admit as associates residents in Cambridge and the neighbourhood, not being graduates. Associates to be elected for a period of three years, and if not then graduates to be eligible for re-election. The president in an eloquent address dwelt upon the loss which the Society had sustained by the death of Prof. Sedgwick, its founder and ever-ardent supporter. The following communications were made by Prof. Clerk Maxwell: "On the proof of the equations of motion of a connected system," and "On a problem in the calculus of variations in which the solution is discontinuous."

Feb. 17.—The following communications were made by Mr. Paley "On the name *Odusseus* signifying 'setting sun,' and the Odyssey as a solar myth." This showed that the name was most probably connected with δυόμενος ἥλιος (setting sun) and that the details of the Odyssey were easily interpreted as a solar myth, describing the journey of the sun to the west and his return after many struggles and adventures to his ever-young bride in the east, Penelope the spinstress, *i.e.* the cloud-weaver.—"On the identity of the modern Hindu with the ancient Greek ship." A model of the former (Bengalee) was exhibited and the close coincidence in build, rig, and tackling was pointed out; and several difficulties in the allusions of classic authors to the parts of a ship were thus explained.

### MANCHESTER

**Literary and Philosophical Society**, Feb. 18.—E. W Binney, F.R.S., vice-president, in the chair. Dr. Joule, F.R.S., gave some further account of the improvements he had made in his air-exhausting apparatus (See NATURE, vol. vii. p. 296). "Notes on a supposed Glacial Action in the Deposition of Hematite Iron Ores in the Furness District," by William Brockbank, F.G.S. The hematite iron ore deposits in the Furness district are of two very different varieties—(1) Those filling hollows in the limestone, covered only by the post tertiary gravels and clays, and (2) Those occurring in the carboniferous limestone in veins, and large irregular cavities or "pockets." The superficial deposits (1) are more especially the subject of the present communication, as they afford, in the writer's opinion, undoubted evidence of glacial action, and of the mode in which the iron ore has been transported by its agency. "The Results of the Settle Cave Exploration," by W. Boyd Dawkins, F.R.S. Since the results of the exploration of the Settle Caves were brought before the British Association at Liverpool, in 1870, considerable progress has been made in the further investigation of the remarkable contents of the Victoria Cavern. Up to that time our researches had revealed, perhaps, the most remarkable collection of enamelled jewellery which had ever been discovered in one spot, along with broken bones of animals and the implements of everyday life, which afforded a pointed contrast to the culture implied by the workmanship of the articles of luxury. The Roman coins, and the style of workmanship of the implements, pointed out that the cave was occupied during the troublous times when the Roman Empire was being dismembered by the invading barbarians, and when Britain, stripped of the Roman legions, was falling a prey either to the Picts and Scots on the one hand, or to the Jutes, Angles, and Saxons on the other. If we stretch the limits of the occupation to the latest, they cannot be held to extend nearer to our own times than the Northumbrian conquest of Elmet (or kingdom of Leeds and Bradford) by Eadwine, in the year A.D. 616, that was preceded in 607 by the march of Æthelfrith on Chester, and the great battle near that Roman fort, celebrated in song for the defeat of the British and the slaying of the monks of Bangor. At that time the Northumbrian arms were first seen on the shores of the Irish Channel, and the fragment of Roman Britain—which had extended on the western part of our island, from the estuary of the Severn uninterruptedly, through Derbyshire and Lancashire into Cumberland—was divided, never again to be united. The Roman civilisation, which had up to that time been maintained in that district, disappeared, and was replaced by the civilisation which we know as English. The traces, therefore, of Romano-Celtic ornaments and implements from the Victoria Cave must be assigned to the period before the English conquest, before the Northumbrians conquered West Yorkshire and Mid-Lancashire. Underneath the stratum containing the Romano-Celtic or Brit-Welsh articles, at the entrance of the cave, there was a thickness of about six feet of angular stones, and at the bottom of this a bone harpoon or fish-spear, a bone bead, and a few broken bones of bear, red deer, and a small short-horned ox prove that in still earlier times the cave had been inhabited by man. A few flint flakes probably imply that these remains are to be referred rather to the Neolithic age than to that of Bronze. Below this was a layer of stiff clay, into which the committee sank two shafts, respectively of twelve and twenty-five feet deep, without arriving at the bottom. They have, however, at last penetrated it, and have broken into an ossiferous bed, full of the remains of extinct animals, similar to those which have been discovered at Kirkdale and elsewhere; consisting of the cave-bear, cave hyæna, woolly rhinoceros, mammoth, bison, reindeer, and horse. The bottom has not been reached, and the area exposed is so small that it is impossible to say whether man was

living in the cave at this time or not. The clay immediately above it is considered, both by Mr. Boyd Dawkins and Mr. Tiddeman, to be of glacial origin, and in that case this cave is the only one in Great Britain which has offered clear proof that this group of animals was living in the country before the glacial age. It may be that the remains of man may be discovered here, as in the caves of Wookey Hole, Kent's Hole, and Brixham; but this problem can only be solved by an exploration on a larger scale, which the committee hope to be able to carry on by the aid of further subscriptions, and which the British Association has thought sufficiently important to aid by a grant of 50*l*. The problem which they are attempting to solve, is not merely of local interest, but one which is worthy of the aid of all who care for the advancement of knowledge. "The explorations of the Victoria Cave," writes Mr. Tiddeman, "carry with them more than common interest, from the probability of making out in this district the relation of the older cave mammals (and perhaps of man) to the Glacial period. The complete absence of this fauna from the river gravels and other Post-Glacial deposits of this district, taken with the former existence of a great development of ice over the northern counties, renders it highly probable that the latter was the agent which removed their remains from all parts of the country to which it had access, leaving them only in sheltered caves. In this cave we find, above the beds containing the older fauna, a deposit of laminated clay of great thickness, differing so much from the cave-earth above and below it as to point to distinct physical conditions for its origin. Clay in all respects similar, but containing scratched stones, has been found intercalated with true glacial beds in the neighbourhood, thus rendering the glacial origin of that in the cave also highly probable. Moreover, at the back of a great thickness of talus at the entrance glaciated boulders have been found, resting on the edges of the beds of lower cave-earth containing the older mammals. All points considered, there is strong cumulative evidence pointing to the formation of the lower cave-earth at times at any rate prior to the close of the Glacial period and probably earlier. It is to be hoped that further investigations may settle these and other most important questions." The objects found in the Victoria Cave will not be removed from the county, but will be placed in a museum attached to the Grammar School at Giggleswick.

### Dublin

**Royal Irish Academy**, Jan. 13.—The Rev. Prof. Jellett, president, in the chair. Mr. B. O'Looney read a paper on the contents of the Book of Leinster.—Mr. W. H. Bailey, F.G.S., read a paper on a new species of Labyrinthodont Amphibian from Jarrow Colliery, Co. of Kilkenny. This species the author said was, he believed, identical with the species referred to in Messrs. Huxley and Perceval Wright's paper on fossil vertebrata from County Kilkenny, as being "a large amphibian, closely allied to, if not identical with, the *Anthracosaurus* of the Scotch coalfield," and of which he had been shown some very fine specimens in the British Museum. He proposed to call this species *A. edgii*.

Jan. 27.—Rev. Prof. Jellett, president, in the chair. Prof. E. Perceval Wright read a report on *Hyalonema mirabilis*.

Feb. 24.—Lord Talbot de Malahide, vice-president, in the chair. The Rev. Prof. Jellett, president, read a paper on sugar-beet grown in Ireland in 1872, in which he stated that, having frequently heard it said that Ireland was not a country in which the beetroot could be successfully cultivated, he had been led to make several experiments on the subject. The results in 1871, which was a dry and sunny year, and those he had obtained in 1872, which was one of the wettest and coldest, presented very little difference. He had been furnished last year from the Albert Model Farm, Glasnevin, with four specimens of sugar-beet, in the growth of one of which the manure used was common salt; in the second case, sulphate of potash; in the third case no manure was used; and in the fourth instance, sulphate of ammonia. He had by optical experiment determined with accuracy that in the first case there was a yield of 79·99 per cent. of water and 12·72 per cent. of sugar; in the second, 80·27 of water and 13·18 of sugar; in the third, 80·60 water and 12·42 sugar; and in the last, 80·52 water and 11·85 sugar. The average of these was 80·34 per cent. of water and 12·54 per cent. of sugar. The amount of sugar thus found to be contained in the Irish-grown beet was quite equal to that in beet grown in Germany, Belgium, and France, and proved Ireland to be a country in which sugar-beet might be cultivated with advantage.

### Edinburgh

**Scottish Meteorological Society**, Jan. 30, half-yearly meeting.—Mr. Milne Holme in the chair.—Mr. Buchan made a statement with reference to the remarkable weather which has prevailed in this country during the past year. The specialty of that year's weather was, he said, its rainfall. The mean rainfall for sixteen years of the whole of Scotland, as indicated by the average of 55 stations, was 39, 1-5th in. The year 1857 was a dry year, its rainfall being 8 in. less than the mean; 1858 fell below the mean by 5 in.; 1861 was 6 in. above the mean; but the rainfall of last year ran up to 15 in. above the mean, the average rainfall of the whole of Scotland during that year being 54 in. This rainfall was 38 per cent. above the mean, and there was nothing approaching it in any of the previous sixteen years. This enormous rainfall was very unequally distributed over the country. He had constructed a map of Scotland based upon the returns from 200 stations. In this map a blue line passing round the north of the Shetland Islands, cutting off the north-west fringe of Caithness and Sutherland, and then bending down southward, but returning northward again so as to pass round the north of the Hebrides, cut off a part of Scotland within which there was last year less rain than usual. Between this and another line which stretched from Shetland, took in part of Orkney, curved down round Islay, and took off a part of the Hebrides, was included a portion of the country where the rainfall did not amount to 25 per cent. above the average. Then suppose a line beginning about Peterhead, curving round so as to include Elgin, and following very closely the east watershed of Scotland, all places to the east of that line were found to have had at least half more rain than usual. Further, the country about Aberdeen and a good part of East Lothian and Berwickshire had an excess above the average to the extent of 75 per cent. Not only so, but taking some of the individual stations, it appeared that Culross, the highest the society had, stood 93 per cent. above the average; Thurston, near Dunbar, 88 per cent. above the average of thirty-two years; Jedburgh, 84 per cent. above the average; and other places fully 80 per cent. above the average. These figures showed a very remarkable distribution of the rainfall for the last year; he thought the records of meteorology had nothing like it. In Castle Gordon, Banffshire, the rainfall of last year was $5\frac{3}{4}$ in. above any rainfall in the previous ninety years. At Edinburgh there were sixty years' observations to go back upon, and last year's rainfall exceeded to the extent of over 4 in. any recorded within that period. With reference to the distribution of rain over the year, the fall in January was greatly in excess of the average, and it only fell below the average in April, every other month showing an excess. On the east side of Scotland, taken as a whole, every month of last year was above the average—an unprecedented fact, he thought, in Scottish meteorology. In the west of Scotland, one month was decidedly under the average, and another month stood at the average, every other month being above the average. June was a very wet month in the west. August was a drier month. September appeared rather wet, but that was due to the greater rainfall in the south, for to the north of Islay the rainfall of that month was very much under the average. As to temperature, for the first four months it was above the average; in May and September very much under the average; June about the average; July above the average, and so on; so that in this respect the year was not on the whole a very bad one. With regard to barometric pressure, he had worked out the mean of 55 stations, and it appeared that for every month, except July and August, the pressure of Scotland was under the average. Northerly, north-easterly, easterly, south-easterly, and southerly winds were above the average; and the distribution of rain was the representative of that fact, a great proportion of the rain that fell having been brought by easterly winds. The atmospheric pressure in Iceland was above the average in every month except January, and during the whole year the pressure in that island was much higher than with us. In the north of Norway the pressure was still higher than in Iceland, and showed a more irregular curve. Following out this point in other parts of Europe, it appeared that in England the pressure was under the average; in Guernsey it was under the average each month, and a similar state of matters prevailed in Ireland, France, Switzerland, Germany, and Austria. On he other hand, in Iceland, the northern part of Norway and Sweden, in Russia, at Constantinople, at Athens, at Moscow, in the north of Africa, and in Spain, pressure was above the average, and the rainfall for the year less than the average. So far as the facts

went it did not seem to him that the rainfall of the whole globe during last year was larger than usual. In the West Indies it was a very dry year up to the beginning of November. In the United States, at least till the end of September, it was drier than usual, and in the north of Europe much drier than usual. In short it seemed that the rainfall of the year instead of being more evenly distributed, as usually happened, had been more concentrated in Scotland, England, France, Italy, south of Norway, Germany, and Austria.

### PARIS

**Academy of Sciences**, March 3.—M. de Quatrefages, president, in the chair.—The following papers were read:—"On the Elliptical Oscillation of Solar Cyclones," by M. Faye. The paper dealt mainly with the mathematical nature of the spots, and the author gave a table in which he showed the exact resemblance which can be traced between the solar and terrestrial cyclones.—"On the Action of the Electric Current on a Mixture of equal volumes of Methene and Carbonic Anhydride," by MM. P. and A. Thenard. The authors find that the silent discharge, when allowed to act on the above mixture, produces a clear, limpid fluid, but that the spark causes an expansion of the gases sometimes accompanied by a deposit of carbon. No analysis of the liquid was given.—"On the Nature and Origin of the Solar Spots," a letter from Father Secchi, who believes that, even admitting M. Faye's cyclones, yet the cause of these must be sought in eruptions. He asserts that he did not say, as M. Faye supposed, that the spots *were* eruptions, but that they were *produced by* eruptions.—The Academy then proceeded to elect a member of the physical section in the place of the late M. Duhamel. M. Berthelot obtained 33 votes, M. Desains 23, and M. Le Roux 4. M. Berthelot was accordingly elected.—A report on a memoir by M. Kretz on the elasticity of moving machines was read.—A paper on the botanical geography of Morocco, by M. F. Cosson, followed; and next came a paper on geodetic operations, by Col. H. Levret, and one on the simultaneity of barometric variations in the high latitudes of either hemisphere, by M. J. A. Broun.—M. B. Renault presented a paper on the fructification and on the structure of the stems of *Annularia* and *Sphenophyllum*.—M. Chasles presented a paper on the trajectories of the points of a straight motion in space, by M. A. Mannheim, and a note on double curves of the sixth order, by M. Ed. Weyer.—M. L. Joulin sent a paper on saline decomposition, a paper relating to the part played by the water used to dissolve a body, when that body is precipitated by means of another.—MM. Troost and Hautefeuille sent a second instalment of their paper on the solution of gases in molten cast-iron. They find that a highly silicious iron scarcely dissolves any hydrogen.—M. Gernez presented another paper on the action of films on supersaturated solutions.—M. Pasteur presented a paper by M. J. Chautard, on the modification of the chlorophyll absorption spectrum, produced by the action of alkalies. The alkalies cause the appearance of a second band in the red.—MM. Houzeau and Renard presented a paper on the use of concentrated ozone in investigations in organic chemistry, and on "ozobenzine." The latter is a gelatinous body produced together with formic and acetic acids by the action of ozone on pure benzine.—Mr. T. L. Phipson sent a note on Anthracenamine.—M. Wurtz presented a second note on the derivatives of Tetrachloride of naphthaline, by M. Grimaux.—This was followed by M. P. Bert's ninth note on the effects of changes of barometric pressure on life. MM. P. Fischer and de Tolin sent a note on the bathymetric exploration of the fosse at Cape Breton, and M. J. Jullien a note on the respiration of the *Psammodroma*.

## DIARY

*THURSDAY*, MARCH 13.

ROYAL SOCIETY, at 8.30.—Note on Supersaturated Saline Solutions: C. Tomlinson.—Visible Direction: Dr. Jago.

SOCIETY OF ANTIQUARIES, at 8.30.—Excavations in the Troad: Dr. Schliemann.

LONDON MATHEMATICAL SOCIETY, at 8.—On an Extension of the term *Area* to a closed curve of double curvature or Skew Polygon: R. B. Hayward.—On the Evaluation of a class of Definite Integrals involving Circular Functions in the Numerator, and powers of the Variable only in the Denominator: J. W. L. Glaisher.—Note on Normals and the Surface of Centres of an Algebraical Surface: S. Roberts.

ROYAL INSTITUTION, at 3.—Forces and Motions of the Body: Prof. Rutherford.

*FRIDAY*, MARCH 14.

ROYAL INSTITUTION, at 9.—Coral Reefs and their Architects: Prof. Allman.

ASTRONOMICAL SOCIETY, at 8.

QUEKETT CLUB, at 8.

ROYAL COLLEGE OF SURGEONS, at 4.—Extinct Mammals: Prof. Flower.

*SATURDAY*, MARCH 15.

ROYAL INSTITUTION, at 3.—On the Philosophy of the Pure Sciences: Prof. W. K. Clifford.

*SUNDAY*, MARCH 16.

SUNDAY LECTURE SOCIETY, at 4.—The Education of Women: Mrs. Fawcett.

*MONDAY*, MARCH 17.

ENTOMOLOGICAL SOCIETY, at 7.

ASIATIC SOCIETY, at 3.

LONDON INSTITUTION, at 4.—Physical Geography: Prof. Duncan.

ROYAL COLLEGE OF SURGEONS, at 4.—Extinct Mammals: Prof. Flower.

*TUESDAY*, MARCH 18.

STATISTICAL SOCIETY, at 7.45.

ANTHROPOLOGICAL SOCIETY, at 8.—On "Theories regarding Intellect and Instinct," and "The Concurrent Contemporaneous Progress of Renovation and Waste: George Harris.

ZOOLOGICAL SOCIETY, at 8.30.—On some Marine Mollusca from Madeira, including a new genus of the *Muricidæ*. Communicated by Mr. Gwyn Jeffreys: R. B. Watson.—On a specimen of *Acanthias vulgaris* and a species of *Galeus*, probably new, taken off Flinder's Island, Bass' Straits: Dr. John Denis Macdonald.—Note on the Gazelles of India and Persia, with description of a new species (*Gazella fuscifrons*): W. T. Blanford.

ROYAL INSTITUTION, at 3.—Forces and Motions of the Body: Prof. Rutherford.

*WEDNESDAY*, MARCH 19.

SOCIETY OF ARTS, at 8.—On certain improvements in the Manufacture of Printing Types: J. R. Johnson.

METEOROLOGICAL SOCIETY, at 7.—On some results of Meteorological Telegraphy: R. H. Scott.—On the Barometric Depressions of Jan. 24, 1872: Wm. Marriott.

ROYAL COLLEGE OF SURGEONS, at 4.—Extinct Mammals: Prof. Flower.

LONDON INSTITUTION, at 7.—Travers Course (Lecture I).

*THURSDAY*, MARCH 20.

ROYAL INSTITUTION, at 3.—The Chemistry of Coal and its Products: A. V. Harcourt.

CHEMICAL SOCIETY, at 8.—On Iron and Steel: C. W. Siemens.

LINNEAN SOCIETY, at 8.—On the "Take-all" Corn Disease of Australia: Dr. Mücke.

## PAMPHLETS RECEIVED

ENGLISH.—Report of the Marlborough Natural History Society.—Journal of the Iron and Steel Institute, No. 4.—Quarterly Journal of the Meteorological Society.

AMERICAN.—Annual Report of the Survey of the Northern and North-Eastern Lakes: C. B. Comstock (Washington).—Movable Torpedoes: Capt. Ericsson.—On a new Sub-Class of Fossil Birds.—On the Gigantic Fossil Mammals of the order Dinocerata: Prof. O. C. Marsh.

FOREIGN.—Introduction a l'Etude de la Nutrition des Plantes, &c.: E. Morren.—Report of the Proceedings of the Meteorological Conference at Leipzig, 1873.—Cosmos, No. 1.

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