SCIENTIFIC SERIALS

THE January number (N.S., No. 37) of the *Quarterly Journal of Microscopical Science* opens with an article entitled "Notes on Sponges," by Prof. E. Perceval Wright. In this the author indicates some peculiarities of the structure of the sponge-body of *Hyalonema mirabilis*, and describes two new species of deep-sea sponges, namely *Aphrocallistes Bocagei*, which is exquisitely figured by Mr. Ford, and the type of a new genus which the author names *Wyvillethomsonia Wallichii*. We cannot help protesting against this new generic name, as being barbarous in the highest degree. Mr. William Archer, of Dublin, continues his valuable descriptions of new or imperfectly-known fresh-water Rhizöpoda, and Mr. W. S. Kent describes and figures a curious new form of Polyzoön, from the Victoria Docks, where the animal lives attached to the surface of specimens of the *Cordylophora lacustris*. For this Polyzoön, which the author regards as the type of a new family (*Homodictidæ*) of the Ctenostomata, he proposes the name of *Victorella pavida*. A singular crustacean parasite found on *Nereis cultrifera* is described and figured by Dr. W. C. McIntosh. Besides these, we have a paper on the distribution of nerves to the vessels of the connective tissue in the hilus of the pig's kidney, and on the ganglia connected with these nerves, by Dr. James Tyson, of Philadelphia; an abstract of a dissertation on the minute structure of the human umbilical cord, by Dr. Köster; a translation of Dr. E. Van Beneden's description of his *Gregarina gigantea* (with a plate); and an abstract of an important memoir, by Dr. Kowalewsky, on the relationship of Ascidians and Vertebrates. The only original article on the microscope itself is one by Dr. G. W. Royston-Pigott, on certain imperfections and tests of object-glasses. This number also contains a review of Mr. Hincks's "History of British Hydroid Zoophytes."

IN the *Geological Magazine* for the present month (No. 67), the most important paper is the first part of a memoir on the sequence of the Glacial Beds, by Mr. Searles V. Wood, jun., in which the author indicates his views as to the best classification to be adopted in the treatment of these difficult deposits, and discusses the characters of the beds and evidence attainable as to the sequence of the phenomena attending their deposition. Mr. David Forbes publishes some remarks on the contraction of igneous rocks in cooling, in which he again maintains, chiefly from his own experiments, that the amount of this contraction is much less than is generally believed, on the authority of Bischof. His paper is really a vindication of himself from some remarks in a memoir by the Rev. O. Fisher. Mr. John Rofe describes some peculiar perforations observed in the lower surfaces of slabs of mountain limestone, at considerable elevations, in various localities, which have already been noticed by several writers, and ascribed by some to lithodomous marine mollusca. Mr. Rofe regards them as produced by snails, either by the rasping action of their odontophores alone, or by this aided by an acid salivary fluid. Mr. Ruskin continues his notices of banded and brecciated concretions. Mr. J. Clifton Ward remarks upon the denudation of the lake-district, which he ascribes chiefly to subaërial action. In a paper on the formation of the Chesil Bank, Mr. T. Codrington maintains, in opposition to Messrs. Bristow and Whitaker, that the streams coming from the land have had nothing to do with the production of this bank, or the excavation of the channel by which it is separated from the mainland. He ascribes the formation of this and similar banks solely "to the heaping-up action of waves breaking when they reach a depth of water about equal to their own height."

THE *Revue des Cours Scientifiques* for the 8th inst. contains a lecture, by Prof. Lorain, on the application of the graphic method to the clinical study of disease. Translations are likewise given of Prof. Helmholtz's address to the meeting of German Naturalists and Physicians at Innspruck, and of Mr. Geikie's account of the same meeting, published in the first number of NATURE.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, December 16, 1869.—The following were among the papers read:—"On the Thermodynamic Theory of Waves of Finite Longitudinal Disturbance," by Prof. Rankine, F.R.S.; "On Approach caused by Vibration," by Prof. Guthrie. The author observes that when a vibrating tuning-fork is held near to a piece of cardboard, the latter has a tendency to approach the fork. Starting from this experiment, a series of experiments is described, having for their object the determination of the cause and conditions of the fundamental observed fact. It is shown that no sensible permanent air-currents, having their source at the fork's surface, are established; and hence that the approach of the card to the fork is not due to the expansion of such currents, as in M. Clement's experiment. The modifications are examined which Mr. Faraday's surface-whirlwinds on a vibrating tuning-fork undergo when the fork vibrates in the neighbourhood of a sensibly rigid plane. It is shown that a delicately-suspended card approaches the fork when either of the three essential faces of the fork is presented to the card, and that the approach takes place from distances far exceeding the range of Mr. Faraday's air-current. That the action between the card and fork is mutual, is shown by suspending the latter. Also one vibrating fork tends to approach another in whatever sense their planes of vibration may be towards one another. The mean tension of the air surrounding a vibrating fork is examined by enclosing one limb of the fork in a glass tube. It appears that the vibrating fork displaces air. The question whether the equilibrium between two equal and opposite forces acting on a body is disturbed by submitting one of the forces to successive rapid, equal, and opposite alterations in quantity, is answered in the negative by an experiment which shows that the equilibrium of a Cartesian diver is not disturbed by submitting the water in which it floats to vibration. Various modifications are introduced into the nature of the surface which receives the vibrations, such as making it a narrow cylinder with one end closed, making it of cotton-wool, &c. It is found that in all cases the suspended body approaches the vibrating one. The author concludes that the effect of apparent attraction is due to atmospheric pressure, and that this pressure is due to undulatory dispersion. It is suggested that the dispersion of the vibrations which constitute radiant heat may cause bodies to approach, being pushed, not dulled.—"On Abstract Geometry," by Prof. Cayley. "I submit to the society the present exposition of some of the elementary principles of an abstract n-dimensional geometry. The science presents itself in two ways: as a legitimate extension of the ordinary two-and three-dimensional geometries; and as a need in these geometries and in analysis generally. In fact, whenever we are concerned with quantities connected together in any manner, and which are, or are considered as, variable or determinable, then the nature of the relation between the quantities is frequently rendered more intelligible by regarding them (if only two or three in number) as the co-ordinates of a point in a plane or in space; for more than three quantities there is, from the greater complexity of the case, the greater need of such a representation; but this can only be obtained by means of the notion of a space of the proper dimensionality; and to use such representation, we require the geometry of such space. An important instance in plane geometry has actually presented itself in the question of the determination of the curves which satisfy given conditions; the conditions imply relations between the co-efficients in the equation of the curve; and for the better understanding of these relations it was expedient to consider the coefficients as the co-ordinates of a point in a space of the proper dimensionality. A fundamental notion in the general theory presents itself, slightly in plane geometry, but already very prominently in solid geometry; viz., we have here the difficulty as to the form of the equations of a curve in space, or (to speak more accurately) as to the expression by means of equations of the twofold relation between the co-ordinates of a point of such curve. The notion in question is that of a k-fold relation,—as distinguished from any system of equations (or one-fold relations) serving for the expression of it,—and giving rise to the problem how to express such relation by means of a system of equations (or onefold relations). Applying to the case of solid geometry my conclusion in the general theory, it may be mentioned that I regard the twofold relation of a curve in space as being completely and precisely expressed by means of a system of equations ($P=0$, $Q=0$, . . $T=0$), when no one of the functions, P Q, . . . T as a linear function, with constant or variable *integral* coefficients, of the others of them; and when *every surface whatever* which passes through the curve has its equation expressible in the form $U=AP+BQ \ldots +KT$, with constant or variable integral coefficients, $A+B \ldots K$. It is hardly necessary to remark that all the functions and coefficients are taken to be rational functions of the co-ordinates, and that the word integral has reference to the co-ordinates."

January 6.—"Some account of the Suez Canal in a letter addressed to the president," by J. F. Bateman, F.R.S.

Entomological Society of London, January 3.—Mr. H. W. Bates, president, in the chair. The fifth part of the "Transactions for 1869" was on the table. A splendid collection of butterflies was sent for exhibition by Mr. Hewitson; it included 135 new species, and many other rarities, the whole having been captured by Mr. Buckley in South America. Observations thereon were made by Mr. Buckley, the President, Mr. Higgins, and Mr. Wallace.—Professor Westwood, Mr. Bond, Mr. Pascoe, Mr. Albert Müller, and Mr. Quaritch, also exhibited various objects, and made remarks thereon.—Papers were read on *Ephemeridæ*, by the Rev. A. E. Eaton; on *Callidryas*, by Mr. A. G. Butler; on *Catasareus*, by Mr. F. P. Pascoe; and on the genera of *Coleoptera*, studied chronologically (Part I., from 1735 to 1801), by Mr. G. R. Crotch.

Royal Horticultural Society, December 21, 1869.—*Scientific Committee.*—Mr. W. W. Saunders in the chair. The secretary, Rev. M. J. Berkeley, exhibited a leaf of Aerides "Fox-brush" with a peculiar form of spot, differing from any he had previously seen.—Mr. Laxton sent specimens of peas of the most varied character, the result of a single cross.—A very interesting paper "On the Fertilisation of Grasses," from Dr. R. Spruce, from which the following are extracts, was communicated through Dr. Masters. The paper had reference to the statement of M. Bidard that grasses are usually self-fertilised while in the bud: it will be published *in extenso* in the Journal of the Society:—

"In gently-flowing rivers of tropical America grow many fine aquatic grasses, species of *Luziola*, *Oryza*, *Leersia*, &c. The following note is from my journal, under date December 1849, when threading in my canoe among the islands of the Trombetas:—'This channel was lined on both sides by a beautiful grass—a species of *Luziola*—growing in deep water, and standing out of it two or three feet. The large male flowers, of the most delicate pink, streaked with deep purple, and with six long yellow stamens hanging out of them, were disposed in a lax terminal panicle; while the slender green female flowers grew on the bristle-like branches of much smaller panicles springing from the inflated sheaths of the leaves that clothed the stem. As the Indians disturbed the grassy fringe with the movement of their paddles, the pollen fell from the anthers in showers,' and would, doubtless, some of it, attain the female flowers disposed for its reception. A parallel case to the above is that of the common maize (*Zea Mays*, L.), where the male flowers are borne in a long terminal raceme or panicle, and the female flowers are densely packed on spikes springing from the leaf-axels. Here the male flowers must plainly expand before the pollen contained in their anthers can be shed on the female organs below, whether of the same or of a different plant. That there are frequent cross-marriages in maize is evidenced by the numerous varieties in cultivation in countries where it is a staple article of food, as in the Andes of Ecuador, where nine kinds, varying in the colour of the grain (through white, yellow, and brown, to black), in its size, consistence, and flavour, are commonly cultivated; besides many others less generally known. In *Phœrus scaber* (H. B. K.) another tall broad-leaved grass, the spikelets stand by twos on the spike—a sessile female spikelet, and a stalked male spikelet. In the same forest grasses of the genus *Olyra*, whereof some species, such as *O. micrantha* (H. B. K.), rise to 10 feet high, and have lanceolate leaves above 3 inches broad, and a large terminal panicle, with capillary branches, like those of our *Aria cæspatosa:* it is the lower flowers that are male, with large innate (not versatile) anthers, and the upper that are female, with two large stigmas, that are either dichotomously divided, or clad with branched hairs, thus exposing a wider surface to the access of the pollen. And as the panicle is often pendulous, many of the male flowers, although placed lower down the axis, are actually suspended over the terminal female flowers. It is generally to be remarked of diclinous grasses, that either the male flowers are very numerous, as in *Zea Mays*, or the stamens are multiplied in each male flower, as in *Pariana*, *Leersia*, *Guadua*, &c.; or the stigmatic apparatus of the female flowers is enlarged, so as almost to insure impregnation, as in *Olyra* and *Tripsacum*. In the *Bambuscæ* I have gathered belonging to the genera *Guadua*, *Merostachys*, and *Chusquea*, the flowers are more or less polygamous, and the stamens of the male flowers often doubled. But there is scarcely a genus in the whole order which is not described as having some flowers by abortion, neuter or male, and especially those that have biflorous spikelets, such as the *Paniceæ*. Some grasses, of normally hermaphrodite genera, are not unfrequently truly unisexual, such as certain species of *Andropogon*. I have occasionally seen panicles of *Orthocladus rariflorus* (Nees), a grass peculiar to the Amazon, quite destitute of stamens, and therefore purely female. To come home to our own country: is all the pollen wasted that a touch or a breath sets free from the flowers of grasses in such abundance? Watch a field of wheat in bloom, the heads swayed by the wind, lovingly kissing each other, and doubtless stealing and giving pollen. Consider, too, that throughout Nature, heat or moisture, or both, are essential to the emanation of the impregnating influence. In all our *Festuceæ*, as well as in *Cynodon*, *Leersia*, and some other genera, the stigmas are protruded from the side or from the base of the flower at an early stage, often before the stamens of the same flower are mature—thus as it were inviting cross-fertilisation from the more precocious stamens of other plants which are already shedding their pollen. All who have gathered grasses will have remarked that some have yellow anthers, others pink or violet anthers; and that anthers of both types of colours may co-exist on distinct individuals of the same species. The same peculiarity is just as noticeable in tropical grasses, and (without professing to give a complete physiological explanation of it) this is what I have observed respecting it. The walls of the anther-cells are usually of some shade of purple, but are so very thin and pellucid, that when distended with mature pollen the yellow colour of the latter is alone visible. When the pollen is discharged, the anthers resume their original purple colour, shortly, however, to take on the pallor or dinginess of decay. Where the anthers emerge of a purple hue, and change from that to brown, it will probably be found that they have discharged their pollen while still included in the flower. These observations, made without any reference to the question now in hand, require to be renewed and tested; and in them, as in all that precedes, I am open to correction. Of grasses with bisexual flowers, there are two ways in which the ovary may be fertilised, viz., either by the pollen of its own flower (closed or open), or by that of other flowers, after the manner of the diclinous species. In the latter case, the pollen may be transported by the wind, or in the fur of animals (as I have observed the seeds of *Selaginellas* in South America), or in the plumage of birds. The agency of insects has not been traced in the fertilisation of grasses, but may exist. The little flies I have seen on the flowers of grasses seemed bent on depositing their eggs in the nascent ovaries, but may also have aided in cross-fertilisation. In the Amazon Valley grasses are often infested by ants, who, indeed, leave nothing organic unvisited throughout that vast region; and they also, I think, cannot help occasionally transferring grains of pollen from one flower to another. The flowers of palms and grasses agree in being usually small and obscurely coloured, but contrast greatly in the former being in many cases exquisitely and strongly scented, whereas in the latter they are usually quite scentless. The odour of palm-flowers often resembles that of mignonette; but I think a whole acre of that 'darling' weed would not emit more perfume than a single plant of the fan palm of the Rio Negro (*Mauritia Carara*, Wallace). In approaching one of these plants through the thick forest, the sense of hearing would perhaps give the first notice of its proximity, from the merry hum of winged insects which its scented flowers had drawn together, to feast on the honey, and to transport the pollen of the male to the female plants; for it is chiefly dicœcious species of palms that have such sweet flowers. The absence of odoriferous flowers from the grasses seems to show that insect aid is not needed for effecting their fecundation, but does not render its accidental concurrence a whit less unlikely. That grasses, notwithstanding their almost mathematical character, vary much as other plants do, is plain from the multitude of osculating forms (in such genera as *Eragrostis*, *Panicum*, and *Paspalum*), which puzzle the botanist to decide when to combine and when to separate, in order to obtain what are called 'good species.' Hence the conclusion is unavoidable that in grasses, as in other plants, variations of surrounding conditions induce corresponding modifications of structure, and that amongst the former must be enumerated cross marriages, however brought about. If the flowers of grasses be sometimes fertilised in the bud, it is probably exceptional, like the similar cases recorded of orchids and many other families. To conclude: the more I ponder over existing evidence, the more I feel convinced that in its perfect state every being has the sexes practically separated, and that natural selection is ever tending to make this separation more complete and permanent; so that the hypothesis of Plato, that the prototype even of man was hermaphrodite, may one day be proved to be a fact!"

—Mr. Saunders alluded to the circumstance that the dead bodies of a species of fly might occasionally be found imprisoned in the flowers of *Lolium perenne*, as if the plant exerted some poisonous influence on the insect. Mr. A. W. Bennett stated, as a result of his observations, that it is impossible to predicate of any given family, whether its members are self or cross-fertilised. In the same group some species may be cross-fertilised, others self-fertilised. Many winter-flowering plants are self-fertilised, and amongst them the common *Poa annua*. Mr. Horne stated that in India different varieties of maize remain constant, even though grown in adjacent fields, so that it would seem as if no crossing took place in this instance.—A conversation then ensued as to the best method of conducting in future the meteorological observations at Chiswick, when Mr. Glaisher stated that he would be willing to reorganise the system of observation in such a manner as to introduce the requisite changes, without impairing the value of the record kept at Chiswick for upwards of forty years. In reference to ground temperature, he stated that at a depth of twenty-five feet the ground was coldest in July, and warmest in January.

Institution of Civil Engineers, December 21.—Annual General Meeting. Charles Hutton Gregory, Esq., president, in the chair. Referring to the business at the ordinary general meetings, of which there were twenty-two during the past session, attention had been directed by the papers read, and by the discussions upon them, to the use of machinery in lieu of gunpowder for "getting" coal; to cylinder foundations for bridges and other similar structures; to the Midland line of the Mauritius railways, where exceptionally steep gradients and sharp curves were necessarily adopted; to some of the chief peculiarities of American locomotives and rolling stock; to works carried out in connection with the river Witham and estuary, for the drainage of the fens and the improvement of the navigation; to the past and present condition of the outfall of the river Humber, and of its peculiar feature, Spurn Point; to the New Ferry and the New Brighton piers and landing-stages on the river Mersey; to the Low-water Basin at Birkenhead, and the extensive sluicing operations for maintaining the basin at its proper depth; to the lagoons and marshes on certain parts of the shores of the Mediterranean; to the mechanical details of construction of lighthouse apparatus and lanterns; to the Roman Rock lighthouse, Cape of Good Hope; to the standards of comparison for testing the illuminating power of coal-gas; and lastly, to an able summary, by a foreign engineer, of the present state of knowledge as to the theory of the strength and resistance of materials of construction. The originality, labour, and ingenuity displayed in these communications, had led to the award of Telford Medals and Premiums of Books to Messrs. Jules Gaudard, W. Shelford, T. N. Kirkham, J. Ellacott, and D. T. Ansted, F.R.S.; of a Watt Medal and a Telford Premium of Books to Mr. Z. Colburn; of Telford Premiums of Books to Messrs. W. H. Wheeler, J. R. Mosse, I. Bell, J. Milroy, S. P. Bidder, jun., and C. J. Chubb; and of the Manby Premium of Books to Mr. D. M. Henderson.

In addition to the ordinary general meetings, there were six supplemental meetings, for the reading and discussion of papers by the students. For the papers read at these supplemental meetings, Miller Prizes had been awarded to the following students: Messrs. E. Bazalgette, F. H. Mort, T. J. Ellis, T. R. Gainsford, C. H. G. Jenkinson, and G. H. Roberts.

After a statement of the financial condition of the institution, it was announced that the council had recently taken vigorous measures to vindicate the honour of the profession, which had been unjustifiably assailed by the Government of India, in a notification, the plain intention of which could only be to charge civil engineers with recognising as legitimate the receipt of commissions from others than their immediate employers, and in addition to their salaries, where so remunerated. The Secretary of State for India had put on record "that he regards with implicit confidence the indignant repudiation by the institution of the recognition of any such practice as that referred to," and that he would call upon the Governor-General in Council for an explanation of the circumstances which led to the issue of the objectionable notification. A sufficient time had not yet elapsed for an answer to be received from India to the remonstrance of the institution. In the meantime, the council felt assured that the steps they had taken would meet with cordial approval. In inviting attention to this report, the presentation of which terminated the trust confided to them by the last annual general meeting, the council observed that they had laboured so to direct the affairs entrusted to them, that the discharge of their duties might be attended with advantage to the institution.

The following gentlemen were elected to fill the several offices in the Council for the ensuing year:—Charles Blacker Vignoles, President; Joseph Cubitt, Thomas Elliot Harrison, Thomas Hawksley, and George Willoughby Hemans, Vice-Presidents; James Abernethy, William Henry Barlow, John Frederic Bateman, Joseph William Bazalgette, Nathaniel Beardmore, Frederick Joseph Bramwell, James Brunlees, John Murray, George Robert Stephenson, and Edward Woods, Members; and Edward Middleton Barry and Lieut.-Col. Andrew Clarke, C.B., R.E., Associates.

EDINBURGH

Royal Physical Society, December 22.—Professor Duns, president, in the chair. The following gentlemen were elected members:—Messrs. Gibson and Durham. The office-bearers for the sessions were elected as follows:—Presidents, Professor John Duns, D.D., R. F. Logan, C. W. Peach; Council, F. W. Dallas, T. S. Wright, M.D., James M'Bain, M.D., R.N., R. Brown, Stevenson Macadam, A. Wilson; Secretary, John A. Smith, M.D.; Treasurer, G. Logan, W.S.; Assistant Secretary, J. Boyd Davies; Honorary Librarian, A. Taylor.—Notice of the occurrence of *Gonoplax angulata* off the coast of Mull, by M. Watson, M.D. This rare crab was taken in September last by Dr. Watson, when dredging in "Bloody Bay," on the north coast of Mull, in about twenty-five fathoms water. The dredge was filled with soft mud, along with a great quantity of the *Pennatula* and *Virgaelaria*. As far as he could learn, it was the first time it had been taken on the Scottish coasts. Mr. Bell, in his "Brit. Crustacea," says it is not known to have been taken in Scotland. This species has not been taken on the east coast of Scotland nor in Shetland. Mr. Peach stated it was got on the south coast of England, on the Welsh coast, and also in Ireland. It is a Mediterranean species. The specimen was a young male, and was an interesting addition to the list of Scottish crustacea. Dr. Duns exhibited a fine species of Gurnard (*Trigla*), which had been forwarded to the New College Museum by the Rev. Walter Wood, Elie, to whom it had been brought as a novelty by a fisherman. He pointed out a number of features in which the specimen differs from those described by Yarrell, Fleming, Gunther, and others, but was inclined to regard it as a variety of *Trigla pini* (Block).

DUBLIN

Natural History Society, January 5.—The Rev. Professor Haughton, M.D., F.R.S., in the chair. Mr. W. Andrews read a paper "On the inhabitants of rockpools and caves, Dingle Bay." The rockpools of Dingle Bay had been examined in October 1868, and were teeming with animal life. After reminding the members of the pleasure of being naturalists, Mr. Andrews said that in the present paper he would speak of the Actinozoa that he had met with in Dingle Bay, and among the species that he mentioned the following appear to be of most interes as being apparently unrecorded as Irish:—*Aiptasia couchii; Cerianthus*, a species near *C. Lloydii*, *Stromphia churchiæ*, *Balanophyllia regia*. Living specimens of *Caryophyllia smithii* were dredged in fifty fathoms of water. Mr. Jeffrey's paper "On Deep-sea Dredging" (*Vide* NATURE, p. 135), was referred to, as proving that this coral was a deep-sea species, whereas Mr. Gosse and Professor Wright twelve years ago described it as being a littoral zone species. Great quantities of *Nullipora compressa* were met with, and many beautiful coloured specimens of the egg-cases of *Pyrpura lapillus* with the young shell in them. The author then proceeded to refer to coral-reefs, and stated that he now believed that the *Millepora alcicornis* Linn. was not a coral. It was a true *Eschara*, and took the place in these seas of the *Pœcillopora* of the tropics. At another time he would refer again to the stony corals met with in Dingle Bay, and enter into the full history of their affinities and structure.—Dr. A. Macalister read a paper "On the Mode of Growth of Univalve Shells." Referring to Canon Moseley's memoir on the geometrical forms of turbinated and discoid shells, he stated that he had made a large number of measurements to determine the logarithmic spiral of the different families of Gasteropods, with the hope that the number found to express the ratio of the geometrical progression of the dimensions of their whorls might be of use in classification. In this he had to a certain extent succeeded, as the tables exhibited showed. Mr. Lalor was glad to see the result of Dr. Macalister's work, as it quite corroborated some investigations that he had made on this interesting subject several years ago.—The Rev. Professor Haughton then read a

paper "On the Geometrical Characters of Muscles." He alluded to the researches of J. A. Borelli, as given in his "De Motu Animalium," published at Rome in 1680, and stated that the classification of muscles therein mentioned was surprising for its accuracy. Dr. Haughton had modified and added to it as follows :—I. Muscular fibres being on same plane : 1. The fibres parallel ; 2. The fibres intersect ; 3. The fibres curved (sphincter). II. Muscular fibres being on curved surfaces : 1. Where the fibres formed right lines ; 2. Where no line on the surface was a right line.—Mr. Lalor read a paper, not containing any original matter, "On the Anatomy of the Oyster."

MANCHESTER

Literary and Philosophical Society, December 28, 1869.—J. P. Joule, LL.D., F.R.S., &c., president, in the chair. "On Pollen considered as an aid in the Differentiation of Species," by Charles Bailey. The author, having recently examined the pollen of several thousand species of plants, is led to think that the characters presented might prove useful as a means of differentiation in allied species ; the following notes are thrown out as indications of some of the more noticeable distinctions to be drawn :—

1. FORM.—It has long been noticed that certain types of pollen are characteristic of the natural order to which the plants which produce them belong, as, for instance, the peculiar pitted polyhedral pollen of the *Caryophyllaceæ*, the spherical spiny pollen of the *Malvaceæ*, the large triangular pollen of the *Onagraceæ*, the peculiar pollen of the *Coniferæ*, or the elliptical pollen of the *Liliaceæ* and other monocotyledonous orders ; in fact, most orders possess a type sufficiently marked to be characteristic of each. This statement, however, must be accepted with limitations ; the *Compositæ*, for instance, have three or more well-marked types, represented by the beautifully sculptured pollen of the Chicory, the minute oval spiny pollen of the Asters, Calendulas, Cacalias, &c., and another form wholly destitute of spines, as in the *Centaurea Scabiosa*. There are, besides, other natural orders where similar variety occurs. But differences of form are met with in plants of the same genus, by which the one species or the other is readily marked off by its pollen ; thus, the pollen grain of *Anemone sulphurea* is roundish, but that of *Anemone montana* is elliptic ; the pollen of *Aronicum Doronicum* is much more elongate than that of *A. scorpioides ;* and while the grains of *Ranunculus philonotis* are round and yellow, those of *R. platanifolius* are elliptic, white, and smaller.

2. MARKINGS.—The pollen of the *Geraniaceæ* and *Campanulaceæ* is for the most part globular, but while some of the grains are quite smooth, others are covered with spines ; thus, the pollen of *Campanula Media* has a number of short spines sparsely scattered over the surface of the grain, but *C. rapunculoides* is wholly destitute of them. In other plants these spines are replaced by tubercles, and both spines and tubercles vary greatly in length and number ; for example, in *Valeriana tuberosa* the spines are only half the length of those on the pollen of *V. montana*, the grains being also slightly smaller. The pollen of the *Liliaceæ* is often covered with a more or less prominent reticulation, which is subject to much variation ; compare, for example, the coarse network which invests the pollen of *Lilium croceum* with the finer reticulation of *L. canadense*, the grains of the latter species being much more globose and smaller.

3. DIMENSIONS.—Some instances of the differences observable in the size of pollen grains have already been published by Professor Gulliver, whose measurements of the pollen of various species of *Ranunculus* show the help that may be derived from this character ; *R. arvensis* is nearly twice the size of *R. hirsutus* their dimensions being respectively $\frac{1}{476}$ and $\frac{1}{888}$ of an inch. For some noticeable differences, compare the smaller pollen of *Epilobium brachycarpum* with the larger pollen of *E. Fleischeri*, or that of *Senecio gallicus* with *S. incanus*, the spines on the latter species being also much coarser. Again, the pollen of *Silene acaulis* is but half the size of that of *S. alpina*, the latter having some beautiful markings in addition ; the pollen grains of this genus differ from the usual caryophyllaceous type in not having the pits or depressions common in the order, so that the grains become spherical rather than polyhedral.

4. COLOUR.—This is not so reliable a character for differentiation as the others noticed, since species differ amongst each other according to the soil, &c. The pollen of *Ajuga genevensis* is yellow, but of *A. pyramidalis* is usually white ; again, while the grains of *Ornithogalum umbellatum* are large and yellow, those of *O. nutans* are small and white. In regard to the mounting of these objects for the microscope, they show to the best advantage when put up perfectly dry ; the cells should be sufficiently shallow to admit of no more than a single layer, and at the same time deep enough to permit the grains to move about. If pollen is mounted soon after it has been discharged from the fresh anthers, the fovilla is apt to condense on the covering glass, and the slide soon becomes useless. The stamens taken from an unopened flower-bud furnish the best and cleanest pollen, and these should be selected in preference to those taken from the fully-developed flower. Canada balsam, glycerine, and other media are occasionally helpful in making out structure ; thus the pores of *Campanula rotundifolia*, *Phyteuma Halleri*, and other allied species are made much more distinct when mounted in balsam.

Microscopical and Natural History Section.—December 6, 1869.—J. Watson, Esq., president of the section, in the chair. Mr. W. Boyd Dawkins, M.A., F.R.S., was elected a member of the section. Mr. J. B. Dancer, F.R.A.S., read a short paper on some of the new Hydro-carbon Compounds from which he had obtained very beautiful polarising objects for the microscope.

PARIS

Academy of Sciences, January 3.—M. Coste was elected vice-president, and MM. Chasles and Decaisne members of the general administrative committee. The outgoing president, M. Claude Bernard, gave an account of the present condition of the publications of the Academy, and announced the changes among the members and correspondents during the past year. The following memoirs and communications were then presented : "On the demonstration relative to the sum of the angles of a triangle," by M. Bertrand ; "On the nascent state," by M. H. Sainte-Claire Deville ; "On the constitution of the solar aureola, and on some peculiarities of Geissler's tubes," by Father Secchi. The publication of Father Secchi's letter is delayed on account of some illustrations which accompanied it not being ready. The memoirs presented to the Academy were as follows :—"On the poinçonnage (piercing) of metals and plastic substances," by M. Tresca ; "On a postulate of Euclid," a note by M. Lionnet, and a note on the same subject by M. Fleury. Of the correspondence addressed to the Academy, the more important were a note by M. Tréve on the action of magnetism on gases, a communication by M. Houzeau "On the origin of nitrogen gas in oxygen supposed to be pure," one by M. Gaudin indicating the process employed in the fabrication of artificial precious stones, and one by M. Prillieux on the movements of grains of chlorophyll under the influence of light. Some account of M. Tréve's note, which is of very great interest, will be given subsequently. The other elections are referred to elsewhere.

BERLIN

German Chemical Society, Dec. 27.—The following papers were read :—Ed. Schaer: "On some relations shown by Coppersalts in the presence of Cyanides."—Th. Zincke: "On the Synthesis of Aromatic Acids." (The author treated the ether of monochloroacetic acid with bromide of phenyle and molecular silver thus producing botaylic ether).—Kempf: "On Chlorocarbonate and Carbaminate of Phenyle."—Vogel: "On recognising Sulphuret of Carbon in Gas."

ITALY

Reale Instituto Lombardo di Scienze e Lettere.—"Report of Researches in the Class of Mathematical and Natural Sciences." (Session, 1868-69.) By Professor Schiaparelli.

Mathematics.—In a memoir "On the Equations which determine the points of contrary flexure of Elliptic Curves," Prof. Brioschi gives the methods of determining the points of flexure of those curves of the n'th order which have $\frac{n(n-3)}{2}$ double points or cusps. Prof. Cremona has studied "The Transformation of Hyperelliptic Curves," that is to say, of those curves whose co-ordinates may be expressed rationally by means of a parameter λ, and the square root of an integral function of even order of this same parameter. The "Number of Moduli of the Equations and Algebraic Curves of a given genus" has been investigated by Professors Cremona and Casorati, whose results tend to support the rule given by Riemann for determining the said number, also the different rule proposed for the same purpose by Cayley. A memoir by Prof. Boltrami of Bologna contains "Researches on a new element introduced by Christoffel into the Theory of Surfaces," which is nothing else than the quantity by which it is necessary to multiply the infinitesimal angle between two geodetics proceeding from the same point, in

order to obtain the length of the arc of any orthogonal trajectory to the two geodetic lines in question, comprised between the same lines. Prof. Geiser of Zurich has generalised, for any number of dimensions, or translated into an analytical fact for any given number of variables, "A theorem of Steiner relating to properties common to all the Maximum Triangles inscribed in a given Ellipse." A communication from the illustrious Clebsch, professor at Göttingen, refers to those "Surfaces which have the property of being representable point by point above a plane." Such representations are known to afford an extremely powerful instrument of geometric analysis. Prof. Bardelli has collected and demonstrated all the formulæ proposed by various geometers (Euler, Monge, Rodrigues Broschi), for the very useful problem of the "Transformation of Co-ordinates in Space," showing the relation and the geometric significance of the several systems of auxiliary variables adopted by those authors. Finally, amongst the mathematical researches may also be included a note by Schiaparelli on "The principle of the Arithmetic Mean in the calculation of Observations," and one by Prof. Porro, "On the new Cleps-cyclic Theodolite," an instrument invented by the author for rapid surveying.

Hydraulics.—The memoirs presented to the Institute under this head were chiefly of local interest, relating to the rivers and canals of Upper Italy. There is also one by Senator Lombardini, entitled "Geographical and Hydrological Researches in the Regions of the Upper Nile and Central Africa."

Astronomy, Meteorology, and Terrestrial Physics.—In a memoir entitled the "Variations of the Eccentricity of the Earth's Orbit, and of Terrestrial Climates in the Geological Epochs," Schiaparelli endeavours to prove that the changes of eccentricity in the orbit cannot be the cause of the great oscillations of temperature which have taken place in geologic epochs, and that the origin of the glacial periods must be sought elsewhere.—Prof. Cantoni, speaking of "The Rains of the Autumn of 1868 in Upper Italy," discusses the cause of the terrible inundations of that year. Cavalleri communicates an "Observation on the Aurora Borealis of the 13th of March, 1869," which was visible over a large part of Europe; and lastly, Prof. Rialti of Forli communicates a note "On the Cause of the Incandescence of Bolides," which gave occasion to Prof. Cantoni to make a calculation respecting the heat developed in bolides by the resistance of the air, analogous to those which had been made on the same subject by Reichenbach in Germany and Marsh in America.

Physics.—Prof. Cantoni has made a series of researches on "Frictional Electrical Machines," and especially that of Holtz; the "Theory of the Electrophorus and of Electro-static Induction," respecting which the author modifies essentially the ideas hitherto generally received; "The application of the Galvanometer to the study of electric phenomena," in which part of the research Cantoni was assisted by Prof. Brusotti of Pavia; "The relations between the variations of intensity of a current, and those of the temperature in a voltaic circuit;" and other subjects connected with the preceding.—The memoirs of Prof. Vilari relate to "The Influence of Magnetisation on the Electric Conductivity of Iron and Steel; the Currents induced between Iron and other Metals; the Heat developed by Caoutchouc when submitted to Traction;" and in association with Dr. Marangoni, on "The limits of perception of Sounds with respect to their duration."

Chemistry.—Prof. Polli, in examining the intimate mode of action of Sulphurous Acid and Alkaline Sulphites on Fermentable Organic Matters, has endeavoured to show that the mode of action of these preparations consists in an isomeric modification of the molecular aggregation, without alteration of the elementary chemical composition.—Prof. Selmi, of Mantua, has communicated his experiments on the miasmatic air of Mantua.

Natural History and Geology.—Under this head there are two botanical memoirs by Prof. Gorovaglio: one on a New Species of Sensitive Plant, cultivated in the Botanic Garden of the University of Pavia; the other containing a project for the establishment of a laboratory of Cryptogamic Botany, with the view of studying the maladies of plants and animals produced by cryptogamic parasites.—In connection with zoology, there is a note by Crivelli and Maggi on the *Corpora fimbriata* of the Frog, and another by Tigri, on the Silkworm Disease.—In Geology, Paolo Garini communicates a paper on a method of producing experimentally the phenomena of Glaciers.—Leopold Maggi communicates his researches on Lacustro-glacial Deposits; and, lastly, Negri and Spreafico have presented a memoir on the Geology of the Environs of Varese and Lugano.

DIARY

THURSDAY, JANUARY 13.

ROYAL SOCIETY, at 8.30.—On the Mineral Constituents of Meteorites: Mr. N. S. Maskelyne.—On Fluoride of Silver: Mr. G. Gore, F.R.S.—Approximate Determination of the Heating Powers of Arcturus and α Lyræ: Mr E. J. Stone, F.R.S.

MATHEMATICAL SOCIETY, at 8.—Equation of Centres and Foci of certain Involutions: J. J. Walker.

ZOÖLOGICAL SOCIETY, at 8.30.

LONDON INSTITUTION, at 7.30.

FRIDAY, JANUARY 14.

ROYAL ASTRONOMICAL SOCIETY, at 8.

QUEKETT MICROSCOPICAL CLUB, at 8.

MONDAY, JANUARY 17.

ROYAL ASIATIC SOCIETY, at 3.

ROYAL INSTITUTE OF BRITISH ARCHITECTS, at 8.

MEDICAL SOCIETY at 8.

TUESDAY, JANUARY 18.

STATISTICAL SOCIETY, at 8.—On the Statistics of Joint Stock Companies from 1814 to the present time, and of Companies with Limited and Unlimited Liability formed since 1856: Prof. Levi.

ANTHROPOLOGICAL SOCIETY, at 4.—Anniversary Meeting.

ROYAL INSTITUTION, at 3.—On the Architecture of the Human Body: Prof. Humphry.

PATHOLOGICAL SOCIETY, at 8.

INSTITUTION OF CIVIL ENGINEERS, at 8.

WEDNESDAY, JANUARY 19.

METEOROLOGICAL SOCIETY, at 7.

SOCIETY OF ARTS, at 8.

THURSDAY, JANUARY 20.

LINNEAN SOCIETY, at 8.—On the Flora of Iceland: Prof. Babington.—On New British Spiders: Rev. O. P. Cambridge.

ROYAL INSTITUTION, at 3.—On the Chemistry of Vegetable Products: Prof. Odling.

ZOOLOGICAL SOCIETY, 8.30 P.M.—Descriptions of a new genus and of eighteen new species of Eand and Marine Shells, Henry Adams. "On the geus Pelargposis of the family Alcedinidæ," R. B. Sharpe. Description of a new Fish from the vicinity of Aden, Lieut.-Colonel R. L. Playfair.

BOOKS RECEIVED

ENGLISH.—Wonders of the Deep: M. Schele de Vere (Sampson and Low).—Anatomy of the Blowfly: B. T. Lowne (J. Van Voorst).—Journal of the Scottish Meteorological Society, 10 numbers.—Ancient Classics, Homer's Iliad: Rev. W. L. Collins (W. Blackwood and Sons).—Cups and their Customs (J. Van Voorst).—Geology and Revelation: G. Mulloy (Longman and Co.).—Across America and Asia: R. Pumpelley.—The Andes and the Amazon: James Orton (Sampson Low).

AMERICAN.—Farming for Boys.—Our own Birds of the United States: W. L. Bailey (through Trübner and Co.).

FOREIGN.—Die Technisch verwendeten Gummi-arten, Harze and Balsame: Dr. Julius Weisner.—Lehrbuch der Chemie: Dr. J. Moser.—Untersuchungen über die theorie und das allgemeine Geographische System der Winde: Dr. Adolph Mühry.—Anatomische Studien: Dr. C. Hasse.—Auffassung der Organischen Natur: Prof. Wilhelm His.—Untersuchungen über die microscopische Zusammensetzung und Structur der Basalt-gesteine: Dr. F. Zirkel.—Recherches pour servir à l'histoire naturelle des Mammièfres; Livraison 5, feuilles 13 à 15: H. Miln-Edwards.

CONTENTS

ERRATUM.—The word "practical," in the 37th line on page 267, should have been "partial."