

between a piston and the train wanted, and the pressure of the air over the large sectional area of the tube required for propulsion is but a small fraction of that formerly employed; there is, consequently, no heating, no inordinate wear and tear, and no loss of power. Equally ingenious is the construction of the proposed air pumps. Very large volumes of air are wanted to accompany and press forward the train—several hundred thousand cubic feet per minute. And what is the nature of the pumps to supply these? Are they to be blast engines? No; they are to be air pumps, in the shape of gasometers. We are all familiar enough with the sight of gasometers, but their application for such a purpose is certainly new.

We find throughout the work the same invincible spirit which seems to seek a difficulty for its immediate destruction. That a permanent railway across the English Channel will be built, we doubt not; we are equally confident that Messrs. Bateman and Révy's scheme is a practicable solution of the problem. No less an authority than the Emperor Napoleon III., after mature consideration of the scheme, wrote to say:—"C'est le seul réalisable," and as the design is one that belongs essentially to England, His Majesty's opinion acquires enhanced value and importance. Let us, then, hope that the engineering and enterprising powers of this eminently engineering country will heartily support, advance, and improve the plan, which seems to ensure inestimable advantages to England and France.

NOTES

THE Secretaries of the Royal Astronomical Society have circulated the following notification. "We are instructed to communicate to you the following Resolution, which was passed at a Committee of the Council held yesterday, April 8th:—Resolved—'That the Fellows be informed that there is a possibility of the Government providing means of transit to and from stations on the Mediterranean for about sixty observers, who may be willing to take part in the Observation of the Total Eclipse of December 22, 1870; and that persons willing to undertake a portion of the Observations on a plan to be arranged by the Council, be invited to send their names to the Secretaries, and also to state the branch of observation which they would be prepared, or prefer, to undertake, and the instruments they would be willing to contribute.' It is desirable that the names of those who are willing to take part in the observation of the Eclipse should be sent in, if possible, before the next meeting of Council, May 13."

WE are informed that M. Fahnehjelm, the Swedish Commissioner for the forthcoming series of Annual International Exhibitions, has applied for permission to exhibit a full-sized model of a school-room, just as it exists in the country parishes in Sweden, with all the books, maps, apparatus, forms, desks, &c., in order to give a complete idea of the Swedish system of elementary instruction. Her Majesty's Commissioners will, there can be no doubt, gladly place a sufficient space at the disposal of the Swedish Commissioner for so interesting an exhibit. It is to be hoped that encouragement will be given to other countries to follow this excellent example. An easy comparison of international appliances for educational purposes would be most useful to visitors to the Exhibition, and would be beneficial and stimulating to the countries exhibiting.

YET another contribution to Mr. De Morgan's "Budget of Paradoxes." A pamphlet reaches us under the title of "The New System of Astronomy" by "Incognito" (Spon, Charing Cross), reviving, as "more in accordance with ascertained observations, and more capable of exact proof than any yet propounded," the old idea that the earth is the centre of our system, the sun revolving round it in an orbit intermediate

between those of the Moon and Mars, with Mercury and Venus as his satellites.

PROFESSOR H. J. CLARK, of Lexington University, Kentucky, sends us a paper entitled "Polarity and Polyecephalism, an essay on Individuality." He applies the term "polarity" to the tendency of the vertebrate individual to arrange its organs in two opposing sets, cephalic and caudal, and again dorsal and ventral. An individual is generally understood to be a monocephalic being. In the case of so-called "alternation of generation" among the Acalephic, since the sexual and sexless are necessary to make up a distinct organism, *i.e.*, vegetative and reproductive, the one a complement of the other, neither alone can represent the individual unit or whole cycle of life; and cephalism is therefore, Professor Clark contends, a better term to indicate the potentiality of these subdivisions to live apart.

MR. T. PAYNTER ALLEN reprints from the "Journal of the Society of Arts" an Inquiry into the existing state of education in Richmond, Twickenham, and Mortlake. He finds that of the whole number of children in the district, one-third are absolutely uninstructed, scarcely one half are in average attendance at school, one-fifth alternate attendance at school with fluctuating labour injuriously to themselves and to the school; one-sixth are of the maximum school age without having reached the maximum of proficiency, and above one-half are children of eight years, and therefore in training in infant or mixed schools, the classification, methods, and teaching power of which are very imperfect and inferior.

PROFESSOR PIAZZI SMYTH publishes "A Poor Man's Photography at the Great Pyramid in the year 1865." The "poor man" is Professor Smyth himself, who details the difficulties encountered in pursuit of his undertaking in the face of a "coalition of rich ones against him." Whatever may be thought of Professor Smyth's theory of the object for which the Great Pyramid was built, there can be no question that he has brought to the subject an immense amount of patient self-denying research which demands acknowledgment, and some of his meteorological observations may yet lead to important results.

MESSRS. LONGMAN'S latest list of forthcoming works includes the following, in different departments of science:—The Origin of Civilisation, and the Primitive Condition of Man, by Sir John Lubbock; Other Worlds than Ours, by R. A. Proctor; The Historical Geography of Europe, by E. A. Freeman; Le Maout and Decaisne's General System of Descriptive and Analytical Botany, translated by Mrs. J. D. Hooker; Researches on Diamagnetism and Magnecrystalline Action, by Professor Tyndall; Lectures on Surgical Pathology, by James Paget; A Course of Elementary Problems in Practical Plane Geometry, by John Lowres; Principles of Mechanism, by Professor Willis; Smoking Fires—their Cause and Cure, by Rev. A. C. Ainslie; On the Manufacture of Beet-root Sugar in England, by W. Crookes; and A Handbook of Dyeing and Calico-printing, by the same author.

THE continental subscription list on behalf of the late Professor Sars now exceeds 10,000fr. A young naturalist, Mr. C. Jobert, called a public meeting at Havre in its support, which was a great success, the mayor granting free use of a room in the Hotel de Ville, and the printer refusing to be paid for printing the circulars: a worthy example for imitation.

Apropos of Professor Tyndall's "Dust and Disease," we extract the following from the *Scientific American*:—"The dust obtained from the places of amusement in New York has recently been analysed by the scientific officers of the Metropolitan Board of Health. Over one hundred speci-

mens of the particles floating in the air, and falling as dust, were collected on plates of glass, and were examined under the microscope. The proportions of the different ingredients varied, but the same substances were found in all the specimens. The composition of the matter subjected to the microscope was as follows:—"The dust of the streets in its finer or coarser particles, according to the height at which it had been collected, with a large proportion of organic elements; particles of sand, quartz, and feldspar; of carbon, from coal-dust and lampblack; fibres of wool and cotton of various tints; epidermic scales; granules of starch of wheat, mainly the tissues of plants; the epidermic tissue, recognised by the stomata or breathing pores; vegetable ducts and fibres, with spiral markings; vegetable hairs or down, either single or in tufts of four or eight, and of great variety, and three distinct kinds of pollens. Fungi were abundant, from mere micrococcus granules to filaments of mould. When water was added to a portion of dust from whatever source, and exposed in a test tube to sunlight or heat for a few hours, vibriones and bacteria made their appearance, and the fungous elements sprouted and multiplied, showing that they maintained their vitality, and proving that the germs of fermentation and putrefaction are very widely diffused."

It is said that Professor Nordenskiöld is organising another Polar Expedition for 1871-2, and that he intends, amongst other things, to attempt to reach the North Pole by starting from Spitzbergen, or its neighbourhood, in the spring, and travelling by sledge over the frozen sea. It is reported that he intends to visit Greenland this year to procure dogs for his enterprise. We fear that if he relies upon dogs, he will not succeed better than his predecessors, and he may even experience great difficulty at the outset in obtaining the requisite number for his purpose; for, by the latest accounts from Greenland, the disease among the dogs in that country (which proved such a hindrance to Mr. Whymper in his attempt to penetrate to the interior in 1867) has spread, in spite of all efforts to check it, from one district to another, and is still continuing its fatal ravages.

THE new number of the *Proceedings of the Royal Institution*, commencing the sixth volume, includes Professor Tyndall's lecture "On Dust and Disease," Professor Odling's "History of the Scientific Work of the late Professor Graham," and Dr. Carpenter's lecture on the "Temperature and Animal Life of the Deep Sea," with briefer notices of the other Friday evening discourses before Easter.

At the meeting of the French Academy on the 11th inst., Marshal Vaillant communicated the curious fact that Cuvier's name was not *George*, but *Jean Leopold Nicolas Frederic*. According to M. Dumas, this circumstance was well known to persons familiarly acquainted with Cuvier, but no reason is given by him for such a singular change of name.

THE second of Sir Edward Sabine's conversazioni as President of the Royal Society will be held on Saturday evening next.

THE *Engineer* states that a new method of warming first-class carriages in express trains has been adopted in Bavaria: a special van is attached to the train and contains a powerful "calorifere," and the heated air is conveyed to all the carriages of the train by means of india-rubber tubes. The experiment with first-class carriages is reported upon so favourably that the authorities have determined to apply it to all the carriages on the Bavarian lines, and it is expected that it will soon be adopted on all the German railways.

THE herbarium of the late Von Martins, which was offered to and refused by the Bavarian Government, has been purchased for 30,000 fr. by the Belgian Government to form the basis of a national collection, to be located at Brussels. It consists, 1st, of the general herbarium, containing 60,000 species, represented by 300,000

specimens, nearly half of which are Brazilian; 2nd, of the great collection of palms; 3rd, a collection of fruits and seeds; 4th, a series of woods; 5th, a collection of drugs and economic specimens, in great part formed by his brother Theodore Martins, Professor of Pharmacy at Erlangen.

ACCORDING to the *Photographic News*, the oft-reiterated statement that the eye of a dead animal has impressed upon it an image of the last object seen in life has been the subject of serious investigation in Germany. Americans have gone so far as to state that the eye of a murdered man had been found in which a portrait of the murderer was distinctly traceable. In the investigation in question the eyes of thirty different animals, all of which had been killed with a view to subsequent examination, were carefully inspected, but in no case was there any evidence discovered to warrant the statement referred to.

A COMPACT and valuable little "Route-map and Index to the more interesting objects in the Royal Gardens, Kew," is about to be issued under official sanction by Messrs. Macmillan and Co. It contains an excellent map of the gardens, and index to some of the more interesting plants: and as it is to be sold for the low price of 2d. it will doubtless have a very large circulation.

DR. E. SYMES THOMPSON, Gresham Professor of Physic, will deliver his two courses of three lectures each at the Gresham College, Basinghall-street, after Easter. The first course on April 22nd, 23rd, and 24th, will be on Cough, on Tonics, and on Climate and Health Resorts. The second course, on June 2nd, 3rd, and 4th, on the Epidemics of the Middle Ages, on Sedatives, and on Narcotics. The Lectures are illustrated with diagrams, and chemical experiments, and are free to the public. They commence at 7 o'clock.

DR. CLARK, assistant to the late Dr. Penny, who continued the winter course of lectures on Chemistry after that gentleman's death, will deliver the summer courses. Further arrangements are dependent upon the proposal of Mr. Young, the President, to endow a chair of Technical Chemistry.

THE statistics of the American Pennsylvania crude oil industry for the past year are now published. The total production of the year was the enormous amount of 4,215,142 barrels, being a daily average of 11,548 barrels. The production of 1868 was 3,715,741 barrels, the increase during 1869 over the previous year thus being 499,401 barrels, or about 1,460 barrels per day.

PROF. H. WURTZ has presented to the New York Lyceum of Natural History a report of an extraordinary outburst of gas in the township of West Bloomfield, co. of Ontario, State of New York. It issues from a bore-hole in the solid rock, about five inches in diameter, and when burning, gives in a still atmosphere a flame some thirty feet in height, the flow amounting to 400,000 cubic feet per day, which has now been going on for more than four years, without any perceptible diminution of rapidity. The density is 0.693, and the result of several analyses shows the following composition:—

Marsh gas	82.41 per cent.
Carbonic acid	10.11 "
Nitrogen	4.31 "
Oxygen	0.23 "
Illuminating hydrocarbons	2.94 "
	100.00

The most remarkable feature of the discharge is the lack of diminution of the flow for so long a time in connection with the low pressure indicated, corresponding to that of but a few inches of water. Dr. Stevens has examined the geological formation of the rock from which the oil proceeds, and finds it to belong to the Hamilton Group, the gas proceeding doubtless from the "Marcellus Shale," which is highly charged with bitumen and

carbonaceous matter, and flames on ignition. The four great gas-producing strata of New York, Pennsylvania, and Ohio thus all belong to the Palæozoic formation.

THE quinquennial prize of 5000fr. of the physical and mathematical sciences of the Belgian Academy has been awarded to Prof. Plateau for his researches on the figures of equilibrium of a liquid mass without weight; a fitting sequel to 26 years' unremitting work, the professor being now blind. The Argenteuil prize of 12,000fr. has been bestowed on M. Champonnois, inventor of the method of distilling beet-root.

THE Council of the Entomological Society offers two prizes, of the value of five guineas each, for essays, of sufficient merit, drawn up from personal observation in the anatomy or economy of any insect or insects; the essays to be sent in before the end of November next.

NOTWITHSTANDING the numerous investigations that have been made upon the process of gastric digestion, the ulterior changes that the food undergoes in the alimentary canal exclusive of the action of the pancreatic and biliary fluids, in other words, the action of the fluid secreted by the walls of the alimentary canal itself on the various constituents of our food, admitted on all hands to be considerable, has received but little attention. In the "Untersuchungen aus dem Institut für Physiologie" in Graz, edited by Prof. Rollett, an essay appears written by Dr. Alexis Dobroslawin of St. Petersburg on this subject. In order to obtain the intestinal juice, he made a fistulous opening into an isolated portion of the intestine and inserted a canular into the orifice, which was properly secured. The dog was fed with a pound of horse-flesh and a single supply of water daily. Investigations were in the first instance made with a view of ascertaining the quantity of intestinal secreted juice. The material obtained consisted of a thin fluid and of a mucous portion, the relative proportion of which varied to a considerable extent under different circumstances, but from an isolated portion of intestine (having a length of 13 centim.) in one dog he obtained 34 grains, and in another, where the isolated portion of intestine had a length of 17 centim. 28 grains per hour. The results of electrical excitation by means of induction currents were very similar to those previously obtained by Thiry, and showed a considerable increase in the amount of the secretion during the passage of the current, and further researches showed that the secretion thus obtained did not differ materially from that produced in the healthy and uninjured animal by the application of electricity to the freshly-exposed intestinal tract. The most interesting part of his researches, however, bears upon the action of the intestinal juice on starch, albumen, and fat respectively. In regard to the former, he was able to convince himself, in opposition to the statements of Thiry, that the intestinal juice possesses a distinct power of converting starch into sugar, and this occurred in whatever state the juice might be, whether clear, or troubled, or filtered, or mingled with flocculent masses of mucus. The time required was in all instances nearly the same, or about two hours. In one instance, evidence of the presence of sugar was obtained in a quarter of an hour. In regard to albumen, his experiments were made with portions of raw fibrin of blood. These were kept at a temperature of about 100° Fahr., in contact with some of the recently-obtained intestinal juice, and it was found that a solvent action did occur, but with great slowness, from twenty to forty, or even forty-eight hours being required. The dissolved fibrin underwent conversion without the development of any putrefactive odour into peptones, as was demonstrated by the action of a series of tests. The researches made with a view of ascertaining the action of the juice on fats, as olive oil and butter, had a negative result; he was never able to discover any of the fatty acids.

In the last part of Schultze's "Archiv. für Mikroskopische-Anatomie," M. Schwalbe describes the lymphatic spaces of the eye. In this paper he shows that there is a large space comparable to a lymphatic sac lined by nucleated epithelium, as shown by the action of nitrate of silver situated between the choroid and sclerotic coats. When injected with a coloured fluid the injection escapes from the globe by channels surrounding the venæ vorticosæ, and then distends the space known as the capsule of Tenon. From thence the fluid passes backwards through a sheath surrounding the optic nerve, and so penetrates into the arachnoid space of the brain.

THE Rev. W. P. Clarke, vice-president of the Royal Society of New South Wales, sends us an interesting paper on the Causes and Phenomena of Earthquakes, especially in relation to shocks felt in New South Wales and in other provinces of Australasia.

In a letter to *Hardwicke's Science Gossip*, Mr. W. W. Spicer states that the colour of insects is greatly influenced by the length of time during which they have remained in the chrysalis condition, well-marked varieties being produced by preserving the chrysalis in a state of abnormal torpidity through the autumn and winter, which can be done by keeping it in ice.

THOSE of our readers who are interested in the theory of vision will find an instructive paper by Mr. G. Joseph Towne, in the last issued volume of the "Guy's Hospital Reports" (1870). It deals chiefly with the subject of binocular vision, with a criticism on the views recently promulgated by Professors Hering and Helmholtz, and at the conclusion of his essay he makes the following statements:—"That the images of all objects placed within the transverse visual plane are referred to the opposite side of the field; that is, to the side of the field opposite to that occupied by the object viewed, and we remark that this phenomenon is special to the transverse visual plane. That in selecting the transverse visual plane as the region for his experiments, and in having applied to the field generally the exceptional phenomena special to this region, Hering has committed an error, which is fatal alike to the consistency of his experiments and to the soundness of his conclusions. That the phenomena on which Hering has based his theory are inseparably connected with a near convergence of the eyes, and it may be asserted that similar phenomena cannot occur, the field being viewed with the optic-axes parallel." Mr. Towne's statements are supported by much ingenious reasoning, and references to numerous experiments, some of which are illustrated.

LARGE beds of rock-salt have been discovered by borings, in the neighbourhood of Middlesborough-on-Tees, and shafts are now being sunk with a view to work the valuable deposits. In this we have another example of the mineral character of that north-east corner of Yorkshire. Iron ore and smelting furnaces abound. Mineral waters well-up in sundry places. Alum used to be made at Guisborough, near the foot of Rosebury Topping; and now the rock-salt offers a new resource to a large and busy port, which, forty years ago, was a wild waste with two or three houses only.

IT is perhaps a sign of a wider awakening interest in geology among the Italians, that a new journal—*Bolletino R. Comitato Geologico d'Italia*—was brought out at Florence, at the beginning of the present year. The second number has just appeared. It contains papers and notices on geological and mineralogical subjects, illustrated by engravings, and so far fulfils its purpose of making "better known than hitherto the geology and topography of Italy." We are glad to welcome this new periodical; for the more the Italians become acquainted with the natural resources of their country, the better will it be for all concerned.