MR. G. H. HURLBUT, an American, has been appointed engineer to the Government of the United States of Columbia at a salary of 480*l*. per annum.

A LARGE public swimming-bath is proposed at Calcutta, and meets with support.

IN Bolivia there is great excitement in consequence of the discovery of rich silver mines in the Sierra del Limon Verde, fifteen miles from the small settlement of Calama, and seventy-five miles from the shore, in the maritime prefecture of Cobija. In a short time 150 mining licenses had been taken out at the prefecture, and there was a great rush from Cobija.

THE Queensland Acclimatisation Society have sent a parcel ot seeds to the Peruvian Government. These have been placed in the Lima Botanic Garden, but are said tobe in bad condition. The Peruvian Government has communicated its thanks to H. B. M. Minister, and has directed a corresponding gift to be sent to the Queensland Society. The transaction has had a very good effect.

ANOTHER coal district has been discovered in India by Mr. W. T. Blanford, F.G.S., in the bed of the Hasdo river, just below the village of Korba, in the Bilaspore district. Mr. Blanford is of opinion that the seam is favourable for working, and that it surpasses the Chanda coal, and is in portions equal to that of Raneegunge.

IRON has been rediscovered in Gwalior in large quantities. It was formerly worked, but abandoned on account of the scarcity of fuel.

AT Chicholi in the Central Provinces of India, a vein of silver has been discovered yielding on assay 9oz. 19dwts. 6grs. of silver to the ton of ore.

THE Observing Astronomical Society entered upon the second year of its existence on July 1st. The recent election of officers for the ensuing year has resulted tn the re-election of the former president, treasurer, and secretary and committee. The Rev. R. E. Hooppell, M.A., L.L.D., F.R.A.S., is the president; Mr. William F. Denning, the treasurer and secretary; and the following are the members of the committee: Messrs. S. P. Barkas, F.G.S.,; James Cook, A. W. Blacklock, M.B., H. Michell, Whitley, and Albert P. Holden. The society numbers forty-six members, and was formed for the purpose of aiding the spread of practical astronomy.

THE most recently published part of Martius's "Flora Brasiliensis" is an important one, comprising the ferns of Brazil (orders *Cyatheaceæ* and *Polypodiaceæ*) by Mr. J. G. Baker of the Kew Herbarium. Mr. Baker makes about 250 species; it is to be regretted that at the same time M. Fée had been working at Brazilian ferns from the very same materials in his *Cryptogamie vasculaire du Brésil*, which we have just received; and, following out the practice too much in vogue among Continental botanists, had made a distinct species of almost every slightly different form, thus enormously multiplying their number; his names will claim priority of publication over Mr. Baker's by a few months. The part is illustrated by fifty splendid plates, twenty of them nature-printed by Ettingshausen of Vienna, the remainder representing details of structure and fructification of every sub-genus, large plates of fifteen new and interesting species, and sections of trunks of the arborescent kinds. The *Hymenophyllaceæ*, *Gleicheniaceæ*, and other small orders by Sturm have been published some years; the *Isoetaceæ* and *Equisetaceæ*, by A. Braun, to be published very shortly, comprising only a small number of species, will complete the volume.

THE preparations for the New York Industrial Exhibition are making rapid progress, but it is not expected that it will be pened before the spring of 1872.

THE HARVEIAN ORATION

THE following extracts from Dr. Gull's Harveian oration, delivered at the Royal College of Physicians, on June 24th, form a fitting sequel to the researches of Dr. H. C. Bastian, which we reccently published, on the Spontaneous Generation of Living Things :—

"If it is ascertained beyond all doubt that, in respect of its materials, a living body contains no more than it has received; that, however strange and mysterious its organs and their functions, the warp and woof are of substances with which we are acquainted under simpler conditions, cannot the same be maintained of the forces it exhibits? . . . . It may be objected that there is lurking a kind of *petitio principii* in the supposed relations of simpler forces to their higher forms; that for the conversion of the former into the latter it is necessary to postulate material conditions of a certain kind, and that for the organic conversion we must begin with a living body or its germ; that the boast of the physiologist is like the boast of Archimedes. If he wanted a πῦυ στῶ, they require germs or ova and a living body. But it is clear that such an objection has no weight as in favour of a vital force which is not material, since it is abundantly proved that, whatever be the conditions required, they do not generate any power, but only vary the form of it. They who maintain the hypothesis of a separate vital force, independent of the ordinary forces of nature, and which has no essential relation to them, do, by the very terms of the hypothesis, assume that the phenomena in living things are out of the proper range of science, and they consign us to a perpetual mental inactivity and ignorance in that region of knowledge in which above all others man is interested. . . . . An hypothesis, like that of a separate vital principle, which demands so much, which stops inquiry at once, making progress impossible, by removing the steps by which it could ascend, should at least have the highest sanction of our intellect. . . . The dogma 'omne vivum ex ovo,' for the truth of which Harvey so justly contended against the fanciful notions of his age, cannot perhaps be now maintained in its integrity. Whether, to use an expression of that day, living things are ever produced automatically—that is, *de novo*—through putrefaction or otherwise, is, like the question of the limitation or universality of the germ power, still a matter upon which opinion is divided; and as it is my duty on this occasion to exhort you to investigate nature by way of experiment, I must ask you not readily to accept negative conclusions which impose limits where none may really exist. . . . . The time is passing in which the human mind can remain satisfied to rest under the fetters it has imposed upon itself, or to cherish its own phantasms, as if its very existence depended upon them. 'Man knows only what he has observed of the course of nature' is the notorious dictum of science, showing the limit and the mode of the acquirement of our knowledge: the limit as wide as nature itself; and the mode is but readiness to be taught. Notwithstanding, therefore, the adverse decision of schools and dogmas, science still occupies itself with the possibilities of occasional automatic generation. And that it should be so, let it not raise antagonism in the minds of those whose pursuits (inquiries) lie in another direction, since the infinity of nature may well include facts which at first seem to be antagonistic. . . . . We have lately been rather blamed for not gratefully accepting the germ theory of disease; but to this college the theory is not new, and, I think I may add, has not been proved to be true. It will be in the remembrance of many present that in the year 1849 a theory was put forth that epidemic cholera was due to fungi and their germs. Peculiar bodies, it was said, had been found in the rice-water evacuations, and also in the air and drinking waters of the infected localities. It was confidently asserted that we had substantial facts in support of the theory, and that it fulfilled the conditions required of being both true and sufficient. This college thought the subject of such moment that a sub-committee was formed from the Cholera Committee of that day for its investigation. The drinking water of infected places was examined, the air of rooms in which cholera patients were dying was condensed, that it might afford whatever floated in it for examination; dust was collected from cobwebs, window-frames, books, surfaces of exposed food, and every imaginable place, to try it for cholera germs. . . . The supposed germs, when really germs (for many shapes had been included in the supposed direful growth), were found to be spores of known harmless fungi and confervæ, of which, if even the startling number of thirty-seven and a half millions should be contained in about two drachms of water, as quoted by Tyndall, from Mr. Dancer's examination,* it is probable that the whole or repeated units of such millions might be harmlessly swallowed. But for the most part the supposed germs were not germs of any kind, but broken scraps of vegetable and animal tissues, spiral vessels from dried horse-dung, hairs, wings, and legs of insects, detrita of dress, and the like. The results were, in fact, entirely negative of any peculiar bodies to which the epidemic disease could be referred. One general result arrived at at that time, however, agrees with the observation of Tyndall in his recent investigation of dust by a beam of light—viz., that the floating particles in the air are chiefly of an organic nature. This we might have been prepared for, from the specific weight of dried organic material, enabling such dust to float, when the heavier inorganic substances would be deposited. That the infectious diseases spread by emanations from the sick, must have been long known, and that such emanations are of a solid nature, we may infer from the fact that they may be dried and conveyed from place to place; but in what state, whether as amorphous material or as germs, we know no more to-day than was known a thousand years past. No new fact bearing upon the propagation of contagious disease has been reached by the recent investigations on dust; nor can we infer the nature of summer catarrh because the nasal mucus under such circumstances and at no other time, was found peopled by vibriones, since decomposing mucus is always populous with this common race of infusoria. The phenomena of fermentation and putrefaction in dead and decomposing substances afford no explanation of the changes observed in a living body in a fever process. The purulent matter produced in small-pox, is not, as we know, in any way comparable to the yeast formed in fermenting fluids. On the contrary, the microscope demonstrates that the forms, as for instance in variolous pus, are not different from those contained in other purulent and innocuous exudations. Nor have we any reason to conclude that any forms which are observed are germs which convey the disease. It is to be regretted that a confusion in terms has been made. Instead of dust and disease it ought rather to have been dust and putrefaction, or dust and fermentation, since the relation of dust to disease has not been revealed anywhere in the inquiry. That the air conveys the material causes of the infectious diseases from the sick to the healthy, is a notorious fact, which had equal force before these inquiries were instituted, though, owing to the exigencies of social intercourse, a fact more neglected than in times of comparative ignorance. It is difficult to vindicate exactness in progress without seeming to be at the same time a hinderer of it. The onward and the regulating forces of a machine, though not incompatible, but necessary, require the nicest balance. This reflection suggests itself by the way the spread of infectious diseases has been handled. The theories it has given rise to have been so easily put forward as to thereby create distrust. But the spirit of science is no favourer of negations. 'Der Geist der stets verneint' finds no greater friend in medicine than in theology. Still it will be admitted that no progress can be made by the ready acceptance of every proposition, however distinguished the source from which it emanates. The parasitic origin and nature of epidemics *may* be true, but it has yet to be proved. As an hypothesis, it admits of proof or disproof, and so has further claim upon the industry of those who have put it forward as a suggestion. Without going to the length which this hypothesis demands, we must admit, however, that we know enough to uide us much further than we have yet gone in the practice of prevention."

* Proceedings of the Royal Institution of Great Britain, Jan. 21, 1870.

PROFESSOR TYNDALL'S LECTURES AT THE ROYAL INSTITUTION, ON ELECTRICAL PHENOMENA AND THEORIES

PROF. Tyndall completed a short course of seven lectures at the Royal Institution, on Thursday, June 9th, upon "Electrical Phenomena and Theories," which were made as interesting as all his lectures are, by the ingenuity and completeness of the experimental illustrations; in this particular case the apparatus of his distinguished predecessor, Faraday, being largely drawn up, in addition to considerable accessions of more recent date, many of them derived from the kind help of individuals who have made themselves high reputations in the various branches of Electrical Science. The scope of the Professor's demonstrations covered the entire range of Electrical and Magnetic Science, commencing with the phenomena of voltaic electricity, and passing through the various leading manifestations and peculiarities of electro-magnetism, magnetic force, frictional electricity, electro-chemistry, magneto-electricity, and, of course, electric telegraphy, and the relations of electric motive force to heat.

One remarkable peculiarity in these lectures of Professor Tyndall is, the effective way in which several of the more subtle effects of electrical change and power are made manifest to a large audience by the instrumentality of beams of electric light, manipulated in various ways. Thus, for instance, the elongation of a solid bar of iron, when it is thrown into the magnetic state, by being encircled in the folds of a voltaic current, conveyed by a helix, is shown by the starting of a spot of light, some six or eight inches upon a screen, when the molecular condition of magnetism is excited by the passage of the current. A beam of light falls upon a small mirror, carried at the extremities of the arm of a lever, so resting upon the end of the iron bar, that when the lever is lifted by the magnetic elongation of the bar, the beam of light is shot off from the mirror as a long weightless index. The change in the position of the molecules of iron by the action of magnetism is also proved by throwing the beam through a vertical cell of glass, containing magnetic oxide of iron suspended in water. When the cell is exposed to the influence of the poles of a strong electro-magnetic, the light passing through the cell and contained liquid to a screen beyond, brightens, in consequence of the metallic molecules turning themselves "end on" to the incidence of the beam. The lines of magnetic force assumed, when iron filings are sprinkled over the poles of a magnet, are portrayed by the intervention of a system of lenses, which depicts the image upon the screen. The formation of the "tree of lead" upon the negative electrode of a voltaic current, when a salt of lead is decomposed by the current, is shown in the same way; the arborescent crystals glowing and dissolving alternately on the opposite poles, immersed in the solution as the direction of the current is reversed. The very beautiful colours and patterns of Nohili's rings, formed when lead is thrown down by voltaic decomposition upon a polished plate of steel, are exhibited by a similar intervention of lenses, and the illumination from the electric beam. An artificial telegraph cable, whose resistance to the transmission of the electric current is made identical with 14,000 miles of an actual marine cable, is formed by introducing into the path of the current gaps, consisting of feebly conducting liquids and condensers, so distributed as to represent the respective distances by telegraphic route of Gibraltar, Malta, Suez, Aden, Bombay, Calcutta, Rangoon, Singapore, Java, and Australia. A mirror, belonging to each gap, lies in the path of the currents, carried by a galvanometer, constrained to deflect its needle from the position of both on the instant that the passage of the current is felt. Before the current is sent through the apparatus, ten dots of light, cast from the mirrors by the instrumentality of electric illumination, lie upon the screen, in a straight vertical range. When the current is passed through the apparatus, dot after dot starts aside upon the screen, as the current fills the condenser immediately before each mirror, and then flows beyond to deflect the galvanometer immediately in advance. The deflection of the successive galvanometers, and the corresponding traverse of the beam of light upon the screen, is seen, under this arrangement, to take place at successive steps or intervals, which exactly express the intervals of time which the electric current would require to reach the several stations named, in the actual progress of telegraphy. The starting aside of spot after spot upon the screen when the current is sent through the apparatus, and the subsequent return of spot after spot to the position of original test in inverse order, forms a very striking illustration of the fact that the resistance of an electric cable is in some degree dependent upon its length, and that time is consumed in overcoming this resistance. The most interesting and telling of all these beam-of-light illustrations, however, is certainly the one which is employed to indicate the excitement of diamagnetic force in a tube of copper, when it is suspended between the poles of an electro-magnetic. The tube is carried by a string of silk, and rotates rapidly under the influence of a twist given to the string. The string also carries above the tube a series of small mirrors, which reflect the light of an electric beam, so that a continuous elliptical band of illumination is formed on the screen whilst the twisting is con-