

less passed over. The fruit I possess is attached to a branch, and was found during the last visit to Alum Bay on which I was able to collect any fossils, for within a few months of that time the leaf-bed disappeared with the recession of the cliff. It is the only Conifer known from Alum Bay, or even from the Lower Bagshot formation, and all others should be erased from the list.

The second species is from Bournemouth, and is known from even more ample material. The foliage is also dimorphic, the distichous type being however very subordinate and confined, as in *P. cupressina* and other living species, to short, simple branchlets. A complete seedling plant with its roots possesses an irregular distichous foliage something like that of the Alum Bay species, but becomes imbricated towards the root. The young plant seems to have retained this character for some time, as shown by several branchlets. It then appears to have assumed a semi-imbricated foliage, which is exceedingly graceful. The full-grown tree principally possessed imbricated foliage, and the position the distichous branchlets occupied can only be inferred from existing allies. The largest branch is about fifteen inches long, and is composed of about thirty branchlets; but this is surpassed in elegance by another seventeen inches long, whose stem is still imperfect. The simple branchlets are very slender, about six inches long, and were often shed singly, but both branches and branchlets, as I here term them, were, I think, articulated and shed naturally, and not broken off by wind. The fruit is a berry of about half an inch diameter, clustered in three, shortly stalked, and borne on an imbricated branch, and the male catkins are in pairs and terminal. The tree was probably of large growth, and pendulous. A third form, which I cannot assign with equal reason to any genus but *Podocarpus*, has larger foliage. Both of these types seem extinct, with their nearest allies in the Australian region and the Oriental Island region of Wallace.

In addition to these there are fruits from Sheppey which I believe to be podocarpaceous, one at least seeming identical with *P. elata* of Queensland. The whole of the forms will be published and fully illustrated by the Palæontographical Society in their usual exhaustive manner.

The study of the Tertiary Coniferæ, together with that of the ferns, has already led to some not unimportant rectifications. The Bovey Tracey beds have been exactly correlated with those of Bournemouth, and now the Mull, and I believe also the North of Ireland beds, can be clearly shown to be Eocene. I also hope in my next journey to Iceland to complete the correlation of the Tertiary beds there, and of Scotland and Ireland, with those of Greenland, which I cannot but regard, from whatever aspect they are viewed, as of considerably earlier age than Miocene.

J. STARKIE GARDNER

#### NOTES

WE are glad to see in the recently published number of the *Journal* of the Linnean Society Mr. Bentham's important paper on the *Gramineæ*, giving the critical results of his examination of the leading groups and genera of that important family. Having been read so recently as November 3, 1881, it has been printed and issued to the Fellows with commendable rapidity. We understand that our distinguished English botanist is, notwithstanding his recent severe domestic affliction and his advanced age, in excellent health, and that he is daily engaged in the Herbarium of the Royal Gardens, Kew, in the continued preparation of the *Genera Plantarum*—the monumental work on the genera of all known flowering plants, of which the first instalment was published in 1862. Sir Joseph Hooker and Mr. Bentham have been occupied with its elaboration for the last quarter of a century, and it will be with feelings of no small satisfaction that all students of systematic botany will learn that

the printing of the third and concluding volume will shortly be commenced.

MESSRS. MACMILLAN AND CO. will shortly publish an account of the late Prof. James Clerk Maxwell, by Prof. Lewis Campbell, of St. Andrews, and Mr. William Garnett, late Fellow of St. John's College, Cambridge. We understand that Prof. Campbell was Maxwell's intimate associate in early life, and Mr. Garnett was associated with him as demonstrator at the Cavendish Laboratory from its opening in 1873 until Prof. Maxwell's death in 1879. The work will consist of (1) a biographical outline by Prof. Campbell, with selections from correspondence; (2) by Mr. Garnett, a popular account of Maxwell's chief contributions to science; and (3) a collection of his poems, a few of which are already known to the public, while the greater number of them will now be published for the first time. The book will be illustrated with one or more steel plates of portraits, and a series of outline sketches of early scenes, done by Prof. Maxwell's cousin, Mrs. Hugh Blackburn (J.B.), from drawings made by herself at the time; also with coloured and other diagrams explanatory of his scientific work, some of which are taken from original water-colour sketches of his own. Not to dwell here on Prof. Maxwell's eminence as a man of science—the originality and depth of his character, his religious earnestness, his amiability, and his quaint ironical humour, may be expected to render this presentation of him by intimate friends more than ordinarily attractive to many readers outside the scientific world. The whole will be comprised in an octavo volume of about 500 pages.

UNDER the direction of the Trustees of the Gilchrist Educational Trust a course of scientific lectures by Mr. Lant Carpenter has just been given in five Lancashire towns. The total audiences were from 3500 to 4000 per week, chiefly artisans, who maintained their interest to the very end—the same people coming night after night—and in some instances going to another town in the same week to hear the lecture over again. The lectures were well illustrated by experiments and by the photographic diagrams, &c., in the oxyhydrogen lantern. The latest developments of science were treated of, including the storage of energy and the electrical transmission of power. At the close of the course, hearty votes of thanks (with requests for other courses) were passed to the Gilchrist trustees and to the lecturer.

THE staff of the Russian observing station on the Lena left St. Petersburg on December 27. MM. Yurgens and Eigner are intrusted with the astronomical, magnetical, and meteorological observations, and Dr. Bunge will make researches in zoology, botany, and geology. They expect to reach Irkutsk with their instruments, in two months, and to begin next spring their journey to Yakutsk, so as to be able to open the polar station at the mouth of the Lena, on August 1, 1882.

THE rate of the cricket's chirp varies with the temperature, becoming faster as the latter rises. Recently a writer in the *Salem Gazette* (Mass.) gave the following rule for estimating the temperature of the air by the number of chirps made by crickets per minute:—"Take seventy-two as the number of strokes per minute at 60° temperature, and for every four strokes more add 1°; for every four strokes less deduct the same." In a letter to the *Popular Science Monthly*, Margaret W. Brook gives an account of observations she made with a view to testing this rule, on twelve evenings, from September 30 to October 17. Her column of temperatures as computed by the rate of vibration shows a close agreement with that of temperatures recorded by the thermometer.

THE industrial manufacture of oxygen has engaged much thought, while the uses, on a large scale, of that agent have not been very exactly determined. At Passy there are now works

for producing the gas according to an improved method of MM. Brin frères, who attach the highest value to oxygen as an industrial agent, and indicate various applications of it. The process is the well-known one in which caustic baryta absorbs oxygen from the air, and gives it up under heat. By a special way of preparing the baryta, however (described in *Annales Industrielles*), they render it highly retentive of its absorbent power, obviating the necessity of frequent renewal. After 400 operations there was (on microscopical examination) no appreciable change. The baryta is placed, at Passy, in metallic retorts connected, in groups of fifteen, in two furnaces heated with gaseous fuel. A locomotive engine drives Root blowers, which force air into the retorts; after peroxidation the oxygen is liberated by heat, and pumped into the gasometer through an apparatus which removes traces of carbonic acid. As it is found that the peroxidation takes place better with moist than with dry air, the air is passed through a saturator on its way to the retorts. For production of 5000 cubic metres of oxygen a day in Paris, it is estimated (from the data at Passy) that the cost per cubic metre would be from 0.12 to 0.15 franc, according as coal or coke was used for fuel. The price of 100 kilogr. of baryta prepared by the new method is about 250 francs.

MILITARY surgeons are familiar with the remarkable attitude retained by soldiers who have died on the battle-field. Recent experiments by M. Brown-Séguard (*Comptes rendus*, December 26) throw some light on the phenomenon. It is proved (1) that a true muscular contraction may occur a certain time after as well as before death, and that this contraction may last long, and pass into the state of cadaveric rigidity, or disappear completely, so that one may then recognise the persistence of muscular irritability; (2) that of the different parts of the brain, the cerebellum has most power of producing contraction after death; (3) that the retention, by soldiers killed on the battle-field, of the attitude they had before death, depends not on a sudden occurrence of cadaveric rigidity, but on the production of a true contraction.

In a paper lately read before the Royal Society of Tasmania, Sir J. H. Lefroy gives a new determination of the magnetic declination— $8^{\circ} 49' 3''$  E.—at Hobart for the year 1881, which he had made on the site of the old magnetical observatory of 1840-48. He notes the observation of Tasman in 1642, that "near the coast here" (Tasmania) "the needle points due north," and comparing this with the values obtained by some modern observers since 1840, he concludes that the declination which had been increasing up to the time of the magnetic survey made by Dr. Neumayer in 1863, is now decreasing. At Melbourne it has also been observed that the declination has been decreasing since 1865.

THE University of St. Petersburg has had added to it an astronomical observatory for the students. Until now the students who wished to learn practical astronomy have been reduced to make use of the very old observatory of the Academy of Sciences, with its old instruments and a complete want of any accommodation for study, or to find some friend among the officers of the Military General Staff Academy, who study at Pulkovo. Now St. Petersburg has a fine observatory, and will have an assistant-professor especially for this subject.

ST. PETERSBURG is to have its Electrical Exhibition, organised by the Technical Society. Several manufacturers of electrical apparatus and several Russian inventors have already promised their co-operation.

A VOLUME of considerable interest has recently been published by Friedenschon and Co. of Hamburg—"Dr. Ludwig Leichhardt's Briefe an seine Angehörigen," edited by Dr. G. Neu-

mayer and Otto Leichhardt, a nephew of the unfortunate Australian explorer. These letters are of special interest at present, when rumours come from Australia that the journals and other traces of Leichhardt have at last been found. The letters extend from 1834 (Göttingen) to April 3, 1848 (Macpherson's Station, Fitzroy Downs). These letters give one a high opinion of Leichhardt's qualifications for the work of exploration. He had an excellent education not only at home, but during lengthened residences in London and Paris. He had a strong love for natural science, was a shrewd and accurate observer, and a writer of considerable graphic power. His account of life in London and Paris is decidedly interesting, and his letters from Australia during his exploring work lead one to feel that the death of the writer was a real loss to science. These letters were quite worth publishing. Appended is a long paper by Dr. Neumayer on Leichhardt as a naturalist and explorer, in which the writer justly gives a high estimation of his qualifications and character.

THE Association for the Improvement of Geometrical Teaching will hold its annual meeting at University College, Gower Street, W.C., on Wednesday, January 11, at 11 a.m., when amongst other business the Code of Rules drawn up last April will be submitted for confirmation. The following resolutions will be proposed: That the proofs of the propositions contained in Book I. of the Syllabus will be received by the Association; and that the Committee for Elementary Plane Geometry be instructed to add a collection of exercises to the proofs of the propositions of the Syllabus. All persons interested in the objects of the Association are invited to attend.

THE number of visitors to the Royal Gardens, Kew, during the year 1881 was 836,676, the largest hitherto recorded.

AMONG the special articles in the *Annuaire* of the Brussels Observatory for 1882 are the following:—A list of 2000 communes in Belgium with their altitude according to the official survey; a paper on the conformation of the terrestrial globe; a series of studies of sun-spots in their various relations, by M. R. Tamene; tides on the coast of Belgium, by F. Van Rysselberghe; asteroids and comets discovered in 1881, by M. L. Niesten.

MR. E. C. OZANNE, of the Indian Civil Service, at present a student at the Royal Agricultural College, Cirencester, has been appointed Director of Agriculture in the Presidency of Bombay.

A SCHEME is on foot, having been approved by the Municipal Council of Paris, for extensively lighting with electricity the quarters of the Prefecture of the Seine, in the Tuileries. It is the work of M. Cernesson, and comprises lighting the Salle des Séances with eighty Swan lamps (in place of eighty Carcel lamps), and six Siemens' arc-lamps; lighting the library with forty-eight Maxim incandescent lamps (on the present lustres); another room with twenty-four Lane-Fox incandescent lamps; another with twenty Swan lamps; the Salle des Pas Perdus with two Werdermann lamps; a lobby with two Siemens' lamps, and a staircase with four Brush lamps. The whole will require an outlay of 75,000 francs. The horse-power necessary is 44, and while the idea of obtaining this from the Seine has been considered, it has been decided to set up a gas-engine in the court of the Tuileries. A portion of the motor force is to be employed for electric hoists, for driving ventilators, and other uses.

FROM the Annual Report of the Government Botanical Gardens at Saharanpur and Mussooree for the year ending March last, we gather the following facts:—On the collection and preparation of drugs, which seems to be an important item in the work of the establishment, it is stated that an indent for 200 lb.

of *Taraxacum* extract from the root of the Dandelion (*Taraxacum officinale*) was received from Calcutta. To supply this demand, which was the first occasion on which *Taraxacum* extract was supplied from the Saharunpur Garden, the seeds were sown over about half an acre of land in August, and the roots were dug up during the month of March and thoroughly dried in the sun, after which they were reduced to fine powder, this powder was then put into water and allowed to stand one night. The mixture was strained through fine cloth, and the clear liquid was then heated in a water bath until it had acquired the proper consistency. During the heating process a certain quantity of rectified spirits of wine was added to the extract. The heating process being finished, the extract on becoming cool was put into suitable jars and despatched. Of the Chuffa or Earth Almond, the tubers of *Cyperus esculenta*, a native of South Europe and North Africa, Mr. Duthie reports that about two dozen tubers have been received from Dr. Schomburgk, of Adelaide, and of this number about one-half had started into growth and were thriving luxuriantly. The tubers of this plant are used as an article of food in Egypt and in some parts of Europe, and they are now recommended for feeding sheep, hogs, poultry, &c., for which purpose they are largely used in the Southern States of America. Of Lucerne (*Medicago sativa*) it is stated that the demand for seed is every year increasing. "In addition to its good qualities as a fodder plant for horses and oxen it has the further advantage of being a perennial, which is very little affected by the extremes of heat and moisture it has to endure in North India. The Argan (*Argania sideroxylon*), a valuable oil-producing tree of Morocco, has been received at Saharunpur, and every care will be taken with the plants should the seeds germinate. Mr. Duthie says, "I find from a list published in 1854 by the late superintendent, that the tree then existed in the Saharunpur Garden. As none of the original trees are now to be found it would appear that the climate of this part of India is not altogether suitable."

UNDER the title of a "Catalogue of the Phænogamous and Vascular Cryptogamous Plants of Indiana" we have received a small octavo pamphlet, giving as we believe the first complete catalogue of the flowering plants and ferns of the well-known State of Indiana. The flora numbers 1432 species referred to 577 genera, and no doubt further additions will from time to time be made. The authors of the useful flora are the editors of the *Botanical Gazette* of Crawfordsville (J. M. and M. S. Coulter) and Prof. C. Barnes.

THE last number of the *Zapiska* (Memoirs) of the Caucasian branch of the Russian Geographical Society contains a valuable paper by the late P. K. Ushar, on the "Oldest Traditions on Caucasus."

WE have just received the first part of a second series of Dr. C. Fr. W. Krukenberg's "Vergleichend-physiologische Studien," Heidelberg, 1882. This part, of over 180 pages, is taken up with a number of very important and interesting memoirs, on such subjects as "On the Temperature at which the Lymph of Invertebrates Coagulates," "On the Colour Substance of Feathers," "On the Protective Coverings of the Echinoderms," &c.

THE Polytechnic has at last been sold, and will finally close on January 21. Until then a varied programme will be presented daily, including new musical, optical, magical, and popular scientific entertainments, as well as a *réchauffé* of very many of those that have been characteristic of the place during the last twenty years.

A VERY favourable Report is to hand of the Sheffield Free Public Libraries and Museum. Many additions have been made to the latter, and the small observatory attached, and which is

open to the public, was visited during the year by about 3000 people.

ON December 29, 1881, two strong shocks of earthquake were felt at Kiangari, in the province of Kastamoumi. The movement was from east to west. Considerable damage was done to the village, but no details have yet been received at Constantinople.

WE have received from the Society of Telegraph Engineers a list of the additions to their library during the past year; this library, we may remind our readers, is now open to the public.

THE Waterford Literary and Scientific Association have begun to publish their Proceedings. The part for 1880-81 contains abstracts of various lectures and papers, and the fifth Annual Report records the steady success of the Association.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus erythreus*) from India, presented by Mr. Wm. Trent; a Marsh Ichneumon (*Herpestes galeri*) from South Africa, presented by Mr. Ernest Wells; an Indranee Owl (*Syrnium indranee*) from Ceylon, presented by Commander Burkitt; a Short-toed Lark (*Calandrella brachydactyla*), British, presented by Mr. H. A. Macpherson; a Pike (*Esox lucius*), British fresh waters, presented by Mr. George Seaton; a Malbrouck Monkey (*Cercopithecus cynosurus*) from West Africa, a Kinkajou (*Cercoleptes caudivolutulus*) from Brazil, a Black-footed Penguin (*Spheniscus demersus*) from South Africa, deposited; a Kusimanse (*Crossarchus obscurus*) from South Africa, a White eared Conure (*Conurus leucotis*) from Brazil, a Blue crowned Parrot (*Tanygnathus luzonensis*) from the Philippines, purchased; a Molucca Deer (*Cervus moluccensis*), born in the Gardens.

#### PHYSICAL NOTES

THE vapour-tension of liquid mixtures has been lately investigated by Herr Konowalow (*Wied. Ann.*, No. 9) in the case of the first four members of the alcohol and the acid series, each mixed, in various proportions, with water. Curves were obtained by taking the percentages as abscissæ and the tensions as ordinates. The author finds that each mixture, to which a maximum or minimum of tension corresponds, has, at the temperature indicated, the same composition as its vapour. Thus liquid mixtures, with reference to distillation, are divisible into three groups—(a) Those whose curve of tension has neither a maximum nor a minimum; (b) Those whose curve has a maximum (e.g. propylic alcohol, butyric acid); (c) Those whose curve has a minimum (e.g. formic acid). Herr Konowalow shows, from a table of all the constant boiling mixtures known to him, that in all the boiling temperature of the mixture is either greater or less than those of both constituents, i.e. all the tension-curves have a maximum or a minimum. The existence of such a point seems, thus far, to be a necessary condition of the existence of a constant boiling mixture. These mixtures have not, apparently, a simple molecular constitution.

IN his study of sulphur Saint-Claire Deville obtained (from flowers of sulphur) a variety more stable than those known, and insoluble in sulphide of carbon; its form being that of a fine powder, each grain a hollow vesicle. He failed to find the specific gravity of this vesicular sulphur, and suggested to M. Spring, about a year ago, to subject the material to the powerful compressing apparatus used in his recent noteworthy experiments. This has been done (*Bull. Belg. Acad.* No. 8), with a pressure of 8000 atmospheres for a few seconds and temperature of 13°, producing hard pale yellow blocks. Treatment with sulphide of carbon showed that 4.21 per cent. was transformed into octahedral sulphur, so that the density of the vesicular variety is less than that of the other. M. Spring further directly determined the specific gravity of those blocks at different temperatures, measuring the expansion; and by calculation he reaches the result that vesicular sulphur has probably the same specific gravity as prismatic sulphur (1.960). It was also observed that vesicular sulphur dilates regularly under heat up to 43°, beyond which it contracts continuously, till at 80° it has the same specific