

National Museum. In it is given a systematic description of the species of the hymenopterous family *Proctotrypidæ* found north of Mexico; the genera of the world being also studied and described, as an aid to future students. The Proctotrypidæ are considered by some authorities to be closely allied to the Chalcididæ, which they usually follow in catalogues and lists of hymenopterous families. Mr. Ashmead considers, however, that there is little affinity between the two, and that such an arrangement is unnatural. He thinks that the Proctotrypidæ should be placed at the head of the Terebrantia, for after the removal of the group Mymarinae (which probably forms a separate and distinct family allied to the Chalcididæ), there is no relationship with the Chalcididæ.

THE first volume of "Studies from the Physical and Chemical Laboratories" of the Owens College has been published, and it furnishes evidence of the large number of important investigations carried on by the alumni of the College. The volume contains thirty papers in all, most of which have been reprinted from the Transactions and Proceedings of various societies. A paper by Mr. J. A. Harker, "On the Reaction of Hydrogen with Chlorine and Oxygen," has been translated from the *Zeitschrift für Physicalische Chemie*, and appears in English for the first time. Among the papers not previously published is one "On New Forms of Stereometers," by Mr. Haldane Gee and Dr. Harden, and another "On the Duration of Chemical Action in the Explosive Combination of Gases," by Dr. Turpin. The council of the Owens College has done a good work by collecting and publishing the results of researches made in its laboratories during the last few years.

In his paper on the "Glacial Striæ in Somerville," Mr. Upham concludes, from a large series of observations, "that the currents of the ice-sheet were deflected here from one course to another, and even to several successive courses in so short a time that it allowed no great amount of erosion of the rock beneath." The general motion of the ice-sheet during the period of its maximum thickness was south-south-east over the Boston area, but it was deflected eastward during the recession of the ice. The long axes of the drumlins have also an eastward direction, and Mr. Upham finds in this fact evidence that they were formed wholly during the time of deflected glacial movements.

SINCE the publication, in 1868, of Pasteur's classical work, "Études sur le vinaigre," the only contributions of importance to this subject are those made in this country by Mr. Adrian Brown. It is, therefore, interesting to learn that Dr. Lafar intends devoting special attention to the whole question of the fermentation of vinegar, and the *Centralblatt für Bacteriologie*, vol. xiii. p. 684, 1893, contains his first contribution to, as well as a short review of, the existing literature on this important subject. In the course of his researches at the Institute for the Experimental Investigation of Fermentation Industries near Stuttgart, Dr. Lafar obtained a species of yeast which rendered beer strongly acid, and on studying its behaviour in other alcoholic media it was found to produce vinegar. The various observations made with this interesting organism are conveniently brought together in a table, and include the determination of the amount of vinegar produced, the changes, both in taste and smell, induced in the media, the formation of surface-film, &c. In his next communication, Dr. Lafar hopes to furnish more exact particulars of the physiological and bacteriological characters of this vinegar-producing yeast.

THE *Illustrated Archaeologist* for December contains a number of very fine illustrations. Among the articles is one "On the Excavation of a Pictish Tower in Shetland," by Mr. G. Goudie. The author thinks that the remarkable round towers with the remains of which the islands of Orkney and Shetland are studded

may be assigned a date as far back as the commencement of the Christian era, or earlier. Mr. Arthur Elliot writes on "Some Old Towers at Liège," and Mr. J. Romilly Allen, "On the Celtic Brooch, and how it was Worn." Dr. R. Munro contributes some notes on flint saws and sickles, in which he discusses the differences between Egyptian sickles and the saws found in the Polado lake-dwelling near Desenzano. He is of the opinion that there is little or no evidence that such sickles were in use among the prehistoric people of Western Europe, though compound saws of the kind discovered at Polado may be found among the *débris* of prehistoric civilisations beyond that of the lake dwellings of Europe.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Sir F. D. Dixon-Hartland, Bt., M.P.; a Ring-tailed Coati (*Nasua rufa*) from South America, presented by Mr. Kenelm Chandler; two Arctic Foxes (*Canis lagopus*) from the Arctic Regions, presented by the Duke of Hamilton, K.T.; a Red Kangaroo (*Macropus rufus*) from Australia, two Short-toed Eagles (*Circæus gallicus*) European, deposited; a Moloch Lizard (*Moloch horridus*) from Australia, presented by Mr. John Carter.

IN line four of article "Experiments on Flying" (NATURE, December 14), read $n\frac{1}{2}$ instead of n^7 .

OUR ASTRONOMICAL COLUMN.

COLOUR-ABERRATION OF REFRACTING TELESCOPES.—At a recent meeting before the Royal Astronomical Society, the proceedings of which will be found in the *Observatory* (No. 208, December), Mr. H. Dennis Taylor read an abstract of a paper entitled "The Secondary Colour-Aberration of Refracting Telescopes in Relation to Vision," which had for its aim the determination of the detriment to vision, if any, and the percentage of light lost for defining purposes, owing to the presence of the usual colour-aberrations. In the colour curves which the author exhibited, where the wave-lengths and longitudinal colour-aberrations were represented by the ordinates and abscissæ respectively, some remarkable facts were brought to light. A comparison with Captain Abney's curves of the luminous intensity of the normal solar spectrum gave a means of obtaining a rough estimate of the percentage of light thus lost. The following table gives one a rough idea of these losses for different objectives in the case of star work, 100 representing the whole amount of light transmitted:—

Objective.	Focal length. Feet.	Light lost.
36-inch Lick Telescope	57	27
24 " Refractor	30	42
12 " "	15	21
6 " "	7½	9
28 " Greenwich Refractor	28	50

Other conclusions which the author draws from the above inquiry may be stated as follows:—In large telescopes the light-gathering power for star work by no means increases as the square of the aperture, the focal length being constant, but a point is reached when it increases simply as the aperture. With a given large aperture the light-grasping power can be considerably augmented by increasing the focal length. In the case of large telescopes, a smaller telescope of relatively large focal length may actually excel in light-grasping power a telescope of larger aperture and shorter focal length. In his concluding remarks Mr. Dennis Taylor refers to the increase of size in the images of stars under increasing exposures; this, he says, can be accounted for by the photographing of the halo of wasted light which surrounds the real image. If further research corroborates the views above stated, there seems to be no doubt that there is still room for improvement in rendering our lenses more perfectly achromatic. Of course the main point in large telescopes is to have them as short as possible, and it is satisfactory to notice the comparative smallness of the light lost in the 36-inch Lick instrument.

STARS WITH REMARKABLE SPECTRA.—The present list (*Astr. Nach.* No. 3200) is a continuation of that which appeared in a previous number of the same journal (*Astr. Nach.* No. 3171).

Among some of the *more* remarkable spectra may be mentioned that of R. Coronæ, which, as Mr. Espin says, is one of the most puzzling in the heavens. The spectrum, he "feels pretty sure," is a double one, and that there is a displacement; at one time the spectra coincide and the star's light is continuous, and at another they are so displaced as to give the appearance of bright lines flanked with dark ones. T. Coronæ, which showed some years ago a nebular spectrum, seems to have undergone a change, as Mr. Espin says that it "is certainly not now the case."

A remark of interest is that the region bounded by the declinations $+51^\circ$ and $+56^\circ$, and R.A. 10h. 40m. and 11h. 8m. contains a large grouping of coloured stars. Out of 108 stars above 9th mag. there are seventeen which may be classed as orange-red. The region from β to ϵ Ursæ is also "very rich."

"HIMMEL UND ERDE" FOR DECEMBER.—In the current number of this journal Prof. Scheiner contributes an interesting article on the cluster in Hercules; it is accompanied both with early drawings of this fine object as viewed in the telescope, and also with the latest photograph. The last-mentioned appears, as one would suppose, as if quite another object had been photographed, so different is the result obtained. Dr. Schwahn treats in a clear manner also of a very difficult subject in an article entitled "Die Lothabweichungen und das Geoid."

A NEW VARIABLE.—In *Wolsingham Observatory Circular*, No. 38 (December 14), the Rev. T. E. Espin announces that photographs taken with the Compton telescope show that the star Espin-Birmingham 57° (R.A. 11h. 39m. 58s.; Decl. $+56^\circ 23'$), Magnitude 9.5, is variable. The star is now 8.5 mag. It has a Type III. spectrum.

GEOGRAPHICAL NOTES.

DR. F. A. COOK has communicated to the American Geographical Society of New York a scheme for the exploration of the Antarctic regions. He proposes to purchase a steam-whaler of 300 tons, equip her specially with several large boats, sledges, and an outfit similar to that used for Arctic travel, including fifty Eskimo dogs. The plan proposed is to steer south from the Falklands to Terre Louis Philippe, and enter the ice-barrier at the first convenient opening where winter quarters may be established and a landing effected. The adjoining land would be systematically explored and all possible scientific observations made. The scientific party will not exceed twelve or fourteen. Dr. Cook has had some experience in Arctic exploration with Lieutenant Peary, and Astrup, now with Peary on his second sojourn in North Greenland, has agreed to accompany him. It is proposed that the expedition should be one year in the Antarctic regions. Dr. Cook estimates the cost of his expedition at £10,000, which he hopes to raise by private subscriptions, grants from scientific societies, and by lecturing. While recognising the greater advantages to science likely to accrue from a national expedition on a large scale, such as that suggested by Dr. Murray, we would like well to see Dr. Cook's party also in the field, which is a wide one, and full of scientific possibilities.

REUTER'S Agency announces that Mr. and Mrs. Theodore Bent and their party left Aden on the 16th inst. for the seaport of Makalla, on the south coast of Arabia, whence they will proceed to the interior with the object of exploring Hadramant.

Ausland announces the sudden death, on November 21, in Yokohama, of the Austrian Consul-General, Gustav von Kreitner, who was with Count Szechenyi on his great journey in Central Asia as topographer. There his work was of the best quality, and made the results of the expedition permanently valuable to cartographers.

THE *Annales de Géographie*, a quarterly geographical paper edited by M.M. Vidal de la Blache and Marcel Dubois, which has just entered on the commencement of its third volume, has already taken the first place amongst French geographical journals for the comprehensive scope of its contents and the solid value of the contributions to geography which it publishes, as well as for the impartiality of its editorial notes. The last number is particularly good, containing a coloured map of the faunal divisions of the globe, with a discussion by Prof. J. Welsch; an able treatise on the lakes of the Jura by Dr. A.

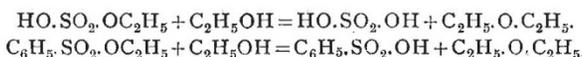
Magnin, several excellent studies in local geography, an epitome of M. Maistre's great journey to the Shari, and an account of Mount Ararat by M. Chantre.

THE prospective formation of a "buffer-state" between Siam, Burma and China, necessitates a more complete survey of the region than has hitherto been attempted, and an Anglo-French Commission will probably undertake this work at an early date.

DR. H. R. MILL completed a course of twelve lectures on geography applied to commerce, at the London Institution, on Tuesday evening. The lectures were arranged by the Royal Geographical Society as a special educational course, designed to meet the wants of merchants and advanced school-teachers. The first six lectures took up the scientific basis of commercial geography, showing the relations of mathematical, physical, biological, anthropological, and political geography to the special subject. The remainder of the course dealt with the commercial geography of the larger divisions of the British Empire, in order to enforce the general principles in particular cases. The attendance throughout was satisfactory; and the same course was given on Friday evenings at Birmingham, under the Oxford University Extension scheme. Mr. Mackinder will commence the second course of educational lectures for the Royal Geographical Society on January 12, in the hall of the United Service Institution, Whitehall, the subject being the relation of geography to history.

A NEW PROCESS FOR THE PREPARATION OF ETHERS.

A NEW and advantageous general process for the preparation of ethers (alkyl oxides), including the most important from a technical point of view, ethyl ether, is described by Prof. Krafft, of Heidelberg, in the current *Berichte*. In the course of an investigation of the aromatic derivatives of sulphuric acid, it was observed that there is a complete analogy between the behaviour of sulphovinic acid and its homologues on the one hand, and the alkyl esters of aromatic sulphonic acids on the other, towards alcohols at moderately elevated temperatures. It was found, in fact, that the conclusions arrived at by Prof. Williamson in the year 1851, with regard to the processes involved in the formation of ethers from the esters of sulphuric acid, are equally applicable to the alkyl esters of the sulphonic acids. For these latter substances decompose in a precisely similar manner to the alkyl sulphuric acids upon warming with alcohols, an ether being the product of the reaction. Thus, for instance, the reactions between alcohol and ethyl sulphuric acid, and between alcohol and the ethyl ester of benzene sulphonic acid, run exactly parallel, as will be apparent from the equations representing them—



This new class of reactions of the sulphonic acids appears likely to prove of more than merely theoretical interest, for on account of the great stability of these aromatic substances, they are capable of converting far larger relative quantities of alcohol into ether when the reaction is made continuous than the alkyl derivatives of sulphuric acid. Although sulphuric acid is so cheap, and the manufacturing process of continuous etherification has been rendered as perfect perhaps as is possible, still oil of vitriol is unfortunately prone to decomposition in contact with a readily oxidisable substance such as alcohol, becoming reduced to sulphur dioxide which is lost in the gaseous state. Moreover, the powerful affinity of oil of vitriol for water, which is one of the products in the first stage of the reaction, brings about such a dilution after treatment with a considerable quantity of alcohol, that it is no longer capable of performing its function in the process of etherification, which latter must of necessity be arrested in order that the acid may be replaced. Now, the sulphonic acids of the aromatic series, such as benzene sulphonic acid, $\text{C}_6\text{H}_5.\text{SO}_2.\text{OH}$, are so stable at the temperature of reaction with alcohol, that the latter is only etherified, and not in the slightest degree oxidised, doubtless owing to the fact that the hydroxyl group present in sulphovinic acid is replaced by the less mobile radicle of the benzene nucleus. Further, the water which gradually accumulates is not retained by the sulphonic acid, but passes over largely with the ether, from which it separates as a distinct layer in the receiver.