

## Research Items.

**THE SIKHS OF THE PUNJAB.**—The present agitation among the Sikhs of the Punjab is critically discussed by a well-informed writer in the February issue of the *Fortnightly Review*. He points out that numerically the Sikhs constitute only 12 per cent. of the population of the Province, as compared with 51 per cent. Muslims and 36 per cent. Hindus, and that the revival of Sikhism in the period before the war was largely due to its encouragement by the British officers in Sikh regiments. The Sikh, by his aptitude for emigration, is much more open to foreign influences than the stay-at-home Hindu, and after the war he has suffered from a "swelled head." The recent agitation has centred round the management of the Gurudwaras or religious foundations, some of which fell into the hands of ill-conducted Mahants or Abbots, and has been favoured by the influence of outside agitation. We cannot enter into a discussion of the proposals the writer suggests for the control of the agitation and the redress of legitimate grievances. But as an episode in the history of one of the leading fighting races of India we may direct attention to this comprehensive review of a situation which, if not dealt with in a statesman-like way, may have serious consequences.

**THE PLUNDERING OF ROYAL EGYPTIAN TOMBS.**—While the recent wonderful discoveries in Egypt are engrossing public attention two writers in the February issue of *Discovery* have thrown welcome light on the subject. In the first article Prof. T. E. Peet tells us the little that is known of the history of King Tutankhamen, really a series of inferences from archaeological remains. In the second article Dr. A. M. Blackman tells the strange tale of the plundering of the Royal Tombs at Thebes in the XXth and XXIst dynasties, as recorded in the Abbott Papyrus preserved in the British Museum, with sidelights from two Meyer Papyri, now at Liverpool, recently published with a translation and notes by Prof. Peet. In spite of the tragical course of the inquiry which followed the outrage and the horrible examination of the criminals by torture, the tale of the rivalry of the two Mayors, Peser and Pever'ō, governors respectively of eastern and western Thebes, is graphic and characteristic: Peser acquired information of the robbery and thought it a good opportunity to pay off old scores against his hated rival, who was responsible for the protection of the royal sepulchres. Pever'ō ultimately was discharged, but we may reasonably suspect that the charges were anything but groundless, and that the truth of them was being gradually forced on the Vizier Khamwesē who conducted the inquiry. In fact, it would seem that the maladministration of the necropolis had become so notorious that even heavy bribes could no longer make it worth the Vizier's while to continue his policy of hush. The tale, as a whole, shows that human nature in Egypt is now much the same as it was three thousand years ago.

**SARSEN STONES**—The origin of the name given to these stones in the central region of the English Chalk seems still in doubt, but Sarsden village, near Andover, has been suggested as a possibility. The grey sandstone of which sarsens are composed is widely known through its use at Stonehenge; but the original bed in the Eocene series seems to have been completely broken up by denudation. The sarsens lie as relics on the surface, with detrital deposits worn from the Eocene strata and the Chalk, and an instructive photograph has now appeared in the Geological Survey Memoir on the country around Beaconsfield

(Ordnance Survey, 1922, price 2s.). Here we are shown great blocks lying in the "clay-with-flints" of Buckinghamshire, and we learn that the stones are sought for by boring in the hope that the tool will strike on one. Following prehistoric practice, the builders of Windsor Castle gathered sarsens, and they are still the only useful stone to be found in the Beaconsfield district.

**CITRUS FRUIT FROM SOUTH AFRICA.**—Investigations on waste in export citrus fruit were carried out by Miss Thomson, and Messrs. Putterill and Hobson, during 1920 and were continued during 1921, and the results are embodied in a report, Bull. No. 1, 1922, Union of S. Africa, Dep. of Agriculture, Pretoria, 1922. Care in handling is perhaps the principal factor upon which elimination of waste depends. The slightest damage in packing or in the subsequent handling of the cases tends to induce discoloration and the development of moulds which spoil the fruit. Cargoes can be successfully shipped to this country not only in cold storage, but also in holds without cold storage provided they be properly ventilated and the fruit undamaged. Proper wrapping of the fruit in special wax tissue wrappers reduces wilting considerably. The best cold storage temperature lies between 43° and 50° F. Change in flavour is particularly induced by a temperature below 40° F., probably by killing the cells, thus allowing the acid-tasting constituents of the skin to penetrate to the juicy part of the fruit.

**BRITISH MYCOLOGY.**—Volume 8, Parts I. and II. of the Transactions of the British Mycological Society contains Mr. Carleton Rea's presidential address; the views expressed by Mr. Rea as to the value of certain continental revisions of the systematic arrangement of the larger fungi will carry very great weight and, in the future, the microscope will certainly figure more prominently in the work of British mycologists. J. Line shows good reasons for regarding with suspicion the advent of the well-known "coral spot" fungus, *Nectria cinnabarina*, among a plantation of pruned red currants; the fungus apparently spreads slowly from dead spurs into the healthy tissues with disastrous effects ultimately. The paper by J. Ramsbottom upon orchid mycorrhiza is reprinted in full from Messrs. Charlesworth and Co.'s catalogue; it is a scientific contribution of very general interest and at the same time a tribute to the memory of a remarkable orchid grower, the late Mr. Joseph Charlesworth. Among other papers should be noted Dr. M. C. Rayner's critical analysis of the claim recently made by Christoph to have raised healthy *Colluna* seedlings free from mycorrhizal infection. W. B. Crow's account of that curious bacterial organism *Leuconostoc mesenteroides* is an interesting example of the significance that may attach in classification to the chemical constitution of a plant membrane: another step towards the distant day when chemical knowledge may be freely used to underpin the elaborate framework erected by the systematist.

**BROWN BAST DISEASE OF RUBBER TREES.**—A. Sharples has recently published (*Malayan Agricultural Journal*, vol. x. No. 6, June 1922) a résumé of recent experimental work in Malaya upon this problem, which is perhaps less urgent for the moment as the industrial depression has decreased the demand for rubber, and the one fact that seems firmly estab-

lished in connexion with this disease is that its spread coincides with efforts to get more latex from the trees. Sharples chronicles briefly the progress of investigations promoted by a representative Brown East Investigation committee formed in Malaya in 1918, but owing to changes of personnel this committee appears to have ceased to function in 1920 although investigations still proceeded. He also passes in critical review a number of papers recently published on the subject which were also noticed in NATURE for March 16, 1922 (vol. 109, p. 357). One general result of the investigations under the auspices of the committee is to strengthen the conclusion, also reached by Rands in Java, that while various organisms may be casually connected with the disease, none can be considered causal and the disease must apparently be definitely added to the list of pathological physiological conditions of obscure origin. In view of confident assertions by Keuchenius in Sumatra that bacterial inoculations produced a similar disease, this conclusion was very critically re-examined and comparative inoculations made with the organism used in Sumatra; the evidence against bacterial causation thus accumulated is very convincing. On the other hand, the Malayan experiments supply further experimental evidence that increased tapping of the latex, either by more frequent incision or by a wider cut, greatly increases the percentage of trees attacked by brown bast. Sharples reviews recent suggestions that various anatomical peculiarities may throw light upon the pathology of the disease. He regards the pockets of laticiferous tissues enclosed within wound cork, recorded by Sanderson and Sutcliffe, as after-effects of little value in elucidating the causes of the disease, and he points out that lignification and necrosis of sieve-tubes, such as is recorded by Farmer and Horne, may frequently be seen in perfectly healthy plants.

**RAINFALL IN 1922.**—The British Rainfall Organization, which now forms a part of the Meteorological Office, Air Ministry, has made a hurried scrutiny of the rainfall records for 1922 in time for insertion in the *Meteorological Magazine* for January, which is published in the middle of the month. Several thousand returns are said to have been already received and a selection has been made of those for which average returns exist; 280 such records have been examined and they afford sufficient data for the construction of a rainfall map. The rainfall for the individual months shows that the rain over the country as a whole was close to or above the average except in the autumn. The total was excessive over England in July, yielding locally more than double the average. October was exceptionally dry, the rainfall being in England and Wales 33 per cent. of the normal, in Scotland 59, and in Ireland 37 per cent. In England and Wales the only months with a deficiency of rain were May, June, October, and November. In Scotland there were six months with an excess and six months with a deficiency, the first seven months being wet with the exception of March. In Ireland there were only five months with a deficiency of rain; these were March, May, June, October, and November. The country as a whole had practically the normal fall for the year. The *Times* for January 29 had a detailed article on the rainfall of the past year, in agreement with its practice followed for many years past. It shows that 1922 was almost entirely devoid of remarkable features. Among the selection of records available the variations of rainfall registered in 1922 ranged from 11.525 in. at Seahwaite to 18.66 in. at Shoeburyness. The map giving the rainfall over the British

Isles shows that there was a general deficiency of rain in Scotland and Ireland and a general excess over England, although in the extreme south-east, where the drought of 1921 reached its climax, the rainfall of 1922 was again below the average; but the deficiency apparently nowhere exceeded 10 per cent. The date given at head of Table II. for all columns except the average should be 1922 and not 1921.

**RECENT VOLCANIC ACTIVITY IN S. AFRICA.**—Dr. P. A. Wagner has written a very thorough and interesting memoir on "The Pretoria Salt-pan, a soda caldera," for the Geological Survey of S. Africa (Mem. No. 20, 1922, price 7s. 6d.). A saline lake some 25 miles north-west of Pretoria has long been used by natives as a source of common salt, and in recent years it has been worked on a commercial scale on account of the sodium carbonate in its waters. Excellent photographs are given of this *zoutpan* in its primitive and its industrialised conditions; but the most interesting of the numerous illustrations are those showing the form and the walls of the depression in which it lies. The author proves clearly that we are here dealing with a true caldera of explosion. If at any time a layer of volcanic scoriæ covered the broad cone of eruption, all traces have disappeared through denudation. It is far more probable that the walls were built up entirely of fragments exploded from the granite and dolomite that underlie the area. Their structure is seen in a number of cliff-sections, and the freshness of the whole ring suggests a Quaternary age for the paroxysm that actually domed up the granite cover and flung the fragments for 1700 feet on all sides from the central pipe. The perimeter of the caldera measures 11,100 feet. The saline layers from which the soda is mainly derived are a trona bed above and a bed of the rarer carbonate, gaylussite, in the muds below. There is a remarkable absence of sodium sulphate. Dr. Wagner gives good reasons for regarding the salts as of magmatic origin. Now that a kimberlite pipe in the Cape Province has been proved to be of post-Neocomian age (see NATURE, vol. 110, August 19, 1922, p. 262), evidence of volcanic outbreaks linking the southern region with the still active areas near the great lakes will be sought for with a lively interest. Folding sections and a map on a large scale accompany this comprehensive memoir.

**PALÆOBOTANY AND THE GONDWANA CONTINENT.**—Recent contributions to palæobotany will be found in the Quarterly Journal of the Geological Society, vol. 78, Part 3, where Prof. A. C. Seward describes carboniferous plants from Peru (pp. 278-83), and Seward and R. E. Holtum report upon Jurassic plants from Ceylon (pp. 271-77); and in the *Geological Magazine* (vol. 59, pp. 385-92, September 1922) Prof. Seward has a note upon fossil plants from the Tanganyika Territory. Dr. A. B. Walkom (Queensland Geological Survey Publication, No. 270) has recently commenced the publication of a monograph upon the Palæozoic Flora of Queensland, while the general issues and problems of distribution and of plant migration across regions of the globe that at the present day provide impassable oceanic or climatic barriers is raised by Prof. Seward in the Hooker lecture published in the Linnean Society's Journal for October 1922. These new palæobotanical data recorded above supply more facts for land areas that presumably were organically linked in Mesozoic times through the great Gondwana continent of which India now remains one of our most authentic relics. It is therefore interesting to note, from the

address of Prof. B. Sahni delivered at the Indian Science Congress in 1921 (Journal and Proceedings of the Asiatic Society of Bengal, vol. 17, No. 4, pp. 152-75), that Indian botanists are taking an interest in the Indian fossil flora, as yet but little explored since the earlier work of Feistmantel, embodied in the "Fossil Flora of the Gondwana System." Prof. Sahni points out that so far Indian strata have given little but plant impressions, but with the recent microchemical methods for the microscopic study of such impressions, developed in the Cambridge laboratories and demonstrated by Mr. J. Walton at the British Association Meetings at Hull, fossil impressions may become as valuable and as definite in the results they yield as the plant petrifications permitting anatomical study.

**MEASUREMENT OF VERTICAL DIMENSIONS WITH MICROSCOPE.**—In the Journal of the Quekett Microscopical Club (Ser. 2, vol. 14, No. 88, November 1922) Mr. F. Addey gives a note on the measurement of the vertical dimensions of objects by the use of the graduated fine adjustment, in which he shows from mathematical considerations that the true thickness of the object is its apparent thickness multiplied by the refractive index of the mounting medium, the cover glass making no difference. This result has been confirmed by actual measurements.

**FOCUS APERTURE RATIOS OF MICROSCOPE OBJECTIVES.**—In the Journal of the Quekett Microscopical Club (Ser. 2, vol. 14, No. 88, November 1922) Mr. E. M. Nelson discusses the focus aperture ratios of microscope objectives. If the values of the numerical apertures of objectives now available be plotted against the magnifying powers the resulting graph reveals several inconsistencies. In the present paper a new set of power aperture curves drawn up on a definite plan are given for the construction of objectives. The ideal value for the power aperture ratio, obtained from a consideration of the resolving power of the eye, cannot always be realised in practice. This ideal ratio expressed as an "optical index" (that is 1000 times the N.A. divided by the initial magnifying power) is shown to be 25, and in the proposed curve for achromats the low powers up to  $\frac{1}{16}$  in. have an optical index of 20, after which the optical index is reduced and the curve becomes steeper, rising to a  $\frac{1}{8}$  in. with N.A. 0.9. In the apochromats the optical index in the curve is maintained at 20 up to a N.A. of 0.8. For oil immersion lenses the optical indexes have to be reduced, and the proposed curve begins with a  $\frac{1}{8}$  in. of N.A. 1.0 (optical index 14.3) and ends with a  $\frac{1}{2}$  in. of N.A. 1.4 (optical index 11.7). If such schemes of ratios of aperture to power were adopted the initial magnifying power and the numerical aperture would become practically synonymous terms and a lens could then be accurately designated by its numerical aperture instead of by the focus, thus avoiding ambiguity where different tube lengths are used.

**CONTACT CATALYSIS.**—No. 30 of the Reprint and Circular Series of the National Research Council contains the first report of the committee on Contact Catalysis. The report, which has been drawn up by Prof. Bancroft, gives a summary of recent work and suggests that the two fundamental things to be done in the study of contact catalysis are: (1) To determine in what cases definite intermediate compounds are formed and what they are; (2) To determine what bonds and contravaleances are opened when adsorption takes place, and to show that the opening of these

bonds and contravaleances accounts for the formation of the reaction products.

**BACTERIA AND CONDENSER CORROSION.**—An investigation on the influence of the fermentation products of bacteria on corrosion in engine condensers, conducted by Messrs R. Grant, E. Bate, and W. H. Myers, originated during the systematic examination of possible factors in the causation of corrosion, particularly pit-hole corrosion, in condensers of two power-houses of the Government Railways and Tramways, Sydney, N.S.W. (Rep. of the Director-General of Public Health, N.S.W., for the year 1920, Sydney, 1922, p. 171). It had been noticed that tube failures often occur after a long period of shut-down, even when a condenser has previously been immune from trouble. The authors point out that condensers generally retain a considerable quantity of water, complete drainage never being obtained with the usual horizontal setting. This stagnant water always contains a very high proportion of free and albumenoid ammonia and nitrates. Various micro-organisms of ammonia-producing types were isolated from the circulating and stagnant waters of condensers. Plates of copper, brass, and zinc introduced into cultivations of these organisms underwent corrosion and pitting, photographs of which are reproduced. It is concluded, therefore, that the activity of micro-organisms as a factor in starting or causing corrosion must be seriously considered. If corrosion were a purely thermal or chemical effect, the pitting might be expected to increase steadily with temperature; actually, it is found to be more in evidence in low temperature condensers, which supports the micro-organismal theory.

**FRENCH STREAM GAUGING APPARATUS.**—In a notice recently issued from the gauging station of the University of Toulouse at Ponts-Jumeaux, a description is given of the log used by the French Service des Forces hydrauliques and the method of calibration adopted. The log is essentially a screw of a special form, attached to a revolving axis mounted on ball-bearings in the body of the log. The apparatus is designed in such a way that the axis lies in the direction of the current, and the screw encounters the liquid filaments in front. The relationship between the rotations  $n$  of the screw and the velocity  $v$  of the water is in the following form:  $v = a + bn$ . The determination of the speed of the screw in revolutions per second is carried out as follows. The axis of the screw engages by a worm in a cogged wheel, designed so that the screw makes  $N$  revolutions for a single revolution of the cogged wheel. This number,  $N$ , is fixed for any particular log and is generally equal to 25 or 50. A cam carried by the cogged wheel comes in contact at a fixed point of each turn with a spring plate connected with an insulated electric terminal on the body of the apparatus and thus closes an electric circuit actuating a bell. By measuring the time  $T$ , which passes between two consecutive signals, there is deduced therefrom the number of revolutions of the screw per second ( $n = N/T$ ) and the movement of the water can be calculated. The coefficients  $a$  and  $b$  are determined in the process of calibration. For the purpose of calibrating the apparatus, a carriage with a platform is propelled at a certain speed while the instrument it supports is drawn through still water. During a sufficiently long series of runs, the speed of the carriage is related to the number of revolutions of the screw, and a curve, which is generally a straight line, can be drawn. A cement-lined channel 75 metres long, 2 metres wide, and 1 metre deep is used for calibration.