

SCIENCE NOTES AND NEWS

The Garner Principle of Co-operative Activation.—Certain reactions such as the denaturation of proteins and the dehydration of calcium carbonate hexahydrate take place at abnormally high rates. To explain this phenomenon, Garner (*Nature*, 1939, 144, 287) proposes a mechanism based on co-operative activation of a number of points n on the surface, the activation energy required at each point being E/n , where E is the measured activation energy. F. G. Donnan (*Nature*, 1939, 144, 446) has pointed out the great importance of the principle in the formation of many catalytic phenomena and in the interpretation of the inter-linked sets of reactions which are known to occur in the operation of many enzymes and co-enzymes.

K. S. G. D.

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The Coconut Palm Beetle.—This familiar coconut pest commonly known as the rhinoceros beetle is one of the most discouraging and distracting features in the cultivation of the coconut tree in many parts of South India where it is more responsible than any other single factor for causing a serious set-back to the young growing tree, leading in the case of neglect to a complete destruction of the tree. It is probably one of the pests regarding which requests for suitable remedies are received most frequently. A considerable amount of study both in respect of its life-history and of remedial methods has been made but it is nevertheless a fact that many lacunæ exist in the former while as regards remedies no satisfactory ones are yet known. On both of these aspects and especially in connection with the life-history of the pest a careful study extending over a long period has been made, the results of which are now published (M. C. Cherian and K. P. Anantanarayanan, *Ind. Jour. Agr. Sci.*, 9, Pt. III). The duration of the egg period, the larval and pupal periods are all subject to considerable variation and are found to be 9 to 17 days, 100 to 180 days, and 24 to 62 days respectively, the period from egg to adult varying from 129 days to 232 days. The adults themselves were found to live for periods up to a maximum of 293 days. It is also brought out that the beetles are active throughout the year although during certain months of the year, *viz.*, March and April, the pest is most active; elsewhere too this is the same experience, the peak of the damage being soon after the first rains begin. Work on remedial methods which of course are more important from a practical view-point has not led to any helpful recommendations; a trial has been made of various baits, none of which was found of any use. We have noted however that a mash made up of a little groundnut oil cake with cow-dung proved remarkably effective as a bait. We find no reference to the spraying with Bordeaux Mixture which was tried as a good repellent in certain Mysore trials. Various other devices which are probably mere "nostrums" but which

may have something in them also deserve to be tested out especially in a thorough going investigation of this kind. The growing alongside coconut plants of plantains and of *Euphorbia tirucalli*, the use of common salt, nux vomica leaves and fruit, the oil cakes of some species of *Hydnocarpus* are mentioned as repellents of this category—*inquiries may bring out more—and these deserve a trial.* The familiar skewering out with an iron rod with a barbed end apparently holds the field, in the trials reported.

A. K. Y.

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Alcohol as Motor Fuel.—Now that a beginning is being made in India in the use of alcohol for mixing with petrol as fuel in motor vehicles, trials conducted elsewhere on the suitability of such mixtures should be both valuable and interesting. The report of an elaborate trial with alcohol used nearly straight and in mixtures of varying proportions with petrol for driving a motor car appears in the *Philippine Agriculturist*, 28, No. 2 (A. L. Teodoro, Fifty thousand kilometres on alcohol as motor fuel). The trials relate to two groups, one comprising the use of nearly straight alcohol (gasoline being only 3% and 5%) and the other comprising mixtures in which the gasoline was 10, 30, 50, 70, 80 and 90 per cent. The car used in the trials was a De Soto De Luxe Sedan (1929 model) which had run on gasoline for four years during which a distance of 10,678 miles had been driven. Slight alterations were made to the car before the trials such as, enlarging the diameter of the high speed metering jet, and of the area of the pump discharge jet; ignition timing was set 5 to 14 degrees ahead of the usual adjustment for gasoline, and idling adjustment was changed according to the kind of alcohol motor fuel used. Details of the behaviour of the engine in respect of starting, acceleration, power, engine wear, corrosion and economy of operation are given in full. Likewise for each one of the fuels used particulars under working conditions and of the number of miles driven are also given, with full numerical data, for all of which reference to the full report is commended. As the result of these trials in which quite 50,000 kilometres were run it is concluded that the car performed very satisfactorily on these alcohol fuels for a period of five years. No difficulty was encountered in starting except when the engine carburetion and ignition systems were faulty and when the driver improperly used the choke. As much power as could be produced with gasoline was obtained with the alcohol fuels. No sticking of the piston valves was noted. The milcage increased as the amount of gasoline increased in the mixture; thus with the nearly straight alcohol fuels the milcage was only from 8.9 to 9.8 miles per gallon, while with the gasoline mixtures the milcage rose to 11.3, 12.7, 14.4, 15.3, 16 and 17.4 as the gasoline percentage rose from 10 to 30, 50, 70, 80

and 90 per cent. respectively. For the proper utilisation of nearly straight alcohol proper adjustment of carburetion and ignition and care in manipulating the parts which control these systems are specially mentioned as requirements.

A. K. Y.

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Some Trials of Citrus Budding Methods.—Is it essential in the budding of orange or other citrus seedlings to remove completely from the inside of the bud shield all adhering wood tissue before inserting it in the T-cut of the stock or can it be left on without detriment or with advantage? It is generally believed that the wood tissue should be carefully removed and only the smooth inside of the young bark should be brought into union with the similar tissue of the stock, if good results should be attained. In practice this careful removal is not always easy, it is certainly slow; and the slipping in of the bud shield too is tricky on account of the lack of rigidity in the shield. From a practical point of view therefore one would welcome a correct answer to the above question, based upon accurately conducted experiments. This has been undertaken under the auspices of the Imperial Council of Agricultural Research on the Fruit Research Station, Anantarajapet, Madras Presidency, and the results are now available (K. C. Naik, *Ind. Jour. Agr. Sci.*, Vol. IX, Pt. IV). Along with this question another point for experiment was also taken up, *viz.*, whether the root stock should be lopped off above the union immediately after the insertion of the bud or after the latter has made some growth. The experiments have been laid out with great care for obtaining significant results which have all been statistically studied and interpreted. It was not possible in practice to ensure what would be considered a very material requirement, *viz.*, that the seedlings used as stocks should be of the same age and of the same degree of growth as judged by their girth. From the trials which have now gone on for two years it is concluded (1) the presence of the wood in the bud shield is a distinct advantage; such retention of wood led to a higher percentage of "take" of the buds, the increase ranging from 32 to 36.51 per cent.; (2) the presence or absence of wood has not affected the period taken for the bud break or for the rapid extension of the bud growth; (3) the primary lopping of the root stock at the time of bud insertion has lowered the "take" of buds in some cases but has stimulated an earlier bud break, both in *chinee* oranges and acid limes, the two citrus varieties used in the experiment; (4) delayed primary lopping of the root stock until the bud growth had extended for a length of not less than two inches resulted in a comparatively rapid extension of the bud growth, in the case of *chinee* oranges. It was also found, though this is only of local application, that the months of July to September were the most favourable seasons for budding. It is stated that the results in regard to the retention of wood in the bud are not in accord with the experience of nurserymen in India, among

whom the method of careful removal of the wood is the one generally prevalent. It will be useful to inquire and ascertain if there is any special reason for this preference, especially in the light of the above results and also of the greater ease and speed of the method now recommended.

A. K. Y.

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Artificial Insemination of Domestic Animals.—Started many years ago and adopted with a considerable measure of success in the breeding of horses in the U.S.A., and in recent years in the breeding of dairy cattle and sheep in Italy and the U.S.S.R., sufficient progress has evidently been made in its adoption in Italy to justify the holding of a session of the National Assembly of Italian Veterinary Surgeons for Artificial Insemination regularly once in two years, which was decided upon at the last session of the Assembly held in Pavia, Italy, during the current year. It was also resolved at the meeting that the Milan Institute for the study of this subject should set up a permanent committee for the encouragement of research in this field. Plans were also considered for converting these biennial assemblies into International Conferences, for the introduction of regular courses of instruction in these methods in the Veterinary Colleges in the kingdom, for its adoption on an extended basis for the raising of both pure and cross-bred sheep of the Karakal breed, and for the opening of special centres suitably equipped for the purpose. More than a quarter of a century ago, on the stud farm at Kunigal in the Mysore State the method was being tried with the costly imported stallions and recently its possibilities in respect of the raising of Merino crosses with Mysore sheep are being looked into. As a means of getting over some of the serious difficulties connected with this problem of sheep improvement the method holds out promise and a study of the Italian methods in this connection deserves to be taken up in India.

A. K. Y.

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Asura Culture of Chota Nagpur.—Some of the large number of prehistoric building sites and graveyards scattered all over Chota Nagpur, particularly in the Ranchi and Singhbhum Districts of Bihar, have recently been brought under protection by the Government of India under the Ancient Monuments Preservation Act, according to a press note from Simla.

The sites were first brought to notice by Rai Bahadur Sarat Chandra Roy, who made a preliminary survey and carried out some trial operations. Mr. Roy found that the building sites contained evidence of two or three periods of occupation, ranging from the Neolithic Age to the early Iron Age.

The present-day aboriginal population of Chota Nagpur ascribe the sites to the ancient *Asura* culture. Whether their own ancestors were the authors of this *Asura* culture or whether another race was responsible for this culture, it is difficult to say. It appears probable, however, that the culture of this region is connected, on the one hand with the Copper

Age of North India and on the other, with the Megalithic and Iron Age cultures of South India.

The Government notification is intended to prevent unauthorised excavation on these sites till such time as the Department is able to detail a specialist for such work in Northern India.

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Vegetable Oil for Lamps.—We are glad to report that Mr. D. R. Jogalekar has successfully evolved a lamp which burns on vegetable oils.

As compared with kerosene consuming lamps, he claims a saving of 20 per cent. in cost, while the luminosity attained is of the same order. The utilisation of these vegetable oils as fuel for internal combustion engine, we are told, is receiving the attention of Mr. Jogalekar, whose attention may be invited to the work already in progress in the Alipore Test House, Calcutta, under the auspices of the *Industrial Research Bureau*. It is a matter for great satisfaction that the work has been financed by the Government of Bombay.

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Campaign against Narcotics.—The latest number of the *Bulletin of the Health Organisation of the League of Nations* (Vol. 8, No. 3) contains, among other contributions, a bibliographical report relating to the pharmacodynamic properties of eucodal, dicodide, dilaudide and acedicone. At its session held in May-June 1937, the Advisory Committee on Traffic in Opium and other Dangerous Drugs, discussed the comparative pharmaco-dynamic properties of certain drugs which are being used as substitutes for morphine and decided to ask the secretariat to prepare a memorandum for the information of the Committee. The Health Section accordingly prepared a report which is now published. This brings to light the results of the studies so far made of the anti-spasmodic, analgesic and hypnotic properties of these drugs.

The other contributions in the *Bulletin* are:—Doping: A study of the means employed to raise the level of performance in sport; Rural Dietaries in Europe; and Report on Bread in Several European countries.

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The Government of India have under consideration proposals for making permanent the Agricultural Meteorology Section of the Meteorological Department, which is now financed by the *Imperial Council of Agricultural Research*.

The Section is concerned principally with studies relating to the effect of weather on soil and crops and has a number of experiments on hand. It acts as a *liaison* between meteorology and agriculture by helping agricultural workers in setting up farm observatories, by training their assistants deputed to Poona, and by calibrating or repairing their meteorological instruments when sent to Poona. Special attention is being given to officers in charge of the locust, dry-farming, sugarcane and cereal rust research schemes. An important aspect of the

liaison activity is to discover the types of weather forecasts and warnings that will be most useful to the farmer generally, as for example, heavy or untimely rainfall, cold wave warnings, etc.

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Island Observatories in Indian Seas.—The question of starting pilot balloon observatories in some of the islands in the Indian Seas is under the consideration of the Meteorological Department of the Government of India.

A beginning was made in April this year when steps were taken to open a station in Car Nicobar Island. An officer was also deputed to visit Laccadive Islands to report on the possibilities of starting a pilot balloon observatory at Amini Devi or Minicoy.

The work of marine meteorology is growing every year. The Department held three meetings with ships' officers and ships' and shore Wireless Telegraph officers in Bombay and two with ships' officers in Calcutta last year, at which experiences and views were exchanged on the Department's service to ships.

Storm warnings for the Bay of Bengal and the ports around it are issued from the Meteorological Office at Calcutta and those for the Arabian Sea from the Headquarters office at Poona. The latest information about weather is supplied to shipping at sea by means of wireless weather bulletins issued from coastal radio stations twice daily on ordinary undisturbed days and more frequently on disturbed days.

The chief sources of marine data are wireless messages from ships at sea and extracts from weather logs of ships calling at the principal ports.

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The Photo-Litho Office of the Survey of India, founded in 1889 by Major-General James Waterhouse, I.A., the celebrated authority on photography, who held charge of the map reproduction of the Survey of India, celebrated its Jubilee last month. The Office is situated in Calcutta and it was here that the first postage stamps of India were lithographed in the early fifties.

A press note issued from Simla draws attention to the main activities of this Department of the Survey of India. The Office employs 300 skilled workers and "More than 3,000,000 impressions are pulled in the machines annually and the value of the annual output at office rates is over Rs. 3,00,000.

"Of the original contributions of the Photo-Litho Office towards development of new ideas and modern methods, mention may be made of the direct zinc printing process now known throughout the world as the 'Vandyke Process' which was evolved at this Office and is named after the late Mr. F. R. Vandyke, Manager of its Lithographic Branch, who was responsible for the discovery.

"An experimental section has been instituted in the Office for research on its own account, where original investigations are being continued."

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Progress of Irrigation in India.—According to the annual review of Irrigation in India, just issued, over one-eighth of the total cultivated area in British India—about 32¼ million acres—are annually irrigated by State works alone. The capital outlay on Irrigation and navigation works amounts to Rs. 154 crores, the working expenses to about Rs. 5 crores and the gross revenue to about 14½ crores, with a net return of 6.09 per cent.

275 Irrigation schemes are in operation in British India, of which 70 are of a major description. Nearly a third are classified as productive and the rest, which have been constructed primarily for the protection of tracts with precarious rainfall, as unproductive.

Of the total irrigated area, 12 million acres are in the Punjab. About 86 per cent. of the total area or about 4½ million acres, is under irrigation in Sind. Madras has 7¼ million acres under irrigation and the United Provinces about 4 million acres.

Of the important works, recently completed, mention may be made of the Kattalai Scheme in Madras, which cost over Rs. 37 lakhs and the Haveli Project in the Punjab, since completed at a cost of about Rs. 4½ crores. A Project for impounding the waters of the Tungabhadra is under consideration.

A contour survey in the central and western parts of Bengal is being carried out. Other important works on hand are the Nira Right Bank Canal works in Bombay, the remodelling of the Ganges Canal Branches in the United Provinces and the Quetta Storm water drainage and embankment project in Baluchistan.

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Scientific Expedition to Central Pacific.—Further details regarding the personnel of the Expedition sponsored jointly by the *National Geographic Society* and the *University of Virginia* (cf. this *Journal*, 1939, 8, 391) are now available through the courtesy of the *National Geographic Society*. Dr. Charles S. Piggot, well known for his studies on the silt samples from the ocean bottoms, is a member of the expedition. His amazing apparatus for securing samples of mud from the ocean bottom, consists of a cannon which is loaded with a charge of powder and a projectile, which consists of a hollow metal tube ten feet long. "Lowered to the bottom, the cannon goes off automatically. The force of the explosion drives the hollow tube down into the mud. When it is pulled to the surface it contains a cross-section of silt that has been deposited gradually over a period of thousands of years. Studying this cross-section, scientists can reconstruct from it the geological history of the ocean bottom extending back for many ages."

Dr. Maurice Ewing, Professor of Physics, Lehigh University, Bethlehem, Pennsylvania, is another member of the Expedition, who will be engaged in the study of the ocean bottom by means of his ingenious "artificial earthquake" apparatus. The quakes are produced by small "time bombs" which are sunk to the bottom of the sea and exploded automatically by clockwork. "The explosions cause vibra-

tion in the sea bottom like those produced by earthquakes. Automatic recording devices are sunk to the bottom at a considerable distance from the bombs. When a bomb explodes, the sound vibrations travel down through the sediment to bed rock, through the rock in a horizontal direction, and up again through the sediment. The vibrations are picked up by microphones in the recording devices, and cause beams of light to vibrate. An automatic movie camera in the recorder photographs the vibrations of the light beam, and the elapsed time between the explosion and the arrival of the sound in the recorder is noted.

"From this record Prof. Ewing can calculate the thickness of the sediment through which the sound vibrations have travelled. He also can determine the type of sediment—how far it has progressed towards hardening into rock—because sound vibrations move more slowly through soft sediments and more rapidly through harder ones."

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Shortite: a new mineral.—The United States Department of the Interior has announced the discovery of a new mineral, officially named "shortite".

Composed of a double carbonate of sodium and calcium, the new mineral was found and identified by J. J. Fahey, a chemist in the American Geological Survey Laboratory. It was discovered as disseminated, well-formed crystals in sections of core from an oil and gas well, drilled in Sweetwater County, Wyoming, at depths of 1,250 to 1,800 feet below the earth's surface. Shortite was named in honour of Dr. M. N. Short, a former geologist of the Survey, who now is Professor of Optical Mineralogy at the University of Arizona.

—(*Chemical Age*, 1939, p. 168.)

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University of Mysore.—The decision of the University of Mysore to institute post-secondary *diploma course in sericulture* from the year 1940, breaks new ground in the matter of textile technical education in India. At present no diploma course in Sericulture under University auspices is given anywhere in this country. The decision of the Mysore University should therefore be regarded as of a pioneering nature. The Mysore State occupies a pre-eminent position in the production of silk in India, and the institution of a regularised course to train specialists, will lead to increased efficiency in the Silk Industry.

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University of Calcutta.—Mr. Kshitischandra Bhattacharyya, m.sc., has been admitted to the Degree of Doctor of Science in consideration of the thesis entitled "An Examination of the Question of Strain on Mono-cyclic Rings" which was examined by a board consisting of Professor R. Cornubert, Sir Gilbert T. Morgan and Sir W. J. Pope.

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Associateship of the Imperial Dairy Institute.—The question of according formal recognition to the post-graduate course in Animal Husbandry and Dairying given at the Imperial Dairy Institute, Bangalore, since 1923, has been under consideration by the Government of India. It has now been decided that those who have in the past satisfactorily completed the course or who may do so in future should be designated as **Associates of the Imperial Dairy Institute**. This title will be denoted by the abbreviation "Assoc.I.D.I.", which the successful post-graduate students will be entitled to affix to their names.

Industrial Notes

Catalogue of Fibre Plant Exhibits.—This publication which has been sponsored by the *Botanical Survey of India*, is a useful bulletin dealing with the fibre plant exhibits, and the usefulness of the volume would have been considerably enhanced if the author had critically appraised the economic value and indicated the extent of availability of these materials. It is earnestly to be hoped that the author will, in his next edition, not only elaborate these points but also avoid the embarrassingly long four-page corrigendum and addendum.

Laboratories of the British Non-Ferrous Metals Research Association, London.—This is a national organization of producers, manufacturers and users of non-ferrous metals established in 1920 for the promotion of scientific knowledge in industry. The Association owns a subscribing membership of about 300 and administers a total annual income exceeding £30,000 which is partly subsidised by the *Department of Scientific and Industrial Research*. Since 1930, the council has centralised the administrative, technical and information services of the Association in one building in London near Euston Station. Although much of the Association's research has since been gradually transferred to this centre, a certain amount of investigation is still carried on extra-murally, to take advantage of the special facilities obtaining in other laboratories. The centralisation succeeded in stimulating the growth and expansion of the activities of the Association to such an extent that the council in 1937, approved a substantial capital expenditure on additional laboratory accommodation. The new laboratories which were completed in 1939 are described in a profusely illustrated and well got up booklet which also includes information on the Association's organisation and the type of work carried out, for the benefit of its members.

The International Tin Research and Development Council.—The Council was sponsored some seven years ago by the Governments of various tin-producing areas throughout the world, for the purpose of acquiring and disseminating scientific and technical knowledge relating to tin, its alloys and chemical compounds. The researches and other activities of the council are planned to discover and develop new industrial applications of tin, to improve existing products and processes and to assist tin consumers in overcoming their tech-

nical difficulties and problems. This project is directed and financed by the united efforts of numerous political entities.

The research work is widely dispersed at several centres, Aberdeen, Berlin, Birmingham, Cambridge, Columbus (Ohio), Delft, The Hague, Liverpool, London, Manchester, Munich, Paris, Sheffield, Swansea and Utrecht.

At the commencement of the year 1939, the council occupied its permanent headquarters in the vicinity of London, which houses the administrative offices, the technical bureau and the library and the metallurgical and chemical laboratory.

The council issues a quarterly journal under the caption "*Tin and Its Uses*", which is sent free to those who are interested in the subject. The publication contains contributions of interest to the chemical engineering, moulding, sheet metal working, canning and packing industries. In addition to this quarterly, the council issues special bulletins on subjects like electro-tinning, soldering, tin alloys in dental practice, etc. The international collaboration in the field of pure and applied research on tin secured by the council, is one that should be extended to other economic products of the world.

Titanium Oxide as a By-product in the Manufacture of "Alumina-Ferric" from Bauxite.—The residual mud remaining after treatment of Indian bauxite with sulphuric acid in the manufacture of Alumina-Ferric, contains as much as 35-40% TiO_2 , and forms a valuable raw material for the extraction of titanium oxide. The process developed by Mr. S. C. Chakravarty, which is an adaptation of that employed in the manufacture of the oxide from ilmenite, is described in a *Bulletin* (No. 15) of the *Industrial Research Bureau* of the Government of India. Mr. Chakravarty has successfully recovered from his pilot plant operations a product containing 98-99% TiO_2 , the yield being about 42% on the weight of the mud. The cost is reckoned at Rs. 35 per cwt., the current market rate being about Rs. 56. The oxide is extensively employed as a pigment in paints, in soap-making and in ceramics and as a component of vitrified enamels.

Announcements

Benares Hindu University.—A Prize called Chandulal Chotalal Mehta Prize consisting of the interest on Rs. 5,000 for one year or of books of the like value to be selected by the winner, shall be awarded for the best essay on the subject "The Population and Production in India".

Competitors shall be graduates of the Benares Hindu University of not more than seven years' standing from the date of the graduation.

The essay must be sent to the Registrar, on or before the fourth Monday in July 1941. Each essay shall be designated by a motto instead of the writer's name and shall be accompanied by a sealed cover containing the name of the competitor, his university standing, full address and a declaration that the essay is *bona-fide* his own composition.

The Prize shall not be awarded for an

essay which, in the opinion of the Judges, does not show research or originality of treatment.

The Twenty-third Annual Conference of the Indian Economic Association will be held at Allahabad under the auspices of the Allahabad University from the 29th to the 31st December 1939.

Indian Statistical Conference.—The third session of the Indian Statistical Conference will be held in Madras in the first week of January 1940. It has been provisionally arranged that the Conference will be opened by H. E. the Governor of Madras on the 3rd January. On the invitation of the Mysore University, arrangements have also been made for holding a special session in Mysore, possibly on the 6th and 7th January.

In Madras, the work of the Conference will be carried on in active co-operation with the Indian Science Congress as in previous years. Arrangements have been made for joint meetings with the Sections of Mathematics, Physics, Agriculture, and possibly the Section of Medicine and Public Health. There will also be a special session on Economic Statistics.

The Hon. Mr. V. V. Giri, Minister of Labour and Industries, Government of Madras, will preside over a special discussion on "Labour Statistics".

Papers and scientific contributions should be sent so as to reach the Honorary Secretary, Indian Statistical Institute, Statistical Laboratory, Calcutta, before December 15.

We have been informed by the Secretary, Central Board of Irrigation in India, Simla, that with reference to the statement:

"Discussion on these two subjects seems to have lead nowhere"

[referring to (1) the role of reservoirs in River Flood Control, and (2) meandering of rivers] occurring in the review of the Annual Report of the Central Board of Irrigation for the year 1936-37 (this *Journal*, 1939, 8, 24, col. 2), the study of these problems is a progressive one carried on from year to year in which way valuable data is gradually accumulated and analysed (cf. Report for 1937-38, pp. 64 and 93, and 68 and 108).

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We acknowledge with thanks receipt of the following:—

Journal of Agricultural Research, Vol. 59, No. 2.

"Agricultural Gazette of N.S.W.", Vol. 50, No. 9.

"The Philippine Agriculturist", Vol. 28, No. 4.

"Monthly Bulletin of Agricultural Science and Practice", Vol. 30, No. 8.

"Indian Journal of Agricultural Science", Vol. 9, Pt. 4.

"Allahabad Farmer", Vol. 13, No. 5.

"Journal of the Institute of Brewing", Vol. 45, No. 9.

"Journal of the Indian Botanical Society", Vol. 18, No. 2.

"Journal of Chemical Physics", Vol. 7, No. 8.

"Journal of the Indian Chemical Society", Vol. 16, Nos. 7-8.

"Chemical Age", Vol. 41, Nos. 1043-44, 1048-53.

"Comptes Rendus (Doklady)", Vol. 23, Nos. 8 and 9 and Vol. 24, Nos. 1-2.

"Experiment Station Record", Vol. 81, Nos. 1 and 2.

"Indian Forester", Vol. 65, Nos. 9 and 10.

"Transactions of the Faraday Society", Vol. 35, Nos. 220 and 221.

"Genetics", Vol. 24, No. 3.

"Bulletin of Health Organization (League of Nations)", Vol. 8, No. 3.

"Review of Applied Mycology", Vol. 18, Nos. 7 and 8.

"Calcutta Medical Journal", Vol. 36, Nos. 2 and 3.

"Bulletin of the American Meteorological Society", Vol. 20, No. 6.

"Indian Medical Gazette", Vol. 74, Nos. 8 and 9.

"Indian Journal of Medical Research", Memoir No. 31, July 1939.

"Indian Science Abstracts", 1937, Parts I & II.

"Nature", Vol. 144, Nos. 3639-45.

"Canadian Journal of Research", Vol. 17, Nos. 6-8.

"Journal of Research, National Bureau of Standards", Vol. 22, Nos. 3-4.

"Lingnan Science Journal", Vol. 18, No. 3.

"Indian Trade Journal", Vol. 134, Nos. 1730-36 and Vol. 135, No. 1737.

"Electrotechnics", No. 12, August 1939.

"Forschungen und Fortschritte", Vol. 15, No. 22.

"Mathematics Student", Vol. 7, No. 1.

"Scripta Mathematica", Vol. 6, No. 1.

"Journal of the Indian Mathematical Society", Vol. 3, No. 6.

"Journal of the Bombay Natural History Society", Vol. 41, No. 1.

"Occasional Notes (Royal Astronomical Society)", No. 5.

"Indian Journal of Physics", Vol. 13, No. 3.

"Sky", Vol. 3, No. 10.

"Science Forum", Vol. 4, No. 2.

"Indian Journal of Veterinary Science & Animal Husbandry", Vol. 9, Pt. 2.