Trust party in collecting fossil reptilian remains from the Central Provinces.

A welcome sign of the time is the interest taken in palæontological work by some of the younger workers in Indian geology. Considering the serious and often unsurmountable limitations to palæontological research by those beyond the reach of organised departmental centres, *e.g.*, properly equipped libraries and museums, the progress, though yet not great, gives cause for satisfaction. Besides some excellent palæobotanical work produced by Prof. Sahni's students, the Zoology and Geology departments of the Mysore University, the Geology laboratory of the Presidency College, Calcutta, and, lately, that of the Benares Hindu University are making creditable endeavours to start palæontological research on the right lines.

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The Indian Sugar Committee Meeting at Coimbatore.

THE Sugar Committee of the Imperial Council of Agricultural Research held its sixth meeting at Coimbatore on the 14th, 15th and 16th November 1933, under the Chairmanship of Dewan Bahadur Sir T. Vijayaraghavachariar, Vice-Chairman of the Imperial Council of Agricultural Research. Of all the Committees set up by the Council, the Sugar Committee has been the most active and has contributed materially to the development of the Sugarcane Agriculture and Sugar Industry of India. Within the space of three years, the achievements and the future programme of the Committee have gone far beyond the expectations on a five-year plan. This is evident from the periodical reports of the discussions of the Committee, which having provided adequately for the growth and development of sugarcane agriculture and industry, is applying itself to problems on the equal distribution of profits between the grower and the miller, to the establishment of a central Sugar Research Institute, and to the profitable utilisation of the by-products and waste products of the industry. The grant of protection to the industry and the creation of new and better varieties of sugarcane by Rao Bahadur T. S. Venkataraman, have been responsible for the phenomenal development of the sugar industry in this country. While in 1930-31 only twenty-nine sugar factories were operating in India, fifty-seven factories were in operation in the season 1932-33, and a total of over 120 factories are expected to operate during the coming season.

This being the first time the Committee visited Coimbatore, the several members went round the thick and thin breeding stations and acquainted themselves with the several phases involved in the evolution and distribution of improved varieties of sugarcane. Rao Bahadur T. S. Venkataraman, the Government Sugarcane Expert, and Mr. N. L. Dutt, the Second Cane Breeding Officer, showed the members and visitors round and explained to them the several phases of the science and art of sugarcane breeding, their joys and sorrows in the preliminary selection and rejection of seedlings and their successes and failures and hopes. Mr. Venkataraman also showed the interesting collections of wild sugarcanes and his new creations—the sugarcane x sorghum hybrids—and wound up with a graphic description of how his cane breeding station had already materially contributed to the advancement of the cultivator and the industry and what further improvements could be expected. These morning visits besides enabling the Committee to gain first-hand knowledge of

the fundamental work leading to the growth of the industry, were instructive to the lay visitor in showing what science, state protection and direction by a committee of experts in the line can do.

Of the several items of business transacted by the Committee, judging from the press reports, the most important and the most difficult subjects discussed were those dealing with the distribution of profits, the establishment of a Central Sugar Research Institute and the utilisation of molasses for power alcohol production.

The discussion on the distribution of profits and the methods of doing it is a subject of considerable interest all round and is beset with several difficulties. The grower and the miller are the active participants in sugar production and it is therefore reasonable that both should participate equally in the profits. It should be more assuredly so, when there is protection. While the axiom is easily stated, there are several practical difficulties in devising ways and means of ensuring the equal distribution of profits. This was one of the subjects discussed at the Simla Sugar Conference in June last without arriving at a decision. Since then, there have been several discussions in the press both from the point of view of the grower and the miller. Some suggest the raising of the price of jaggery or gur, some suggest the removal of surcharge, while some opine that the miller in his own interests will necessarily have the interests and the well-being of the grower at heart. None of these suggestions, however, adequately solves the problem. Each is defective in one way or the other and there are several opportunities for abuse. This being so, it is gratifying to note that the Committee tackled this difficult problem carefully and have taken the first step forward in recommending that legislation should be undertaken by which the price paid to the grower would be linked up with the profits made by the sugar factory and in suggesting that each province should legislate according to its conditions. While this is satisfactory so far as it goes, the means of attaining the end remains to be settled. Various formulæ were suggested for linking the price paid to the grower with the profits made by the factory. These have obvious advantages and are attendant with all the alleged risks existing now. The problem is not peculiar to India. It was in existence in the beginning in all the sugar-producing countries but was eventually solved by arriving at suitable working arrangements. It will be interesting to examine their methods of dealing with the problem.

Sugarcane for mills is generally grown under one or more of three systems: 1. entirely by the mills (rare in India but a regular feature in Java), 2. entirely by agriculturists (the usual practice in India), and 3. partly by mills and partly by agriculturists. The question of payments comes in only in the case of 2 and 3. In Java, the factories usually raise their own cane. When they buy sometimes, they do so from large estates on an agreement by which the profit is equally shared. On the side of the estate the total cost of growing cane and delivering it at the factory weigh-bridge are computed and the mill in its turn calculates the total costs of manufacture, packing, etc. Samples of cane at 5 to 10 per cent. of the quantity delivered are crushed and analysed daily and the available sugar on cane is calculated by a formula which varies with the variety of cane. In Mauritius, the agriculturist gets two-thirds of the sugar produced in the factory in return for the cane supplied. In Queensland the price of cane paid to the growers by the mills is strictly under the supervision of the Government who appoint for the season, at each mill, a Government Check Chemist whose business it is to see that sampling and analyses of consignments of cane, are properly done. In the British West Indies, the payment is made on a basis of 55 per cent. of the value of D. C. sugar manufactured for commerce. The system of payment in Antigna is that the planters receive as a first payment the value of $4\frac{1}{2}$ pounds of 96° sugar for every hundred pounds of cane supplied and at the end of the season they receive a further payment on the basis of fifty-fifty participation in profits. Natal and Zululand in South Africa, according to Maxwell, stand alone in the matter of irrational payment for cane based on weight and with no reference to quality. It is therefore clear that the regulation of payment for cane is not, after all, an impossible proposition. The great difficulty in India is that sugarcane cultivation is largely in the hands of peasants and generally illiterate farmers, who employ a middleman to sell their crop to the factory, but this is not an insuperable difficulty. The first requisite is the evolution of a formula by which it should be possible to calculate approximately from

the analysis of first mill juice, the amount of available sugar and there should be no difficulty in obtaining this information if the mills and departments of agriculture set to work together.

An item of considerable interest is the decision of the Committee to establish a Central Institute for Sugar Research. As would be expected, the earliest efforts at resuscitating and establishing the Indian Sugar Industry were first directed towards the most promising and fruitful lines of work. On one side impetus was given for the production of raw material by way of evolving new varieties of sugarcanes and by encouraging provincial agricultural departments, with or without grants from the Council funds, in carrying out cultural and manurial experiments, by setting up an organisation to study the economics of sugarcane cultivation and by bestowing attention on the technology of sugar manufacture. Progress in these directions having reached a definite stage, the Committee have recognised the necessity for sustained and comprehensive research and at its Coimbatore meeting approved separate schemes for research on the Chemistry and Anatomy of sugarcane and sanctioned the establishment of a Central Institute for Sugar Research. In these days of rapid scientific progress and severe competition from outside, no industry can hold its own without continued and efficient research in all its phases and more so with sugar industry in India. The methods of cultivation and manufacture developed with older types of imported canes need re-examination and new creations have yet to be studied in greater detail. The indigenous methods of sugar production which are best suited to the conditions of the peasant cultivator need examination and modification. The older ones were largely empirical and are rule of thumb methods which the cultivator himself has worked out with almost scientific precision. The methods vary widely in different areas and are applicable strictly to the localities in which they are developed. When attempts are made to translate practices from one locality to another they have, as would be expected, the disconcerting habit of failing frequently because of their empirical nature. In spite of the rapid progress in white sugar production, jaggery or gur making will continue, at any rate for some decades, to be an important product of sugarcane. While all the facilities that science offers are readily requisitioned for service in the manufacture of white, crystalline sugar, the application of science and the development of suitable methods for jaggery or sugar production on a cottage industry basis, has not received adequate attention. It is, therefore, pleasing to note that the Committee have not lost sight of this problem of tremendous importance to the peasant cultivator and provided for research in this field. In this connection the members of the Sugar Committee were very much interested to see at the Central Farm of the Agricultural College and Research Institute the whole of the new process of Cream jaggery manufacture with the use of activated paddy husk charcoal recently evolved at Coimbatore and the Committee were impressed with the simplicity of the process and the superior quality of the product. Completeness of organisation for research and its centralisation are essential for success and the Committee have not only recognised this but have taken the big step forward in sanctioning the establishment of a Central Sugar Research Institute.

The Committee spent anxious time and thought on the problem of the production of power alcohol from molasses and on the consequential legislation for its use, blended with petrol, as motor fuel. The problem of molasses disposal is a necessary evil arising out of white sugar industry. In October 1932 this subject was under discussion at Coimbatore jointly by the Society of Biological Chemists (India), the Indian Chemical Society (Madras Branch) and the Association of Economic Biologists. Within one year from that date, the problem gained both in size and momentum and ranked itself as one of the most urgent problems facing the sugar factories. Representatives of sugar factories were anxious to have legislation permitting the production of power alcohol and for the compulsory use of a mixture of alcohol and petrol as motor fuel. The proposition is attractive but is beset with several practical difficulties. In dealing with this subject the Sugar Committee was cautious and decided that the most important step was to carry out an experiment for the marketing and distribution of power alcohol in admixture with petrol as motor fuel in a limited area. This decision while providing adequately for research on the most urgent problem of the factory owner, does not involve the public in uncertainties and losses attending

on compulsory general legislation. The alcohol-petrol blend as a source of fuel for internal combustion engines is not yet an entirely successful and proved proposition fit for universal adoption. It is true it is being used in Germany, France and Italy. In America, where it is said to be in vogue, the American Automobile Association carried out several investigations in co-operation with the Secretary for Agriculture early in 1933 and issued two leaflets dated March and June 1933. According to the report of the American Automobile Association, alcohol is materially lower in heat value than gasoline and therefore requires adjustment of carburettors for equal performance compared with gasoline. Alcohol has the property of absorbing moisture and this results in the separation of alcohol and petrol in the blend and involve carburation and starting difficulties. In addition, increase in maintenance cost of motors may be expected owing to the deleterious effects on various parts of the system. Based on these observations, the Board of the American Automobile Association finally stated that hundreds of tests conclusively showed that an alcohol gasoline blend would be a great deal less efficient than regular gasoline and that its universal and compulsory use would add to the cost of up-keep. In the light of this experience, the decision of the Sugar Committee to carry out preliminary experiments is undoubtedly based on a very careful examination of the question in its several aspects.

This is about the disposal of factory molasses. There is still the problem of the disposal of molasses from small factories which manufacture white sugar by the open-pan system. The accumulations from individual factories may be small relatively, but in the aggregate the quantity of molasses produced will be larger than that from big factories. Even if the manufacture of power alcohol and its use as motor fuel with petrol materialises, it will not be a paying proposition for the open-pan sugar producing concerns to transport his molasses to a central distillery. The disposal of this type of molasses still constitutes a problem, and calls for investigation. Taking everything into consideration the most promising line of development appears to lie in the use of molasses in agriculture itself for manurial and feeding purposes. This kind of disposal is already in vogue in Java, Hawaii and other sugar-producing countries, but it is necessary to carry out investigations with reference to Indian conditions before agricultural departments in India are in a position to make specific recommendations. A comprehensive scheme of research on the effect of molasses on the soil in regard to its physico-chemical and bio-chemical characteristics, on its effect on crops and on its value in the feeding of farm animals has been in progress at Coimbatore this year and some interesting and valuable data have already been obtained.

When considering the Indian Sugar Industry one has always to remember that the Industry will need to face World competition if and when protection is withdrawn in the fulness of time and the utilisation of waste and bye-products is one way of stabilising the Industry against such competition.

The Committee also considered and discussed annual reports of the various schemes previously sanctioned and fair progress was evidenced in all directions.

B. VISWA NATH.

Indian Science Congress.

IMPORTANT NOTICE.

OWING to the continued plague epidemic in Poona which has only slightly abated, the venue of the Congress at Poona would have entailed special measures, such as obligatory inoculation of all visitors. The Local Committee, as well as the Congress authorities, have very carefully considered the situation and finally decided to avoid the inconvenience and possible danger of a meeting at Poona. In consultation with the University authorities in Bombay it has been decided to transfer the venue of the Congress from Poona to Bombay. The original date of the opening of the Congress (2nd January) remains unaltered.
