Sectional Addresses.

AGRICULTURE :

THE acuteness of the present agricultural depression has been aggravated by organized, heavy crop-production in some parts of the World and introduction of synthetic substitutes for natural products in others. The pursuit of agriculture has, more or less, ceased to be remunerative and, considering the present conditions in the country, the future appears to be all but bright !

During the past thirty years, the agricultural departments of India have striven hard to effect various improvements ; but in spite of the introduction of better implements and high yielding varieties, growing knowledge of suitable rotations and better facilities for irrigation and marketing, the situation has not appreciably improved—in fact, it has become worse as indicated by the increased suffering and greater indebtedness of the peasantry.

An analysis of the position shows that a large part of the trouble is due to our ignorance of the influence of environment on crop-yield. Successful crop-production is essentially the result of reciprocal reaction between the plant and its surroundings, but in our enthusiasm for the former we have overlooked the importance of the latter.

As an instance of the importance of environment may be mentioned the influence of season which (*a*) introduces greater differences in crop-yield than all the varieties introduced by man, and (*b*) so obscures the effects of manurial treatments that, in spite of three decades of experience, agricultural experts are still unable to give satisfactory advice to cultivators ! Crops are often sought to be raised under soil and climatic conditions which are not generally favourable to them. Thus although the Punjab American cottons are superior to the indigenous *Desi* in length of lint, their ecological amplitude is narrower and hence their failure more frequent than that of the latter. Soil conditions, chemical as well as biological, also determine the success or failure of crops. It is a notorious fact that most Indian soils have reached the limit of maximum impoverishment but still high yields are expected to be obtained by the introduction of new varieties ! Moreover, our knowledge of the reciprocal reactions of the soil, the crop and the micro-organisms is so limited that we rarely ever strike a favourable balance : thus, when off-season cultivation was attempted in the Punjab to eradicate the moth borers of rice, the yields went down by as much as 42 per cent ! The concentration of carbon-dioxide in the atmosphere is also a factor determining the efficiency of plant growth but so far very little use has been made of this knowledge.

Every country—nay every tract—has to solve its own ecological problems. The problems of the Punjab are different from those of Bihar or South India and must be studied in full cognisance of the local conditions. This would apply particularly to the depredations of pathogenic organisms and insect pests which should be tackled in the same way as medical men forestall possible outbreaks of epidemics. The literature on plant pathology abounds with instances of allied phenomena showing the importance of environment in determining the abundance and distribution of various pests.

A striking example of the above is the Desert Locust which appears, in swarms, at intervals, spreading over Baluchistan, the Indo-Gangetic plain, Rajputana and West Central India, breeds for a few generations and then disappears. One naturally likes to know where the locusts come from, what they do during non-swarming seasons, why they migrate from their homes and in such large numbers and finally how to prevent the recurrence of their invasions in the future. The researches conducted by the author and his co-workers under the auspices of the Imperial Council of Agricultural Research show that : (*a*) the permanent breeding ground of the Desert Locust lies in parts of Baluchistan and the Indus valley ; (*b*) that it thrives best in dry weather but perishes readily in a humid atmosphere, thus accounting for the rapid disappearance of the locust from the Gangetic plain shortly after every invasion; (*c*) that the rapid multiplication preceding their big flights is facilitated by a succession of seasons with good rainfall ; (*d*) although when occurring in small numbers they are quite harmless, they turn out bold and highly aggressive during their flights ; and (*e*) prior to their migrations the locusts multiply rapidly in their desert homes, shed their protective colouration and turn into dark hoppers. The above information, though not sufficient to eradicate the pest altogether, should still be helpful in warning the cultivators or otherwise minimising their depredations.

V. S.

ANTHROPOLOGY :

IN his Presidential Address at the Anthropological Section of the Indian Science Congress, Dr. P. Mitra refers in his introduction to the research thesis of a few of the Post-graduate Students as part of work for their M.A. and M.Sc. degree examinations, as also to the research work of the members of the Anthropological Department of the Calcutta University since its organization in 1921.

Research leads in India, says the President, saw the starting of linguistic classification of mankind with the Asiatic Society of Bengal. Pater Schmidt, Sten Konow and Grierson have, after their laborious researches, shown fresh fields for further investigations. The Austro-Asiatic or Pre-Dravidian problem is engaging the attention of scientists. The Dravidian linguistic problem is still unsolved, and the comparative study of Milanesian languages by Dravidian scholars may promise to open up fresh fields. The President then refers to the patriarchal theory of Sir Henry Main, Morgan's wonderful discovery of the relationship terms, and its correlation to the Dravidian and Senecan system for the solution of some anthropological problems. In his opinion a detailed and comparative study of some of the Australian and South Indian tribes is calculated to produce promising results for the solution of the Dravidian problem. Special emphasis is laid on the marriage systems of these tribes as helpful to the discovery of cultural affinities. The origin of exogamy, in the opinion of the President, is still

shrouded in mystery in spite of the numerous theories that have been formulated by the various anthropologists and the ancient Hindu rishies.

The President gives some parallelism between the early developed culture in Northern India and Polynesia. Further the stratic graphic study of culture in the line of the German school and mapping out of culture areas are recommended. Definite distribution of traits of a culture complex is far more yielding of results in the fields of material culture. The study of material culture traits common to India, Africa and the Pacific might lead to produce types which are likely to have originated in a central home before dispersal.

The recent studies of Dr. Broom in South Africa reveal the probable existence of a South African Australoid race who have left similar physical traits. In the opinion of the President, India can be studied in comparison with the data from Africa on the one hand and the Pacific on the other. The implements in South India and Tasmania are said to be similar. As probable survival of the early stone age culture complex, boomerang plays a prominent part. Griebner in his classic study of the Milanesian bow culture has shown five stratifications of which the old Australian culture with boomerang was the earliest, and this was followed by totemic culture, and then a matriarchal dual organization after which came the boomerang bow culture complex and still later the Polynesian culture. The boomerang, says the President, is common to Africa, India and to Australia, as may be seen from the specimens exhibited in the Pitt-Rivers Museum of Oxford. Similarly the study of the bow will also yield valuable results.

The study of the problem relating to the dispersal of taro and banana and of domesticated animals, study of culture of intercontinental regions will reveal important role of India as primary or secondary centre of diffusion of cultures in several stages of her culture complex in the march of time. The study of the origin and development of plough yields important results. Finally India has to take inspiration from her cultural patterns so as to be able to combine with the cultural traits of the West and break into new paths. Finally he concludes his address by referring to some super anthropological problems.

L. K. A.

BOTANY:

THE study of algæ did not receive for a long time the attention due to it from Indian botanists. One main reason for its neglect is the general impression that a study of this group of plants can hardly be of any economic value. So, while Mycology, Plant-Breeding and Plant-Physiology are drawing most of our men, subjects like Algæ which are supposed to be of academic interest only fail to attract any of them. It is gratifying to see, however, that of recent years more people are taking to the study of algæ. An attempt is made in this address to show among other things how a study of algæ, besides throwing valuable light on fundamental biological problems, can also be of value economically.

It is generally believed that life first originated in water and that the first living organism must have been of an algal type. And a detailed study of these plants will throw light on the problem of the origin of life, the solution of which is the ultimate goal of all biologists. Again a study of this group will enable us to understand many biological principles such as division of labour, parallelism in evolution, the phenomena of differentiation of somatic and reproductive cells, origin of sex, alternation of generations, adaptation to land life, etc. And the structure, function and origin of cellular bodies like the nucleus, plastids, pyrenoids, blepharoplasts, chondriosomes and golgi bodies are more likely to be understood by a careful study of this group of plants than of any other.

The different systems of classification of algæ are briefly dealt with, particular emphasis being laid on the flagellate origin of algæ, the main differences between the *Isokontæ* and the *Heterokontæ*, the parallel evolution seen in both these two groups and the existence of "flagellate" and "algal" forms in all the main algal groups. Reference is made to the works of several algologists on these simplest types of algæ and the desirability of work being done in India on similar lines is emphasized.

The work done on the ecology of algæ by several workers like West and Pearsall, Naumann, Fritsch, Donat and others is briefly described. Among other points, the ecology of freshwater lakes as described by these authors is explained in some detail. The classification of lakes as under Oligotrophic, Eutrophic and Dystrophic ones is explained and the effects of various factors such as the depth and form of the lake, the sediment, the hydrogen-ion concentration, the surroundings of the lake, etc., on the nature and composition of the algal population are described.

The ecology of subærial algæ is next described and an account is given of the important role these algæ play in colonising new and inhospitable strata, which are thereby rendered more habitable for higher plants. The need for research work on the ecology of algæ in India is pointed out.

The possible lines of work on the cytology of algæ in India are referred to, particular emphasis being laid on the possible presence of structures similar to Golgi bodies and mitochondria in algal cells.

Lastly, the economical aspects of the study of algæ are dealt with in some detail. The value of algæ on the growth of fishes is briefly explained. The algæ form the food of minute animals, which in their turn form the food of larger animals, which in their turn again serve as food for fishes, so that possibility of fish-life in any area is ultimately dependent on the presence of these minute lowly plant organisms. Investigations on the algal population and the various physical and chemical features which control their growth will help to control the nature and extent of the fish-population in any area.

The need for the establishment of freshwater biological stations for investigating hydrobiological problems in India as has been done in other countries is pointed out.

The study of algæ in relation to agriculture is next dealt with and the importance of determining whether the algæ growing on cultivated soils are beneficial or harmful to the crops is pointed out.