



Vol. III] DECEMBER 1934 [No. 6

CONTENTS.

	PAGE
Inland Fisheries in India	227
Some Recent Advances in Indian Geology. By W. D. West	231
Progress of Algological Studies. By K. Biswas ..	237
On the Neural Gland, etc. of <i>Herdmania pallida</i> Lahille. By S. M. Das	242
Obituary:	
Shiv Ram Kashyap, Ekendranath Ghosh ..	245
Letters to the Editor:	
Note on the Limiting Density, Mass and Temperature of Condensed Stars. By A. Ganguli ..	249
Formation of Hydrates and Diamagnetism. By S. Ramachandra Rao and P. S. Varadachari ..	249
Note on the Chem. Examination of the Roots of <i>Indrāyan</i> . By R. R. Agarwal and S. Dutt ..	250
Mannose Dehydrogenase and Ascorbic Acid (Vitamin C). By B. C. Guha and A. R. Ghosh ..	251
Haustorial Regeneration of Sandal and Its Significance. By M. Sreenivasaya	251
Parasitism of the Cotton Root-Rot Organisms. By V. N. Likhite and V. G. Kulkarni	252
Introduction and Spread of <i>Euphorbia geniculata</i> , in South India. By P. V. Mayuranathan ..	254
The Original Home of <i>Achyranthes aspera</i> L. By B. L. Gupta	255
A Fossil Dicotyledonous Wood from Assam. By K. A. Chowdhury	255
Abnormal Flowers of <i>Cassia fistula</i> Linn. By T. S. Raghavan and K. R. Venkatasubban ..	256
Life History of <i>Herpestis monniera</i> H. B. & K. By K. V. Srinath	257
Gametogenesis and Embryogeny in Some <i>Commelinaceae</i> . By K. Lakshminarasimha Murthy ..	258
Contribution to the Morphology of <i>Ottelia alismoides</i> (Pers.). By S. K. Narasimha Murthy ..	259
Specificity of Parasitism by <i>Eublemma amabilis</i> . By S. Mahdihassan	260
Fruit and Seed Development of <i>Tinospora cordifolia</i> , Miers: Exembryonate Seeds, by N. K. Tiwari; Seeds and Seedlings by K. N. Seshagiriiah; The Seeds of <i>Tinospora cordifolia</i> , Miers, by Bahadur Singh; Reply by A. C. Joshi ..	262
Soil Temperatures. By L. A. Ramdas and R. K. Dravid	266
Entomological Investigations on the Spike-Disease of Sandal. By T. V. Ramakrishna Ayyar ..	268
Chemical Nature of Enzymes. By K. Venkata Giri ..	276
Diffraction of Matter. By S. Ramaswami ..	277
Research Notes, Science Notes, and Reviews.	

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Inland Fisheries in India.

THE *Statesman* of Calcutta recently published a series of short articles on "Fisheries of the Punjab" contributed by a correspondent. These articles disclose an inside knowledge of the working of the Department of Fisheries in the Punjab, and raise certain problems of such fundamental importance in regard to its administration and scientific aspects, that we think it necessary in the interests of the fishing industry to invite public attention to them.

Some twenty years ago when the Punjab Government organised the Fisheries Department, Mr. G. C. L. Howell, I.C.S., was placed in charge of its destinies. This appointment was in general conformity with the doctrine which all the governments used fondly to entertain (on the basis of the principles of facultative psychology), that a member of Civil Service is good enough for every conceivable branch of administration. The reason why a civilian is not appointed as head of the Cavendish Laboratory may, however, be found in the fact that it is not an earning department and its output is not immediately taxable. But in all industrial concerns where a deep scientific knowledge and technical training are indispensable for efficient and successful management of their affairs, Government assumes that the administrative experience of its officers is more than their equivalent. It is true that the general administrative officers possess alertness of mind, a comprehensive vision, tact, ability and application, but neither any one of these qualities nor all of them together will avail in the management of departments in which an intensive scientific training, technical experience, acquaintance with the methods of research and ability to initiate original investigations are required for making the concern a remunerative one; knowledge of revenue collection and of the penal code must, at all times, be a poor substitute for these qualities. The administrative duties in the fishery and agricultural departments are considerable and responsible, and it seems to us that the head of such departments must also be a research worker himself so as to be able to guide the laboratory work of his assistants, to assess their results and suggest problems for fresh investigations. Moreover, the administrative functions of

scientific departments are not identical with those of the general branches of government, and a blank mind, which is not often the supreme qualification of even a judicial officer, can never be an equipment for scientific posts. The prevailing practice of appointing civil officers as heads of technical and scientific departments is due to the fact that Government, which expends money on their organisation, desires to control their output, and no one is more competent to advise Government on the subject of prices and taxation than its civil servants. An industry, whose scientific problems are subjected to considerations of prices and taxation, must ultimately become as inefficient as an industry that has no scientific problems. An industry without a civilian head to control its affairs is as blessed as a country which has no history.

The correspondent of the *Statesman* suggests in the concluding portion of his contribution that the research work on Fisheries in the Punjab should be closed down "until such time as adequate funds are available to place it on a proper footing, with a pisciculturist from Europe or America at its head". This is just the kind of advice that a civilian administrator of scientific departments would, in a spirit of despair, tender to the government when its financial resources might temporarily be dislocated: but the viewpoint of a scientist would precisely be the opposite. A time of economic depression is manifestly the psychological moment for the display of financial courage and technical skill, for if the lines of scientific investigation in the government industrial departments have been carefully planned with reference to the experimental and other environmental conditions, then it would be realised that the only protection against depression is more research. If the major industries such as agriculture,—and under their category we would also include pisciculture,—are ultimately to be depended upon for the restoration of financial stability, then the suggestion for the curtailment of research, even as a provisional measure, would appear to be fatal to the best interests of government. We have had occasion (*Curr. Sci.*, Oct. 1933) to comment on the subject of research on Fishery work while reviewing Mr. Sorley's report on the Marine Fisheries of the Bombay Presidency, and we would repeat once more that if research work is

entrusted to competent persons, then government will find it profitable to invest more funds in its promotion. The prosperity of any industrial organisation must depend upon continuous and anticipatory scientific research, and industrial prosperity implies the financial stability of government. In the existing scheme of competitive internationalism, the advocacy of the policy of closing down research departments of government industries, such as is advocated by the correspondent of the *Statesman* and Mr. Sorley, can only be accepted on the responsibility of placing the country in a state of perpetual dependence on foreign products.

The second proposal made by the correspondent, *viz.*, that a European or an American pisciculturist ought to be appointed as head of the fisheries department in the Punjab betrays his ignorance on the subject of fisheries research in India. An American or European pisciculturist may be a very eminent scientist in his own country, but in the widely different conditions prevailing in the tropics, he will generally find that he has to unlearn a great part of his training and experience before he can understand the complicated situation arising from the vagaries of the dry Indian climate, the rainfalls which obey no known law, the little understood habits of fishes which still have to be studied more intimately, the diverse customs and practices of the country, the nature of the rivers and tanks and the uses made of their waters for irrigational purposes. In the case of all appointments of foreign scientists, a more or less prolonged period of self-education in the complicated and unfamiliar local conditions must necessarily precede the acquisition of anything like a clear grasp of the situation and the nature of Indian problems. If these scientists are really capable men, they may begin to gather experience of fishery work in the tropics during the probationary period and start on some useful lines of scientific investigation, otherwise they drift into the administrative branches of their department. In fact, it has been a singular misfortune of the Fishery Researches in India that, after Francis Day, persons, without competent knowledge and experience of the peculiar local conditions, have been appointed in most of the provinces, with the result that their efforts have been always unsatisfactory. So far in the Punjab there have been two directors of the department, but neither

of them could claim to possess any scientific training or previous experience of fishery work, and accordingly they attended only to the administrative aspect of their work to the detriment of the more important side of scientific enquiries. The department needs the scientific atmosphere and inspiration for the junior workers, and they can be provided only by the unbounded zeal of the head of the department who must be an intrepid research worker himself.

The Department of Fisheries in the Punjab at the time it was established set out to achieve a three-fold object, *viz.*, to conserve all the species of fish then held by the rivers and tanks through regulation of the methods of fishing and the abolition of uneconomic and wasteful devices adopted by the fishermen; to discover the habits and life-histories of the more important forms with a view to breeding them in captivity; and to attend to the interests of the fishermen castes and to bring back many to the trades of their forefathers. These are simple propositions and of these the second only is scientific, capable of being accomplished by a steady pursuit of the subject. According to the correspondent of the *Statesman* when a research officer was appointed in 1920, "it was confidently hoped that this branch would develop, but fourteen years have elapsed and except that he has been accommodated where he has access to a fine laboratory, research as such is no further advanced." The research officer alluded to is a young inexperienced graduate of the Punjab University, and he was expected to work miracles, without special training and necessary guidance by the head of the department. If the Fisheries Department of the Punjab was unable to discover the general habits and life-history of the carp (*Labeo rohita*) in order to stock the rivers of the province, the blame attaches to the defective planning of the department. We have no hesitation in maintaining that the official head of the department must be a scientist, possessing competent knowledge and training and capable of conducting original investigations himself and directing those of his subordinates. The post ought not to be offered to civilians whose interest in the development of the scientific sections cannot be expected to be more than academic; and it is uncharitable to require them to guide researches for which they possess

neither adequate knowledge nor previous training.

According to the testimony of the writer in the *Statesman* the Fisheries Department has achieved a certain measure of success in reclaiming those fishermen whom the system of *begar* (labour for government servants without remuneration) had driven to basket-making. This is certainly a great departmental achievement. But it must be remembered that the system of *begar*, in any event, is bound to become obsolete on account of the spread of education and the growth of political consciousness. Will the suppression of unremunerated labour by official authority and police vigilance keep the fishermen to the profession of their forefathers? The reports of the Bombay and Madras Fisheries departments deplore the increasing tendency of fishermen to take to more lucrative professions in considerable numbers, and this is only part of the universal phenomenon of the defection of industrial communities from their traditional occupations. This is due to two causes. In the first place the doctrine of proportional representation in government appointments and local bodies and legislative chambers has stimulated the competitive ambitions of every section of population to acquire and exercise political and administrative authority. Perhaps, the second cause must be the discovery, that the education that is imparted to the children of the industrial people, has no relation to their occupational activities, but tends only to produce a decided aversion for them. More than all these, the rapid industrialisation of the urban areas must, by the offer of higher wages, deplete the villages, whose population once drawn into the welter of distractions of the cities is permanently lost to rural occupations. Fishermen are not saints. To enable them to pursue their traditional profession in happiness, peace and contentment, to make them realise that an intensive and scientific cultivation of their industry will bring them increasing prosperity and political power, and to induce them to take a legitimate pride in their descent from Peter and John, are problems of such magnitude and importance that, in the successful solution of at least some of them, the head of the Punjab Fisheries Department might reasonably take pride, but assuredly not in the suppression of the *begar* system.

Regarding the scientific work of the

Fisheries Department we read in the *Statesman* that "efforts to breed the indigenous fish of the country ended in a failure" and the next paragraph opens with the sentence "the only direction in which the department could point to with some pride was the introduction of the trout". If the cultivation of this foreign species is thriving in the streams of the Punjab Hills, the department is, however, unable to account for its success. Besides, an act of this nature, manifestly undertaken in a playful mood to gratify a whimsical curiosity, but not based on scientific prescience, is fraught with intricate and numerous biological consequences. In Madras the experiment of trout breeding is proceeding, and the effects of successful cultivation of foreign species on the population of indigenous forms must be carefully watched. In our existing incomplete knowledge of the feeding and breeding habits of many of the local forms of fish, the introduction of foreign fish into their midst might possibly disturb the balance of life, and lead to the rapid diminution and ultimate extinction of the former. Any interference with the delicate adjustment of life in restricted areas by clumsy experiments, which are usually attended by disastrous results, is an act which few trained and experienced scientists would lightly undertake, and palpably it must be in the nature of a speculative adventure.

The suggestions made by the correspondent in regard to the establishment of sanctuaries for the propagation of indigenous fish deserve immediate public attention and comments were made on this subject in *Current Science* (*vide* issue for July 1933). In the Punjab with its network of rivers and canals, facilities for the creation of a number of sanctuaries exist, and the delay in the formulation of a scientific scheme for conservation and propagation of fish is unaccountable. The utilisation of river and tank waters largely for irrigation purposes must unfortunately have an adverse effect on the general habits of fishes, and in all irrigation projects, due attention should be paid to the needs of the fishery of the country. Dr. Francis Day has made valuable suggestions on this subject in his Reports on Fish and Fisheries of India, which are available to the heads of the Fisheries Department for consultation, and we have no doubt that many of them can, with a slight improvement, be adopted to

suit the particular circumstances of the provinces.

In his last note, the correspondent deplores the fact that "on the retirement of the late Warden the post was abolished and Fisheries Department was placed directly under the Director of Agriculture as a separate entity." It is to be remembered that in every civilised country, a combined Ministry of Agriculture and Fishery has been found to be a great advantage both as a measure of securing economy and unitary administrative control over the two industries, whose problems cross one another in several ways. In India the political divisions, especially in the older Presidencies like Bombay and Madras, are far too extensive and varied in geographical features, to be brought under a unitary scientific or administrative control. In Madras where a few years ago, higher education used to be directed by a single University, it is now under the management of five or six universities, and we think that it would be advantageous to split each of the larger presidencies into at least two divisions for the purposes of developing the Agricultural and Fishery Departments. The first step in this much-needed decentralisation is to separate Marine Fisheries from Inland Fisheries. The latter is to be divided into two departments in conformity with a similar bifurcation of the Agricultural Department. They should then be put in administrative charge of one Director for each of the divisions, and the two departments should be provided with a separate well-equipped laboratory under competent scientific staff. For the purpose of co-ordinating the results and the initiation of new problems in pisciculture, the creation of a new Central Bureau of Fishery Research under the control of the Member of the Department of Education, Land and Public Health, becomes a matter of imperative necessity. Our considered opinion is that the establishment of this central scientific organisation is overdue. Early in September, the Advisory Board of the Imperial Council of Agricultural Research held a prolonged discussion on the conditions of the Fisheries industry and the possibility of its development. It was generally agreed that there was great need for the appointment of an expert committee to investigate the question in all its aspects, and it was announced in the papers that the Fisheries Committee would soon be instituted. It is

hoped that the terms of reference to the Committee, when established, will be sufficiently wide and elastic, so as to permit an exhaustive enquiry being undertaken. Those who have actually done research on fish and fisheries in India are few, and we have no doubt that the wealth of knowledge and experience accumulated by individual scientists

will be found invaluable in conducting the enquiry by the Committee. We confidently hope that sufficient room will be found for experts on this proposed Committee whose proceedings will be followed with earnestness by the public, whose interest in the development of the food resources of the country is manifestly increasing.

Some Recent Advances in Indian Geology.*

By W. D. West,

Geological Survey of India.

3. The Geology of the Himalaya.

DURING the past ten years or so considerable progress has been made in our knowledge of the geology of the Himalaya, which has only served to show how complicated is the geology of this great range and how great is our ignorance of its real structure. During this period work by the Geological Survey of India has mainly been concentrated in two areas, the North-West Himalaya in Hazara and Kashmir, and the Simla hills around Simla and Chakrata; while in addition there have been several foreign expeditions to the Karakoram and neighbouring tracts beyond the Himalaya which have added something to our knowledge of the geology of those parts. Thus in spite of large blanks still existing on the geological map of the Himalaya, largely accounted for by the inaccessibility of Nepal, the accumulating results of steady mapping are gradually providing a sure foundation on which may ultimately be built a complete synthesis of Himalayan geology. Theories of mountain structure based on our present incomplete knowledge of even one section of the Himalaya must necessarily be largely speculative. They arrive almost by every mail, and are frequently advanced by those whose acquaintance with Himalayan geology is by no means extensive. Perhaps of no part of Indian geology can one more truly say that the more one knows of it the more one realises how little one knows. The present policy of the Geological Survey is to concentrate its small available resources on two sections of the Himalaya, as stated above, in the belief that a sustained attack

on these two selected areas will yield more valuable knowledge of the geological structure of the Himalaya as a whole than a larger number of smaller investigations spread over a wider area. The summary that follows, therefore, deals mostly with these two areas. In compiling it the writer is indebted to his colleague Mr. J. B. Auden for many fruitful discussions on the problems raised therein.

THE NORTH-WEST HIMALAYA.

The most striking feature in the orogeny of the North-West Himalaya is the way the strike of the mountains, after following an arcuate S.E.—N.W. direction for over 1,200 miles from Assam to Kashmir, makes a great bend in Hazara, rapidly curving round through an E.—W. to a N.—S. direction, and producing thereby a great re-entrant angle in the alignment of the mountains between Abbottabad on the South-West and the Kashmir valley on the North-East. This bend is seen not only in the frontal ranges bordering the Indo-Gangetic alluvium, but is repeated in each successive range northwards, culminating in the Pamir massif. Even this great mass shows the same trend lines, which are south-west on the west, equatorial through the Pamirs, and south-east on the east side, as first determined by D. L. Ivanow and subsequently confirmed by Sir Henry Hayden.¹ As regards the origin of this feature, it had previously been supposed by E. Suess in his great work 'Das Antlitz der Erde' that the rapid change in the strike of the mountains was due to the meeting at an oblique angle of two mountain systems, the Himalaya and the Hindu Kush.² For this line of meeting

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¹ *Rec. Geol. Surv. Ind.*, 1916, 45, 271.

² *The Face of the Earth*, 1904, 1, 422.