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CONTENTS.

Indian Fisheries and Japanese Enterprise.

THE *Statesman* of Calcutta in its issue of the 17th February 1936, published the following news from its Singapore correspondent under the heading "Fish in Abundance: Japanese Boats operating in Indian Ocean":—

"Japanese trawlers are catching large quantities of fish in the Indian Ocean between Penang and Calcutta and are transhipping it at Singapore for transport to Japan. Previously the trawlers had been operating in the China Sea and off Australia, but their catches decreased owing to the operations of other trawlers in the same waters.

"In the Indian Ocean the Japanese ships, it is stated, are finding an abundance of fish and as much as 80 to 100 tons of fish are transhipped at Singapore for Japan. Most of this is for consumption there but a quantity is shipped back to Singapore as fish meal."

This news does not seem to have caused any stir at the time, but recently when the *Statesman* in its issue of the 5th March 1937 reported the appearance of a Japanese trawler, the '*Shinkyo Maru*,' in the Kidderpore Docks, Calcutta, with a cargo of about 200 tons of fish, "including pomfret, bekti and lobsters caught in the Bay of Bengal," considerable interest was aroused, both in the press and the public, regarding the fisheries of the Bay of Bengal and the paucity of the supply of fish to Calcutta. Though at the time great difficulty was encountered in investigating the significance of this new move on the part of the Japanese vessel, three days later the *Statesman* published a short note on Calcutta's Fish Supply and reported the Japanese plans of working 40 trawlers for the new enterprise. It stated that

"The presence in the port of Calcutta of the Japanese trawler *Shinkyo Maru*, laden with fish from the Bay of Bengal, initiates an experiment made by a long-established business house in Japan.

"One of the fleet of 40 vessels constructed for the purpose, the *Shinkyo Maru* has a capacity for carrying about 500 tons of fish. Its equipment, like that of its sister ships, is most

modern in every respect. Other vessels of the fleet serve Rangoon, Singapore and other Far Eastern Ports.

" It was explained to a *Statesman* representative that this was a well prepared and serious attempt to supply Calcutta with fish, and that interested enquiries from many consumers had already been received.

" Upon the success of the experiment depends the continuation of supplies from this source.

" It has been estimated that in Bengal 80 per cent. of the population consume fish as a regular item of diet when they can afford to buy it; yet so badly is the industry organized and so hopelessly are the actual fishermen in the hands of *mahajans* and middlemen that an ever-increasing demand goes unsatisfied while the price of such supplies as reach the Calcutta markets is maintained at a level which can only be described as exhorbitant.

" The possibilities of establishing remunerative steam trawling in the Bay of Bengal have never been sufficiently explored, even though investigation had proved that there are extensive areas in the Bay capable of yielding large quantities of high-class fish and which are suitable for trawling.

" An experiment that was made was a financial failure mainly because of the hostility of vested interests, and the lack of cold storage facilities. The latter difficulty no longer exists.

" Calcutta consumes about 700–800 maunds of fish daily, but the supply is regarded by dealers as insufficient. In the last decade the demand has increased 40 per cent. but the supply only 25 per cent.

" If the new Japanese enterprise can regularly contribute to the deficiency, and at the same time exert an influence in the way of forcing prices down the visit of the *Shinkyo Maru* may prove economically important. "

We have quoted the report of the *Statesman* in full, as it sums up admirably the present position of the fish supply of Calcutta and the necessity for augmenting it from the Bay of Bengal, an immense source of supply near at hand. The public reaction to these statements has been of two opposing types. Some have agreed with the *Statesman* and look upon the Japanese enterprise as a great boon to the poor people whose unbalanced diet is in reality the cause of so much sickness and ill-health in this country and to which the Government has become greatly alive during the last 2 to 3 years. While there are others who consider that the Japanese enterprise will adversely affect a large number of persons engaged in fish trade and that a very big industry, almost next to agriculture in its potentialities, will pass into the hands of the Japanese and it may become politically difficult afterwards to turn them out. Both these views deserve the greatest consideration before any action should be taken in the matter.

There appears to be a general agreement that the Bay of Bengal is teeming with fish life and that all grades of economic fish, from Cat fishes to Pomfrets and Perches, are found in plenty in this area. Two of the Surgeon Naturalists on board the s.s. '*Investigator*,' the late Lt.-Col. A. Alcock and Lt.-Col. R. B. S. Sewell, who had opportunities to do extensive trawling in the Bay have forcefully expressed their views that the fisheries of this area are very rich. The officers of the Government of Bengal, Sir K. G. Gupta, Mr. A. Ahmad, Dr. J. T. Jenkins, Mr. T. Southwell and Dr. B. Prashad, who were appointed from time to time to report on and investigate the possibilities of fisheries, both fresh-water and marine, also came to the conclusion that the Bay of Bengal is almost a limitless source of marine fisheries. A careful study and analysis of the reports of the Government of Bengal's Steam Trawler '*Golden Crown*' also shows that there are many rich fishing grounds in the Bay and, provided a suitable organisation can be set up, there are great possibilities for the development of the Bay fisheries.

The next consideration in such an undertaking would be the disposal of the catches, and here again opinion is unanimous that there is a great demand in Bengal for fish, as almost 80 per cent. of the population would eat fish as a regular item of diet if they could afford to buy it. As the dietetic researches advance there is no doubt that the percentage of the fish-eating population will also increase. As has been stated in the *Statesman's* report quoted above, the demand for fish has already increased during the last decade by 40 per cent. but the supply by only 25 per cent.

It is stated that Bengalis, as a class, are fond of fresh-water fish, mostly carps and a few types of cat fishes, and that there is little demand in the Province for marine fish. In the present circumstances there would seem some justification for this view, because a very small quantity of marine fish is exhibited for sale in Calcutta markets, and even this quantity, which is sold at higher rates than the local fresh-water fish, is brought down for consumption by the foreigners, Europeans and others, in this

cosmopolitan town, from Puri and Balasore by train. Those, who have had opportunities to go round the Calcutta fish markets, are greatly struck by the paucity of the commodity, the average high price of fish of all kinds and the absence for sale of any truly marine forms. The quantity of fish brought to the markets is so small that practically the whole of it is sold out within a couple of hours, and the business is so remunerative that the traders make enough money within this short period. Even if it be admitted that the Bengalis have an inherent prejudice against marine fish, it should be borne in mind that propaganda and education are two very potent agents in overcoming such prejudices. Above all, the necessity of fish diet for a rice-eating population is so great that a simple knowledge of the dietetic value of fish will appease this prejudice. It should also be remembered that whereas the rich may still continue to eat only carps; the poor will readily take to cheaper fish provided it is made available to them. Moreover, the influx of cheaper marine fish will no doubt bring down the prices of other types of fish in the market.

As an instance of what sound commercial propaganda can do, one may cite the instance of "Wolf-fish", a Blennid, of the British coasts. It is so horrid-looking that people detest to buy it, in spite of the fact that its flesh is nice and tasty. Researches have shown that its flesh possesses great nutritive value. To remove the public prejudice against the fish, the traders have given it a sweet commercial name and they never exhibit it for sale with the head intact. Only properly cleaned flesh is sold and very few people, who relish it, know that they are consuming "Wolf-fish".

As an outstanding case of supply and demand one may give another instance of the sale of cartilagenous fishes—Skates and Rays—in Great Britain. Before the War, this type of fish was not much in demand, but during the War when fishing outside the territorial waters became dangerous, the consumption of this type of fish increased. Investigations into the nutritive value of these fishes showed that they were considerably superior to a large number of popular fishes. Thus the fishery of the cartilagenous fishes has come to stay and there is hardly any prejudice against their consumption now.

These instances, which can be multiplied, show what can be achieved by proper organisation and application of science to everyday needs of life. There need not be any diffidence, therefore, regarding the ultimate success of the Bay fisheries. What is needed is the harnessing of financial resources, energy and ability. Above all, the application of science to methods of trade should not be lost sight of.

From the above it is clear that there is a great demand for fish in Bengal generally, and in Calcutta particularly. It is also clear that there is an immense source of supply near at hand. To a layman it would appear a very simple proposition of economics to correlate these two factors. Attempts, unfortunately not fully organised, have been made in the past to fish in the Bay and to supply the ever-growing demand of the Calcutta fish market. But the hostility of the vested interest has been so great that it has been difficult for small enterprises to fight it. It is most essential, that a powerful organisation with considerable financial resources should be set up. The past failures are a great deterrent to the public zeal and, therefore, it would seem to be the duty of the Government of Bengal or of the Corporation of Calcutta to lead the way. A small beginning on the lines of the Bombay Government should be made, small steam trawlers equipped with modern appliances should be purchased, and fast transport of catches from the sea to the cold storage at Calcutta should be organised. When the experiment is carried on for sometime, the public will see the utility of the scheme, and then Government can sell these trawlers and launches to private concerns. Within a very short period under the guidance of a fully trained Indian scientist, such a scheme has achieved a lot and the Fisheries Department of the Province has been greatly expanded. In such enterprises local knowledge is a great asset and, therefore, the failure of some of the earliest schemes of the various Governments can be partly attributed to their importing Europeans for fisheries work.

Now supposing for a moment that the Government of Bengal is not willing to undertake this work and there is no other agency in this country that is likely to work the fisheries of the Bay, is it not desirable to seek the help of foreigners in

this matter? In this connection, it should be remembered that by the International Laws exploitation of the sea products is open to all nationals outside the territorial limits. No one can, therefore, question the rights of the Japanese to fish in the Indian Ocean outside the territorial waters, and if they are prevented from coming to Calcutta they would seek other ports to dispose of their catches. Any interference on the part of the Calcutta citizens with the Japanese enterprise would, under the circumstances, seem like the policy of the dog in the manger. Commenting on "Japan and Bengal Fisheries", the *Statesman* in its editorial of the 15th April 1937 concluded that "Japanese fishermen might be excluded from fishing in territorial waters they can hardly be altogether kept out of the Bay of Bengal. In any event what is good and acceptable for Rangoon and Singapore cannot be altogether bad for Calcutta." This is very sound advice indeed. Those, who have the good of the poor at heart and the interest of the starving millions of Indians, should lose no time in organising the fisheries of the country and place a highly nutritive source of food within the reach of all. If we are not capable of managing it, let outsiders show us the way. An arrangement can be made with an outside agency that after a number of years the terms of agreement will be revised. The sea provides a harvest which requires no sowing. What is needed is its exploitation on proper scientific lines. In our editorial on the Marine Fisheries of India (October 1933) we indicated the lines along which the work should be organised and suggested the creation of a Central Bureau of Fisheries for scientific enquiries and investigations. When early in September 1934, the Advisory Board of the Imperial Council of Agricultural Research held a prolonged discussion on the condition of the Fisheries industry and the possibility of its development, it was expected that the Fisheries Committee to be appointed by them would be able to investigate the question in all its aspects, but unfortunately nothing has so far come out of this talk. It seems to us a most opportune moment to refer to the findings of the Royal Commission on Agriculture on "Fish as an article of diet", because we feel that during the Viceroyalty of Lord Linlithgow, who was the Chairman of the Royal Commission, the fishery problem of India will receive due consideration. It is stated in the report that

"We have been struck with the comparative failure to develop the fisheries of the country as a source of food. We are aware that, in certain parts of the country, there are religious objections to the use of fish as an article of diet. But in Madras and Bengal, it is readily taken and much relished by some four-fifths of the total population. In Burma, it is universally liked and in the form of a fish paste (ngapi) is regarded as an indispensable condiment. In Bombay, the United Provinces and Bihar and Orissa, large classes of the population take it when they can get it and, in the Punjab, there has been, since the War, a largely increased demand for it. Fish forms a specially valuable addition to a diet the staple of which is rice.

"We note with regret that the Fishery Department in Bengal was abolished as a measure of economy in 1923. We understand that the Government of Bengal are desirous of reconstituting it for work on inland fisheries only, as soon as their finances permit. We consider that the development of inland fisheries in Bengal should be regarded as one of the most urgent measures of rural amelioration and we recommend that, if the financial situation does not permit at present of the reconstitution of the department, at least one officer possessed of the necessary qualifications should be placed on special duty to promote interest among local authorities in the stocking of tanks with suitable fish and their conservation. The existing fishery departments in the Punjab, Bihar and Orissa and Madras should be strengthened for the same purpose. A special officer has been recently appointed in Burma with a view to submitting proposals for increasing the efficiency of the inland fisheries. We suggest that his investigations should include an examination of the case for entrusting the development of these fisheries to a properly organised department. We recognise that a certain amount of work is already being done in some provinces in regard to the conservation of the existing stocks of fish. Ladders are being constructed over weirs at the head-works of canals, regulations prohibit the capture of fish by dynamiting, poisoning and the use of small meshed nets, and rewards are being given for the destruction of various enemies to edible fish. Propaganda is also being undertaken to enlist the sympathies of the professional fishermen in the working of such beneficial regulations. There is clearly, however, room for further development in conservancy work along these lines in all provinces.

"Generally, we note that it has been the policy of local governments to insist upon the Fishery Department paying its own way and that, in consequence, the staff has been restricted to a few members. We regard this as a mistake and recommend that a longer view should be taken of the possibilities of development of the fish resources of the country in the interests of the people as a whole. The chief object of the department should not be revenue but public benefit.

"We are fully aware that, if material progress is to be made in augmenting in this way the food supply of rural areas, it will be essential for the district boards, and the rural community generally, to play their part in the stocking of local waters and in their conservancy. It will be for the public health officers and for all organisations interested in the welfare of the people to disseminate a knowledge of the value of the addition of fish to diet. But without some expert authority at provincial headquarters, there will be a risk that ill-advised experiments in stocking may be made and the resultant failures will seriously endanger the prospect of success for the movement as a whole.

"Improvement in the cultivator's diet holds out such promise of improvement in his general health and the addition of fish to his diet impresses us as being so much the most promising way of providing it over large areas of the country, that we consider that we are more than justified in making recommendations which, to those who know the difficulties, may well appear to err somewhat on the side of optimism."

In our opinion the time has come when the Central Government, Governments of the various autonomous provinces, local bodies and the public at large can no longer ignore the development of Indian fisheries, and if there is *no* enthusiasm for such an enterprise in this country we should not stand in the way of the Japanese who would help the masses of India by exploiting the fisheries resources of the Bay.

The Vitamin B_2 Complex and Allied Factors.

I. Mammalian Factors.

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THOUGH many suspected that vitamin B was multiple in nature, convincing proof that this was so was not produced until 1926 when, mainly by the method of feeding supplementary foodstuffs, several workers established that at least two factors were involved in rat nutrition. Of recent times this fact has induced an extensive investigation of the water-soluble factors required not only by the rat but also by the pigeon, chick, etc. It has led to the accumulation of considerable evidence for the existence of several factors generally classified under the heading of vitamin B of which an individual animal may require at least two. Table I is a list of the different factors of the vitamin B group for which evidence has been offered:

TABLE I.

Vitamin B factors (other than vitamin B_1) so far shown to be essential for mammalian nutrition.

Rat ..	vitamin B_2 ..	{ flavin vitamin B_6–antidermatitic
	vitamin B_4 ..	(position uncertain)
Dog ..	Black tongue factor	
Man ..	Anti-pellagra factor vitamin B_6	(P-P factor of Goldberger)

At present it is important to differentiate the several factors of the rat, pigeon, chick, dog and man because a superficial similarity in chemical and physiological properties suggests but does not prove a relationship among them. Of one factor only, namely flavin, is it possible to speak with some certainty. This has been isolated in crystalline form from natural sources, particularly vitamin B_2 extracts, and its structure established by synthesis. Its physiological properties have been studied in greatest detail in the rat.

Lactoflavin.[1]

(Ovoflavin from eggs,[2,3] hepatoflavin[4] from liver, and renoflavin[5] from kidney.)

For over 80 years we have been aware of the presence of substances in animal tissues fluorescing in ultraviolet light. Many tissues contain substances fluorescing blue like quinine; Bence-Jones (1866)[6] called this property quinoidine. A preliminary investigation by Kinnersley, Peters and Squires (1925)[7] indicated that the blue fluorescence of tissues was due to more than one quinochrome (*i.e.*, substances fluorescing blue) and that those in yeast accompanied but were not identical with vitamin B_1. In 1933 a new class of natural pigments with a yellow-green fluorescence came into prominence. The biological significance