



PART IV.—EDUCATION, SCIENCE, AND ART (G).

Administration Report of the Acting Marine Biologist for the Year 1933.

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MARINE BIOLOGY.

ADMINISTRATION REPORT (MARINE BIOLOGY) FOR 1933.

I.—INTRODUCTION.

THE Department has suffered a severe loss and fisheries research in Ceylon a severe check by the departure, on December 2, of Dr. Joseph Pearson on three months' leave preparatory to retirement. Dr. Pearson succeeded Dr. A. Willey as Director, Colombo Museum and Marine Biologist on August 11, 1910. When he assumed duties as Marine Biologist he had neither staff nor facilities to prosecute fisheries research. His duties were largely to advise Government on scientific matters arising from the pearl fisheries and the fishing industries of the Island generally. The pearl fisheries were then leased to the Ceylon Company of Pearl Fishers, but following a barren period of 5 years and with no fisheries in prospect this company surrendered its lease to Government in 1912. The administration of the pearl fisheries was then entrusted to the Master Attendant and remained in his hands until after the war; but in 1919 as a result of continued representations to Government, by Dr. Pearson, that the food fisheries of the Island were of more value than the pearl fisheries and that facilities should be given him to investigate the fish resources of these waters, Government sanctioned a marine biological survey of the littoral waters; transferred the administration of the pearl banks to him and gave him a trawler the "Lilla" with necessary crew to carry out the work. A Marine Superintendent, Captain Kerkham, was appointed and also an Assistant Marine Biologist. Thus the Department was virtually established, in 1919, as a direct result of Dr. Pearson's efforts and to him is due the credit for the organization and execution of the work carried out by the Department to the date of his departure. This work has been recorded in these reports and in the Ceylon Journal of Science, Section B.—(Spolia Zeylanica) and Section C.—Fisheries. His staff much regret his departure and wish him many happy years of well-earned leisure.

The survey of the pearl banks, made during March and April of this year, revealed a promising sign of a repopulation of the banks; small branches of oysters were found scattered over most of the pear areas and in particular over the West Cheval, usually the first pear to receive a spatfall after a long period of barrenness. These oysters are not in themselves of any fishable value, but they are important in that they may produce subsequent spatfalls to repopulate the banks, other conditions being favourable. We may therefore look forward with some anticipation to finding a considerable area covered with spat when the banks are inspected next year. Incidentally the inspection of this year was carried out entirely by dredge from the "Nautilus" and not by the usual media of skin divers. This departure was introduced partly as a measure of economy and partly because the state of the banks did not warrant the expense of a full divers inspection. While this method of inspection is satisfactory in the search for spat, it can never replace the inspection by divers as a means of correctly estimating the distribution of older oysters and, moreover, it has not the same accuracy as a divers inspection for the purpose of chart making.

The inspection of lake Tamblegam shows that there are favourable prospects of a series of fisheries of the window-pane oyster commencing in 1934, and tenders will be invited for the lease of the fishing rights.

II.—PEARL FISHERY (GULF OF MANNAR).

As the inspection of 1931 failed to reveal the presence of oysters of note on the pearl banks, and as a measure of economy, the usual inspection by divers was replaced by a dredging survey from ss. "Nautilus". This was carried out from March 8 to April 12. The Master Attendant, whose services were loaned by the Chairman, Colombo Port Commission, for the purpose, carried out the nautical survey, while the 2nd Assistant Marine Biologist conducted the biological survey. Four divers were accommodated on the "Nautilus" and were used to supplement the work of the dredge by making detailed diving inspections of small areas when required.

North and south lines of dredges, each separated by an interval of half a mile, were taken over (a) the whole of the southern paars and (b) over the whole of the Cheval group of paars, including the Moderagam paars and the Periya Paar Karai. These lines extended west to the overfall and east to the neighbourhood of the Arippu reef. The lengths of these lines varied considerably and while in some localities a whole day from 7 A.M. to 6 P.M. was occupied in dredging a single line, in others two and three lines were dredged within this period. Wherever the dredge brought up more than 10 oysters that area was buoyed and was inspected, the "Nautilus" acting as a third inspection boat by dredging between the two inspection boats.

The results of this inspection were promising and showed a scattering of first-year oysters over most of the paars examined. They were most numerous in two patches on the Mid-west Cheval and two on the south-western edge of the Periya paar. The divers inspected all four patches, of which only those on the West Cheval are worthy of note. These together covered an area of approximately $1\frac{1}{4}$ square miles and contained roughly four million oysters. These oysters have no value from a fishery point of view, but they may have considerable value as producers of subsequent spatfalls for the repopulation of the banks, other conditions being favourable. Thus we may look forward with considerable anticipation to finding extensive spatfalls next year.

The lines of dredges were not confined to deeps within the capacities of the local diver, but were extended into deep water to the edge of the 100-fathom overfall. The ordinary oyster dredge used on this occasion proved inefficient for deep water and a deep-sea dredge should be used when dredging in these depths on future occasions. These experimental dredges were, however, not wasted as they enable us to fix accurately the 100-fathom line along a total length of 13 miles and so provide a little more detail for the chart of the pearl banks now in preparation.

In the region of the North Cheval, an area of about 12 miles was found to be covered with a mixture of *Avicula* (false spat) and pearl oyster spat, mainly on sand and attached to weed. These will doubtless have disappeared during the south-west monsoon. Lines of dredges were also taken on the paar ground off Negombo when several young pearl oysters about 8 months old were dredged.

While the "Nautilus" was on the pearl banks experiments were conducted with a view to ascertaining the effects on pearl oysters of abrupt changes of salinity. It was found that oysters kept in a mixture of 1 part of fresh water to 2 parts of sea water were unaffected after several days, while others kept in mixture of equal parts of fresh water and sea water quickly succumbed. Although these experiments are not conclusive, they indicate that, as the pearl banks are some miles distant from land, it is not possible for flood water to bring about such a reduction in salinity as would be harmful to the pearl oysters. Further experiments on these lines will be conducted as opportunity permits.

III.—WINDOW-PANE OYSTER FISHERY (LAKE TAMBLEGAM).

An inspection of Lake Tamblegam was made from October 25-28 and showed the following distribution of window-pane oysters:—(1) a bed of 4-5 year oysters in the Kapalthurai area covering approximately $\frac{3}{4}$ square mile, now fishable, (2) a bed of first- and second-year oysters covering approximately $1\frac{1}{2}$ square miles in the south central portion of the lake which provided they survive the flood periods of the north-east monsoon should be fishable in 1935 or 1936. (3) A small bed of first-year oysters between Salamunai and Pattaiaddaimunai, and (4) a small bed of first-year oysters in the Kondatchi area which should be fishable in 1936. Fisheries next year and succeeding years are distinctly promising and tenders will be invited for the lease of the fishing rights for the three years 1934-1936.

IV.—CHANK FISHERIES.

The usual chank fisheries were again carried on in Palk Bay more or less throughout the year and in the inshore area of the pearl banks between Mannar, the Vankalai reef, and Moderagam point, which is available for fishing between the period January 31 to April 30.

No statistics are available regarding the actual number of chanks fished, but the prosperity of this fishery is reflected to some extent in the number of chanks exported from Ceylon, chiefly to Bombay. The following are extracted from Customs returns:—

Annual Average.	Chanks Exported.	Royalty Collected.		Average Royalty per 1,000 Shells.
		Rs.	c.	
Old Royalty—				
1919-1928 ..	.. 2,305,664	.. 10,770	2	.. 4.67
New Royalty—				
1930 ..	.. 2,193,967	.. 28,667	14	.. 13.06
1931 ..	.. 1,240,440	.. 16,690	35	.. 13.45
1932 ..	.. 1,326,846	.. 14,684	33	.. 11.06
1933 ..	.. 1,128,564	.. 11,517	42	.. 10.20

The above figures show that the revenue collected in 1933, while less than half that of 1930 due to continued effects of the depression, is, nevertheless, still greater than the average revenue for ten years collected under the old royalty. An improvement in this industry, which is carried on mostly by divers from Southern India and by chank merchants in Jaffna, may be expected following an improvement in trade conditions.

V.—THE LOCAL FISHING INDUSTRIES.

Imports.—The total imports of fish goods into the Island for the year amounted to 506,092 cwt. valued at Rs. 9,736,718, as against 530,799 cwt. valued at Rs. 10,288,880 for 1932 and 548,350 cwt. valued at Rs. 12,465,706 for 1931. Of these imports, cured fish from Southern India and Maldivian fish from the Maldivian Islands accounted for 389,419 cwt. valued at Rs. 9,111,437, as against 403,127 cwt. valued at Rs. 9,521,933 for 1932 and 391,116 cwt. valued at Rs. 11,403,516 for 1931. Thus there has been a slight decline during the last two years, as compared with 1931. This is, however, attributable more to the effects of the depression rather than to any improvement in the local fishing industries.

Development of the Industry.—In the reports of the two previous years, references were made to a proposed scheme of investigation in these waters, to determine the best means to be adopted to promote the development of the local fishing industries. This scheme was essentially, to purchase a small modern type of motor fishing vessel, to equip it with the latest fishing appliances and to experiment with this vessel and her gear, in order to ascertain by actual experiment the most suitable type of boat and fishing gear for adoption by the industry to replace the present antiquated gear and craft.

The offer of a grant of Rs. 50,000 was obtained from the Commissioners of the Colonial Development Fund for the purpose of building and equipping the vessel, on the condition that Government would meet the recurrent cost of the investigation, but on account of opposition to the scheme, mainly from the standpoint that it would lead to capitalization of the industry, the offer has not been accepted.

The fact that the conditions governing fishing in these waters are vastly different from those obtaining in European waters and that little or no development in the local industry can take place until it is ascertained by actual experiment, either through private enterprise, or under the auspices of Government, how local conditions can be met, both as regards suitability of boats and fishing gear, does not seem to be properly realized, for we are often approached for advice relative to these questions. The only possible reply to such inquiries is, that failing actual experiment it is impossible to give any guarantee as to the suitability to these waters of any particular type of boat or fishing gear, neither is it possible to give any comparative estimates of running costs or of the value of the catch. Hence it is imperative that all possible data relating to this question should be obtained, if any real development in the fishing industry is to take place.

VI.—MISCELLANEOUS.

Fishing Disputes, Udappu.—This is a revival of an old dispute between “teppan” fishermen and “ma del” fishermen, which originated in 1911 and culminated in a District Court case at Chilaw, when the dispute was settled by mutual agreement. Friction has again broken out, mainly directed against the “teppan” men, who are accused of not complying with the terms of settlement drawn up in 1911, and particularly that they do not draw up their nets at 7.30 A.M.

Attempts to arrive at a mutual settlement have failed and rules have now been passed under section 27 of the Game Protection Ordinance, No. 1 of 1909, regulating fishing in this district. These were published in Part I. (General) of the *Ceylon Government Gazette* of October 27, 1933, page 1638.

Hikkaduwa.—Objections to the new regulations governing fishing in this district proclaimed in *Government Gazette* of July 3, 1931, and briefly referred to in my last report have been made on behalf of both “baru del” and “ma del” fishermen, and the framing of new rules is under consideration.

Destruction of Fishes.—During the last fortnight in November the unusual phenomenon of numbers of immature globe fishes, *Diodon maculatus*, floating along the shore between Colombo and Hikkaduwa in a dead and dying condition excited much comment. Living specimens which were examined showed the following features:—The fins, especially the caudal and pectoral, were very frayed, the eyes were opaque, the stomachs empty and many harboured the parasitic copepods *Penella* and *Caligus*. These possibly parasitized the fishes after they had been enfeebled, either by an undetected Sporozoan parasite, or by partaking of poisonous food. Death could not be assigned to any definite cause.

Turtles.—Experiments are being conducted by Mr. Deraniyagala in rearing the young of (a) green turtle *Chelonia mydas* obtained from the Maldives in 1932, (b) the olive loggerhead *Lepidochelus olivacea* obtained at Weligama in February, 1933, and (c) the leathery turtle *Dermochelys coriacea* obtained at Bentota in August, 1933, and records are being kept of their rate of growth.

Fishes.—(a) A collection of fishes obtained from the Maldivian Islands has been worked out and consisted of the following species:—

Gymnothorax pseudothyrsoides, *Epinephelus merra*, *Coryphaena equisetis*, *Clupea (H) punctata*, *Strongylura crocodilia*, *Mulloidichthys auriflamma*, *Upeneus vittatus*, *Istiophorus gladius*, *Puntius vittatus*, *Polynemus kuru*, *Mugil coerulomaculatus*, *Caranx (C) sexfasciatus*, *Caranx (C) melampygus*, *Caranx (C) janthinospilos*.

(b) Collections of living fishes were despatched to Marseilles, Monaco, and Paris.

(c) The following specimens were received from the Leiden Museum in exchange for Ceylon fishes:—

1 *Periophthalmus schlosseri*
1 *Periophthalmus dipus*
6 *Butis melanostigma*
3 *Ctenogobius criniger*
5 *Oligolepis melanostigma*
1 *Parapocryptes macrolipis*

(d) A collection of *Amphioxus* taken off Negombo and from the pearl banks was sent to Mr. L. D. Townsend, Puget-sound Biological Supply, Seattle, Washington.

(e) A coloured map, illustrating the zoological resources of Ceylon and the surrounding waters, was prepared at the request of the Ceylon Tea Propaganda Board for exhibition.

(f) It is satisfactory to record that Ceylon is attracting considerable attention among deep-sea anglers on account of her big game fishes. Among inquiries received were some from Australia and North India.

Publications.—The following papers were published in the Ceylon Journal of Science, Section C.—Fisheries, Vol. V.:—

The Maximum Yield of a Pearl Oyster Bed	...	J. Pearson
Further Observations on the Growth-rate of the Ceylon Pearl Oyster, <i>Margaritifera vulgaris</i> , with Special Reference to Oysters on Donnan's Muttuvarattu Paar	...	A. H. Malpas
Cured Marine Products of Ceylon	...	P. E. P. Deraniyagala
Names of Some Fishes from Ceylon	...	P. E. P. Deraniyagala

The following papers, by the 2nd Assistant Marine Biologist, Mr. P. E. P. Deraniyagala, dealing with aquatic animals, have been published in the Ceylon Journal of Science, Section (B):—

- A new mountain stream fish.
- Two shark monstrosities.
- Some larger Rhegnopteri of Ceylon.
- The loggerhead turtles of Ceylon with a new species *Caretta gigas*.

Colombo Museum,
February 27, 1934.

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