NOTES

ON HELMINTH PARASITES FROM THE MADRAS COAST

There have been several contributions on the helminth fauna of the Indian region, in earlier years, by British and American workers such as Leiper, Southwell, Maplestone, Lane, Buckley, and Chandler, most of them having been of medical or veterinary significance. Those relating to parasites of marine hosts and of fishery importance, especially in the peninsular section of the country were made by Southwell and a few others. Marine biology and Fisheries have always held an important place in the economy of India, a country with a long coast line and three seas around it. While the parasitic fauna of terrestrial and fresh water animals could be explored and experimented upon at any of the institutions located inland, organisms occurring in the sea should necessarily be studied at centres in close proximity to the sea.

In the Department of Zoology, University of Madras, marine biological studies have been conducted for many years, and at least two important contributions made on the trematode and cestode parasites of fishes. Subhapradha (1948, 1951a, 1951b, 1955a, 1955b), surveyed the cestodes, larval and adult, and some Monogenea of the economic fishes of the Madras Coast, and Ramalingam (1952) studied the trematode fauna, especially the monogenetic ones. The latter worker (Ramalingam, 1957) continued his studies on the monogenetic trematodes, at the Central Marine Fisheries Research Station, Mandapam, South India, and included developmental studies on some digenetic trematodes also in his thesis. No further work of this kind has since been undertaken here.

The author conducted her investigations at the University Zoology Department, Madras, for a period of three years (1958-1961), the choice of the subject having been naturally guided by these earlier studies. It was no doubt significant that the digenetic trematodes were inadequately known, and no hosts other than the fish examined. As the animal communities in the ocean exhibit an intricate food chain, it was decided to search for larval and adult parasitic helminths in the rich planktonic and dredge collections, teleosts, elasmobranchs, and birds.

Numerous invertebrate and vertebrate hosts were examined for helminth parasites, and it was observed that quite a proportion among them harboured none at all, while others were parasitized with larval and adult digenetic trematodes, cestodes and a nematode, besides an acanthocephalan, most of them from hosts of coastal distribution. The acanthocephalan, however, was from an Eagle, a bird of prey, expect to consume fish also.

The helminths, examined in living or preserved condition, were representative of: (*a*) the trematode families Allocreadioidea, Hemiuridae, Acanthocolpidae, Prosthogonimidae, Echinostomatidae, Heterophyidae and Cyclocoelidae, of invertebrates, fish and birds; (*b*) cestodes, one of undetermined identity from *Squilla*, tetraphyllidean and trypanorhynchan larvae from invertebrates and fish, larvae of a Diphyllidean in gastropods and decapods, and a Proteocephalid from a teleost; (*c*) Acanthocephala, one from the Booted Eagle; and (*d*) Nematoda, a juvenile

Gnathostome from gastropod. They were identified with already described species, or as new ones, as listed below against their hosts :

1.	Allocreadioid metacercaria	..	*Pleurobrachia globosa.*
2.	Hemiurid metacercariae	..	*P. globosa* and *Beroe* sp., *Eucheilota* sp., *Phialucium multitentaculata, Cytaeis tertastyla*, and *Sarsia* sp.
3.	*Lecithochirium trichiuri* n. sp.	..	*Trichiurus haumela.*
4.	*Acanthocolpus* sp., and *A. luhei*	..	*Chirocentrus dorab.*
5.	*Prosthogonimus roberti* n. sp.	..	*Gallinago gallinago.*
6.	*Stephanoprora yamagutii* n. sp.	..	*Larus argentatus.*
7.	*Galactosomum puffini*	..	*Sterna fuliginosa.*
	Galactosomum linguiforme n. sp.	..	*Larus argentatus.*
	Galactosomum witenbergi n. sp.	..	do.
	Galactosomum sp., (juvenile)	..	*Matuta victor.*
8.	*Cyclocoelum* sp. (No. 1)	..	*Tringa glareola.*
	Cyclocoelum sp. (No. 2)	..	*Gallinago gallinago.*
9.	Cestode larva (?)	..	*Squilla holoschista.*
10.	Tetraphyllidean larvae	..	*Trichiurus haumela, Megalops, Harpa, Oliva, Meretrix casta, Matuta victor, Pleurobrachia globosa, Eucalanus pseudattenuatus.*
	Trypanorhynchan larvae	..	*Chirocentrus dorab, Trichiurus haumela, Trachynotus* sp., *Pteroplatea micrura.*
11.	*Echinobothrium* sp. (larva)	..	*Bullia* sp., *Murex* sp., *Matuta victor.*
12.	*Gangesia macrones*	..	*Macrones gulio.*
13.	*Centrorhynchus golvani* n. sp.	..	*Hieraaetus pennatus.*
14.	*Echinocephalus* sp.	..	*Hemifusus pugilinus.*

Experimental infections with fish hosts to follow the development of the juveniles obtained were intended even at the outset, and indeed commenced. But, the maintenance of marine fishes for a sufficient length of time without facilities for continuous circulation of sea-water was found to be difficult, and only a few unsuccessful feeding experiments were conducted. A detailed morphological and taxonomic study of these parasites have been made, but biological and ecological aspects of the infections have not been ignored. New species of trematodes and an acanthocephalan have been described, new hosts of known species reported, and new locality records included. The occurrence of larval and juvenile parasites in various marine invertebrates has been revealed for the first time, and this attempt has been most productive of valuable observations.

The ctenophore, *Pleurobrachia globosa*, has been found to be a host of two kinds of metacercariae and tetraphyllidean larvae ; the decapod *Matuta victor* of

Galactosomum sp., tetraphyllidean larvae, and *Echinobothrium* sp.; the stomatopod *Squilla* of an unidentified cestode larva; and molluscs of tetraphyllidean larvae and a nematode. Teleosts harboured adult trematodes, tetraphyllidean and trypanorhynchan larvae, and Elasmobranchs were heavily infected with adult cestodes. Birds of piscivorous habits, *Larus*, *Sterna* and *Gallinago*, demonstrated pure and mixed infections of heterophyid and echinostomatid trematodes, besides cyclocoelids and acanthocephala. These infections, when correlated, would lead to a better understanding of the life-cycle and transmission of some of the helminths. Planktonic organisms such as medusae, ctenophores, copepods and chaetognaths serving as food for fishes would convey these parasites to them; larvae in lamellibranchs, gastropods and crustaceans would develop in teleosts and other fishes; and those of smaller fishes in Elasmobranchs and ichthyophagous birds. The amazing variety of intermediate hosts of parasitic helminths in Madras has thus been brought into focus.

A detailed account of these studies was presented by the author (Anantaraman, 1961) which also incorporated observations dealing with (a) the histochemistry of the vitellaria in cestodes of the Tetraphyllidea, Trypanorhyncha and Lecanicephala; (b) the *in vitro* survival of cestode larvae and a filarid; and (c) experiments on a tetraphyllidean larva to study volume change and conductivity in dilutions of sea water. The Allocreadioid metacercaria from the ctenophore *Pleurobrachia globosa*, the cestode larva from the nervous system of *squilla holoschista*, and the tetraphyllidean larva in the copepod *Eucalanus pseudattenuatus* have been described in three publications (Anantaraman & Krishnaswamy 1958, Anantaraman, 1959a, 1959b), and the data on volume regulation in tetraphyllidean larvae are embodied in a paper to be published shortly (Anantaraman 1963). Individual accounts of other parasites listed above may be awaited.

I express my indebtedness to the Government of India and the University of Madras for a Research Scholarship, to Prof. C. P. Gnanamuthu of the Zoology Department, Madras University, for directing the work and an abiding interest in its progress, and to my husband Prof. M. Anantaraman of the Department of Parasitology, Madras Veterinary College, for critical discussions and counsel.

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