Rec. zool. Surv. India, 86(2) : 243-252, 1990

LARVIVOROUS FISHES OF MADRAS AND ADJOINING AREAS

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INTRODUCTION

Several references (Chacko and Rajagopal, 1962; Day, 1889; Evangeline and Subbiah, 1969, Misra, 1959; and Jayaram, 1981) to the fish fauna of Madras and its vicinity are available. But publications, on larvivorous fishes are few with the exception of Chacko (1950), Job (1940) and Menon (1977). The Corporation of Madras spends considerable amount of money every year on chemical control of mosquitoes. Ichthyologists (Bay, 1972; Hass and Pal, 1984; Hora, 1938; Job, 1940; Menon, 1977; Menon and Rajgopalan, 1977 and 1978), the report of the WHO, Travelling seminar on the use of Larvivorous Fish (WHO, 1980) and the WHO Informal Consultation on the use of fish for mosquito control (WHO, 1982) have, however, emphasised the importance of control of mosquitoes through the indigenous larvivorous fish. With a view to introduce extensive use of larvivorous fish for antimalarial measures and to make an assessment of the availability of indigenous larvivorous fishes in and around Madras, surveys were undertaken from February 1982 to July 1983 the results of which are embodied in this paper.

MATERIAL AND METHODS

Areas Surveyed : The following water bodies in and around Madras city were surveyed and material collected: Pillaipakkam Pond, Kovour Tank and Paddy fields, Vengampakkam Pond and Agaram lake, Thinnanur Tank and lake, Navalur Lake, and Chemmencheri Pond. For the purpose of collection, two types of minnow nets of two sizes were made from fine blue nylon netting of approximately 3mm. mesh. The smaller one was half meter in diameter ring net and another larger 3 × 1.5 sqm. seine. The fishes were presserved in 5% formaldehyde solution immediately after collection. The specimens are deposited in the Southern Reginal Station, Zooligical Survey of India, Madras.

RESULT

The specimens examined during the Present study comprised 13 species belonging to 10 genera. 3 of the species belong to the genus *Puntius* while the other 10 species belong to 9 different genera. The classification followed is after Jayaram (1981).

SYSTEMATIC ACCOUNT

Order CYPRINIFORMES

Family CYPRINIDAE

Subfamily CULTRINAE

Genus	*Chela* Hamilton
	Chela laubuca (Hamilton)
Subfamily	RASBORINAE
Genus	*Esomus* Swanson
	Esomus danricus (Hamilton)
Genus	*Danio* Hamilton
	Danio aequipinnatus Mc clelland
Genus	*Rasbora* Bleeker
	Rasbora daniconius (Hamilton)
Subfamily	CYPRININAE
Genus	*Puntius* Hamilton
	Puntius amphibius (Valenciennes)
	Puntius arenatus (Day)
	Puntius filamentosus (Valenciennes)
Order	ATHERINIFORMES
Family	CYPRINODONTIDAE
Genus	*Aplocheilus* Mc Clelland
	Aplocheilus blochii (Arnold)
	Aplocheilus lineatus (Valenciennes)
Genus	*Oryzias* Jerdon and Snyder
	Oryzias melanostigma (Mc Clelland)
Family	POECILLIDAE
Genus	*Gambusia* Poey
	Gambusia affi nis (Baird & Girad)
Genus	*Poecilia*
	Peocilia reticulatus (Peters)
Order	PERCIFORMES
Family	CICHILIDAE
Genus	*Etroplus* Cuvier
	Etroplus maculatus (Bloch)

The following account gives the valid names accompanied by outline sketches of the individual species, their distribution and particulars of material examined including the locality, date of collection, name of collector, number of examples and range of length in mm. in that order. Under remarks, the utility value of fishes for mosquito control is also discussed.

Chela laubuca (Hamilton)

(Fig. 1)

1822. *Cyprinus laubuca* Hamilton, *Fish Ganges*, pp. 260, 380 (type locality : Ponds of the northern parts of the Bengal).

1889. *Perlambus lubuca Day, Fauna Brit. India,* Fish., 1, p. 360.

Material : Kovur Tank, dt. 26.5.1982, K.I., 11 exs., 65-84 mm.; Navalur Lake, dt. 14.7.1983, K.I., 7 exs., 64-82mm.

Distribution : India: Andhra Pradesh, Madras, Orissa, West Bengal, Madhya Pradesh, Assam, Pakistan, Nepal, Bangladesh, Burma, Sri Lanka.

Remarks : This fish has upturned mouth and feeds at the surface and should, therefore, be useful in larvicidal measures (Hora, 1938).

Esomus danricus (Hamilton)
(Fig. 2)

1822. *Cyprinus danrica,* Ham. *Fish. Ganges,* pp. 325, 390, Pl. xvi. 886 type locality : Ponds & ditches of Bengal).

1889. *Nuria danrica,* Day, *Fauna Brit. India,* Fish; 1 p. 334.

Material : Kovur Tank and Paddy fields, dt. 24.4.82, K.I., 5 exs., 41-68mm.; Navalur lake, dt. 14.7.82; K.I., 18 exs., 40-78mm.

Distribution : India: Tamilnadu, Karnataka.

Remarks : This species is of larvicidal value and also used as an aquarium pet. This fish is gregarious and spends much of its time at the water surface, it lives in the shallow water of Ponds, tanks, pools, paddy fields, ditches etc., where, it breeds freely (Jayaram, 1981).

Danio aequipinnatus (Mc Clelland)
(Fig. 3)

1839. *Perilampus aequipinnatus* Mc Clelland, *Asiat. Res.,* 19, P. 393, Pl. 60, fig. 1 (type locality: Assam).

1889. *Danio aequippinnatus* Day, *Fauna Brit. India,* Fish; 1, P. 356.

Material : Thinnanur Tank and irrigation canals, dt. 27.7.83, K.I., 7 examples.

Distribution : Throughout India, Pakistan, Nepal, Bangladesh, China, Sri Lanka, Burma, Thailand, Sumartra, Yunnan Province.

Remarks : Several species of this genus *Danio* have been reported to have used as good larvicidal fishes (Hora, 1938 and WHO 1977).

Rasbora daniconius (Hamolton)
(Fig. 4)

1822. *Cyprinus daniconius* Hamilton, *Fish Ganges,* pp. 327-391, Pl. 15, fig. 89 (type locality : river of Southern Bengal).

1889. *Rasbora daniconius* Day, *Fauna Brit. India,* Fish, 1,

Material : Thinnaur Tank, dt. 28.7.82, K.I., 13 exs., 54-78mm.; Navalur Lake, dt. 14.7.82, K.I., 10 exs., 50-72mm; Agaram lake and Vengampakkam Pond, dt. 25.11.82, K.I., 13 exs. 58-78mm.

Distribution : Throughout India, Pakistan, Nepal, Bangladesh, Srilanka, Thailand, Vietnam, South China and Malaysia.

Remarks : This species may be used for mosquito contol in place where it occurs in great abundance. (Hora, 1938).

Puntius amphibius (Valenciennes)
(Fig. 5)

1842. *Capoeta amphibia* Valenciennes, *Hist. nat. Poiss.*, 16, p. 282, Pl. 478 (type location : Bombay).

1889. *Barbus amphibius* Day, *Fauna Brit. India,* Fish. 1, p. 322.

Material : Chemmancherry Pond dt. 22.7.82, K.I., 23 exs., 50-88mm.

Distribution : India : Freshwaters of U.P., Orissa, Madras, Central India, Deccan, Karnataka, M.P., Kerala, Bombay, and Sri Lanka.

Puntius arenatus (Day)
(Fig. 6)

1889. *Barbus arenatus* Day, *Fauna Brit. India,* Fish. 1, p. 321.

Material : Pillaipakkam Pond, dt. 30.4.82, M.B.R., 5 exs: Kovur Tank, dt. 14.7.82, K.I., 1 ex., 48mm., Thinnanur Tank, dt. 28.7.82 & 15.2.82, K.I., 24 exs. 35-82mm.

Distribution : India: Madras.

Puntius filamentosus (Valenciennes)
(Fig. 7)

1844. *Leucius filamentosus* valenciennes, *Hist. nat. Poiss.* 17, p. 96, Pl.492 (Type locality : Alypey).

1889. *Barbus filmentosus* Day, *Fauna Brit. India,* Fish; 1, p. 333.

Material : Kovur Tank, dt. 26.5.82, K.I., 1 ex., 47 mm.

Distribution : India: South India: Sri Lanka.

Remarks : Puntius spp. are very common in our country. There is hardly any body of fresh water where one cannot encounter some species or other of these "garden fishes" They are small, hardy forms of practically little value as food for human beings. They are able to stand transportation well and can breed freely in confined waters. Several workers have experimented with different species of this genus and have found them effective as larvicidal forms, (Hass, 1984; Hora, 1938).

Aplocheilus blochii (Arnold)
(Fig. 8)

1911. *Haplocheilus panchax* Var. blochii Arnold, *Wschv. Terrar. -u,* Terrerienk, 8, p. 672.

1916. *Panchax parvus* Raj, *Rec. Indian Musseum,* 12, p. 268. (rivers and tanks of Madras city).

Material : Kovur Pond and Paddy fields, dt. 27.7.83 K.I., 25, 32-40mm.

Distribution : India: Fresh and brackish water of Kutch, Ahemedabad, Madras; Pakistan and Sri Lanka.

Aplocheilus lineatus (Valenciennes)

1846. *Panchax lineatus* Valenciennes, *Hist. nat. Poiss.* 18, p; 381 (type locality : Bombay).

1889. *Haplocheilus lineatus*, Day, *Fauna Brit. India*, Fish, 1 p. 416.

Material : Pillaippakkam Pond, dt. 12.2.84, M.B.R. 3 adult exs. and 13 juvenile exs., 35-38 mm.

Distribution : India: Fresh and brackish waters along the coast of Bombay, Wynaad, Malabar, Travancore, Cochin, Coorg, Madras, Coromandel; Sri Lanka.

Remarks : *Aplocheilus* "the Indian top minnow", is the most suitable indigenous fish for destroying mosquito larvae. It is a perennial breeder and is hardy in nature, it can withstand transportation well, and live both in fresh and moderately brackish waters. Its life history by Job (1940) and its use for controlling the mosquitoes by Menon and Rajagopalan (1977 and 1978) have been studied in detail.

Oryzias melanostigma (Mc Clelland)
(Fig. 9)

1839. *Aplocheilus melanostigma* Mc Clelland, *Asiat, Res.;* 1 p. 301. 427, Pl.42, fig.3 (type locality: Tanks in Calcutta).

1889. *Haplocheilus melanostigma*, Day, *Fauna Brit. India*, Fish. 1, P. 415.

Material : Kovur Pond, irrigation cannals and paddy fields, dt. 24.4.82, 14.5.82 and 26.5.83, K.I., 58 exs., 32-38mm; Thainnanur Tank and Paddy field irrigation canals, dt. 15.2.83, K.I., 21 exs. 33-38mm.

Distribution : India: West Bengal, Orissa, Tamil Nadu; Kerala; Bangladesh, Burma, Thailand.

Remarks : This species is a perennial and rice-field breeder found in great abundance in the Paddy fields and irrigation canals of Kovur and Thinnanur and its utility for mosquito control was highly commended by Job (1940). The Prime vector of the Japanese encephalitis virus, the mosquito *Culex tritaeniorhynchus*, breeds in Paddy fields. From this, it would follow that the disease might occur in places wherever rice is cultivated. In fact, it has been found both in endemic and epidemic form in the ricegrowing areas of Tamil Nadu, Andhra Pradesh, West Bengal, Assam and Uttar Pradesh, and as expected, the distribution of cases has been predominately rural (Banerjee, 1979). It is important to mention here that the introduction of *Oryzias melanostigma* in such areas for anti-larval measures in the rice fields would be a boon for rural community to control the vector.

Gambusia affinis patruelis (Baird and Girard)
(Figs. 10 & 11)

1853. *Heterandria patruelis* Baird and Girard, *Proc. Acad. nat. Sci. Philad.*, 6. p. 390 (type locality: Rio Sabinal, Texas).

Material : Occurring in all the habitats during this survey.

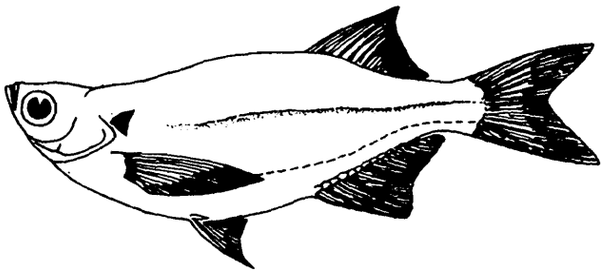
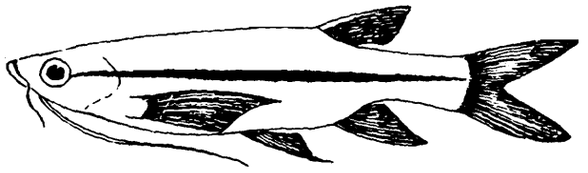


Fig. 1.



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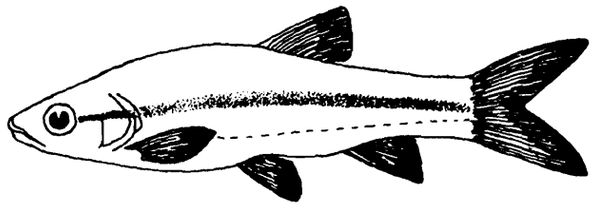

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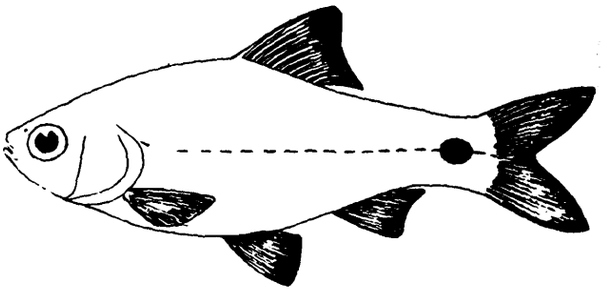

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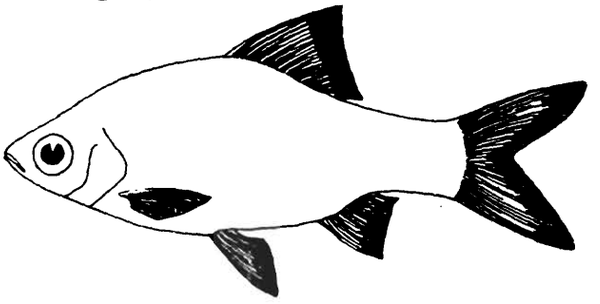

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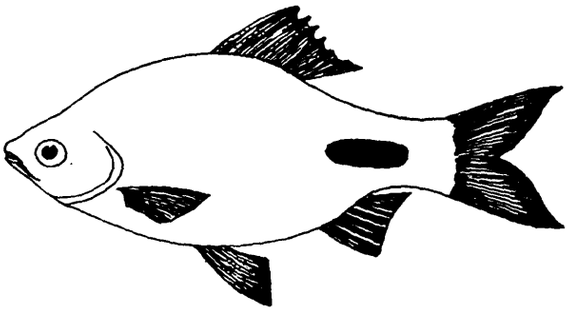

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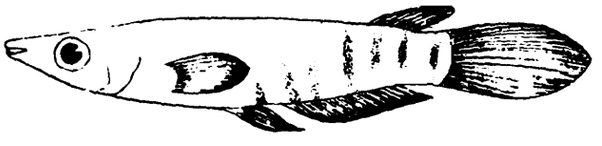


Fig. 7.

Fig. 1. *Chela laubuca* (Hamilton); Fig. 2. *Esomus danricus* (Hamilton); Fig. 3. *Danio aequipinnatus* Mc Clelland; Fig. 4. *Rasbora daniconius* (Hamilton); Fig. 5. *Puntius amphibius* (Valenciennes); Fig. 6. *Puntius filamentosus* (Valenciennes); Fig. 7. *Puntius arenatus* (Day)

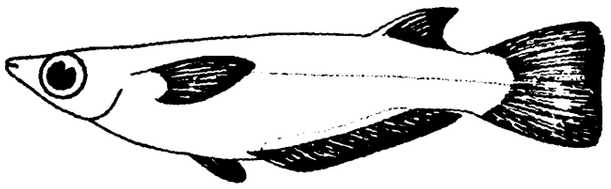


Fig. 8.

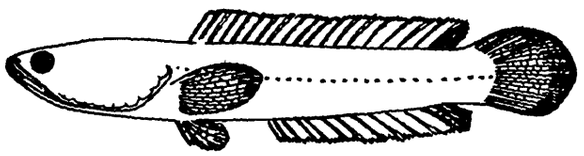


Fig. 9.

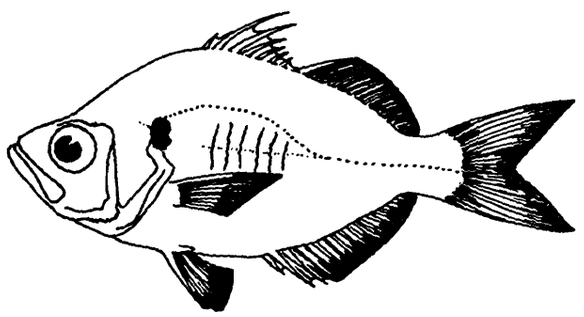
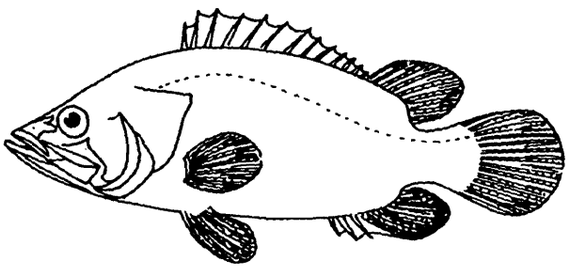


Fig. 10.



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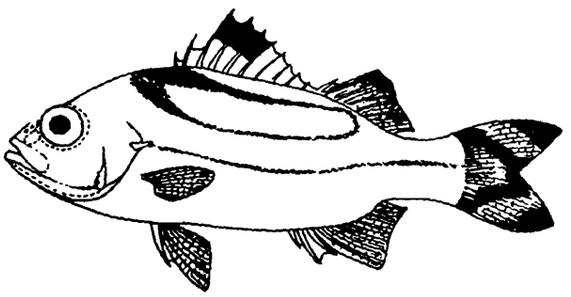

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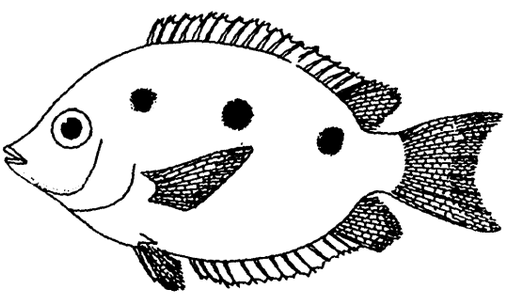

Fig. 13.

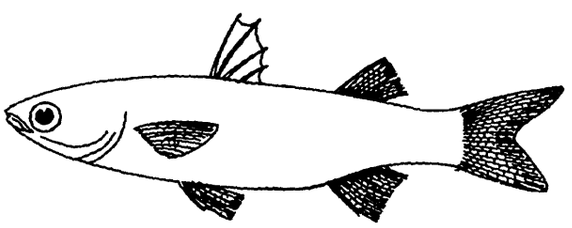

Fig. 14.

Fig. 8. *Aplocheilus blochii* (Arnold); Fig. 9. *Oryzias melanostigma* (Mc Clelland); Fig. 10. *Gambusia affinis* (Baird & Giard): Male; Fig. 11. *Gambusia affinis* (Baird & Giard): Female; Fig. 12. *Poecillia reticulatus* (Peters) Male. Fig. 13. *Poecillia reticulatus* (Peters) Female; Fig. 14. *Etroplus maculatus* (Bloch)

Distribution : Native to the Southern United states northward to Illinois an introduced in many parts of the world include India, Pakistan, Burma, Sri Lanka, Philippines Hawaii, Formosa and Italy.

Remarks : Gambusia has been and continues to be widely used for mosquito control. But considering its impact on the other aquatic animal life, its use for larval control has been controversial.

Poecilia reticulatus (Peters)
(Figs. 12 & 13)

1859. *Poecilia reticulatus* Peters, *Monatsber. AK. Wiss.* Berl. p. 412 (type : Caraccas, Brazil).

Material : Except in Navalur Pond this has also been found in all habitats during this survey.

Distribution : Originally from tropical America. Introduced into India, particularly well established in South India.

Remarks : *Poecilia* has been used for the control of *Anopheles tessellatus* whih breeds exclusively in wells and *A. sulepictus and Culex quinquefaciatus* (vector for filariasis) which breed in brackish water. (Haas and Pal 1984).

Etroplus maculatus (Bloch)
(Fig. 14)

1785. *Chaetodon maculatus*, Bloch. *Syst. Ichth.* p. 427 fig. 2. (type locality : not given).

1889. *Etroplus maculatus* Day. *Fauna Brit. India* Fish 2. p. 529.

Material : Pillaipakkam Pond, dt. 12.2.82, M.B.R., 2 exs., 35-65mm; Chemmancherry Pond, dt. 22.7.82 K.I. 15 exs. 32-60mm.

Distribution : India particularly in South India and Sri Lanka.

Remarks : A natural inhabitant of Brackish or sea Water, and it is easily acclimatised to the fresh water bodies like lakes and ponds. It thrives where luxuariant growth of acquatic vegetation is available. Since this fish is deep bodied and armed with spines it does not easily fall a prey to murrels. As such it can be cultivated safely along with murrels. Hora (1938) reported that young ones are active predator on mosquito-larvae.

DISCUSSION

Madras city continues to be favourite haunt of the malarial mosquito *Anopheles stephensi*. It was reported that it accounted for 60 per cent of the 67,912 malaria cases recorded in the State in 1983. In the last four years, the city did not give up its prime place even once. In 1980, 36, 196 cases were recorded in the city, while the entire State reported only 73,381 cases. The figures for 1981 was 44951 (71,517), for 1982 it was 44,981 (66,133) and for 1983 it was 44,817 (47, 912).

Recent studies have shown that the mosquitoes are devloping resistance not only to DDT, BHC and Malathion but also to the latest generation of synthetic Pyrethroid chemicals. The Indian Council of Medical Research (ICMR) has developed integrated environmental control methods to combat insecticide resistant malria carrying

mosquitoes and it used naturalistic methods and encouraged community participation to combat the menace. As it reported, after the application of larvivorous fishes in the Union territory of Pondicherry and Khera district of Gujarat, mosquito breeding in the ponds has been considerably reduced, and in many ponds, completely eliminated.

Poecillids such as *Gambusia* and *Peocilia* have got higher reproductive rate better protection from natural enemies which damage or eliminate indigenous species. The harmful effects of introduced exotic fish can include: reduction or elimination of local fish, reduction or elimination of plants which play a vital role in food chains of fish or necessary for the breeing of local fish or production of alterations favouring growth of other vectors of human diseases - e.g., it is conceivable that through the effects on other fish, *Gambusia* may favour filharziasis vectors. Therefore new introductions of exotic fishes should be considered with the almost care. (Haas and Pal 1984).

The Indian top minnows such as *Aplochilus blochii, A. lineatus, A. panchax, and Oryzias melanostigma* were long back in use, although *G. affinis and P. reticulatus* had been introduced into India about 1928 for controlling *Anopheles stephensi* and other amospheline mosquitoes. Menon and Rajagopalan (1977) carried out laboratory and field trials in Pondicherry with *A. blochii and O. melanostigma.* They were more effective against the well inhabiting mosquitoes *A. stephensi* and *A. subpictus* than was *Gambusia.* In particualar the species *O. melanostigma* has got a high growth rate, high reproductive capacity and shorter incubation period (Personal observations). The above factors would substantially provide better understanding for choosing them as good larvivorous fishes than the exotic ones.

In view of the above facts, Madras and its vicinity could also be brought under large scale mosquito control with the use of indigenous larvivorous fishes and community participation. A scheme, which may be called "Social Forestry" scheme, so that people can select and exploit the locally available larvorous fishes to control the mosquito. For example in areas like Kovur Pond, Paddy fields and Thinnanur pond and neighbouring irrigation canals, *Oryzias melanostigma,* and *Aplocheilus blochii* were noticed in abundance and these could be extensively used for anti-malarial measures.

SUMMARY

The distribution of larvivorous fishes with reference to mosquito control collected from Madras and its vicinity during 1982 and 1983 is reported. The availability of the species *Oryzias melangostigma* (Mc Clelland) in abundance and its significance for controlling the vector, *C. tritaeniorhynchus* of the Japanese encephalitis virus are discussed and the suggestion of "Social Fisheries" is also.

ACKNOWLEDGEMENT

The author is thankful to the Officer-in-Charge, Southern Regional Station, Zooligical Survey of India, Madras and the Director, Zoological Survey of India, Calcutta for providing facilities. Suggestion of this work by late Prof. M. Anantaraman, Professor Emeritus and confirmation of certain fishes and critically going through this paper by Dr. A.G.K. Menon, Emeritus Scientist of Zooligical Survey of India, Madras are gratefully acknowledged.

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