Research Paper

Volume : 4 | Issue : 6 | June 2015 • ISSN No 2277 - 8179

Zoogeographical distribution an evidence of co-evolution : Freshwater fish parasitic monogenean Genus Mizelleus & its host diversity

Zoology

KEYWORDS : Zoogeography, Monogenea, Coevolution, Mizelleus, Wallago, Clupisoma, Mystus.

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ABSTRACT

Distribution of any organism is the representation of its adjustment and adaptation to the particular surroundings. Zoogeographical studies may be significant cue in co evolutionary patterns in case of host parasite studies, the concept is more peculiar for host specific parasites and patterns of distribution of host in different ecosystem may be regarded as marker for co evolutionary investigation. Freshwater fish parasitic genus Mizelleus was collected from river Gomti at Lucknow. Present paper is an attempt to study the concept of zoogeographical distribution and its implication in co evolutionary studies of biodiversity especially with reference to host specific parasites.

Introduction

Zoogeographical distribution represents the adjustment and adaptation to the niche, biological demands are met and the organism enjoys surroundings for generations. Geographical distribution being functionally preferred area by the organism. Genus *Mizelleus* was erected for the worms from the gill filaments of *Wallago attu* (Bl. and Schn.) at Lucknow, *M. indicus* Jain, 1957, as the type species [1]. Additional species reported from time to time, Lim and Lerssutthichawal [2] reported a new species while describing the monogeneans for the type host from Thailand, *i.e.,* only known reported member outside India. Present paper is an attempt to study the concept of zoogeography and its implication in co-evolutionary studies of biodiversity especially with reference to host specific parasites. *Mizelleus* enjoys a very restricted range on earth, therefore, its an attempt to study geographical distribution together with piscine hosts.

Materials and Methods

Genus *Mizelleus* and its host record was extensively explored from available sources *i.e.,* literature. Distribution pattern of related host established from available sources was geo mapped manually for relating between parasite and host distribution patterns.

Results

Genus *Mizelleus* has been reported from three hosts *viz.*, *Wallago attu* (Bl. and Schn.); *Mystus aor* (Ham.) and *Clupisoma garua* (Ham.). All hosts are not on IUCN Red List [6, 7].

Wallago attu the type host with type locality India: Malabar. Its distributed (table-1) in South and South East Asia distributed in the tropical region 38°N-10°S, preferred temperature ranges 19-29°C and the water quality is not of much significant consideration. Found in large rivers, lakes and tanks and a large, voracious and predatory catfish which thrives in heels with grassy margin[3]; mostly hide under holes in river banks and canals[4]. In the Mekong, its reported to migrate to smaller streams, canals and to the floodplain during the flood season [5], with drop in water level and the recede of flood, it moves to the Mekong or larger tributaries, where it stays in deep pools until the next inundation period [5]. It has lower risk near threatened status in Western Ghats, India [4].

M. aor type locality India: Malabar. Geographically, it is distributed (table-2) in tropical region 38°N-10°S. The preferred temperature ranges between 19-29°C, water quality is not of much significant consideration. It is demersal, potamodromous[7], freshwater.

C. garua is a demersal potamodromous [7] found in tropics 38°N-8°N. It is geographically distributed (table-3) in Asian region mainly and inhabits large fresh water and tidal rivers[8], exclusively feeds on insects, shrimps, other crustaceans and small fish [9].

The genus *Mizelleus* and its new species were regularly reported from the various parts of India (table-4). First such report came from Hyderabad in the form of two new species by [10]. Later, *M. linorchis* Kulkarni, 1969 was synonymised with the type species *M. indicus* Jain, 1957 by Gussev [11]. There are ten valid species out of which nine species reported from the India and one from Thailand. Surprisingly, there have been no reports about this parasite from any other part of the world. Even when the hosts are widely distributed in the wide range of area in South and South East Asia.

Discussion

Recently one species of genus *Mizelleus* abstracted from Thailand contradicted the endemic nature of this genus exclusively to India. *W. attu* is distributed widely in South and South East Asia [3, 9, 12-21]. Similarly, another host *viz., M. aor* also enjoyes fairly wide distribution and is reported from various places [9, 13, 18, 19]. Specific reason could not be assigned for the specific distribution of the parasite. Main reason behind this silence could be the reason that there exists lack of technical expertise in other areas. That is also not available everywhere for the study of this group of parasites. There exists a scope of exhaustive survey in the other parts of the host locality in order to find out the diversity of undiscovered biodiversity. It could establish the evolutionary link, among hosts in different ecosystems and may be able light on ancestral association, between the genus and its host.

Conclusions

Results suggest that parasite co-evolved with the same host, reflected in monogenetic nature and any missing link with other hosts. In circumstance where host is reported, while no reports about the parasite may be attributed to lack of studies in that particular region. Future results could establish a relationship along with ancestor patterns. All fresh water sources in the world are not linked at present directly, which is contrary to marine ecosystem. Eliminating scope of continuous exchange of faunistic pool across time.

Acknowledgments

Authors are thankful to the respective head of institutions facilities and authorities of CSIR (India) for financial assistance to PVA as CSIR JRF/SRF.

Table 1. Ecosystem Wise Distribution of *Wallago attu* (Bl. and Schn.).

Ecosystem	Type	Status	Reference
Cauvery	River (basin)	Native	[4]
Chao Praya River	River (basin)	Native	[20]
Chilka Lake	Lake	Native	[22]
Ganges	River (basin)	Native	[9]
Godavari	River (basin)	Native	[23]
Krishna River	River (basin)	Native	[23]
Mekong	River (basin)	Native	[14]
Oriental	Zoogeographic realm	Native	[19]
Paleartic	Zoogeographic realm	Native	[15]
Salween	River (basin)	Native	[20]
Tonle Sap	Lake	Native	[24]

Table 2. Ecosystem wise distribution of *Mystus aor* (Ham.).

Ecosystem	Type	Status	Reference
Brahmaputra	River (basin)	Native	[8]
Cauvery	River (basin)	Native	[8]
Ganges	River (basin)	Native	[8]
Godavari	River (basin)	Native	[23]
Indus	River (basin)	Native	[8]
Krishna River	River (basin)	Native	[23]
Oriental	Zoogeographic realm	Endemic	[9]

Table 3. Ecosystem wise distribution of *Clupisoma garua* (Ham.)

Ecosystem	Type	Status	Reference
Kali Gandaki	River (basin)	Native	[18]
Kosi	River (basin)	Native	[18]
Oriental	Zoogeographic realm	Endemic	[9]

Table 4. Reports of various species of *Mizelleus* Jain, 1957

Species	Place	Author
M. indicus	Lucknow	[1]
M. linorchis	Hyderabad	[10]
M. postorchidis	Hyderabad	[10]
M. ramalingami	Lucknow	[25]
M. postorchidis	Hyderabad	[26]
M. indicus	Hyderabad	[26]
M. lucknowensis	Lucknow	[27]
M. kherai	Meerut	[28]
M. hindanensis	Ghaziabad	[29]
M. chauhani	Lucknow	[30]
M. wallagonius	Meerut	[31]
M. indicus	Raipur	[32]
M. linorchis	Raipur	[32]
M. siamensis	Thailand	[2]
M. indicus	Lucknow	[33]

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