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Current scenario of stiletto flies (Insecta: Diptera: Therevidae) in India

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Abstract

A total of 18 species of three genera under two subfamilies of the family Therevidae belonging to the order Diptera are reported from India which is only 1.57 % of total global therevid fauna. Among these, nine species have restricted their distribution within the country. But there is no sufficient information about the specific distributional localities of 38.88%of Indian therevids. Considering the biogeographic zones of India, the highest number of stiletto flies were found in the Himalayan regions (38.88%) and the least number from Arid, Semi-Arid & Hot desert region (5.55%). This is the first consolidated account on the current status of Indian therevid fauna.

Key words : Biodiversity, Bio-geographical Patterns, Therevidae, India.

INTRODUCTION

Flies of the family Therevidae are nearly worldwide in distribution, occurring in all geographical regions except Antarctica. Stiletto-flies (Family Therevidae) are found in a variety of habitats ranging from rainforest to desert, but are generally most diverse in arid regions where the sandy, friable soils provide a suitable habitat for their fossorial (soil dwelling) larvae.

The therevid bio ecology is poorly understood. They inhabit a wide variety of environment with a dominant proportion occupying arid and semi-arid zones. Adults are not considered to be predaceous. In arid environment, adults often concentrate around water sources. A few species of therevids have been regarded as mimics of various wasp models. [1] Adults are nectar feeders, while the larvae are voracious predators of soil arthropods. Larvae are characterized by a secondarily segmented abdomen and an apically spatulate tentorial rod. [2] Larvae can be found in almost all type of terrestrial habitats but are especially diverse where sandy soil are dominant (e.g. dry forests, coastal dunes and deserts). Members of the family Therevidae play an important biological control agents.

The knowledge on thervid fauna of India is at the very primary level. Moreover, all these information are published in different journals in a scattered manner. Present document is, therefore, aimed to generate a state of art report on the Indian therevid fauna and also highlight the gaps area of research in India.

History of Taxonomic research

Probably, *Irwiniella cylindrica* is the first species reported by Walker (1848) from India. [3] Beside this, Walker was reported two more species, *Irwiniella sequa* (Walker, 1852), *Thereva indica* Walker, 1852 from India. [4] Then after a long gap, in the early 20th century, Brunetti, Wiedemann, Van der Wulp provided their valuable contributions on this group. [5, 6, 7] In 1975, Lyneborg catalogued few therevid flies from Oriental Region. [8] The contribution of Bigot (1892), Brunetti (1912, 1917) etc. are also enriched the Indian therevid fauna by exploring several new species. [9, 10, 11]

Irwin & Lyneborg (1989) compiled a catalogue of Australian and oriental Therevidae, and revaluated the generic placement of many species based on genitalic characteristics. [12] Another species have been added to the Indian therevid fauna by Lyneborg (2003). [13]

Distinguishing characters:

Body small, usually grayish or blackish, slightly hairy, not more than 5mm in length. Ocelli three. Antennae three segmented, two basal segments short and the third elongated. Mouthparts sucking type, proboscis very short. Maxillary palps 1-2 segmented. Thorax moderately convex. Legs short and lack empodia. Wings overlap on the abdomen in the resting phase; M_{1+2} ends in front of wing tip. Abdomen large and cylindrical or flattened. Many genera have attractively patterned wings and males with distinctive silvery pruinescent markings on the body. Many species show marked sexual dimorphism.

Habit and Habitats

Adult therevids are seemingly all diurnal. [14] Some genera only appear in the early hours of the morning. Little is known about the food habit of therevids, but adults appear to feed on honeydew, flower nectar and pollen. They have a rapid flight of short duration. The flying period for some of the more common species is usually 3-4 months. [14] In semi-arid and arid environments, therevids are strongly attracted to water. Pools of water in drying creek beds often attract a tremendous diversity of these files.

The larvae, like most underground dwellers, are rarely encountered unless these soils are actively sieved. They twist violently when exposed and are extremely quick and agile in their attempts to escape. Even pupae when disturbed will wiggle vigorously in an attempt to scare away intruders.

RESULTS AND DISCUSSION

Worldwide, 1143 valid species of 128 genera are reported, [15] whereas India shares only 18 species (which is only 1.57% of

global therevid fauna) of three genera under two subfamilies (Table - 1). The state West Bengal shares maximum number of therevid species (33.33 %), followed by Uttarakhand (22.22%), Meghalaya (16.66%), Uttar Pradesh (11.11%), Assam (11.11%), Bihar (11.11%). Few states (Himachal Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Odisha and Tamil Nadu) share very minimum number of species (5.55% each) (Figure - 1).

Considering the diversity of therevid fauna among six biogeographic zones in India, [16] the maximum flies have been reported from the Himalayan regions (38.88%). In addition to, Indo-Gangetic Plains and North-East Region both shares 16.66%, followed by Ghats and Peninsular regions (11.11%) and The Arid, Semi-arid and Hot Desert region (5.55%). No therevid species were reported from Island biogeographic region (Figure - 2).

This communication is unable to trace out the specific distribution locality of seven therevid species (38.88%) in India. All these have been considered as species with NSL (No specific location). 50% of the total therevid species are restricted to India.

Xeric habitats are destroyed at an alarming rate through a number of threatening processes such as land clearing, salinity and invasive species. Generalist predators feeding on subterranean herbivores are potentially good indicators of diversity, productivity, and heterogeneity, and in desert communities, they are at the top of the food chain. [16] Furthermore, therevids may have potential for biological control because they suppress root-feeding pest larvae in sandy agro ecosystems.

Considering the taxonomic and bio-indicating importance of this dipteran family more emphasis to be given on faunal exploration throughout India and non-reported states and Union territories (Andhra Pradesh, Arunachal Pradesh, Dadra & Nagar Haveli, Daman & Diu, Delhi, Goa, Haryana, Jammu & Kashmir, Jharkhand, Lakshadweep, Manipur, Mizoram, Nagaland, Puducherry, Punjab, Rajasthan, Sikkim, Telengana, Tripura) in particular.

CONCLUSION

This present communication gives an idea of the current status of the Indian therevid flies with its distributional records from different states and bio-geographic zones of India as well as the distribution outside of India.

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Table 1: Taxonomic diversity of the family Therevidae in India

Sub Family	No. of Genera	No. of Species
Therevinae	2	12
Phycinae	1	6
Total	3	18

Table 2: Species list of Therevidae (Insecta: Diptera) of India along with distribution and type-locality. (Bio-geographic zones are followed after Alfred *et al.*, 2006 [17])

Sl. No.	Name of the species with Type-locality	Distribution (State-wise within India)	Bio-geographic zones of India	Distribution other than India
	Sub family: Therevinae **Genus**: *Irwiniella* Lyneborg, 1976: 251			
1	*Psilocephala albina* Wiedemann,1819 TL: Indonesia. Java	East India (NSL)	NSL	Java, Sumatra, Sumbawa, Timor
2	*Psilocephala bigoti* Lyneborg, 1975 TL: "Indes"	NSL	NSL	Restricted within India
3	*Irwiniella cylindrical* (Walker, 1848) TL:"East Indies," (T M BMNH)	East India(NSL)	NSL	Indonesia
4	*Irwiniella bigoti* (Bigot, 1892) TL: "Indes"	NSL	NSL	Restricted within India
5	*Irwiniella sequa*(Walker, 1852) TL: East India (T M BMNH)	Uttar Pradesh , West Bengal, Bihar	IGP	Sri Lanka, Flores

	Genus : *Thereva* Latreille, 1796			
6	*Thereva bilineata* Brunetti, 1917 TL: India. Simla Hills: Theog	Himachal Pradesh	HR	Restricted within India
7	*Thereva brunettii* Hollis, 1964 TL: Nepal. Taplejung: Sangu, 6,200 ft (HT F BMNH)	West Bengal	HR	Nepal
8	*Thereva flavolineata* Brunetti, 1912 TL: India. Assam: Shillong	Meghalaya, Assam	NER	Restricted within India
9	*Thereva indica* Walker, 1852 TL: East India (T F BMNH)	East India(NSL)	NSL	Restricted within India
10	*Thereva kempi* Brunetti, 1920 TL: India. Assam: Shillong	Meghalaya, Assam	NER	Restricted within India
11	*Thereva nivaria* Walker, 1852 TL: East India (T F BMNH)	East India(NSL)	NSL	Restricted within India
12	*Thereva persequa* Walker, 1852 TL: East Indies	East India(NSL)	NSL	East Indies
	Sub family: Phycinae **Genus**: Phycus Walker, 1850			
13	*Phycus atripes* Brunetti, 1920 TL: India. Darjeeling District, Kurseong (HT M ZSI)	Uttarakhand, West Bengal	HR	Nepal,China (Szechwan)
14	*Phycus kerteszi* Krober, 1912 TL: Taiwan. Toyenmongai (LT F USNM)	West Bengal	HR	Taiwan
15	*Phycus nitidus* van der Wulp, 1897 TL: Sri Lanka. Kandy (HT M HNHM)	Bihar, Uttarakhand, West Bengal	IGP,HR	Restricted within India
16	*Phycus brunneus* (Wiedemann, 1824) TL: "India orient." (LT M UZMC)	Tamil Nadu, Meghalaya, Uttarakhand, Uttar Pradesh, Madhya Pradesh, West Bengal, Gujarat, Maharashtra	GPR, NER, IGP, HR, ASHD	Sri Lanka, Nepal, Laos, Malaysia, Singapore, Indonesia (Sumatra)
17	*Phycus freidbergi* Lyneborg, 2003 TL: India. Orissa: Bhubancswar (HT M USNM)	Orissa	GPR	Restricted within India
18	*Schoutedenomyia argentiventris*Brunetti, 1920 TL: Naini Tal District, Unchogon	Uttarakhand	HR	Sri Lanka

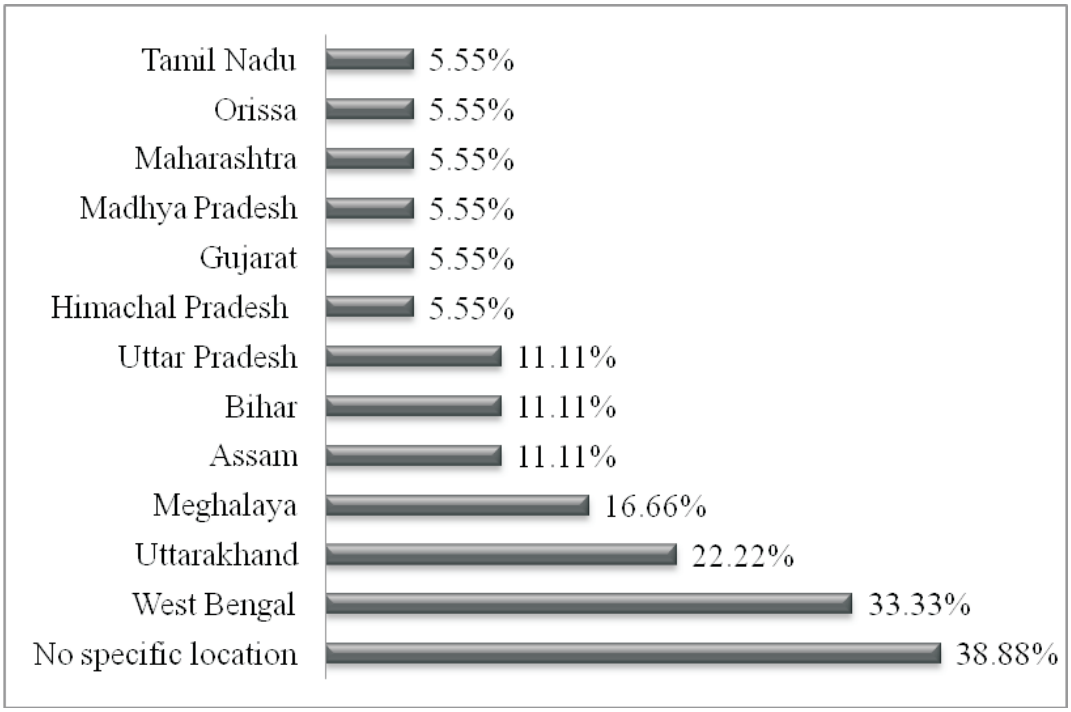

Fig. 1: State wise percentage of reported species of Therevidae from India.

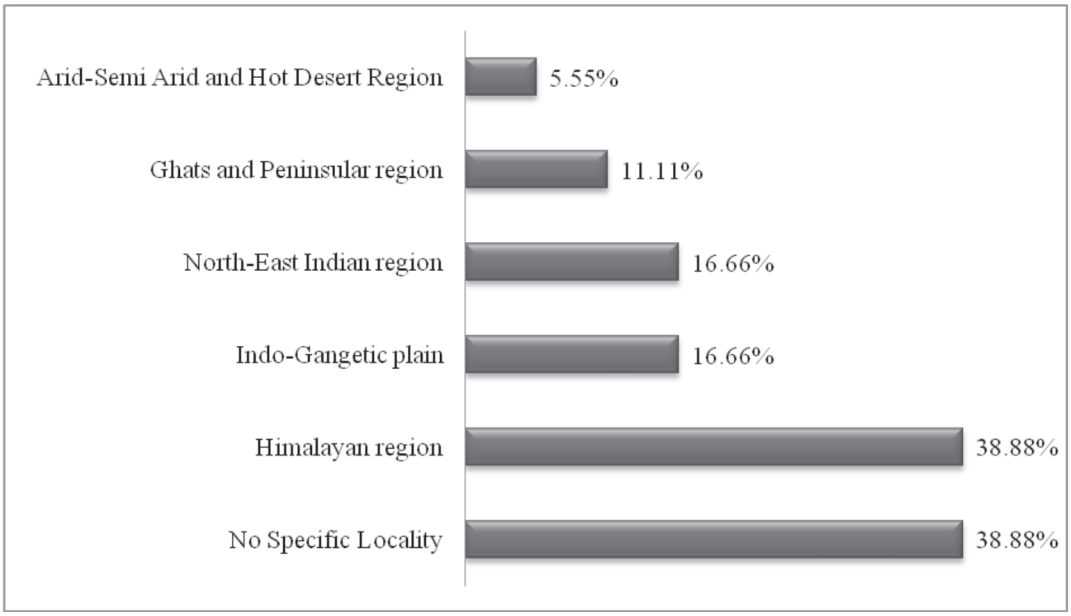

Fig. 2: Percentage in different Bio-geographic zones of India

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Abbreviation used:

HR: The Himalayan Region; IGP: Indo Gangetic Plains; GPR: The Ghats & Peninsular Region; ASHD: Arid, Semi-Arid & Hot desert region; NER: North Eastern region; NSL: No specific Locality; TL: Type Locality.

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