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Rajesh Kumar EkkaDepartment of Entomology,
COA, IGKV, Raipur,
Chhattisgarh, India**Ankita Gupta**Scientist, ICAR-NBAIR,
Bengaluru, Karnataka, India**SS Shaw**Department of Entomology,
COA, IGKV, Raipur,
Chhattisgarh, India

A study on the distribution pattern of Genus *Stenomesus* Westwood (Hymenoptera: Eulophidae) from Chhattisgarh

Rajesh Kumar Ekka, Ankita Gupta and SS Shaw

Abstract

The genus *Stenomesus* Westwood was studied in different natural and agricultural ecosystem of Chhattisgarh. This study was conducted from October 2018 to February 2020. At present 22 specimens are studied from Chhattisgarh. The distribution pattern of *Stenomesus* Westwood was analyzed and digitized. It is distributed in five biogeographic realms, namely: Nearctic, Neotropical, Afrotropical, Oriental and Australasia. In India, it had been reported from Bihar, Delhi, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, Uttarakhand and Karnataka. In present study, it was reported from Jashpur, Balrampur, Mahasamund, Dhamtari, Gariyaband, Surguja Korba, Raipur and Jagdalpur districts of Chhattisgarh.

Keywords: distribution pattern, *Stenomesus* Westwood, Chhattisgarh

Introduction

The Chhattisgarh is the part of central India. The State falls under East Deccan physiographic zone and can be divided into three agro-climatic zones, viz. the Chhattisgarh Plains, the Northern Hills of Chhattisgarh and the Bastar Plateau. It covers an area of 1,35,192 sq km, which is 4.11 percent of the geographical area of the country. The state has forest area of 59,772 sq km, which is 44.21 percent of states geographical area and ranks third in the country in terms of forest covers. The state has three National Parks and eleven Wildlife Sanctuaries which constitute 4.93 percent of state geographical area. It has a tropical hot and humid climate. The average annual rainfall varies from about 1,100 mm to about 1,700 mm and the average annual temperature ranges between 11 °C to 47 °C.

Eulophidae is the largest family under superfamily Chalcidoidea representing more than 5,000 species in 330 genera worldwide. In India, it is represented by 636 species in 112 genera (Noyes, 2019)^[6]. Kazmi & Girish (2015)^[2] had made an attempt to describe the eulophidae genera from Chhattisgarh. They described three species of genus *Elasmus* viz., *Elasmus brevicornis* Gahan, *Elasmus johnstoni* Ferriere and *Elasmus queenslandicus* Girault with their distribution pattern.

The biodiversity of Chhattisgarh fauna of parasitic Hymenoptera has remained unexplored. Lack of information on basic knowledge of natural enemies, and their improper identification will hinder in the development of proper management practices. An advancement of taxonomic knowledge is greatly needed in the arena of basic studies in relation to biodiversity of faunal studies, host parasitoids relationship, etc. before going in for an adventure in the field of biological control (Singh, 2005)^[9].

Method and Materials

The Chhattisgarh state lies between 17°47' N to 24°06' N latitude and 80°15' E to 84°24' E longitude. The different places surveyed during the study are as follows: Achanakmar Wildlife Sanctuary; Badalkhol Wildlife Sanctuary; Barnawapara Wildlife Sanctuary; Boramdev Wildlife Sanctuary; Gomardha Wildlife Sanctuary; Semarsot Wildlife Sanctuary; Sitanadi Wildlife Sanctuary; Tamor Pingla Wildlife Sanctuary; Udanti Wildlife Sanctuary, Kanger Valley National Park; College of Agriculture, Raipur; RMD CARS, Ambikapur; KVK, Mainpat; SG CARS, Jagdalpur; Bachha Batha, Dongargarh; KVK, Durg, Anjora; Badechakma, Jagdalpur; Devpahari, korba; KVK, Balrampur.

Corresponding Author:**Rajesh Kumar Ekka**Department of Entomology,
COA, IGKV, Raipur,
Chhattisgarh, India

The permission was obtained from the Office of the Principal Chief Conservator of Forests (Wildlife Management & Biodiversity Conservation cum-Chief Wildlife Warden) Chhattisgarh for the sample collection with letter number 5581, dated 06/10/2018. *Stenomesus* Westwood was collected using yellow pan traps, malaise traps and sweep net. The traps were filled with solution (salt, liquid dish wash, water) and were placed at a distance of approximately one meter away from each other. One Malaise trap was installed for 5-7 days at each location. The collected insects were preserved in 70% ethyl alcohol. Sweep net (SN) was used for catching *Stenomesus* Westwood from the various ecosystems (natural and agro ecosystems). The collected specimens were killed using ethyl acetate and were later preserved in 70% ethyl alcohol.

Result and Discussion

Stenomesus Westwood, 1833

Synonymy

Stenomesus Westwood, 1833: 343. Type species *Stenomesus pulchellus* Westwood, designated by Westwood, 1839.

Euryscotolinx Girault, 1913: 266. Type species *Euryscotolinx guttativertex* Girault, by original designation. Synonymised by Boucek 1977: 401.

Stenelachistus Masi, 1917: 201. Type species *Stenelachistus impressus* Masi, designated by Gahan & Fagan, 1923: 136. Synonymised by Boucek 1977, 401.

Nioro Risbec, 1951: 25. Type species *Nioro elegantula* Risbec, by monotypy. Synonymised by Boucek 1977: 401

Diagnosis (Fig 1)

Propodeum medially with two strong carinae connected before middle in form of 'H' or 'X'; scutellum with lateral longitudinal groove; hind tibial spurs normal; pronotum without without transverse carina; female funicle 4 segmented; mesosoma finely sculptured or partly smooth or shiny; propodeum smooth or finely reticulate or coarsely carinate reticulate; petiole shorter than hind coxa, gaster usually elongate.

Specimen examined

INDIA: Chhattisgarh: 5M and 5F, Badalkhol Wildlife Sanctuary, Jashpur 22°89'60"N 83°91'58"E, 596m, 04.ix.2018, Coll. Rajesh Kumar Ekka; 3M and 10F, Semarsot Wildlife Sanctuary, Balrampur, 23°32'54"N 83°32'46"E, 668m, 10.xi.2018, Coll. Rajesh Kumar Ekka; 2M and 3F, Barnawapara Wildlife Sanctuary, Mahasamund, 21°29'83"N 82°31'67"E, 337m, 18.viii.2019, Coll. Rajesh Kumar Ekka; 4M and 5F, Sitanadi Wildlife Sanctuary, Dhamtari, 20°20'56"N 81°57'39"E, 415m, 19.ii.2019, Coll. Rajesh Kumar Ekka; 4M and 5F, Udanti Wildlife Sanctuary Gariyaband, 20°07'09"N 82°22'57"E, 354m, 06.i.2019, Coll. Rajesh Kumar Ekka; 5M and 6F, Kanger Valley National Park, Jagdalpur, 18°57'09"N 82°14'68"E, 554m, 14.ix.2018, Coll. Rajesh Kumar Ekka; 6M and 6F, RMD CARS, Ambikapur, Surguja, 23°08'38"N 83°08'60"E, 623m, 28.ix.2019, Coll. Rajesh Kumar Ekka; 3F, KVK, Mainpat, Surguja 22°49'38"N 83°16'28"E, 1095m, 05.ix.2018, Coll. Rajesh Kumar Ekka; 4M and 5F, KVK, Balrampur, 23°36'23"N 83°36'23"E, 530m, 27.ix.2019, Coll. Rajesh

Kumar Ekka; 3F, Devpahari, Korba, 22°38'12"N 82°48'41"E, 293m, 13.ii.2019 Coll. Rajesh Kumar Ekka; 10F, College of Agriculture, Raipur, 21°14'02.2"N 81°42'42.5"E, 298m, 23.viii.2018, Coll. Rajesh Kumar Ekka; 2M and 2F, Bana nursery, Raipur, 21°14'02.2"N 81°42'42.5"E, 298m, 03.ix.2018, Coll. Rajesh Kumar Ekka; 4M and 7F, SG CARS, Jagdalpur, 19°05'33.9"N 81°57'38.7"E, 557m, 14.ix.2018, Coll. Rajesh Kumar Ekka.

Distribution pattern of genus *Stenomesus* Westwood

World: Afrotropical, Australasia, Nearctic, Neotropical, and Oriental region.

India: Bihar, Delhi, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh, Uttarakhand and Karnataka.

Chhattisgarh: Jashpur, Balrampur, Mahasamund, Dhamtari, Gariyaband, Surguja Korba, Raipur and Jagdalpur

The genus *Stenomesus* Westwood is distributed all over the five biogeographic realms, viz. Afrotropical, Australasia, Nearctic, Neotropical, and Oriental region (Noyes, 2019) ^[6] and in India, it is distributed in Bihar (Rao and Hayat, 1986) ^[7], Gujarat (Yadav *et al.*, 1987) ^[10], Maharashtra (Shetgar *et al.*, 1993) ^[8], Uttar Pradesh (Khan, 1994) ^[3], Uttarakhand (Khan *et al.*, 2005) ^[4], Delhi and Karnataka (Husain and Khan, 1986) ^[1], from Kerala, Madhya Pradesh, Tamil Nadu it was reported by Narendran in 2011 ^[5].

Table 1 shows the distribution of Genus *Stenomesus* Westwood in the three agro-climatic zones of Chhattisgarh. Fig 2, shows the distribution pattern more precisely on the map of Chhattisgarh. In Chhattisgarh it was observed from Badalkhol Wildlife Sanctuary, Jashpur (22°89'60"N, 83°91'58"E, 596m), Barnawapara Wildlife Sanctuary, Mahasamund (21°29'83"N, 82°31'67"E, 337m), Semarsot Wildlife Sanctuary, Balrampur (23°32'54"N, 83°32'46"E, 668m), Sitanadi Wildlife Sanctuary, Dhamtari (20°20'56"N, 81°57'39"E, 415m), Udanti Wildlife Sanctuary, Gariyaband (20°07'09"N, 82°22'57"E, 354m) and Kanger Valley National Park, Jagdalpur (18°57'09"N, 82°14'68"E, 554m) under natural ecosystem were as from agro-ecosystem it had been observed from College of Agriculture, Raipur (21°14'02.2"N, 81°42'42.5"E, 298m), RMD CARS, Ambikapur, Surguja (23°08'38"N, 83°08'60"E, 623m), KVK, Mainpat, Surguja (22°49'38"N, 83°16'28"E, 1095m), SG CARS, Jagdalpur (19°05'33.9"N, 81°57'38.7"E, 557m), Devpahari, Korba (22°38'12"N, 82°48'41"E, 293m) and KVK, Balrampur (23°36'23"N, 83°36'23"E, 530m).

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Table 1: Distribution of genera *Stenomesius* Westwood from different natural and agricultural Ecosystem of Chhattisgarh

Genus	Natural Ecosystem									
	AMWLS	BKWLS	BNWLS	BDWLS	GWLS	SSWLS	SNWLS	TPWLS	UWLS	KVNP
<i>Stenomesius</i> Westwood	-	+	+	-	-	+	+	-	+	+
	Agricultural Ecosystem									
	COA-R	RMD-A	KVK-M	SG-J	BB-R	KVK-D	BCK-J	DP-K	KVK-B	BN-R
	+	+	+	+	-	-	-	+	+	

"+" = Present; "-" = Absent

Abbreviation used in the text for survey area

Abbreviation	Sites surveyed during study
AMWLS	Achanakmar Wildlife Sanctuary
BKWLS	Badalkhol Wildlife Sanctuary
BNWLS	Barnawapara Wildlife Sanctuary
BDWLS	Bhoramdev Wildlife Sanctuary
GWLS	Gomardha Wildlife Sanctuary
SSWLS	Semarsot Wildlife Sanctuary
SNWLS	Sitanadi Wildlife Sanctuary
TPWLS	Tamor Pingla Wildlife Sanctuary
UWLS	Udanti Wildlife Sanctuary
KVWLS	Kanger Valley National Park
COA-R	College of Agriculture, Raipur
RMD-A	RMD CARS, Ambikapur
KVK-M	KVK, Mainpat
SG-J	SG CARS, Jagdalpur
BB-R	Bachha Batha, Dongargarh
KVK-D	KVK, Durg, Anjora
BCK-J	Badechakma, jagdalpur
DP-K	Devpahari, Korba
KVK-B	KVK, Balrampur
BN-R	Bana Nursery, Raipur

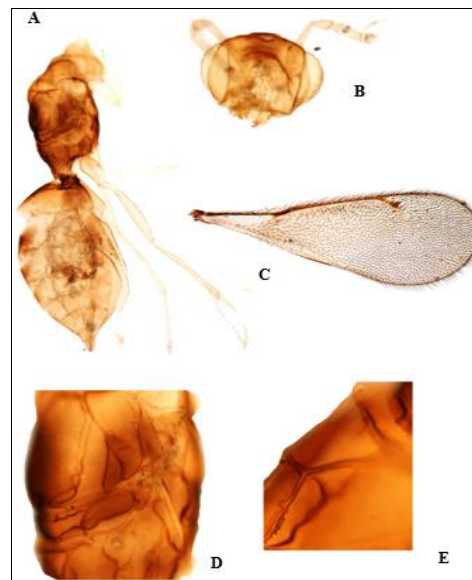


Fig 1: *Stenomesius* Westwood, 1833; Female: A. Habitus image; B. Head; C. Wings D. mesoscutum; E. Propodeum.

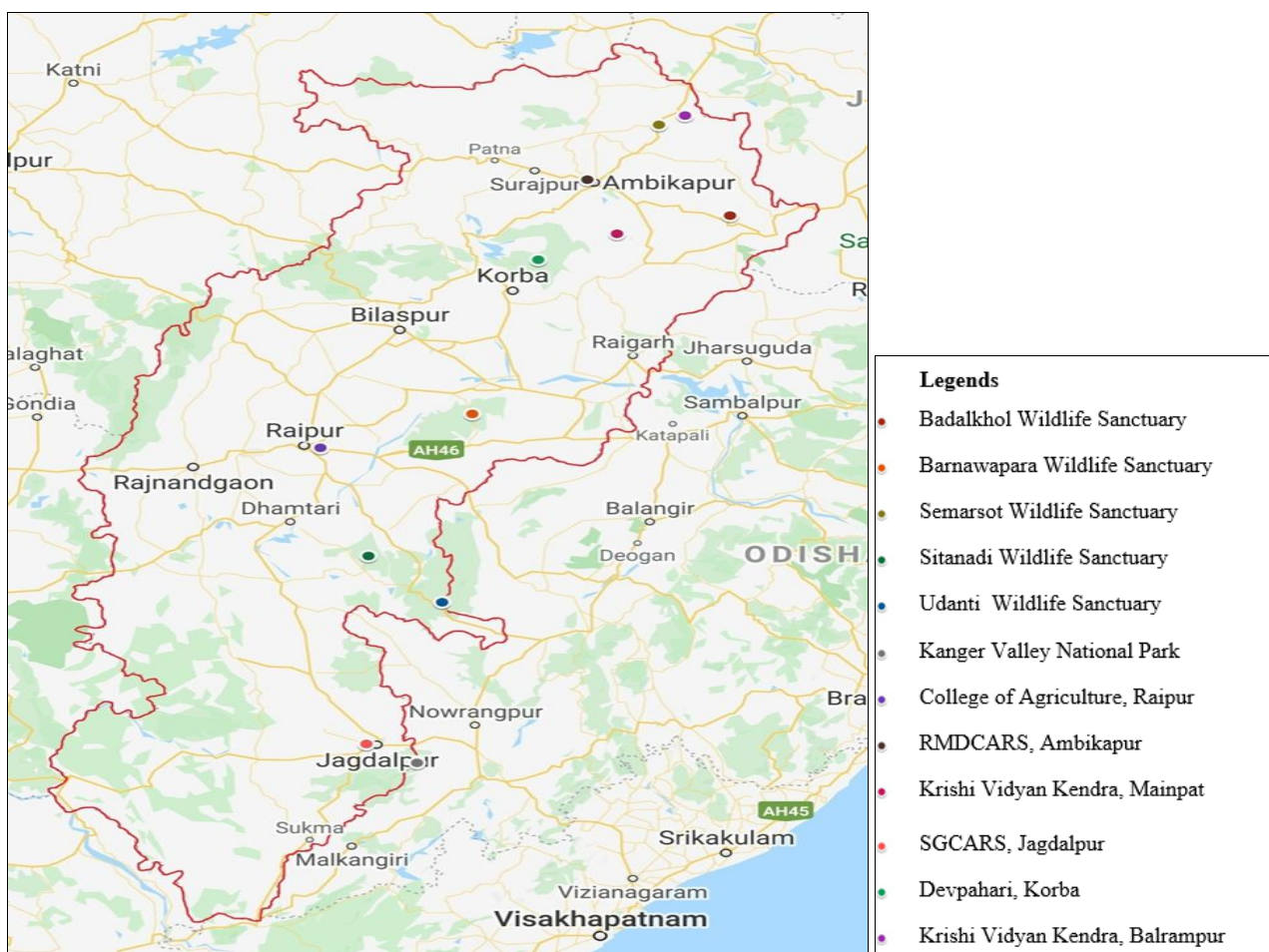


Fig 2: Distribution pattern of *Stenomesius* Westwood in the three Agro-climatic zone of Chhattisgarh

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