International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 13-04-2025, Accepted: 14-05-2025, Published: 29-05-2025
Volume 10, Issue 5, 2025, Page No. 101-104

First record of genus *Cotesia* Cameron (Braconidae: Microgastrinae) from Kashmir Valley (J&K) India

S Faizan Anayat, Tahmeena Maqsood, Mohd Yousuf, Rabiya Irshad*
Department of Life Sciences, Central University of Kashmir, Jammu and Kashmir, India.

Abstract
The present study is pertaining the first record of four species of genus *Cotesia* Cameron, from Kashmir Valley (Jammu & Kashmir), India. Four species: *Cotesia anthelae*, *Cotesia tiracolae*, *Cotesia janati* and *Cotesia flavipes* are being recorded for the first time from Kashmir Valley, which is an addition to the biodiversity of larval parasitoids of Braconidae.

Keywords: Hymenoptera, Braconidae, Microgastrinae, *Cotesia* spp., larval parasitoids, new record, Kashmir valley

Introduction
According to Rodriguez *et al*. (2013) [10], Microgastrinae is among the largest parasitoid groups regarding species diversity and economic importance. One of the genera abundant in species of parasitoid wasps within the diverse subfamily Microgastrinae is the genus *Cotesia* Cameron, 1891 [3] (Hymenoptera: Braconidae), which has 296 species recognized globally (Yu *et al*., 2016) [16]. Estimates suggest there are between 1500 to 2500 species of *Cotesia* across the globe (Mason, 1981; Achterberg and Polaszek, 1996) [1, 5]. Cameron (1891) [3] established the genus *Cotesia*, but it was later synonymised with *Apanteles* Szépligeti, 1904 [12] (Szépligeti 1904) [12] until Mason (1981) [5] reclassified the Microgastrinae as a generic. Despite the considerable species variety within the genus, individuals often appear quite uniform morphologically. The shape of the propodeum is sculptured, and the first and second tergites serve as distinguishing features of *Cotesia*, including: the width of the second tergite being at least 1.5 times the apical width of the first tergite, while the first tergite never narrows at the apex, is slightly longer than wide, and expands towards the apex, although it can sometimes be wider than long. The propodeum is rugose and does not have an areola. It usually possesses a median longitudinal carina, which can sometimes be partially obscured by rugosity. The study was carried out in the Kashmir Valley. This valley is surrounded by Himalayan peaks, featuring the Pir Panjal Range to the southwest and the Greater Himalayan Range to the northeast. This represents the first systematic study of the genus *Cotesia* in the Kashmir Valley. It includes new records of four species belonging to the Microgastrinae, within the genus *Cotesia*.

Material and Methods
Study Area: Ganderbal and Bandipora districts are the collection sites of Kashmir Valley.

Collection method and preservation: The samples were collected from various habitats including orchards, paddy fields, vegetable gardens, grass fields, shrubs and bushes across different locations in Ganderbal and Bandipora districts in Kashmir Valley; using a sweeping net. The samples were immediately transferred into small vials containing 70% ethyl alcohol for preservation. The freshly collected Microgastrine specimens were sorted out under a stereozoon microscope (Olympus SZX10) and then preserved in eppendrof tubes containing 70% ethyl alcohol. Slides were prepared following the procedure of Noyes (1982). Dissections and photography were performed using the Stereo zoon microscope (Olympus SZX16) and measurements were taken using a CILIKA Patented Digital Head Technology slide microscope equipped with an 8-megapixel camera on an iPad.

Identification
Identification was done by consulting Wilkinson (1928 a, b) [13, 14], Nixon (1965, 1967) [6, 7], Mason (1981) [5], Papp (1986, 1987) [8, 9].

Results
Order: Hymenoptera
Superfamily: Ichneumoniodea
Family: Braconidae
Subfamily: Microgastrinae

Genus *Cotesia* Cameron, 1891 [3]
Diagnosis
Cotesia can be recognized within Microgastrines by observing specific combinations of characteristics: The propodeum is roughly textured with a medial carina rather than a medial areola; the first and second metasomal tergites are generally quite quadrate in shape and coarsely textured; the ovipositor and sheaths are brief and hardly extended; and the forewings do not possess the second r-m vein, resulting in the small areolet being open at the distal end.

1. *Cotesia anthelae* Wilkinson
Apanteles anthelae Wilkinson, 1928: 102
Cotesia anthelae Austin & Dangerfield, 1992 [2]: 21
Diagnosis: Female. 2.6 mm in length, black throughout; legs, except coxae and tegulae (light brown), yellowish-brown basal ventrites; apices of hind femora and apical third of hind tibia, dark brown to black. Wing veins and pterostigma are dark brown. The forewings possess a first abscissa of the radial vein, which is shorter than the transverse cubital vein and less than the width of the pterostigma. The pterostigma and metacarp are approximately equal in size (Fig.1). The sclerotized portion of the second tergite is rough and oval in shape, firmly and distally crenulate at the posterior boundary and lateral

margins. The first tergite is strongly and coarsely punctate in the apical one-third, largely parallel sided, curving inward at apical corners. Exerted ovipositor sheaths, subequal to the length of the longer spur of hind leg.

Material examined: INDIA: J&K, Kashmir: Ganderbal: Wakura; 2♀, 14.vi.2023; coll. S. Faizan Anayat (sweeping); Bandipora: Sumbal; 1♀, 25.vii.2023; coll. S. Faizan Anayat (sweeping).
Host: Unknown

2. *Cotesia tiracolae* (Ashmead)
Apanteles tiracholae, Ashmead 1896. Proc. U. St. Nat. Mus., xviii, no. 1092, p. 647, female, male.
Apanteles tiracholae. Wilkinson 1928, Bull. Ent. Res., xix, p. 102.
Apanteles tiracolae Ashmead 1896. Yu (2012) [15].
Cotesia tiracolae (Ashmead), Howard & Ashmead, 1896 [4]
Diagnosis: Female. Body length 2.5mm. Black. Antennae primarily black, scape yellowish brown at the base with a black apex; tegulae are brown; fore and mid legs are testaceous red (except for red-brown coxae which have a slight bluish-black hue on the dorsal side). Hind coxa is black with a white apex, rugose punctate, and shiny. Forewings feature a brown pterostigma and brown wing veins. The first abscissa of the radius is shorter than the stigma's width, and the pigmented section of the second abscissa of the cubital is equal to the apical part of the first abscissa of the cubital, which is in turn longer than the upper part of the basal vein while the recurrent vein is longer than the transverse cubital (Fig.2). Hindwings featuring a margin of the vannal lobe that is nearly convex and hairy all over. The first metasomal tergum is almost square, barely longer than it is wide, with its side margins being nearly parallel and corners rounded; the apical half is coarsely yet sparsely sculpted. The second tergum has an indefinite sculpturing with lateral grooves, and its basal margin is slightly wider than the apical margin of the first tergum. The hypopygium is short; the ovipositor sheath is less than half the length of the hind tibia, hidden by the hypopygium.

Material examined: INDIA: J&K, Kashmir: Ganderbal: Zazna; 1♀, 21.vi.2023; Manasbal; 1♀, 15.vii.2023; coll. S. Faizan Anayat (sweeping); Bandipora: Safapora; 2♀, 30.vii.2023; Asham; 1♀, 04.viii.2023; coll. S. Faizan Anayat (sweeping).
Host: Unknown

3. *Cotesia janati* Sathe and Bhoje
Diagnosis: Female. Body is 2.4mm long. Antenna is 16 segmented. Forewings are membranous. First abscissa is longer than pigmented portion of second abscissa of cubital which is equal to the apical portion of first abscissa of cubital. Transverse cubital vein is shorter than recurrent which is longer than width of metacarp. Metacarp is longer than the length of pterostigma (Fig.3). First tergite is rugose, narrow at the base, second tergite apically half brownish yellow which is smooth. Ovipositor basally narrow and apically broad. Ovipositor short, sheath without hairs smaller than femora, sparsely punctate apically.

Material examined: INDIA: J&K, Kashmir: Ganderbal: Nuner; 1♀, 18.vi.2023; Sehpora; 1♀, 22.vi.2023; coll. S. Faizan Anayat (sweeping); Bandipora: Naidkhai; 1♀, 28.vii.2023; Hajin; 1♀, 10.viii.2023; coll. S. Faizan Anayat (sweeping).
Host: Unknown

4. *Cotesia flavipes* Cameron
Diagnosis: Female. Length is 2.8mm. Antenna is 16 segmented. Forewings are hyaline without areolet. First abscissa of radius is equal to the pigmented portion of second abscissa of cubital; recurrent vein is longer than the transverse cubital and the upper portion of basal vein is longer than the apical portion of first abscissa of cubital (Fig.4). Metasomal tergite first narrow apically, second tergite broad usually sub-rectangular. Hypopygium short, ovipositor short and stout basally, ovipositor sheath with hairs concentrated apically.

Material examined: INDIA: J&K, Kashmir: Ganderbal: Rapore Lar; 1♀, 03.vi.2023; Gutlibagh; 1♀, 07.vi.2023; coll. S. Faizan Anayat (sweeping); Bandipora: Gundi Jahangir; 2♀, 28.vii.2023; coll. S. Faizan Anayat (sweeping).
Host: Unknown

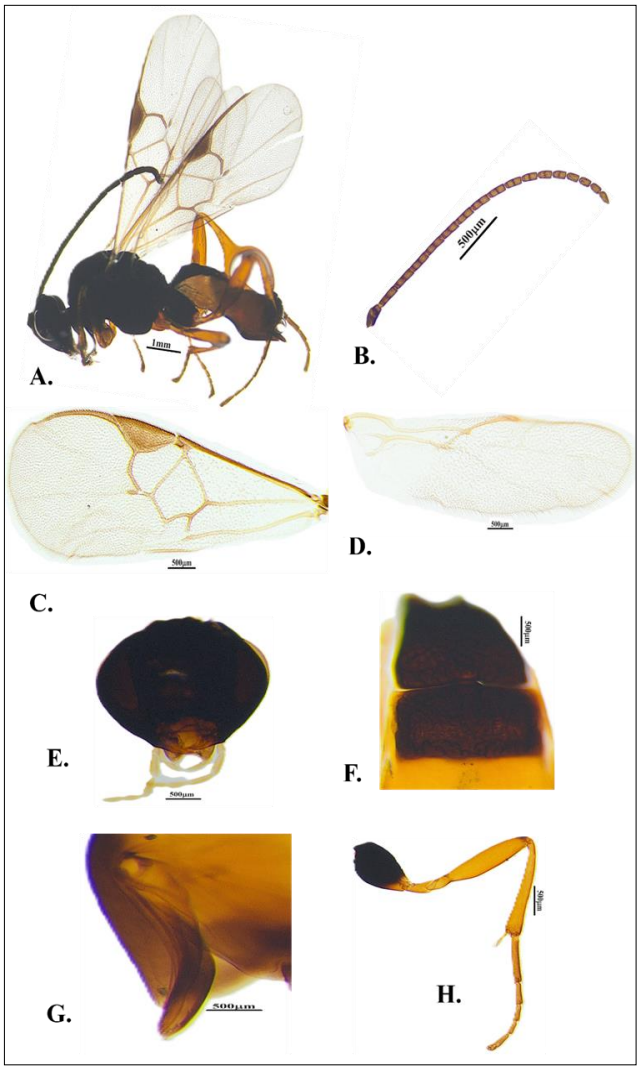

Fig 1: (A-H) *Cotesia anthelae* Wilkinson (female) A. adult, B. antenna, C. forewing, D. hindwing, E. head, F. metasomal tergite, G. ovipositor, H. hindleg

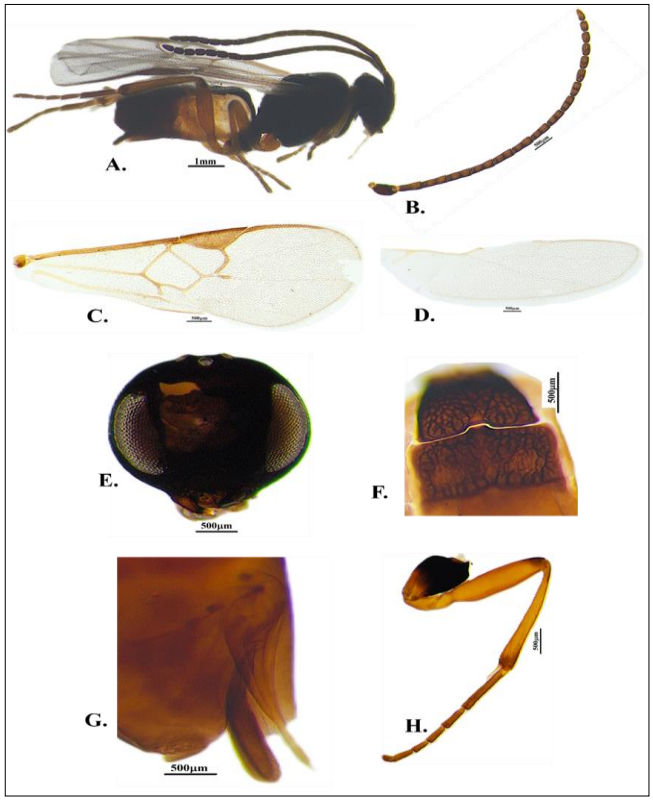

Fig 2: (A-H) *Cotesia tiracolae* (Ashmead) (female) A. adult, B. antenna, C. forewing, D. hindwing, E. head, F. metasomal tergite, G. ovipositor, H. hindleg

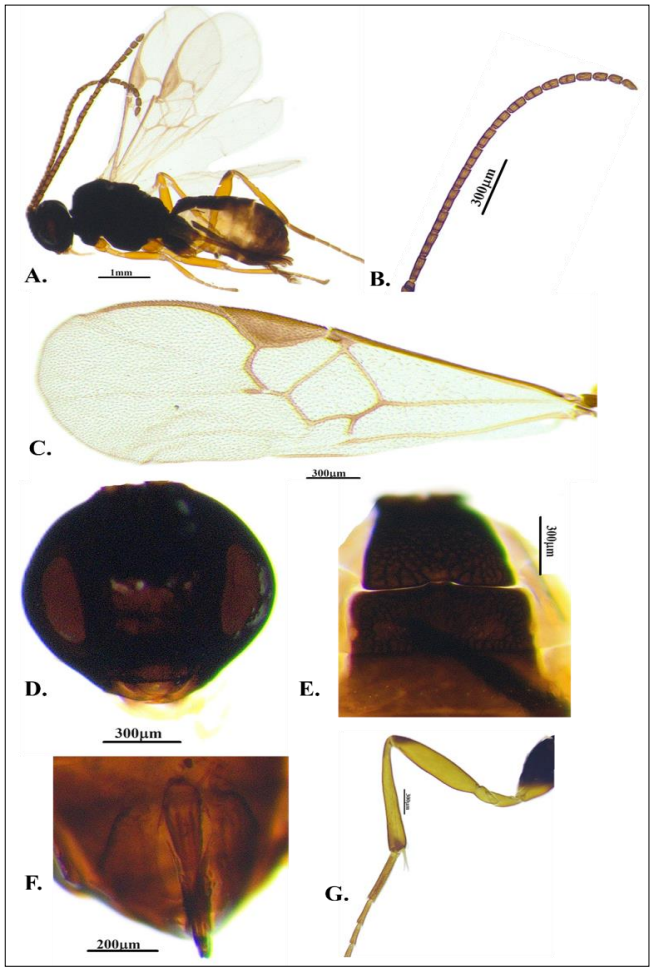

Fig 3: (A-G) *Cotesia janati* Sathe and Bhoje (female) A. adult, B. antenna, C. forewing, D. head, E. metasomal tergite, F. ovipositor, G. hind leg

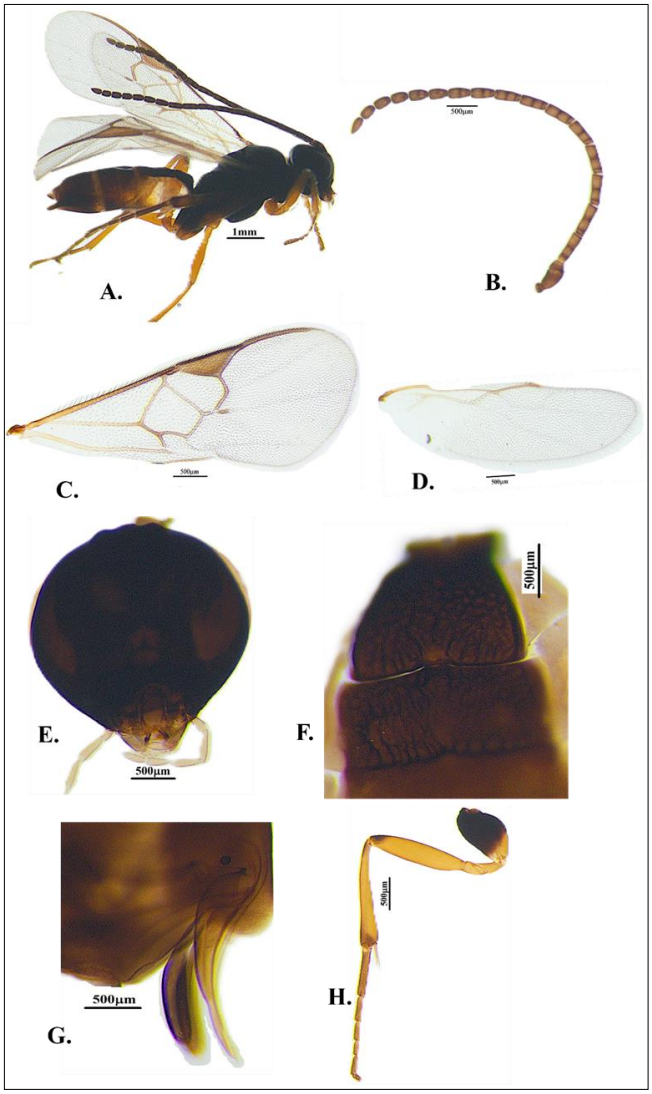

Fig 4: (A-H) *Cotesia flavipes* Cameron (female) A. adult, B. antenna, C. forewing, D. hindwing, E. head, F. metasomal tergite, G. ovipositor, H. hindleg

Discussion and Conclusion: *Cotesia* species are widely distributed in India, including Kashmir Valley. The exploration of *Cotesia* spp. from the Kashmir Valley has not been done earlier. During the present study, four species of the genus *Cotesia*: *Cotesia anthelae*, *C. tiracolae*, *C. janati* and *C. flavipes* were collected and identified for the first time from the Kashmir Valley. Our understanding of the variety of microgastrine parasitoids in the Kashmir Valley is thus expanding the biodiversity of Microgastrinae by this work.

Acknowledgement
Authors extend sincere gratitude to Vice chancellor of Central University of Kashmir, for providing the necessary research facilities for the present work.

References

1. Achterberg C, Polaszek A. The parasites of cereal stem borers (Lepidoptera: Cossidae, Crambidae, Noctuidae, Pyralidae) in Africa, belonging to the family Braconidae (Hymenoptera: Ichneumonoidea). Zoologische Verhandelingen,1996:304:1-123.
2. Austin AD, Dangerfield PC. Synopsis of Australasian Microgastrinae (Hymenoptera: Braconidae), with a key

to genera and description of new taxa. *Invertebrate Taxonomy*,1992:6(1):1-76.
3. Cameron P. Hymenopterological notices. I. On some Hymenoptera parasitic in Indian injurious insects. Memoirs and Proceedings of the Manchester Literary and Philosophical Society,1891:4:182-194.
4. Howard LO. and Ashmead WH. On some reared parasitic Hymenopterous insects from Ceylon. Proceedings of the United States National Museum,1896:18:633–648.
5. Mason WRM. The polyphyletic nature of *Apanteles* Förster (Hymenoptera: Braconidae): a phylogeny and reclassification of Microgastrinae. Memoirs of the Entomological Society of Canada,1981:115:1-147.
6. Nixon GEJ. A reclassification of the tribe Microgasterini (Hymenoptera: Braconidae). Bulletin of the British Museum (Natural History) Entomology, Supplement,1965:2:1-284.
7. Nixon GEJ. A revision of the north-western European species of the glomeratus-group of *Apanteles* Foerster (Hymenoptera, Braconidae). Bulletin of Entomological Research,1967:64:453-524.
8. Papp J. A survey of the European species of *Apanteles* Först. (Hymenoptera, Braconidae: Microgastrinae). IX. The glomeratus-group, 1. *Annales Historico-Naturales Musei Nationalis Hungarici*,1986:78:225-247.
9. Papp J. A survey of the European species of *Apanteles* Först. (Hymenoptera, Braconidae: Microgastrinae). X. The glomeratus-group, 2 and the cultellatus-group. *Annales Historico-Naturales Musei Nationalis Hungarici*,1987:79:207-258.
10. Rodriguez JJ, Fernandez-Triana JL, Smith MA, Janzen DH., Hallwachs W, Erwin TL, *et al*. Extrapolations from field studies and known faunas converge on dramatically increased estimates of global Microgastrine parasitoid wasp species richness (Hymenoptera: Braconidae). Insect Conservation and Diversity,2013:6(4):530-536.
11. Sathe TV, Bhoje PM. Biological Pest Control. Daya Publishing House, India, 2000, 122 pp.
12. Szépligeti G. Hymenoptera. Fam. Braconidae. Genera Insectorum,1904:22:1-253.
13. Wilkinson DS. A revision of the Indo-Australian species of the genus *Apanteles* (Hymenoptera: Braconidae). Part I. *Bull. Ent. Res*,1928a:**19**:79-105.
14. Wilkinson DS. A revision of the Indo-Australian species of the genus *Apanteles* (Hymenoptera: Braconidae). Part II. *Bull. Ent. Res*,1928b:**19**:109-146.
15. Yu DSK, van Achterberg C, Horstmann K. Taxapad 2012, Ichneumonoidea 2011. Database on flash-drive. Ottawa, Ontario, 2012.
16. Yu DSK, van Achterberg C, Horstmann K. World Ichneumonoidea 2015. Taxonomy, Biology, Morphology and Distribution. Taxapad, Database on flash-drive, Nepean, Ontario, Canada, 2016.