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## A NEW HOST RECORD AND A NEW COMBINATION IN *COTESIA CAMERON* (HYMENOPTERA: BRACONIDAE) FROM INDIA

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Genus *Cotesia* Cameron is the second largest genus of subfamily Microgastrinae (Hymenoptera: Braconidae) from the Indian region after *Apanteles* Förster. *Cotesia* is the commonest and the most ubiquitous genus, comprising nearly 1500–2000 species worldwide (Mason 1981). The species are mostly gregarious in nature with only a few solitary forms. They mainly parasitize caterpillars of Noctuidae, Geometridae and Saturniidae (Whitfield et al. 2009). Literature review shows that nearly 34 species are recorded from the Indian region (unpublished data of the first author) with a few cosmopolitan species. Some frequently encountered Indian species of the Genus *Cotesia* inhabiting various agro-ecosystems include *Cotesia flavipes* Cameron, gregarious parasitoid infesting graminaceous stem borers *Chilo partellus* (Swinhoe) and *Chilo sacchariphagus* (Bojer); *Cotesia vestalis* (Haliday), solitary parasitoid of the diamondback moth *Plutella xylostella* (L.); *Cotesia glomerata* (Linnaeus), potential parasitoid of *Pieris brassicae* (Linnaeus), *Pieris rapae* (Linnaeus), *Spodoptera frugiperda* (Smith), *Bombyx mori* (Linnaeus), *Agrotis ipsilon* (Hufnagel), *Lymantria dispar* (Linnaeus) and *Trichoplusia ni* (Hübner); *Cotesia kazak*

(Telenga), solitary larval parasitoid of *Helicoverpa armigera* (Hübner) and *Helicoverpa zea* (Boddie); *Cotesia marginiventris* (Cresson) infesting *Helicoverpa armigera* (Hübner) and *Spodoptera litura* (Fabricius); *Cotesia ruficrus* (Haliday) infesting *Pelopidas mathias* (Fabricius) on rice, *P. brassicae* (Linnaeus) and *P. rapae* (Linnaeus) on cabbage, *Pectinophora gossypiella* (Saunders) on cotton, *Plutella xylostella* (Linnaeus) on cabbage, *Helicoverpa armigera* (Hubner) on many crops, *Spodoptera* spp. and *Chilo* sp.; *Cotesia chilonis* (Munakata) infesting *Chilo partellus* (Swinhoe), *Chilo infuscatellus* Snellen and *Chilo suppressalis* Walker; *Cotesia sesamiae* (Cameron) as larval parasitoid of *Chilo partellus* (Swinhoe) and *Cotesia melanoscela* as parasitoid associated with *Lymantria dispar* Linnaeus.

In the present study, a new combination is proposed for *Cotesia tiracolae* (= *Apanteles tiracolae*), which is recorded as a larval parasitoid of *Phaedyra columella* (Cramer) (Lepidoptera: Nymphalidae) feeding on the host plant *Grewia tiliifolia* Vahl from Mumbai, Maharashtra, India. This is the first record of larval parasitism associated with *P. columella* from India. *Cotesia tiracolae* comb. nov. is redescribed and illustrated.

**Materials and Methods:** The wasps were bred from the parasitized caterpillar collected from Indian Institute of Technology, Mumbai campus. Specimens were preserved in 70% alcohol. Alcohol preserved specimens were critically point dried and later card mounted and identified consulting Wilkinson (1928) and Mason (1981). The parasitoid images were taken using a Leica M 205 A stereozoom microscope with Leica DC

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420 inbuilt camera using automontage software (version 3.8). Images of the host were captured using Canon Powershot SX30 IS.

## Results

### *Cotesia tiracolae* (Ashmead), new combination (Images 1–11)

*Apanteles tivacholae*, 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).

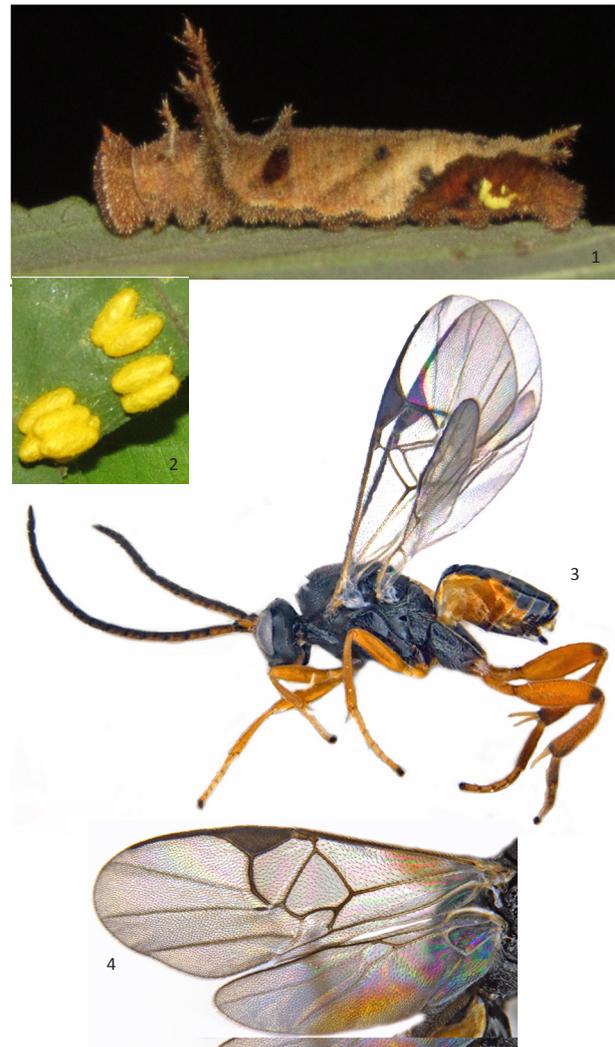
*Cotesia tiracolae* (Ashmead) comb. nov., Howard & Ashmead, 1896 is reassigned from the traditionally defined *Apanteles* based on the presence of the following characters:

**Material examined:** NBAll/Bra/Mic/Cot/tira/29612, 29.vi.2012, six females mounted on card, Powai, Maharashtra, India, bred from parasitized larvae of *Phaedyma columella* (Cramer) (Lepidoptera: Nymphalidae) on host plant *Grewia tiliifolia* Vahl, coll. Swapnil A. Lokhande. All specimens deposited in the National Bureau of Agriculturally Important Insects (NBAll), Bengaluru, India.

**Diagnosis:** Female (Image 3). Body length 2.5mm. Black. Antennae mostly black, scape yellow brown with apex black; tegulae brown; fore and mid legs testaceous red (except red brown coxae with slight bluish-black tinge dorsally). Hind coxa black with white apex, rugose punctate and shining. Hind femora tipped with black; hind tibia darkened towards apex and hind tarsi dark brown. Hind tibial spurs subequal and pale testaceous; individually shorter than half of basitarsus. Forewings with pterostigma and wing veins brown; R1 vein longer than stigma. Hindwings with margin of vannal lobe almost convex and hairy throughout (Image 4).

Head (Image 5) and mesosoma (Image 7) densely punctate, punctations denser in head. Mesoscutum evenly and strongly punctate; scutellum shining, shallowly and sparsely punctate. Propodeum (Image 8) rugose, without areola, with a more or less complete median longitudinal carina from which emerge oblique carinae, and with strong basal transverse carinae.

Metasoma laterally testaceous yellow-red except last and second last lateral tergites black; 1<sup>st</sup> and 2<sup>nd</sup> tergite with lateral margins pale testaceous, 3<sup>rd</sup> tergite testaceous red laterally, paler on latero-apical margin, suffused with black in the middle; basal ventrites testaceous yellow. Pale lateral margins of 1<sup>st</sup> and 2<sup>nd</sup> tergite narrower than lateral margins of 3<sup>rd</sup> tergum. Tergum 1<sup>st</sup> (Image 8) nearly



Images 1–4. 1 - Parasitised caterpillar of *Phaedyma columella* (Cramer); 2 - Cocoons of *Cotesia tiracolae* (Ashmead); 3 - Female wasp of *Cotesia tiracolae* (Ashmead), habitus view; 4 - Forewings and hindwings of *C. tiracolae* female. © 1,2 - Swapnil A. Lokhande; 3,4 Ankita Gupta

quadrate, hardly longer than wide, its lateral margins subparallel with corners rounded; apical half coarsely but sparsely sculptured. Tergum 2<sup>nd</sup> indefinitely sculptured with lateral sulci, basal margin little wider than apical margin of tergum 1<sup>st</sup>, tergum 2<sup>nd</sup> shorter in median length than 3<sup>rd</sup> but longer than 4<sup>th</sup>, subrectangular and indefinitely sculptured. Tergum 3<sup>rd</sup> subrectangular and smooth. 4<sup>th</sup> and 5<sup>th</sup> tergites testaceous yellow medio-laterally with posterior margin black. Hypopygium short; ovipositor sheath shorter than half length of hind tibia, concealed by hypopygium, with a few hair concentrated at apex.

**Types:** Wilkinson (1928) redescribed this species from a cotype given by Dr. A.B. Gahan to the British Museum and from five females and one male, 10.i.1919, ex. larvae



Images 5–8. Frontal view of head, *C. tiracolae* female; 6 - Fore tarsus, *C. tiracolae* female; 7 - Mesosoma with part of first metasomal tergite, *C. tiracolae* female; 8 - Propodeum & metasoma, *C. tiracolae* female. © Ankita Gupta

of *Tirachola plagiata* Walker, type locality Ceylon.

**Remarks:** Both the genera, *Apanteles* Förster and *Cotesia* Cameron, are described in detail by Mason (1981). Genus *Cotesia* can be identified with following key characters: Propodeum mostly rugose, usually with a median carina and a short transverse carina running mesad from near the spiracle, never with an areolet, short inflexible hypopygium, short ovipositor. Tergum 1<sup>st</sup> parallel sided or broadened posteriorly, mostly rugose. 2<sup>nd</sup> tergum rectangular, rugose. The key characters of the Genus *Apanteles* include: Propodeum never showing trace of a median longitudinal carina but instead more or less well defined areola and costulae; ovipositor sheath usually long and hairy throughout. Hindwing with vannal lobe margin typically concave and hairless on the posterior part, in extreme case convex, though curve is somewhat flattened and sparsely hairy.

The original description of '*tivacholae*' given by Ashmead (1896) lacks characters of propodeum which

are very important in correct placement of species in the genus. The species description was based on 36 females and 14 males bred from larvae of *Tirachola plagiata* Walker. It mentions "two basal joints of antennae brownish-yellow. The legs are brownish-yellow, but all coxae black, while the apex of hind femora, apex of their tibiae and their tarsi are fuscous, the scutellum is smoother; the abdomen is as long as the thorax and except venter, the membranous margins of first and second segments and lateral dorsal spots on third and fourth segments, which are yellow and sometimes confluent, is black; the plate of first segment is long trapezoidal, more than twice as long as wide at apex and shagreened apically; the second is as long as the fourth, feebly shagreened; the third is very short".

The diagnostic characters of this species agree with the redescription of '*tiracholae*' given in Wilkinson (1928). In the key to Indo-Australian species of Genus *Apanteles* provided by Wilkinson (1928) the species is placed in couplet 45<sup>th</sup>. The description includes



Images 9–11. 9 - Caterpillar of *Phaedyma columella* (Cramer); 10 - Host plant *Grewia tiliifolia* Vahl; 11 - Adult of *Phaedyma columella* (Cramer). © 9 - Swapnil A. Lokhande & 10,11 - Abhay Soman

propodeum characters stating “propodeon rugose with median longitudinal carina from which emerge oblique carinae and with strong basal transverse carinae”.

Considering the following contradicting characters: Propodeum with strong rugosity and distinct median longitudinal carina, areola absent; shape and sculpture of 1<sup>st</sup> and 2<sup>nd</sup> tergite (similar to that of Genus *Cotesia*), the species is proposed to be rightly placed in Genus *Cotesia* instead of *Apanteles*.

**Distribution:** India (New distribution record) and Sri Lanka.

**Host record:** *Phaedyra columella* larva (Lepidoptera: Nymphalidae) on host plant *Grewia tiliifolia* Vahl. Also recorded from *Agrotera basinotata* Hampson (Lepidoptera: Crambidae), defoliator of *Lagerstroemia parviflora* from Central India, ICFRE (2009) and *Tiracola plagiata* (Walker) (Lepidoptera: Noctuidae) from Sri Lanka, Yu (2012).

### Discussion

Both species, *Cotesia tiracola* (Ashmead) and *Protapanteles neptisis* (Watanabe) attack same host Genus *Neptis*. *P. neptisis* is recorded as a larval parasitoid of *Neptis coenobita* Goeze (Lepidoptera: Nymphalidae) (Yu 2012). Morphologically, the genus *Protapanteles* is very close to the genus *Cotesia* (Whitfield 1997). Hence, both species are compared here as *C. tiracola* can be confused in identification with *P. neptisis*. It differs in the following characters of *P. neptisis* - head, disc of scutellum and hind coxae smooth; cocoons white; first tergite 1.5x longer than wide.

### Conclusion

*Cotesia tiracola* (Ashmead 1896), new combination, is redescribed and illustrated from India. *Phaedyra columella* larva parasitised by *C. tiracola* confirms that this parasitoid is capable of infecting Nymphalidae in addition to the known host spectrum belonging to Crambidae and Noctuidae.

### REFERENCES

- Howard, L.O. & W.H. Ashmead (1896).** On some reared parasitic Hymenopterous insects from Ceylon. *Proceedings of the United States National Museum* 18: 633–648.
- ICFRE (2009).** Annual Report 2009–10. <<http://www.icfre.org/UserFiles/File/Annual-Report-2009-10-English-19Apr12/Forest-Protection.pdf>>. Downloaded on 31 July 2012.
- Mason, W.R.M. (1981).** The polyphyletic nature of *Apanteles* Förster (Hymenoptera: Braconidae): a phylogeny and reclassification of Microgastrinae. *Memoirs of the Entomological Society of Canada* 115: 1–147.
- Whitfield, J.B. (1997).** Subfamily Microgastrinae, pp. 333–364. In: Wharton, R., P.M. Marsh & M.J. Sharkey (eds.). *Manual of the New World genera of the family Braconidae (Hymenoptera)*. Special Publication No. 1, International Society of Hymenopterists, Washington, D.C.
- Whitfield, J.B., J.J. Rodriguez & P.K. Masonick (2009).** Reared microgastrine wasps (Hymenoptera: Braconidae) from Yanayacu Biological Station and environs (Napo Province, Ecuador): diversity and host specialization. *Journal of Insect Science* 9: 1–22.
- Wilkinson, D.S. (1928).** A revision of the Indo-Australian species of the genus *Apanteles* (Hymenoptera: Braconidae)—Part I. *Bulletin of Entomological Research* 19: 109–146.
- Yu, D. (2012).** *Home of Ichneumonoidea*. <<http://www.taxapad.com>>. Downloaded on 31 July 2012.

