



## Distributional records of *Xanthopimpla* Saussure (Hymenoptera: Ichneumonidae: Pimplinae) from the southern Western Ghats with description of three new subspecies

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**ABSTRACT:** The distribution and diagnostic features of the species belonging to the genus *Xanthopimpla* Saussure from the southern Western Ghats are discussed. A total of 13 species groups are recorded, of which *Cuneata* species group is recorded for the first time from the region. Of the 34 species identified, six species are recorded as new to the study area, viz., *X. exigua*, *X. laticeps*, *X. verrucula*, *X. nigritarsis*, *X. sikkimensis* and *X. clivulus*, of which first three are new records to India. Three new subspecies are described with key. © 2018 Association for Advancement of Entomology

**KEY WORDS:** *Xanthopimpla*, diagnostic features, subspecies, *Cuneata*, Western Ghats, India

### INTRODUCTION

The genus *Xanthopimpla* Saussure, first described by Saussure (1892) with *Xanthopimpla hova* as its type species, belongs to the tribe Ephialtini of subfamily Pimplinae. *Xanthopimpla* is one of the largest genera of tribe Ephialtini, which include 261 species from the World, of which 165 species are described from Indo-Australian region (Townes and Chiu, 1970; Pham *et al.*, 2011). The genus is represented by 41 species with 12 subspecies from India, of which 28 species with 5 subspecies are reported from the southern Western Ghats (Akhtar *et al.*, 2010). In India, major works on *Xanthopimpla* have been published by Morley

(1913), Cameron (1911), Townes and Chiu (1970), Townes and Gupta (1961), Patil *et al.* (1995), Akhtar *et al.* (2010), and Chougale (2016). One of the significant works on the fauna of *Xanthopimpla* was that of Townes and Chiu (1970) from Indo-Australian area. They categorized the genus into 20 species groups, of which 12 groups are known from southern Western Ghats. The genus *Xanthopimpla* can be easily identified by their stout, yellowish body with black spots or bands, clypeus divided by a median transverse suture and the narrow, pointed apex of mandible, which is twisted so that the lower tooth is directly behind the upper tooth. These parasitic wasps are important due to their abundance and their role as biological control

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agents, and the diversity in host records. The biogeographical data of species recorded from the southern Western Ghats is scattered. In this paper, an attempt is made to compile the distributional data with diagnostic features of all the species recorded.

## MATERIALS AND METHODS

Specimens of the present study were collected using malaise trap and sweep net. Specimens were preserved in 70% alcohol. Pinned and dried specimens were observed under Magnus Stereozoom binocular microscope and were identified up to species and further to subspecies level, using the keys of Townes and Chiu (1970). Photographs were taken using Leica M80 microscope with Leica MC170 HD camera. Loaned specimens from Ashoka Trust for Research in Ecology and Environment (ATREE), Bengaluru were also included in this study. Specimens preserved in the collection of ICAR-NBAIR, Bangalore; University of Calicut; WGRC Kozhikode and NBRL, Kozhikode were also studied. Photographs of types, holotypes or paratypes of the species recorded from the study area but not represented in the present collection were obtained from International depositories in USA, Germany and Canada. Terminology used in this paper follows Townes (1969) and Wahl and Sharkey (1993).

Abbreviations used in the text are:

F = Female; M = Male; HW = Head Width; HL = Head Length; FWW = Fore wing width; FWL = Fore wing length; HWW = Hind wing width; HWL = Hind wing length; T2 - T8 = Metasomal tergites first to eighth; F1 - F42 = Flagellomeres first to Forty two segments; ATREE - Ashoka Trust for Research in Ecology and Environment, Bengaluru

- BMNH - British Museum of Natural History London  
 CNCI - Canadian National Collection of Insects, Ottawa  
 DEI - Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany  
 FDAC - Florida Department of Agriculture and Consumer Services, Gainesville, Florida

- GBNH - Berlin Natural History Museum, Germany  
 GPTA - Delhi University, Department of Zoology, Gupta Collection, Delhi India  
 HMUG - Glasgow University, Hunterian Museum, Glasgow, United Kingdom  
 MZPW - Polish Academy of Science, Museum of the Institute of Zoology, Warsaw, Poland  
 NBAIR - National Bureau of Agriculture Insect Resources, Bengaluru, India  
 NBRL - Prof.T.C.Narendran (TCN) Biodiversity Research Laboratory, The Zamorin's Guruvayurappan College, Kozhikode  
 NHRS - Naturhistoriska riksmuseet, Stockholm, Sweden  
 OUMNH - University Museum of Natural History, Oxford, United Kingdom  
 RMNH - Netherland Centre for Biodiversity Naturalis, Leiden, Netherland  
 USNM - National Museum of Natural History, Washington D.C., USA  
 USU - Utah State University, Logan  
 UUZM - Uppsala University, Uppsala, Sweden  
 WGRC - Western Ghats Regional Centre, Zoological Survey of India, Kozhikode  
 ZMAN - Universiteit van Amsterdam, Instituut voor Taxonomische Zoologie, Zoologisch Museum, Amsterdam, Netherlands  
 ZMUC - University of Copenhagen, Zoological Museum, Copenhagen, Denmark

The holotypes of the new subspecies are deposited in Prof. T.C.Narendran Biodiversity Research Laboratory (NBRL) for the time being, which will later be transferred to WGRC, Zoological Survey India, Kozhikode.

## RESULTS

The present study recognizes 13 species group under the genus *Xanthopimpla* from the southern Western Ghats with a total of 34 species and 18 subspecies, which includes 6 new records and

description of three new subspecies, viz., *X. elegans priyadarsanani* sub sp.nov., *X. elegans kadnurensis* subsp.nov. and *X. nigratarsis wayanadensis* subsp.nov. The thirteen species groups from the study are the Brachycentra, Citrina, Cuneata, Elegans, Incompleta, Nana, Occidentalis, Punctata, Regina, Stemmator, Terebatrix, Trunca, and Xystra. Among them Cuneata is recorded for the first from the southern Western Ghats. A key to the subspecies of *X. elegans* is also provided, with the description of the new subspecies. Six new records from the southern Western Ghats are, *X. laticeps*, *X. exigua*, *X. verrucula*, *X. sikkimensis*, *X. clivulus* and *X. nigratarsis* of which first three are new records to India. Distribution of *Xanthopimpla* sp. in the southern Western Ghats is shown in the map

#### **BRACHYCENTRA SPECIES GROUP**

**Diagnosis:** Mesoscutum with dense hairs between tegulae; largest bristles of mid and hind tarsal claws not widened apically; fore wing with areolet closed; ovipositor sheath 0.25 – 0.7x as long as hind tibia.

#### ***Xanthopimpla platyura* Townes & Chiu, 1970**

*Xanthopimpla platyura* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.* 14: 199. Holotype: ♀, Devala, Nilgiri Hills, south India (CNCI)

**Diagnosis:** Lateral flange of scutellum very high; areola 1.0 as long as wide; tergite3-5 with dense coarse punctures; ovipositor sheath 0.7 x as long as hind tibia.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu, 1970).

**Material examined:** Nil. Photographs of **Holotype**- 1♀, INDIA: Devala, Nilgiri Hills, x.1960, Nathan, CNCI examined.

**Remarks:** The diagnosis is based on the original description (Townes & Chiu, 1970) and the Photographs obtained from the CNCI, Ottawa.

#### ***Xanthopimpla reicherti reicherti* Krieger, 1914**

*Xanthopimpla reicherti* Krieger, 1914. *Arch. f. Naturgesch.*, (A) 80 (6): 40, 89. Lectotype: ♀, Myanmar: Pekon on Loikaw River, Karenni State (GBNH).

*Xanthopimpla reicherti reicherti* Townes and Chiu, 1970. *Mem. Amer. Ent. Inst.* 14:187, ♂, ♀. Key, des., fig Type: ♀, China.

**Diagnosis:** Scutellum evenly convex; areola as long as wide; hind tibia with 5 - 6 preapical bristles; T1, T3, T7 each with black band; T4 & T5 each with two black spots; T2 nearly impunctate; T3 - T5 densely, coarsely punctate; ovipositor sheath 0.5x as long as hind tibia; mesoscutum with a transverse black band and a black spot in front of scutellum.

**Distribution:** Townes and Chiu (1970) previously recorded from the Karanataka region.

**Material examined:** Nil. Photographs of **Type:** 1♀, Tekoxloikaw R, GBNH; **Paratype:** 1♀, Tongking; Fruhstorfer.v, Townes, GBNH examined.

**Remarks:** The diagnosis is based on the original description (Krieger, 1914) and the photographs obtained from GBNH.

#### ***Xanthopimpla walshae walshae* Townes & Chiu, 1970**

*Xanthopimpla walshae* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.* 14: 199. Holotype:♀, Pelabuhan Ratu, Java (USU).

**Diagnosis:** Lateral flange of scutellum rather narrow, gradually narrower towards apex; carinae surrounding areola weak; T6 with a pair of black spots; middle and hind tibia with 3 to 5 preapical bristles; hind femur with a black stripe below and another near upper edge on hind side.

**Distribution:** Townes & Chiu (1970) previously recorded this species from Tamil Nadu.

**Material examined:** Nil. Photographs of **Holotype:** 1♀, INDONESIA: West Java, USU examined

**Remarks:** The species is not represented in the present collection and the diagnosis is based on the original description (Townes & Chiu, 1970) and Photographs obtained from the USU collection, Logan, USA.

#### **CITRINA SPECIES GROUP**

**Diagnosis:** Body and legs entirely yellow; except black ocellar area; clypeus weakly convex; lower front corner of the pronotum a broadly rounded

angle of about 110°; mesoscutum with notaulus almost extending to anterior of tegula; scutellum evenly convex, lateral flange moderately high, reaching to apex; fore wing with areolet closed; largest bristles of mid and hind tarsal claws distinctly widened, black apically; areola closed, completely bounded by strong carina; ovipositor stout; ovipositor sheath about 0.65x as long as hind tibia.

***Xanthopimpla enderleini* Krieger, 1915**  
(Plate 3, Fig. g, h)

*Xanthopimpla enderleini* Krieger, 1914. *Arch. f. Naturgesch.*, (A) 80 (6): 35. Lectotype: ♀, Indonesia: Sumatra (MZPW).

**Diagnosis:** Stigma dark brown; areola receiving costula at the centre; areola 1.05 to 1.45x as long as wide.

**Distribution:** Townes & Chiu in 1970 recorded this species from Tamil Nadu

**Material examined:** 2♀, INDIA: Kerala, Kottayam, Kumarakom, (N9°61'75"-E76°43'00"), Santhosh S, 17.iv.2004.

***Xanthopimpla flavolineata* Cameron, 1907**  
(Plate 1, Fig. f)

*Xanthopimpla flavolineata* Cameron, 1907b. *Tijdschr. V. Ent.* 50: 48, jk, keydes. Type: kdj, New Guinea: Merauke (ZMAN).

*Xanthopimpla emaculata* Szepliget, 1908. *Notes Leyden Mus*, 29; 256. ♀. Key, des, Type: ♀, Java: Semarang (Budapest). Syn, by Townes & Chiu, 1970.

*Xanthopimpla immaculata* Morley, 1913. *Fauna of British India....Hymenoptera*3(1): 115. ♂, ♀. Key, des. Type: ♀. India: Chapra in Bihar (New Delhi). Paratype seen in London. syn. under *emaculata* by Cushman, 1925

*Xantopompla hyaloptila* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 35. key; (A) 80 (7):16, ♂. des, fig. Type: ♂, Australia: North Queensland (Berlin). Syn, by Townes & Chiu, 1970.

*Xanthopimpla xanthostigma* Girault, 1925. *Insecutor Inscitiae Menstruus*13:38. ♀. des. Type: ♀ Australia: Amamoor forest (Brisbane). Syn, by Townes & Chiu, 1970.

*Xanthopimpla xara* Cheesman, 1936. *Trans. R. Ent.Soc.* : 85:179. ♀. des., fig. Type: ♀, New Hebrides Is: N.E Malekula (London). New

Hebrides Is: South West Bay on Malekula. Syn, by Townes & Chiu, 1970.

*Xanthopimpla* sp. Townes, 1947. *Results of an entomological inspection tour of Micronesia*. Mimeographed p.47. Micronesia: Yap; Palau.

*Metopius sesamiae* Rao, 1953. *Indian Forest. Rec.* (n.s., Ent.) 8:184. des., fig. Type, India : Bengaluru ( Dehra Dun). Syn, by Townes & Chiu, 1970.

*Xanthopimpla* spp. Krishnamurti and Usman, 1955. *Indian Jour. Ent.* 16:333. India: Bengaluru; Mandya.

*Xanthopimpla sesamiae* Townes, Townes and Gupta, 1961. *Mem. Amer. Ent. Inst* 1:67.n.comb.

**Diagnosis:** Stigma light brown; areola receiving costula behind the centre; areola 0.82 to 1.35x as long as wide.

**Distribution:** This species has been previously recorded from Karnataka, Kerala and Tamil Nadu (Townes and Chiu, 1970).

**Material examined:** 1♀, INDIA: Kerala, Kozhikode, Nanminda (N11°42'23"- E 75°83'16"), Manjusha B.M, 12.v.2016; 4♀, INDIA: Kerala, Thrissur (N10°52'76"- E76°21'44"), Beena P, 1.v.1998; 6♀, INDIA: Kerala, Malappuram, Calicut University campus (N11°70'20"- E75°51'22"), Sudheer K, 30.iv.2001; 1♀, INDIA: Kerala, Malappuram, Calicut University campus (N11°70'20"- E75°51'22"), Girish K, 30.iv.2001; 1♀, INDIA: Kerala, Malappuram, Chaliyar (N11°05'75"- E76°06'57"), Girish K, 14.iii.2003; 1♀, INDIA: Tamil Nadu, Tiruvallur (N13°25'44"- E 80°00'87"), Diravium, 4.iv.2003; 1♀, INDIA: Tamil Nadu, Kanchipuram (N12°83'41"- E79°70'36"), Diravium, 2.v.2003; 1♀, INDIA: Kerala, Kannur, Azhikode (N11°91'70"- E75°33'53"), Sudheer K, 16.ii.2003; 1♂, INDIA: Kerala, Kannur, Azhikode (N11°91'70"- E75°33'53"), Girish K, 16.ii.2003; 4♀, INDIA: Kerala, Kottayam, Kumarakom (N9°61'75"- E76°41'00"), Girish K, 17.iv.2004; 3♀, INDIA: Kerala, Kottayam, Kumarakom (N9°61'75"- E76°41'00"), Sudheer K, 17.iv.2004; 2♀, INDIA: Kerala, Kottayam, Kumarakom (N9°61'75"- E76°43'00"), Santhosh.S, 17.iv.2004; 1♀, INDIA: Kerala, Alappuzha, Kayamkulam (N9°17'48"- E76°50'13"), Sudheer K, 19.iv.2004; 1♀, INDIA: Kerala, Alappuzha, Kayamkulam (N9°17'48"- E76°50'13"), Girish K, 20.iv.2004;

1♀, INDIA: Kerala, Alappuzha (N9°49'80"-E76°33'88"), Ranjith A.P, 5.ii.2012; 1♀, INDIA: Kerala, Trivandrum, Amaravila (N9°44'58"-E76°54'09"), Rajesh K.M, 25.i.2013; 1♀, INDIA: Kerala, Kottayam, Changanassery (N8°40'67"-E77°10'82"), Ranjith A.P, 23.i.2013; 2M, INDIA: Kerala, Ernakulam, Mulamthuruthy (N9°90'03"-E76°38'44"), Rajesh K.M, 26.i.2013; 1♀, INDIA: Kerala, Malappuram, Perassannur (N10°84'94"-E76°06'52"), Rajesh K.M, 22.iii.2013; 1♀, INDIA: Kerala, Kasaragod (N12°51'02"-E74°98'51"), Rajesh K.M, 28.ix.2013; 2♀, INDIA: Kerala, Kannur, Nellikapalam (N11°96'26"-E75°75'64"), Rajesh K.M, 29.xi.2013; 1♂, INDIA: Kerala, Kannur, Kaiveli (N11°76'85"-E75°44'38"), Rajesh K.M, 28.xi.2013; 1♂ & 1♀, INDIA: Kerala, Kozhikode, Perambra (N11°56'39"-E75°75'64"), Rajesh K.M, 10.viii.2014; 2♂, INDIA: Kerala, Perumthuruthy (N9°41'02"-E76°52'71"), Rajesh K.M, 25.ix.2014; 1♀, INDIA: Kerala, Kannur, Kudukkimotta (N11°91'30"-E75°45'70"), Ranjith A.P, 29.xi.2014; 1♂ and 1♀, INDIA: Kerala, Kottayam, Vazhappally (N9°45'65"-E76°52'71"), Rajesh K.M, 19.xi.2014; 1♀, INDIA: Kerala, Kozhikode, Thikkodi (N11°49'51"-E75°62'38"), Manjusha B.M, 8.x.2015; 1♀, INDIA: Kerala, Kozhikode, Balussery (N11°44'13"-E75°82'01"), Manjusha B.M, 16.v.2015; 1♂, INDIA: Kerala, Kannur, Madaippara (N12°03'23"-E75°25'66"), Manjusha B.M, 22.v.2016; 1♀ and 1♂, INDIA: Kerala, Idukki, Pambadumshola (N10°07'34"-E77°14'58"), Ranjith A.P, 2.iv.2016; 1♀ and 1♂, INDIA: Kerala, Kozhikode, Kakkayam (N11°54'72"-E75°89'26"), Manjusha B.M, 20.x.2016.

#### CUNEATA SPECIES GROUP

**Diagnosis:** Lower front corner of the pronotum a round angle of about 135°; mesoscutum with sparse hairs; scutellum conical or pyramidal, lateral flange reaching the apex; subtegular ridge sharp; fore wing with areolet closed; largest bristles of mid and hind tarsal claws distinctly widened, black apically; hind tibia with some small apical bristles; propodeum with pleural area divided into two areas by posterior transverse carina; ovipositor sheath 0.2 - 0.3x hind tibia.

#### *Xanthopimpla clivulus clivulus* Townes & Chiu, 1970 (Plate 1, Fig. c)

*Xanthopimpla clivulus clivulus* Townes & Chiu, 1970. Mem. Amer. Ent. Inst., 14: 161. ♀. key, des., fig.

**Diagnosis:** Eyes deeply notched near the antennal sockets; scutellum strongly convex; juncture of lateral longitudinal carina with costula little raised than juncture of lateral and apical transverse carina; mesoscutum with 3 transverse markings, middle one notched, a single spot on posterior end, a pair of black spot on propodeum (1st two lateral area), T1-T6; a transverse band in T7, T8 with two light brown spot, apex of all hind tarsomere light brown, two transverse band on hind femur and tibia.

**Distribution:** Previously recorded from Malaya, Java and Borneo (Townes & Chiu, 1970).

**Material examined:** 1♀, INDIA: Kerala, Idukki, Pambadumshola (N10°07'34"-E77°14'58"), Ranjith A.P, 8.iv.2016.

**Remarks:** This species is recorded for the first time from the Southern Western Ghats also this sub sp. recorded for the first time from India.

#### ELEGANS SPECIES GROUP

**Diagnosis:** Lower anterior corner of pronotum a sharp angle of 90° - 100°; mesoscutum with sparse hairs on anterior part, notaulus moderately long and deep; scutellum strongly convex, lateral carina extending to apex; fore wing with areolet closed, receiving second recurrent vein at very near apex.

**Distribution:** Karnataka, Kerala and Tamil Nadu

#### *Xanthopimpla elegans* (Vollenhoven), 1879

*Pimpla elegans* Vollenhoven, 1879. *Stettin. Ent. Ztg.* 40: 147. Holotype: ♀, Indonesia: Java (RMNH).

*Xanthopimpla elegans*: Krieger (1914). *Arch. f. Naturgesch.* (A)80(6):14.n.comb.

*Pimpla apicipennis* Cameron, 1899. *Mem. & Proc. Manchester Lit. Phil. Soc.* 43 (3): 161. Holotype: ♀, India: Khasi Hills in Assam (OUMNH). syn.by Krieger, 1914.

*Xanthopimpla elegans apicipennis*: Townes & Chiu (1970). *Mem. Amer. Ent. Ins.*, 14:247. ♂, ♀. n.status, key, syn. des., fig. Syn.by Pham, 2011.

**Diagnosis:** Mesoscutum with three continuous black spots on anterior end and one black mark in front of scutellum; areola closed; punctures on upper half of mesopleuron small to medium sized; T1, T3, T5, and T7 always with large black spots or with black bands; ovipositor sheath about 1.0 - 1.5x hind tibia.

**Remarks:** In Oriental region, three subspecies are recognized: *X. e. elegans* Vollenhoven from India, Sri Lanka, Myanmar, Thailand, Vietnam, Malaysia, Singapore, and Indonesia, *X. e. cristaminor* Townes & Chiu from the Philippines, and *X. e. insulana* Krieger from Taiwan. There are four subspecies recognized in this present study differing in size of thoracic punctures, colour pattern and length of ovipositor, including two new subspecies and one new report (*X. e. cristaminor*) from the southern Western Ghats.

#### KEY TO SUBSPECIES OF *XANTHOPIMPLA ELEGANS* (VOLLENHOVEN) OF THE SOUTHERN WESTERN GHATS

1. Mesopleural punctures 0.6 x the distance between the spots, close and coarse; ovipositor sheath <1.5x long as hind tibia.....  
.....*X. e. kadnurensis* sub sp.nov.
- Mesopleural punctures 0.1x the distance between the spots, shallow; ovipositor sheath equal or >1.5x long as hind tibia .....2
2. Mesoscutum with punctures 0.5x distance between the spots on front half of lateral lobe; apex of fore wing faintly infuscate .....*X. e. cristaminor* Townes & Chiu
- Mesoscutum with punctures 0.2 x distance between the spots on front half of lateral lobe; apex of fore wing distinctly infuscate .....3
3. T2 with paired black spot; segments 1-2 of hind tarsus largely infuscate .....  
.....*X. e. elegans* (Vollenhoven)
- T2 yellow; segments 1-2 of hind tarsus yellow.....*X. e. priyadarsanani* subsp.nov.

a) *X. elegans cristaminor* Townes & Chiu, 1970 (Plate 2, Fig. e)

*Xanthopimpla elegans cristaminor* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 251. Holotype: ♀. San Luis, Philippines (USNM)

**Diagnosis:** Punctures on front half of lateral lobe of mesoscutum 0.5 x distance between the spots; areola wider than long, all tergites with pair of spots or transverse band; hind tarsus brown except apex of first tergite; mid and hind tibia with 3 apical and 3 pre-apical bristles.

**Material examined:** 1♀, INDIA: Kerala, Pambadumshola (N10°07'34"- E77°11'51"), Ranjith A.P, 8.iv.2016.

b) *X. elegans elegans* (Vollenhoven), 1879 (Plate 1, Fig. a)

*Pimpla elegans* Vollenhoven, 1879. *Stettin. Ent. Ztg.* 40: 147. ♀. des. Type: ♀, Java. (RMNH)

*Xanthopimpla claripennis* Cameron, 1905c. *Jour. Straits Branch Roy. Asiatic Soc.* 44: 119. [♀]. des. syn by Townes & Chiu, 1970.

*Xanthopimpla taprobanica* Cameron, 1905b. *Spolia Zeylanica* 3: 135. ♀. des. Type: ♀, Ceylon: Kandy (London). syn. by Krieger, 1914.

*Xanthopimpla claripennis* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 14. des. syn by Townes & Chiu, 1970

*Xanthopimpla elegans* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 15. des.

*Xanthopimpla melampus* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 23, 105. B&, ♀. key, des., fig. syn by Townes & Chiu, 1970.

*Xanthopimpla interrupta* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 23, 107. ♀. key, des., fig. syn by Townes *et al.*, 1961.

*Xanthopimpla elegans elegans* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14:249. M, F.n.status, key, syn., des., fig.

**Diagnosis:** Mesoscutum with 3 separate spots on anterior end, middle one notched, all tergites with a pair of spots or transverse band, mid and hind tibia with 4 apical and pre- apical bristles.

**Material examined:** 1♀, INDIA: Kerala, Kollam, Erikkapara (N8°54'54" - E77°06'28"), Priyadarsanan D. R, 5.ii.2009; 1♀, INDIA: Kerala, Kannur, Aralam, Pookkundu (N11°56'02"- E75°48'22"); Seena K, 13.iv.2009; 2♀, INDIA: Kerala, Kollam, Erikkapara (N8°54'54"- E77°06'28"), Priyadarsanan D. R, 9.iv.2009; 1♂, INDIA: Kerala, Kannur, Aralam, Pookkund (N11°56'02"- E75°48'22"), Seena K, 13.iv.2009; 1♀ and 1♂, INDIA: Kerala, Kollam,

Erikkapara (N8°54'54"- E77°06'28"), Priyadarsanan D. R, 18.iii.2009; 1♀, INDIA: Kerala, Kollam, Erikkapara (N8°54'54"- E77°06'28"), Priyadarsanan D. R, 5.ii.2009; 1♀, INDIA: Kerala, Janakikkadu (N11°63'15"- E75°78'61"), Ranjith A.P, 24.iv.2015; 1♀ & 1♂, INDIA: Kerala, Wayanad, Mananthawady (N11°76'92"- E75°98'27"), Manjusha B.M, 22.ii.2016.

c) *X. elegans priyadarsanani* subsp. nov.  
(Plate 2, Fig. a)

**Diagnosis:** Mesopleural punctures 0.1 x the distance between the spots, mid and hind tibia with 3 apical and 3 pre-apical bristles; all tergites except 2 with pair of spots or transverse band; mid and hind last 2 tarsomere black; ovipositor sheath 1.5 x as long as hind tibia.

**Description: Holotype:** Female body length: 12 mm (Including ovipositor)

**Head:** In dorsal view HL = 2.2 mm and HW = 0.3 mm, in front view HL = 1.52 mm and HW = 2 mm; face uniformly punctate, punctures shallow, with hairs, frons with deep groove between antennal socket; clypeus minutely punctate hairy, apex projected forward, hairs longer than face; mandible and malar space densely pubescent; malar space 0.8 x basal width of mandible; inter ocellar distance 0.9x ocello-ocular distance, 0.67x distance between median and lateral ocelli; vertex smooth, a median groove between 2 median ocelli, margin of face in front portion projected forward so that clypeus located below; antenna with 37 segments, scape 1.2x as long as width, 1x as long as pedicel, pedicel 0.2x as long as F1, F1 1.23x as long as F2, 7x as long as its width, 4.78x as long as F37, F2 1x as long as F3.

**Mesosoma:** 1.52x as long as head length in dorsal view, 1.75x as long as width between tegula; pronotum polished, hind corner of pronotal margin form a conical projection near front coxa; mesoscutum with shallow punctures, hairs present, notauli distinct and deep, reaches up to tegula; scutellum strongly convex, lateral carina reaches the apex of scutellum; mesopleuron minutely punctate on upper anterior portion, speculum smooth and shiny, lower posterior region with uniform shallow punctures, hairy; metapleuron polished

impunctate, hairs on posterior end, sub metapleural carina complete; propodeum polished impunctate without hairs; legs hairy, mid and hind tibia with 3 apical and 3 preapical bristles; nervulus opposite to basal vein; FWL = 9 mm, HWL = 6 mm, FWW = 2 mm, HWW = 1.8 mm.

**Metasoma:** T1 1x as long as apical width, 1.1x length of T2; first and T2 smooth and shiny impunctate without hairs, T3 - T8 with shallow uniform punctures hairy, median dorsal carina reaches beyond spiracle, lateral carina not reaches spiracle, ventro lateral carina complete; ovipositor length = 4.1 mm, lower valve with ridges ovipositor slightly curved at apex; ovipositor sheath 1.52x long as hind tibia.

**Colour:** Predominantly yellowish with following black marks :Ocellar region continuing with occipital region (upper portion), 3 fused spots on mesoscutum, one spot on posterior end, transverse band in propodeum, and T1, T3, T7, pairs of spots on T4, T5 and T6, small spot on T8, apex of trochanter, transverse band on hind femur. Marking on mid tibia, apex of mid tibia, and hind tibia, last two tarsal segments of mid and hind tibia, ovipositor, and ovipositor sheath marked with brown.

**Male:** Unknown; **Host:** Unknown; **Biology:** Unknown

**Material examined: Holotype:** 1♀, INDIA: Karnataka, Coorg, Kadnur (N12°21'97"- E75°47'93"), Priyadarsanan D. R, 30.ix.2005.

**Distribution:** Karnataka (Coorg)

**Remarks:** *X. e. priyadarsanani* subsp. nov. closely related to *X. elegans elegans* in having faintly infuscate wing but differs from *X. e. elegans* in the characters depicted in the key. This new subspecies differs from *X. e. kadnurensis* subsp. nov. in having small and shallow mesopleural punctures.

**Etymology:** The new subspecies is named after the collector of the specimen, Dr. Priyadarsanan who has also inspired for the completion of the study.

d) *X. elegans kadnurensis* subsp. nov.  
(Plate 2, Fig. b)

**Diagnosis:** Mesopleural punctures close and coarse; T2 and T8 entirely yellow, T1, T3, T4, T5, T6

and 7 with a pair of spot or transverse band; ovipositor sheath 1.3x longer than hind tibia.

**Description: Holotype:** Female body length: 9 mm (including ovipositor)

**Head:** In dorsal view HL= 1.4 mm and HW= 0.3 mm; in front view HL=1mm and HW = 1.3 mm; face coarsely punctate, with hairs; clypeus minutely punctate, hairy, apically conical; malar space 1.2 x basal width of mandible; inter-ocellar distance 0.72 x ocello-ocular distance, 0.5 x distance between median and lateral ocelli; vertex smooth; antenna with 38 segments, scape 1.6x as long as width, 0.9x as long as pedicel, pedicel 0.3x as long as F1, F1 1.1x as long as F2, 6x as long as its width, 3x as long as F38, F2 1x as long as F3.

**Mesosoma:** 1.42x as long as head length in dorsal view, 1.53x as long as width between tegula; pronotum smooth; mesoscutum with shallow punctures, hairs present, notauli distinct and deep; scutellum moderately convex, lateral carina reaches the apex of scutellum; mesopleuron with moderate punctures on upper anterior portion, speculum smooth and shiny, lower posterior region with moderate punctures, hairy; metapleuron minutely punctate, submetapleural carina complete; propodeum polished impunctate, with all carina; legs hairy; nervulus opposite to basal vein ; FWL =11 mm; HWL = 8.4 mm; FWW =1.8 mm; HWW = 1 mm.

**Metasoma:** T1 1x as long as apical width, 1.2x length of T2; T1 and T2 smooth and shiny impunctate without hairs, T3 - T8 with shallow uniform punctures, hairy, median dorsal carina reaches beyond spiracle, lateral carina not reaches spiracle, ventro-lateral carina complete; ovipositor length = 2 mm, lower valve with ridges ovipositor slightly curved at apex; ovipositor sheath 1.1x long as hind tibia.

**Colour:** Predominantly yellowish with following black marks: ocellar region continue to occipital region, 3 fused spots on anterior end of mesoscutum, posterior large spot in front of scutellum, transverse band in propodeum, T1, T3 - T7, large spot on hind trochanter, trochantellus, middle region of hind femur. Base of hind tibia, subapical band on hind tibia, last 3 tarsal segments brownish black.

**Male:** Unknown; **Host:** Unknown; **Biology:** Unknown

**Material examined: Holotype:** 1♀, INDIA: Karnataka, Coorg, Kadnur (N12°21'97"-E75°47'93"), Priyadarsanan D. R, 8.iv.2005.

**Etymology:** Species epithet is after the locality of collection, Kadnur in Coorg district.

**Remarks:** *X. e. kadnurensis* subsp. nov. varies from *X. e. priyadarsanani* subsp. nov. in having apex of clypeus punctate and conical, hind coxa with a large black spot, T1, T3, T4 & T7 with black transverse band, T5 with spots tending to fuse; ovipositor length=2mm; ovipositor sheath 1.1x long as hind tibia.

#### e) *Xanthopimpla nigratarsis* Cameron, 1903

*Xanthopimpla nigratarsis* Cameron, 1903. *Jour. Straits Branch Roy. Asiatic Soc.* 39: 138. Lectotype: ♀, Malaysia: Sarawak, Kuching (BMNH).

**Diagnosis:** Outer margin of subtegular ridge evenly convex; mid and hind tibiae without stout bristles; T1, T3, T5 and T7 with large black spots or black bands; ovipositor sheath about 0.3x hind tibia.

**Distribution:** Previously recorded from West Bengal (Townes & Chiu, 1970).

#### f) *X. n. wayanadensis* subsp. nov. (Plate 3, Fig. d, e)

**Diagnosis:** T2, T4 and T6 with pair of large black spots; segments 1- 3 of hind tarsus yellow.

#### **Description**

**Holotype:** Female body length: 10 mm (Including ovipositor)

**Head:** In dorsal view HL = 0.32 mm and HW = 1.72 mm; in front view HL = 1.56 mm and HW = 1.42 mm; face and frons distinctly punctate, punctures close, interstices smooth and shiny, hairy; margin of eye moderately notched near antennal socket; clypeus flat, hairs longer than in face, impunctate; mandible and malar space with hairs; malar space 0.34 x basal width of mandible; inter-ocellar distance 0.5 x ocello-ocular distance, 1x distance between median and lateral ocelli; vertex and temple smooth and shiny, with only sparse hairs; antenna with 40 segments, scape 1.23 x as long as width, 1.5x as long as pedicel, pedicel 0.23 x as



long as F1, F1 1.22x as long as F2, 7.6x as long as its width, 5.3 x as long F40, F21.1x as long as F3.

**Mesosoma:** 1.34x as long as head length in dorsal view, 2.07 x as long as width between tegula; pronotum sharp angle, smooth and shiny, mesoscutum minutely punctate with small hairs, hairs smaller than in face, scutellum convex, impunctate, polished, lateral carina reaches the apex; propodeum impunctate, smooth and shiny; mesopleuron with minute punctures on upper anterior and lower posterior, speculum smooth and shiny; metapleuron impunctate, polished, submetapleural carina complete; nervulus opposite to basal vein, not intercepted below; FWL = 8 mm; HWL = 4.85 mm; FWW = 1.8 mm; HWW = 1.1 mm.

**Metasoma:** T1 1x as long as apical width, 0.97x length of T2; T1 with median dorsal carina reaches behind spiracle, impunctate smooth and shiny, T2 with small shallow punctures, hairs present; T3-T5 with punctures deeper than in T2, T6 - T7 with shallow punctures, hairy; ovipositor sheath 1x long as hind tibia.

**Colour:** Yellow with black markings on ocellar region, occipital area, 3 long spots on mesoscutum, one spot on posterior end, pairs of black spot in propodeum and T1- T6, T7 with a spot united, T8 with one spot, apex of hind tibia marked with black, 2 spot of hind trochanter. Stigma, antenna, 2 transverse band hind femur, mark on hind tibia, wing infuscate at apex, all hind tarsomere yellow except last – 5<sup>th</sup> light brown.

**Male:** Unknown; **Host:** Unknown; **Biology:** Unknown

**Material examined: Holotype:** 1♀, INDIA: Kerala, Wayanad, Mananthawady (N11°96'72"-E75°98'27"), Manjusha B.M, 6.ix.2015.

**Remarks:** This is the first record of *X. nigratarsis* from the Southern Western Ghats. Two subspecies are currently recognized from Oriental region - *X. n. punctiger* Townes & Chiu from the Philippines and *X. n. reciprocata* Townes & Chiu from India. The specimen from present study area differs from *X. n. reciprocata* in having pair of large black spots in T2, T4 and T6. It differs from the Philippine subspecies in having small punctures on lower half of mesopleuron, and is described as a new subspecies *X. n. wayanadensis*.

**Etymology:** Species epithet is after locality of collection, Wayanad district of Kerala.

g) *Xanthopimpla tricapus impressa*  
Townes & Chiu, 1970

*Xanthopimpla tricapus impressa* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 260. Holotype: ♀, Myanmar: Toungoo, Karenni (GBNH).

**Diagnosis:** Areola closed; propodeum without basal transverse carina so that first and second lateral area confluent; ovipositor sheath equal to length of hind tibia; notaulus 0.6 as long as tegula; T6 entire yellow.

**Distribution:** Previously recorded from Kerala (Townes & Chiu, 1970)

**Material examined:** Nil. Photographs of **Type:** 1♀, MYANMAR: Toungoo, Karenni, 3000 ft., iv.14, Micholitz GBNH examined.

**Remarks:** The diagnosis is based on the original description (Townes & Chiu, 1970) and the Photographs obtained from GBNH.

#### INCOMPLETE SPECIES GROUP

**Diagnosis:** Fore wing with areolet open on outer side, second intercubitus completely absent; nervulus basad of basal vein; mesoscutum with moderately dense hairs; scutellum strongly convex, lateral carina extending to apex; mid and hind tibiae with a few preapical bristles; ovipositor sheath about 0.2–0.6x hind tibia.

*Xanthopimpla naenia* Morley, 1913

*Xanthopimpla naenia* Morley, 1913. *Faun. British India, Hymenoptera*, 3(1): 115. Holotype: ♀, India (OUMNH).

*Xanthopimpla imprefecta* Krieger, 1914 *Arch. f. Naturgesch.*, (A) 80(6): 23. Key; (A) 80(7):143. ♂, ♀. Des., fig. syn. By Townes & Chiu, 1970.

**Diagnosis:** Punctures on face moderate size; propodeum with areola partly or completely separate from second lateral area; mesoscutum medially with three continuous black spots; femur entirely yellow.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu, 1970)

**Material examined:** Nil. Photographs of **Holotype** - 1♀, TAIWAN: Townes (Data available from the label) USU examined.

**Remarks:** The diagnosis is based on the original description (Morley, 1913) and the Photographs obtained from the USU collection, Logan.

#### NANA SPECIES GROUP

**Diagnosis:** Mesoscutum with sparse hairs, short notaulus, not extending to anterior level of tegula; scutellum convex, lateral flange extending to apex; propodeum with apical transverse carina absent or present as two lateral stubs, areola not defined; pleural area not divided; largest bristles of mid and hind tarsal claws distinctly widened, curved and blackened apically; fore wing with areolet closed.

#### *Xanthopimpla alternans* Krieger, 1914 (Plate 1, Fig. e)

*Xanthopimpla alternans* Krieger, 1914. *Arch. f. Naturgesch.*, (A) 80(6): 31. Holotype: ♀, Taiwan: Chiayi (GBNH). Lectotype ♀, India designated by Townes & Chiu, 1970.

*Xanthopimpla genualata* Krieger, 1914. *Arch. f. Naturgesch.* (A) 80 (6): 32. key; (A) 80 (7) : 100. ♀. des., fig. syn.by.Townes & Chiu,1970.

**Diagnosis:** Propodeum with apical transverse carina present as two small stubs laterally; hind femur black apically; T1, T3, T5 and T7 with black band or black spots; ovipositor sheath about 1.04x hind tibia.

**Distribution:** Previously recorded from Karnataka, Kerala, Tamil Nadu (Townes & Chiu 1970).

**Material examined:** 1♀, INDIA: Kerala, Wayanad, Vythiri (N11°55'16"-E76°04'02), Jobiraj, 23.v.2002; Photographs of Type- 1♀, FORMOSA: Kagi, 26.08.07, Hans sauter GBNH.

#### *Xanthopimpla glaberrima* Roman, 1913

*Xanthopimpla glaberrima* Roman, 1913. *Arkiv för Zool.* 8(15): 22. ♀. key, des, Type: ♀, Philippines (NHRS)

*Xanthopimpla sauteri* Krieger, 1914. *Arch., f. Naturgesch.* (A) 80 (6): 31. key; (A) 80 (7): 102. ♀. des. Syn.by Townes & Chiu,1970.

**Diagnosis:** Mid and hind tibiae with 1–2 preapical bristles; apical transverse carina present as two small lateral stubs; tergites each with two black spots, of which black spots on T 6 always smallest; ovipositor sheath 0.72x hind tibia.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu, 1970)

**Material examined:** Nil. Photographs of **Holotype:** 1♀, FORMOSA: Koroton, Hans Sauter, 15.ix.07. (GBNH) examined.

**Remarks:** The diagnosis is based on the original description (Roman, 1913) and the Photographs obtained from GBNH.

#### *Xanthopimpla nana nana* Schulz, 1906 (Plate 2, Fig. d)

*Xanthopimpla parva* Cameron, 1905b. *Spolia Zeylanica* 3: 136. ♂ . des. Type; ♂, Ceylon: Peradeniya (BMNH). Name preoccupied by Krieger, 1899.

*Xanthopimpla nana* Schulz, 1906. *Spolia hymenopterologica* p. 114. New name.

*Xanthopimpla ornate* Szépligeti, 1908. *Notes Leyden Mus.* 29: 254. ♀. key, des. Type: ♀, Java: Semarang (Budapest). Syn.by Townes & Chiu, 1970.

*Xanthopimpla pulchella* Szépligeti, 1908. *Notes Leyden Mus.* 29: 255. ♀. key, des. Type: ♀, Java: Semerang (Budapest). Syn.by Townes & Chiu, 1970.

*Xanthopimpla nana nana* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 175. ♀, ♂, n. status. Des, fig.India, Java, Sumatra.

**Diagnosis:** Lower front corner of pronotum with a sharply rounded angle; mesoscutum with sparse hairs, notauli small not reaching the line connecting front edge of tegulae; mesoscutum with a transverse black band on which marks on two lateral lobes little widened; upper side of flagellum blackish brown; cutellum convex; propodeum with lateral transverse carina entirely absent, only first two lateral carina present; T1, T3, T4, T5 and T7 with two black spots; hind tibia with 3 to 7 preapical bristles; ovipositor sheath about 0.5 to 0.9x as long as hind tibia.

**Distribution:** Previously recorded from Kerala (Townes & Chiu, 1970)

**Material examined:** 1♀, INDIA: Kerala, Ernakulam, Angamali (N10°18'49"-E76°37'53"), Manjusha B.M, 15.v.2017; 1♀, INDIA: Kerala, Idukki, Pambadumshola (N10°07'34"-E77°14'58"), Ranjith A.P, 8.iv.2016.

**Remarks:** There are 4 subspecies recognized previously from this group. Only *X. nana nana* is reported from the Southern Western Ghats.

***Xanthopimpla laticeps liturata* Townes & Chiu, 1970 (Plate 3, Fig. a - c)**

*Xanthopimpla laticeps liturata* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 181. Holotype: ♀, Penang Island, Malaya (USNM)

**Diagnosis:** Hind tibia with 4 to 9 preapical bristles; propodeum with apical transvers carina absent; three separate spot on mesoscutum, one spot on in front of scutellum; pair of spots in tergites 1 to 7.

**Distribution:** Previously recorded from Malaysia; Papua New Guinea; Philippines (Townes & Chiu, 1970).

**Material examined:** 1♀, INDIA: Kerala, Malappuram, Calicut University campus (N11°70'4"- E75°51'1"), Rajasree, 1.ii.2001.

**Remarks:** This is the first record of the species from India. Two subspecies have been recognized from this group. *X. laticeps liturata* Townes & Chiu from Malaya and *X. laticeps mitigata* Townes & Chiu from New Guinea.

**OCCIDENTALIS SPECIES GROUP**

**Diagnosis:** Lower front corner of the pronotum a broadly rounded angle of about 135°; mesoscutum with sparse punctures anteriorly, hairs present, notaulus short, not reaching to anterior level of tegula; scutellum convex, lateral flange extending to apex; largest bristles of mid and hind tarsal claws not widened or blackened apically; propodeum with areola closed or open posteriorly; ovipositor sheath 0.5 to 0.9 x hind tibia.

***Xanthopimpla despinosa despinosa* Krieger, 1914**

*Xanthopimpla micraulax* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 32. Key; (A) 80 (7): 104. ♀. Des., fig. Type: ♀, Sarawak: Lundu (GBNH). Syn. by Townes & Chiu, 1970

*Xanthopimpla despinosa* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 32. Key; (A) 80 (7): 106. ♂. Des., fig. Type: ♂, Sumatra: Sukaranda (MZPW). Syn. by Townes *et al.*, 1961.

*Xanthopimpla despinosa leipephlis* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 212. Holotype: ♀. Dawki, Assam India. Syn. By Pham, 2011.

*Xanthopimpla despinosa subquatrata* Chao, 1997. *Wuyi Sci.J.* 13:46. Holotype: ♀, Malaysia: Malaysia primary forest. Syn. By Pham, 2011.

*Xanthopimpla despinosa despinosa* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 211. ♂, ♀. n. status, Key, syn. des, fig.

**Diagnosis:** Black marks on mesoscutum long, extending posteriorly upto the margin of scutellum; areola open; T2 and T8 entirely yellow.

**Distribution:** Previously recorded from Karnataka (Townes & Chiu, 1970).

**Material examined:** 1♂, INDIA: Kerala, Kannur, Aralam (N11°96'56"- E75°77'20"), Priyadarsanan D.R., 9.vi.2009; 1♂, INDIA: Karnataka, Coorg, Kadnur (N12°21'97"- E75°47'93"), Priyadarsanan D.R., 31.xii.2005.

***Xanthopimpla exigua exigua* Krieger, 1914 (Plate 1, Fig. b)**

*Xanthopimpla exigua* Krieger. 1914. *Arch. f. Naturgesch.* (A) 80 (6): 41, 100. ♂. key, des., fig. Type: ♂, Sarawak: Lundu (GBNH). Syn. by Townes *et al.*, 1961.

*Xanthopimpla rimosa* Krieger. 1914. *Arch. f. Naturgesch.* (A) 80 (6): 41, 96. ♀. key, des., fig. Type: ♀, Sumatra: Sukaranda (MZPW). Syn. by Townes & Chiu 1970.

*Xanthopimpla carinata* Krieger. 1914. *Arch. f. Naturgesch.* (A) 80 (6): 41, 98. ♂. key, des., fig. Type: ♂, Sumatra: Sukaranda (MZPW). Syn. By Townes *et al.*, 1961.

*Xanthopimpla exigua exigua* Townes & Chiu, 1970. *Mem. Amer. Inst.*, 14: 203. ♂, ♀. n. status.

**Diagnosis:** Areola enclosed by distinct carina; propodeum and T4 & T5 with a pair of black spots; hind tibia with 4 to 7 preapical bristles.

**Distribution:** Previously recorded from China, Indonesia, Sumatra, Malaysia (Townes & Chiu, 1970 and Wang, 1992).

**Material examined:** 1♀, INDIA: Kerala, Wayanad, Mananthawady (N11°76'92"-E75°98'27"), Manjusha B.M., 2.vi.2015.

**Remarks:** This is the new record of this species from India. Three subspecies are recognized in this

group: *X. e. exigua* Krieger from Borneo, Malaya, and Sumatra, *X. e. serosa* Wang from China and *X. e. moluccana* Townes & Chiu from Moluccas and Celebes.

***Xanthopimpla honorata honorata* (Cameron), 1899**

*Pimpla honorata* Cameron, 1899. *Mem. & Proc. Manchester Lit. Phil. Soc.* 43 (3): 170. ♀. key. des. Type: ♀, India: Khasi Hills in Assam (OUMNH).

*Xanthopimpla cera* Cameron, 1908. *Ztschr. System. Hymen. Dipt.* 8: 38. ♀. des. Type: ♀, India: Sikkim (London).syn.by Townes & Chiu, 1970.

*Xanthopimpla kriegeria* Cameron, 1908. *Ztschr. System. Hymen. Dipt.* 8: 38. ♀. Des. Type: ♀, "Himalayas" (London). syn.by Townes & Chiu, 1970.

*Xanthopimpla binghami* Cameron, 1908. *Ztschr. System. Hymen. Dipt.* 8: 38. "♂" = ♀. des. Type: ♀, India: Sikkim (BMNH).syn, by Townes & Chiu, 1970.

*Xanthopimpla honorata* Morley, 1913. *Fauna of British India... Hymenoptera* 3 (1): 134. ♀. key, syn., des. India: Khasi Hills in Assam.n.comb.

*Xanthopimpla erythroceros* Krieger, 1914. *Arch. f. Naturgesch.* (A) 80 (6): 32. Key; (A) 80 (7): 95, ♂, ♀. des., fig syn.by Townes & Chiu, 1970.

*Xanthopimpla eurycephala* var. *assamensis* Krieger, 1914. *Arch. f. Naturgesch.* (A) 80 (7): 99. ♂, des. Type: ♂, India: Dimapur- Manipur Road in Assam (Berlin). syn.by Townes & Chiu, 1970.

*Xanthopimpla varimaculata* Townes, Townes, & Gupta, 1961. *Mem. Amer. Ent. Inst.* 1: 71.syn. (in part).

*Xanthopimpla honorata honorata* Townes & Chiu, 1970. *Mem.Amer.Inst.*, 14: 206. ♂, ♀. Key, syn., des., fig.n.status.

**Diagnosis:** Areola open; a pair of black spots in propodeum; T1, T3, T5 and T7 each with two black spots; hind tibia with 4 - 7 preapical bristles; ovipositor sheath 0.9x hind tibia.

**Distribution:** Townes & Chiu (1970) recorded this species from Karnataka, Kerala and Tamil Nadu.

**Material examined:** Nil. Photographs of **Paratype:** 1♀, INDIA: Mysore, USU Logan examined.

**Remarks:** Subspecies recognized from this group are *X. honorata honorata* Cameron from China, Taiwan, India, Nepal, Myanmar Laos, Vietnam, Thailand, Malaysia, Singapore, Indonesia and the Philippines; *X. h. munda* Krieger from the Philippines; and *X. h. atriclinata* Chao from Malaysia. The species found in this study keys to *X. h. honorata*. The diagnosis is based on the original description of (Cameron, 1899) and the Photographs obtained from the USU Collection, Logan.

***Xanthopimpla proximans* Townes & Chiu, 1970**

*Xanthopimpla proximans* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 204. Holotype: ♀. Garjia, U.P, India. (FDAC)

**Diagnosis:** Space between inner ends of stubs of apical carina of propodeum about 0.8x the stubs; ovipositor sheath 0.6x hindtibia.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu, 1970).

**Material examined:** Nil. Photographs of **Holotype:** 1♀, INDIA: Uttar Pradesh, Garjia N.T8, 9.iv.1965 Tikar coll. (Gupta), FDAC examined.

**Remarks:** The diagnosis is based on the original description of (Townes & Chiu 1970) and the Photographs obtained from FDAC.

**PUNCTATA SPECIES GROUP**

**Diagnosis:** Lower front corner of the pronotum rounded; mesoscutum with sparse hairs anteriorly, posteriorly almost hairless; notaulus reaching about to a line connecting front edge of tegulae; scutellum convex, lateral flange reaching to apex; propodeum with areola closed, wider than long; fore wing with areolet closed; largest bristles on mid and hind tibia claws weakly widened, pale subapically; ovipositor sheath 1.4 - 2.4x long as hind tibia; ovipositor stout, distinct decurved, gradually tapered to apex.

***Xanthopimpla punctata* (Fabricius), 1781 (Plate 2, Fig. c)**

*Ichneumon punctatus* Fabricius, 1781. *Species insectorum* 1:437 . [♂]. des.Type: ♀, India: "coromandel" (ZMUC).

- Pimpla punctata* Fabricius, 1804. *Systema piezatorum* p. 119. syn., des. n. comb. India: "coromandel."
- Pimpla puncator* Smith, 1858. *Jour. Of proc. Linn. Soc. London, Zool.* 2: 119. Misdet. Of *punctator* Linnaeus. Sarawak.
- Pimpla transversails* Vollenhovan, 1879. *Stettin. Ent. Ztg.* 40: 146. ♂, ♀. des. Lectotype: ♀, Sumatra (Leiden). Borneo. Lesser Sunda Is: Timor. syn. by Krieger, 1914.
- ?*pimpla transversalis* var. *Punctata* (?) Vollenhoven, 1879. *Stettin. Ent. Ztg.* 40: 146. syn., des. Lesser Sunda Is.: Timor.
- Pimpla ceylonica* Cameron, 1899. *Mem. & Proc. Manchester Lit. Phil. Soc.* 43 (3): 165. [♂]. key, des. Type: ♂, Ceylon: Trincomalee (London). Syn. by Morley, 1913.
- Xanthopimpla punctata* Krieger, 1899. *Sitzber. Naturf. Gesell. Leipzig* 1897/ 98: 101. ♀. key, syn., des. Celebes: Toli Toli. n. comb.
- Xanthopimpla ruficornis* Krieger, 1899. *Sitzber. Naturf. Gesell. Leipzig* 1897/ 98: 103. ♂. key, des. Type: ♂, Molucca Is.: Kai (Berlin). Syn. by Townes & Chiu, 1970.
- Zanthopimpla* (!) *appendiculata* Cameron, 1902. *Fauna & Geogr. Maldive & Laccadive Archip.* 1 (1): 51. ♂, ♀. Lectotype: ♀, Laccadive Is.: Minikoi (London). syn. by Krieger, 1914.
- Xanthopimpla brunneicornis* Cameron, 1903. *Jour. Straits Branch Roy. Asiatic Soc.* 39: 139. ♀. des. Lectotype: ♀, Sarawak (London). syn. by Krieger, 1914.
- Xanthopimpla kandyensis* Cameron, 1905. *Spolia zeylanica* 3: 136. ♀. des. Type: ♀, Ceylon: Kandy (London). syn. by Krieger, 1914.
- Xanthopimpla maculiceps* Cameron, 1905a. *Tijdschr. v. Ent.* 48: 37. ♂. des. Type: ♂, Java: Pasuruan (Amsterdam). syn. by Krieger, 1914.
- Xanthopimpla lissonota* Cameron, 1906. *Jour. Straits Branch Roy. Asiatic Soc.* 46: 115. ♀. des. Type: ♀, Saarak: Kuching (London). syn. by Townes *et al.*, 1961.
- Xanthopimpla punctator* Schmiedeknecht, 1907. *Genera Insectorum* 62: 40. n. comb. syn. (in part).
- Neopimpla punctata* Kuroiwa, 1926. Provisional list of the Hymenoptera collected in Loochoo determined by Dr. Matsumura p. 1. *Nomen nudum. Ryukyu Is.: Okinawa.*
- Xanthopimpla kriegeri* Szeplgeti, 1908. *Notes Leyden Mus.* 29: 255. ♂, ♀. Name preoccupied by Ashmead, 1905. Key, des. Lactotype: ♀, Java: Semarang (Budapest). syn. by Krieger, 1914.
- Xanthopimpla kriegeri* var. *Szepligetii*, 1908. *Notes Leyden Mus.* 32: 101. ♀. des. Java: Semarang.
- Xanthopimpla punctata* (as *punctuator* on p. 275) Roman, 1912. *Zool Bidr. Uppsala* 1: 268, 275. syn.
- Neopimpla syleptae* Viereck, 1912. *Proc. U.S. Batl. Mus.* 42: 151. ♀. des. Type: ♀, India: Malebannur in Mysore (Washington). syn. by Krieger, 1914.
- Xanthopimpla trimaculata* Matsumura, 1912. Thousand insects of Japan, supplement 4: 145. ♂, ♀. Misdet. Of *trimaculata* Smith. des. Japan: Kyushu. Ryukyu Is.: Okinawa.
- Xanthopimpla transversalis* Morley, 1913. *Fauna of British India... Hymenoptera* 3 (1): 122. ♂, ♀. Key, des. syn. by Townes & Gupta, 1961.
- Xanthopimpla kandiensis* Morley, 1913. *Fauna of British India... Hymenoptera* 3 (1): 123. ♂, ♀. Key, des. India: Bombay. Ceylon: Kandy; Colombo. Emendation.
- Xanthopimpla tibialis* Morley, 1913. *Fauna of British India... Hymenoptera* 3 (1): 124. ♀. key, des. Type: ♀, India: Chapra in Bihar (London). syn. by Townes, Townes & Gupta, 1961.
- Xanthopimpla appendiculata* Morley, 1913. *Fauna of British India... Hymenoptera* 3 (1): 139. ♂, ♀. key, des. Laccadive Is.: Minikoi. Syn. by Townes & Gupta, 1961.
- Xanthopimpla syleptae* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 19. syn., des. N. comb.
- Phygadenon* (!) *punctuator* Ishida, 1915. Report of the sugar cane borer in Formosa 1: 106; 2: pl. 16. ♂, ♀. Name preoccupied by (Linnaeus) Schmiedeknecht, 1907. des., fig. Types: ♂, ♀, Taiwan (Sapporo). syn. by Uchida, 1932.
- Theronia transversalis* Dammerman, 1929. *The agricultural zoology of the Malay Archipelago* p. 144. Syn. by Townes & Gupta, 1961.
- Xanthopimpla pyraustae* Rao, 1953. *Indian Forest Rec.* (n. s., Ent.) 8: 163. ♀. des., fig. Type: ♀, India: New Forest, Dehra Dun in U. P. (Dehra Dun). India: Kannothe Range, Wayanad in Madras. Syn. by Townes & Chiu, 1970.
- Diagnosis:** Mesoscutum with fused spots on anterior; areola complete, 0.5–0.7x as long as wide;

T1, T3, T5, and T7 always with a pair of black spots.

**Distribution:** Widely distributed in India.

**Material examined:** 1♀, INDIA: Kerala, Wayanad, Mananthawady (N11°76'92"- E 75°98'27"), Manjusha B.M, 1.viii.2016; 1♀, INDIA: Kerala, Kannur, kottiyoor forest (N11°50'21"- E 75°40'), Girish k, 17.ii.2007; 1♀, INDIA: Kerala, Thrissur, Peechi (N10°31'21"-E76°15'01"), Das K.M, pupal parasite larva of leaf roller; 1♀, INDIA: Karnataka, Mangalore (N12°91'41"- E 74°85'59"), Sujatha, 17.viii.1999; 1♀, INDIA: Kerala, Malappuram, Calicut University campus (N 11°70'20"- E 75°51'22"), Balamani, 14.v.2001; 1♀, INDIA: Kerala, Thrissur (N10°52'96"-E76°21'44"), Ushakumari, 15.v.2001; 1♀, INDIA: Kerala, Malappuram, Calicut University campus (N 11°70'20"- E 75°51'22"), Divakaran, 12.ix.2001; 1♀, INDIA: Kerala, Malappuram, Calicut University campus(N11°70'20"- E75°51'22"), shuba, 31. xii.2002; 1♀, INDIA : Karnataka, Bengaluru (N12°97'15"- E77°59'45"), Sinu P.A, 21.xii.2002; 1♀,INDIA: Karnataka, Sringeri (N13°41'97"- E75°25'06"), Sinu P.A, 11.x.2003; 1♂,INDIA: Karnataka, Sringeri (N13°41'97"- E75°25'06"), Sinu P.A, 13.x.2003; 1♀, INDIA: Kerala, Kulathupuzha, (N 8°90'90"- E77°05'93"), Santhosh S, 9.xii.2004; 1♀, INDIA: Kerala, Trivandrum, Kanyakumari (N8°05'07"- E77°30'51"), Priyadarshan D.R, 1.ix.2005; 1♀, INDIA: Kerala, Trivandrum, Anaikkatty (N11°10'48"- E76°76'82"), Priyadarshan D.R, 19.ix.2005; 1♀, INDIA: Kerala, Trivandrum, Anaikkatty (N11°10'48"- E76°76'82"), Priyadarshan D.R, 1.x.2005; 1♀, INDIA: Kerala, Trivandrum, Kanyakumari (N8°05'07"- E 77°30'51"), Priyadarshan D.R., 28.ii.2006; 1♀, INDIA: Kerala, Kannur, Aralam (N11°96'76"- E 75°77'20"), Priyadarshan D.R., 14.ii.2009; 1♀, INDIA: Karnataka, Coorg, Kadnur (N12°12'96"- E75°48'22"), Priyadarshan D. R , 31.xii.2005; 1♀, INDIA: Kerala, Ernakulam, Mulamthuruthy (N9°90'03"- E76°38'44"), Rajesh K.M, 26.i.2013; 1♂, INDIA: Kerala, Wayanad, Panamaram (N11°73'80"-E76°38'44"), Rajesh K.M, 2.iii.2014; 1♀, INDIA: Kerala, Kozhikode, Kakkayam (N11°54'72"- E75°89'26"), Manjusha B.M, 20.x.2016; 1♀,INDIA: Kerala, Kollam, Erikkapara, (N8°54'54"- E77°06'28"), Priyadarshan D.R.,

5.ii.2009; 1♂, INDIA: Kerala, Kozhikode, Nanminda (N11°42'23"- E75°83'16"), Manjusha B.M, 12.v.2016; 1♂, INDIA: Kerala, Kozhikode, East hill (N11°29'37"- E75°77'49"), Ranjith A.P, 1.vi.2015.

**Remarks:** This is the most abundant species obtained in this study.

## REGINA SPECIES GROUP

**Diagnosis:** Frons without a groove below median ocelli; face nearly always with weak sublateral vertical ridges on each side; mesoscutum with notaulus short, not extending to anterior level of tegula; scutellum evenly convex to conical, lateral flange reaching to apex; propodeum with areola completely bounded by carinae; pleural area with tubercle-like or hill-like in front of spiracle; pleural area not divided by apical transverse carina; fore wing with areolet closed; largest bristles on mid and hind tibia claws weakly to distinctly widened, pale to black subapically.

### *Xanthopimpla konowi* Krieger, 1899

*Xanthopimpla konowi* Krieger 1899. *Sitzber. Naturf. Gesell. Leipzig* 1897/ 98: 87. ♀.key, des. Type: Japan ?. (GBNH).

*Xanthopimpla japonica* Krieger 1899. *Sitzber. Naturf. Gesell. Leipzig* 1897/ 98: 81. ♀ key, des. Type: ♀, Japan: Yokohama (GBNH). See Uchida, 1928, for true type locality. Syn. by Townes & Chiu, 1970.

*Xanthopimpla anthereae* Cameron 1911. *Soc Ent.* 26: 46. ♂, key, des Type : ♂, India Bengal (Vienna) . Syn. by Townes & Chiu, 1970.

*Xanthopimpla wastoni* Cameron, 1911. *Soc Ent.* 26: 46. ♂, key, des Type : ♂, India Bengal (Lendon) . Syn. by Townes & Chiu, 1970.

*Pimla punctator* Shiraki 1913, Rpt, Culture of the Silk-fish-line worm (*Saturnia pyretorum* Westwood), p, 194, misdet, of *punctator* Linnaeus, Reference not seen.

*Xanthopimpla princeps* Krieger, 1914. *Arch f. Naturegesh* (A) 80 (6): 43, 46. ♀, key des., fig. Lectotype ♀, India: Sikkim (Vienna). Syn. by Townes & Chiu, 1970.

*Xanthopimpla dux* Krieger, 1914. *Arch f. Naturegesh* (A) 80 (6): 43, 48. ♀, key des., fig.

Japan: Yokohama. Syn. by Townes & Chiu, 1970  
*Xanthopimpla formosensis* Krieger, 1914. *Arch. f. Naturegesch* (A) 80 (6): 43, 51 key des., fig type taiwan: Chi-Chi [= Chip Chip] (Berlin). Syn. by Uchida, 1928.

*Xanthopimpla macrofacyia* Krieger, 1914. *Arch. f. Naturegesch* (A) 80 (6): 42, 54 ♀, key des., fig Type India Sikkim (Vienna). Syn. by Townes *et al.*, 1961.

*Xanthopimpla grandis* Cushman, 1925. *Ent. Mitt* 14: 43 43, ♀, ♂, key des., biol, Type: ♀, Taiwan. Syn. by Uchida, 1928.

*Xanthopimpla pedator* Matsumura & Uchida, 1926. *Insecta Matsumurana* 1: 74. ♀, ♂, china mainland . India. Japan: Kyushu. Ryushuls .: Okinawa ; Ishigaki. Taiwan Misdetermination of pedator Fabricius, in part. Syn. by Townes & Gupta, 1961.

*Xanthopimpla theophilae* Rao , 1953. *Indian Forest Rec.* (n.s. Ent.)8: 159. ♂, ♀, des ., fig., Type: ♀. India: Musoorie in U. P. (Dehra Dun) .Syn. by Townes & Chiu 1970.

**Diagnosis:** Mesoscutal crest small; areola receiving costula near middle; scutellum convex; T3 and T4 with relatively sparse, coarse punctures; ovipositor sheath 1.1x hind tibia.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu 1970)

**Material examined:-** Nil. Photographs of Type: 1♀: JAPAN, Konowi, Krieger GBNH examined.

**Remarks:** The diagnosis is based on the original description of (Krieger, 1899) and the Photographs obtained from the GBNH.

### *Xanthopimpla lepcha* (Cameron), 1899

*Pimpla lepcha* Cameron, 1899 (May 4). *Mem. & Proc. Manchester Lit. Phil. Soc.* 43 (3) : 163. ♀. key, des. Type : ♀. India : Khasi Hills in Assam (BMNH).

*Pimpla indubia* Cameron, 1899 (May 4). *Mem. & Proc. Manchester Lit. Phil. Soc.* 43 (3) : 166. ♀. key, des. Type : ♀. India : Khasi Hills in Assam (OUMNH). Syn. by. Townes & Chiu, 1970.

*Pimpla khasiana* Cameron, 1899 (May 4). *Mem. & Proc. Manchester Lit. Phil. Soc.* 43 (3) : 168. ♀. key, des. Type : ♀, India : Khasi Hills in Assam (BMNH). Syn. by. Townes & Chiu, 1961.

*Xanthopimpla soleata* Krieger, 1899 (July 14). *Sitzber. Naturf. Gesel. Leipzig* 1897/98 : 82. ♀. key, des., fig. Type : ♀ India : Khasi Hills in Assam (GBNH). Syn. by Townes & Chiu, 1970.

*Xanthopimpla pardalis* Krieger, 1899 (July 14). *Sitzber. Naturf. Gesel. Leipzig* 1897/98 : 90. ♂. key, des., fig. Type : ♂, India : Khasi Hills in Assam (GBNH). Syn. by. Townes & Chiu, 1970.

*Xanthopimpla lepscha* Schulz, 1906. *Spoila hymenopterologica*. p.104. Emendation.

*Xanthopimpla pedator* Morley, 1913. *Fauna of British India... Hymenoptera* 3(1): 116. ♂, ♀. key, syn., des., fig. India. Syn. by Krieger, 1914.

*Xanthopimpla khasiana* Morley, 1913. *Fauna of British India... Hymenoptera* 3(1) : 135. ♀. key, des., fig. India : Khasi Hills in Assam. n. comb.

*Xanthopimpla indubia* Morley, 1913. *Fauna of British India... Hymenoptera* 3(1) : 137. ♀. key, des., fig. India : Khasi Hills in Assam. n. comb.

*Xanthopimpla lepcha* Krieger, 1914. *Arch. f. Naturgesch.* (A) 80 (6) : 16 des. syn. by Townes *et al.*, 1961

*Xanthopimpla commixta* Krieger, 1914. *Arch. f. Naturgesch.* (A) 80 (6) : 45, 67. ♀. key, des., fig. . Type: ♀, India: Khasi Hills in Assam (GBNH). Syn. by. Townes & Chiu, 1970.

*Xanthopimpla giochiensis* Uchida, 1928. *Jour. faculty Agr. Hokkaidoimp. univ.* 28:65 ♀. key des., fig type: ♀, Taiwan yuchih (sapporo). Syn. by. Townes & Chiu, 1970.

**Diagnosis:** Front end of notaulus without a sharp edged crest; areola < 1 x long as wide; scutellum with low blunt point at the centre; T8 entirely yellow.

**Distribution:** Previously recorded from Karnataka (Townes & Chiu, 1970)

**Material examined:** Nil

**Remarks:** The diagnosis is based on the original description of (Cameron, 1899). The species is not represented in the present collection.

### *Xanthopimpla pedator* (Fabricius), 1775

*Ichneumon punctator* Linnaeus, 1767. *Systema naturae... Edition 12.* 1 (2): 935. ♀. des. Type: ♀, Indies (lost). Name preoccupied by Allioni, 1766.

*Ichneumon pedator* Fabricius, 1775. *Systema entomologiae* p. 828. ♀. des. Type : ♀, India (HMUG).

*Pimpla pedator* Fabricius, 1804. *Systema piezatorum* p. 114. n.comb.

*Ichneumon multipunctor* Thunberg, 1822. *Mem. Acad. Imp. Sci. St. Peters-bourg* 8: 262. des. in Key; 1824. 9: 313. Eastern India & "Cape of Good Hope". New name for *pedator*.

*Pimpla punctator* Vollenhoven, 1879. *Stettin. Ent. Ztg.* 40: 143. syn., des. Java. Sumatra. Borneo. Celebes: Macassar. China : Ningpo.

*Xanthopimpla pedator* Krieger, 1891. *Sitzber. Naturf. Gessell. Leipzig* 1897/ 98: 64. n.comb.

*Xanthopimpla scutata* Krieger, 1899. *Sitzber. Naturf. Gessell. Leipzig* 1897/ 98: 85. Key, des., Type "Kaulun". [= Hong Kong: Kowloon] (Berlin). Syn.by Townes & Chiu, 1970.

*Xanthopimpla punctatrix* Schulz, 1906. *Spolia hymenopterologica* p.114 Emendation.

*Xanthopimpla punctator* Schmiedeknecht, 1907. *GeneraInsectorum* 62: 40.syn. (in part),

*Xanthopimpla predator* (!) Maxwell - Lefroy & Howiet. 1909 *Indian insect life* P. 177. fig.

*Xanthopimpla multipunctor* Roman, 1912. *Zool. Bidr. Uppsala* 1. 267 des..fig

*Xanthopimpla braueri* Krieger, 1914. *Arch . f. Naturgesch.* (A) 80 (6): 43, 58, Key, des. fig. Lectotype : (Labeled by Townes). China mainland, Kiaochow (Kiautschou) [Bay ] at Tsingtau (Tsingtau) (Berlin). Syn.by Townes & Chiu, 1970.  
*Xanthopimpla manilensis* Krieger, 1914. *Arch . f. Naturgesch.* (A) 80 (6): 43, 62, Key, des. fig. Lectotype: Manila (Berlin). Syn.by Townes & Chiu, 1970.

**Diagnosis:** Scutellum distinctly conical; areola receiving costula behind the middle; T3–T5 densely, coarsely punctate; female without black spots on T6; ovipositor sheath 0.82x hind tibia.

**Distribution:** Previously recorded from Karnataka and Tamil Nadu (Townes & Chiu, 1970).

**Material examined:** 1♀, INDIA: Karnataka, Bengaluru, (N12°96'1"- E77°59'3") ex.pupa of *Spodoptera litura* xi.1969. (NBAIR).

### *Xanthopimpla regina* Morley, 1913

*Xanthopimpla regina* Morley, 1913, *Fauna of British India..... Hymenoptera* 3 (1) :118 key, ♂, ♀ des, type: East Pakistan: Sylhet (BMNH). India; Chapra in Bihar: Sikkim. Nepal, Burma: Mandaley.

*Xanthopimpla mecrura* Krieger, 1914, *Arch, f. Naturgesch.* (A) 80 (6): 19. des.Syn.by. Townes *et al.*, 1961.

**Diagnosis:** T1 entirely yellow; T3 densely, coarsely punctate; ovipositor sheath long, 1.85x hind tibia; ovipositor with about 11 apical transverse ridges.

**Distribution:** Townes & Chiu

previously recorded this species from Karnataka

**Material examined:** Nil. Photographs of **Holotype:** 1♀, BMNH (E)962085 (Data as on label) examined.

**Remarks:** The diagnosis is based on the original description (Morley, 1913) and the Photographs obtained from the BMNH, London.

### *Xanthopimpla verrucula apheles* Townes & Chiu, 1970 (Plate 1 Fig. d)

*Xanthopimpla verrucula apheles* Townes & Chiu 1970. *Mem. Amer. Ent Inst.* 14:55. Holotype: ♀, Singapore (USNM)

**Diagnosis:** Punctures on face shallow; areola 1x long as wide; T8 marked with black.

**Distribution:** Previously recorded from Philippines and Singapore (Townes & Chiu, 1970, Yu *et al.*, 2012).

**Material examined:** 1♀, INDIA: Kerala, Malappuram, Calicut University campus (N11°70'20"-E75°51'22"), Taha P, 18.v.2000.

**Remarks:** The species is recorded from India for the first time. One subspecies is recognized in this group. *X. verrucula apheles* Townes & Chiu from Singapore. In this study *X. v. apheles* Townes & Chiu reported first time from the Southern Western Ghats.

### STEMMATOR SPECIES GROUP

**Diagnosis:** Face partially black; T1 0.95 - 1.3 as long as wide; mesoscutum marked with black; notaulus extending to or a little behind anterior level of tegula; scutellum evenly convex, lateral flange extending to apex; propodeum with areola complete, 0.8 - 1.8x as long as wide; hind tibia with 8 to 23 preapical bristles; fore wing with areolet closed; ovipositor moderately stout.



***Xanthopimpla stemmator* (Thunberg), 1824**

*Ichneumon stemmator* Thunberg, 1822. *Mem. Acad. Imp. Sci. St. Petersburg* 8:262. key; 1824. 9:313. [♂].des. Type: ♂, China (UUZM).

*Pimpla integrata* Smith, 1860. *Jour. of proc. Linn. Soc. London, Zool.* 5: 140. ♀. des. Type: ♀, Molucca Is.: Bachan (OUMNH). Syn.by Townes *et al.*, 1961.

*Pimpla integrator* Smith, 1865. *Jour. Linn. Soc. London, Zool.* 8: 64. Molucca Is.: Morotai.

*Xanthopimpla ?integrata* Krieger, 1899. *Sitzber. Naturf. Gesell. Leipzig* 1897/ 98: 65. N.comb.

*Xanthopimpla thoracalis* Krieger, 1899. *Sitzber. Naturf. Gesell. Leipzig* 1897/ 98: 95. ♀. key, des. Type: ♀, Molucca Is.: Kai (GBNH).Syn.by. Krieger, 1914.

*Xanthopimpla maculifrons* Cameron, 1903. *Jour. Straits Branch Roy. Asiatic Soc.* 39: 138. ♀. des. Lectotype: ♀, Sarawak: Kuching (BMNH). Syn.by. Townes & Chiu, 1970.

*Xanthopimpla bimaculata* Cameron, 1906. *Jour. Starits Branch Roy. Asiatic Soc.* 46: 116.♂, ♀.des. Lectotype: ♀, Borneo (London). Sarawak: Kuching. Syn.by. Krieger, 1914.

*Xanthopimpla nursei* Cameron, 1907. *Jour. Bombay Nat. Hist. Soc.* 17:592. ♀.des. Type: ♀, India: [Dessa in Bombay] (London). Syn.by. Krieger, 1914.

*Xanthopimpla facialis* Szepliget, 1908. *Notes Leyden Mus.* 29: 256. ♂. Key, des. Type: ♂, Java: Semarang (Budapest).Syn.by Krieger, 1914

*Pimpla sp.* Jacobson, 1909. Jaarverslag van de Topographische Dienst in Nederlandsch Indie 1908: 206A. Krakatau Is. in Sunda Strait.

*Xanthopimpla stemmatrix* Schulz, 1912. *Berliner. Ent. Ztschr.* 57:65, 98. ♂. Syn., note on type, emendation.

*Xanthopimpla stemmator* Roman, 1912. *Zool. Bidr. Uppsala* 1: 280. ♂. Des.n. comb

*Xanthopimpla Doleshali* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 34. Key; (A) 80 (7): 10. ♀. des., fig. Lectotype: ♀, Molucca Is. : Amboina (Vienna). Syn.by. Townes & Chiu, 1970.

*Xanthopimpla transfuga* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 38. Key; (A) 80 (7): 10. ♀. Des., fig. type: ♀, Java: Sukabumi, 2000 ft. (Wrsaw). Syn.by. Townes & Chiu, 1970.

*Xanthopimpla stemmator* var. *confluens* Krieger, 1914. *Arch. F. Naturgesch.* (A) 80 (6): 27. Key; (A) 80 (7): 4. Des. Type: ♂, Philippines: Atimonan on Luzon (Berlin).Syn.by Townes *et al.*, 1961.

*Xanthopimpla stemmator* var. *maulifrons* Strand, 1915. *Arch. F. Naturgesch.* (A) 80 (8): 1223. Syn.

*Habropimpla sesamiae* Rao, 1953. *Indian Forest Rec.* (n.s, Ent .) 8: 166. ♂, ♀. des., fig. type: ♀, India: Bengaluru (Dehra Dun). Syn.by Townes *et al.*, 1961.

**Diagnosis:** Hind slope of vertex with two black spots; hind tibia with 9–16 preapical bristles; propodeum and tergites each with a pair of black spots (except T6 entirely yellow); ovipositor sheath about 1.1x hind tibia.

**Distribution:** Previously recorded from Karnataka, Kerala and Tamil Nadu (Townes & Chiu 1970).

**Material examined:** 1♀, INDIA: Uttar Pradesh, Kukrail, vii.1963, ex.pupae of *Polygonum* sp.(From NBAIR collection) det by: G.J Kerrrich; 2 M, INDIA: Bamandauga, 21.viii.1967; 1♀, INDIA: Karnataka, K.R Nagar, 21.xii.1963, ex pupae of *Melanitisismene*; 1♀, INDIA: Uttar Pradesh, Golagokarannath, x.1973,ex pupa of *Sylepta derogata*; 1♀, INDIA: West Bengal, Kalimpong, iii.1963,ex pupae of *Sesamia* sp.; 1♀, INDIA: Kerala, Ernakulam, Kanjiramattom, iii.1963 (NBAIR).

**TEREBATRIX SPECIES GROUP**

**Diagnosis:** Lower front corner of pronotum rather sharply to rounded; mesoscutum entirely covered with hairs, notaulus short and deep, not extending to anterior level of tegula; scutellum evenly convex to sharply conical, lateral flange extending to apex; propodeum with areola completely bounded by carinae or rarely confluent laterally with second lateral area; largest bristles on mid and hind tibia claws distinctly widened, blackened subapically; hind trochanter and femur always marked with black.

***Xanthopimpla brevicauda nathani* Townes & Chiu, 1970**

*Xanthopimpla brevicauda* Cushman, 1925. *Ent. Mitt*, 14: 49. ♀. key des. Type: ♀, Taiwan : Chiahhsienpu

*Xanthopimpla brevicauda nathani* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 152. Holotype: ♀, Walayar Forest, Southern Malabar, India (CNCI)

**Diagnosis:** Areola wide behind than in front; punctures on T3 and T4 shallow to moderately deep; T2 and T6 with paired black spot; flagella blackish brown; hind femur not marked with black; ovipositor sheath 0.7x hind tibia.

**Distribution:** Previously recorded from Kerala (Townes & Chiu, 1970).

**Material examined:** Nil. Photographs of **Holotype:** 1♀, INDIA: Walayar Forest, south Malabar, 1000 ft., India, x.1956, P.S.Nathan (CNCI) examined.

**Remarks:** One subspecies is recognized in this group. *X. brevicauda nathani* Townes & Chiu from India. The diagnosis is based on the original description (Townes & Chiu, 1970) and the Photographs obtained from the CNCI.

***Xanthopimpla conica* Cushman, 1925  
(Plate 2, Fig. i)**

*Xanthopimpla conica* Cushman, 1925. *Ent. Mitt.*, 14: 45. Holotype: ♀, Taiwan: Kangkou [= Kankau], Hengchun (DEI).

**Diagnosis:** Scutellum conical with sharp point; median and lateral black marks on mesoscutum almost jointed posteriorly to black mark in front of scutellum, median black mark with deep notch anteriorly; mid and hind tibiae without bristles near apex; tergites each with black band; ovipositor sheath 0.25x hind tibia.

**Distribution:** Previously recorded from Kerala and Tamil Nadu (Townes & Chiu, 1970).

**Material examined:** 1♀, INDIA: Kerala, Kozhikode, Kakkayam (N11°54'72"- E75°89'20"), Manjusha B.M., 8.vii.2015

***Xanthopimpla decurtata detruncata* Krieger, 1914**

*Xanthopimpla detruncata* Krieger, 1914. *Arch. F. Naturgesch.* (a) 80 (6) : 39, 115, ♂♀. Key, des., fig. Lectotype : (designated by Townes, Townes & Gupta, 1961.) ♀, Taiwan: Fengyüan (GBNH).

*Xanthopimpla decurtata detruncata* Townes & Chiu, 1970. *Mem. Amer. Inst.*, 14:143, ♂♀. n.status, key,des.,fig. India.

**Diagnosis:** Face densely and coarsely punctate; base of propodeum with two large black spot; front side of hind femur with sub dorsal black stripe; hind tibia with group of 3 stout bristles; punctures on tergites moderately deep.

**Distribution:** Previously recorded from Karnataka, Kerala and Tamil Nadu (Townes & Chiu 1970).

**Material examined:** Nil. Photographs of **Paratype:** 1M, GERMANY: Luzion: Atimonan, Townes and Chiu, 10-31.viii.08, GBNH examined.

**Remarks:** Only one subspecies is previously recorded. *X. decurtata detruncata* from India, Thailand, Malaysia, Vietnam, and Taiwan. The diagnosis is based on the original description (Krieger, 1914) and the Photographs obtained from the GBNH.

***Xanthopimpla polyspila* Cameron, 1907**

*Xanthopimpla polyspila* Cameron, 1907b. *Tijdschr. v. Ent.*, 50: 101. Holotype: ♀, India: Sikkim (BMNH).

*Xanthopimpla lissonota* Cameron, 1907a. *Ann & Mag. Nat. His.*, (7) 20:19. ♂. Name preoccu. By Cameron, 1906. des. Type: ♂, Malaysia: Kuching (LONDON). Syn. by Townes & Chiu, 1970.

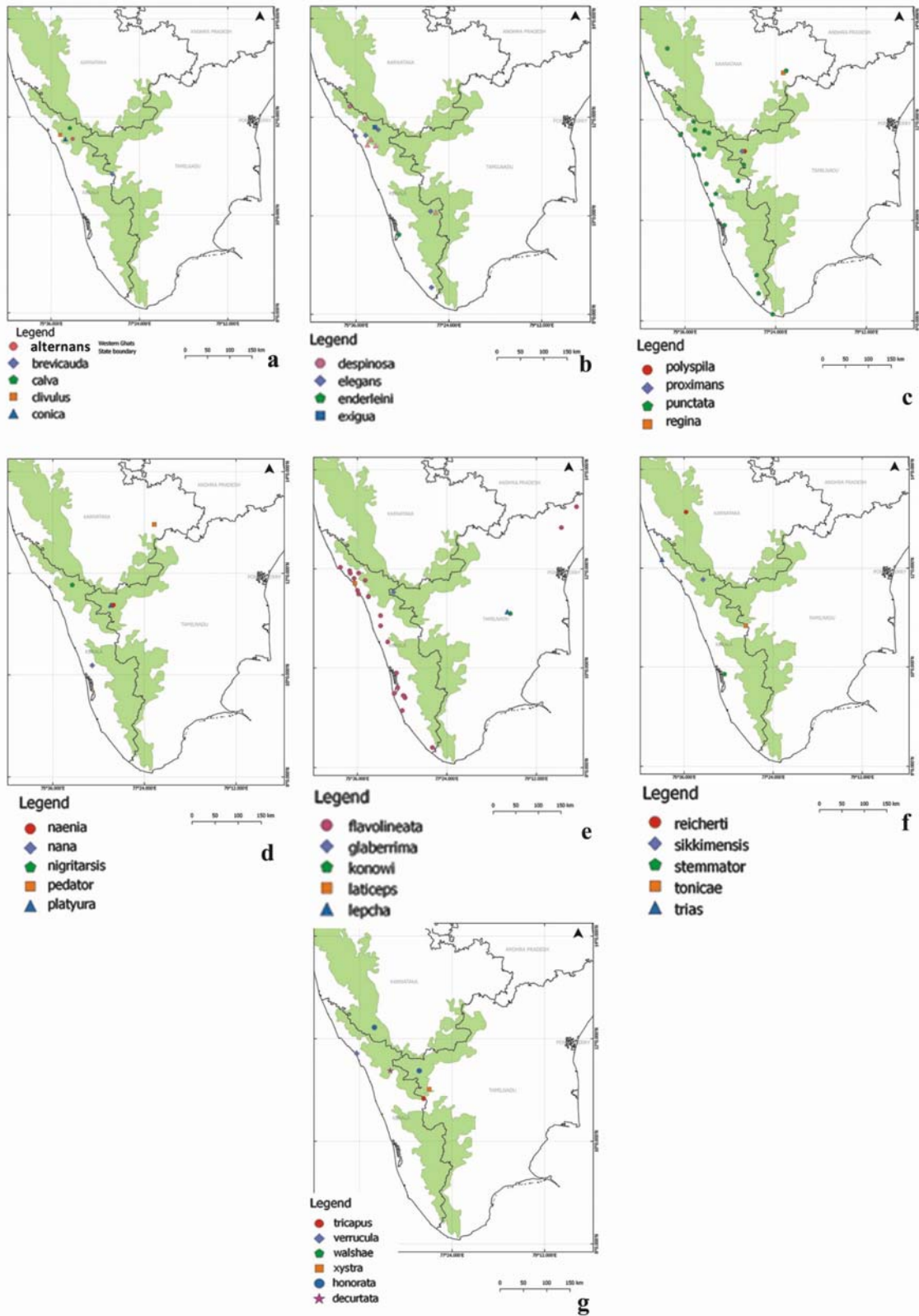
*Xanthopimpla leionota* Townes, Townes & Gupta, 1961. *Mem. Amer. Ent. Inst.*. 1:58. n.name for *lissonota* Cameron.

**Diagnosis:** Face moderately punctate; areola usually with two small black spots, receiving costula near its apical 0.35; tergites each with a pair of black spots; ovipositor sheath 1.45x hind tibia.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu, 1970).

**Material examined :** Nil

**Remarks:** Species distributed in India, Java and Taiwan. This species reported from Nilgiri hills by Townes & Chiu. The species is not represented in the present collection. The diagnosis is based on original description.



Map: Distribution of *Xanthopimpla* sp. in the southern Western Ghats

## Plate -1

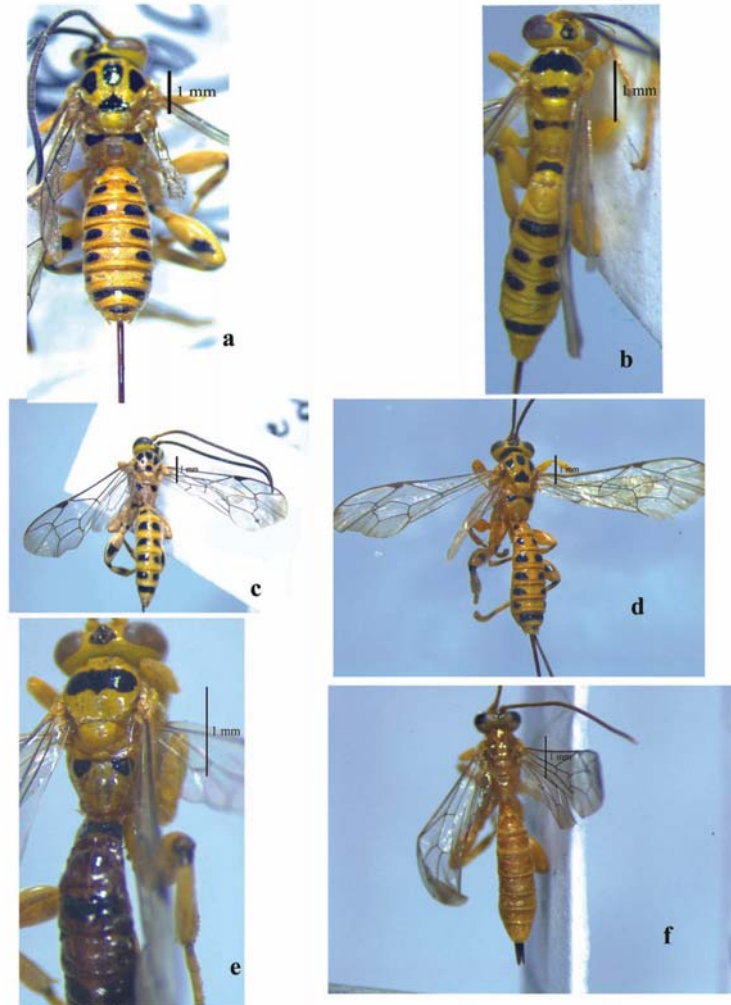


Fig : Dorsal view of a) *X. elegans elegans*, (Vollehoven) b) *X. exigua exigua*, Krieger  
 c) *X. clivulus clivulus*, Townes & Chiu d) *X. verrucula apheles*, Townes & Chiu e) *X. alternans*,  
 Krieger f) *X. flavolineata*, Cameron.

***Xanthopimpla sikkimensis* Cameron, 1907  
 (Plate 2, Fig. f)**

*Xanthopimpla sikkimensis* Cameron, 1907b. *Tijdschr. v. Ent.*, 50: 100. Holotype: ♀, India: Sikkim (BMNH).

**Diagnosis:** Face with small punctures; hind slope of vertex with black area; notaulus deep, not extending beyond the line of connecting front edge of tegula; hind femur with a black mark on front side, hind tibia with black marks anteriorly,

posteriorly, apically; propodeum and T1, T3, and T7 with black bands; ovipositor sheath 2.3xlong as hind tibia.

**Distribution:** Previously recorded from Sikkim (Townes & Chiu, 1970).

**Material examined:** 1♀, INDIA: Kerala, Wayanad, Mananthawady (N11°76'92"-E75°98'27"), Manjusha B.M, 1.viii.2016.

**Remarks:** This is the first record of the species from the Southern Western Ghats.

Plate -2



Fig : Dorsal view of a) *X.elegans priyadarsanani* sub sp.n. b) *X.e.kadmurensis* sub sp.n c) *X.punctata* (Fabricius) d) *X.nana nana*, Schulz e) *X.e.cristaminor*, Townes & Chiu f) *X.sikkimensis*, Cameron g) *X.calva sexcincta*, Townes & Chiu h) *X.trias*, Townes & Chiu i) *X.conica*, Cushman

***Xanthopimpla tonicae* Townes & Chiu, 1970**

*Xanthopimpla tonicae* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 153. Holotype: ♀, Walayar forest, South Malabar, India (CNCI)

**Diagnosis:** Scutellum evenly convex; hind femur with a large black mark on front and hind side, hind tibia with 4 apical bristles and 2 small pre apical bristles; ovipositor sheath 0.27 x long as hind tibia.

**Distribution:** Previously recorded from Kerala (Townes & Chiu, 1970).

**Material examined:** Photographs of **Holotype** 1♀, INDIA: South Malabar, viii.1952, Townes & Chiu, CNCI

**Remarks:** The diagnosis is based on the original description (Townes & Chiu, 1970) and the Photographs obtained from the CNCI Ottawa.

**TRUNCA SPECIES GROUP**

**Diagnosis:** Lower front corner of pronotum very broadly rounded, forming an angle of more than

## Plate -3

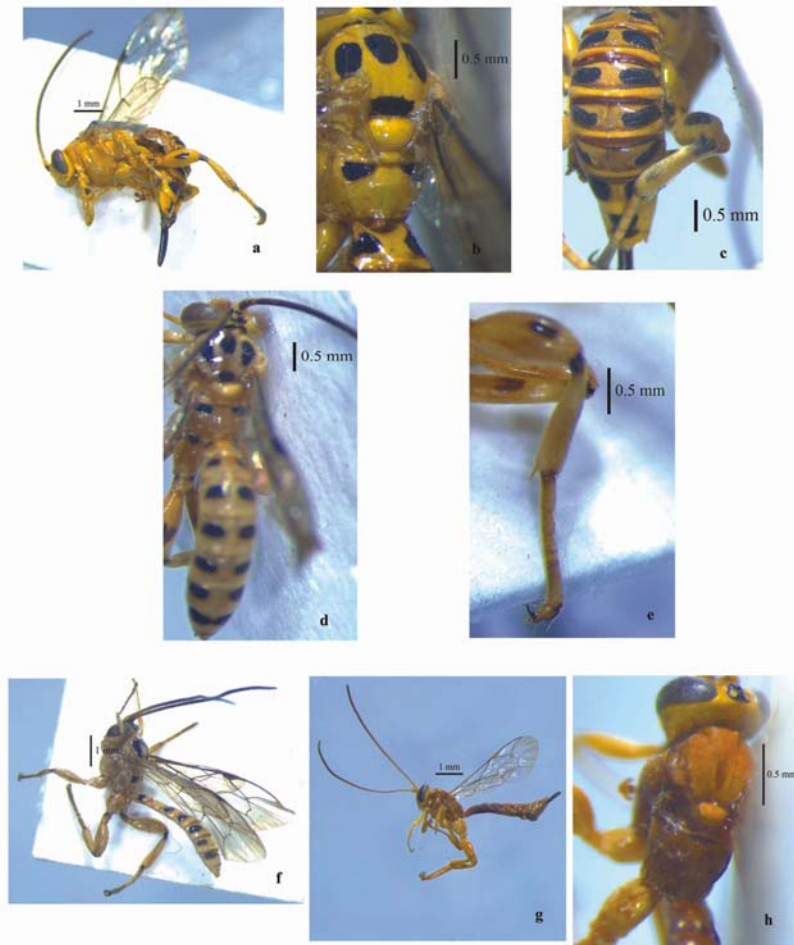


Fig : a- c *X. laticeps liturata*, Townes & Chiu a). Lateral view of habitus b). Dorsal view of thorax c). Dorsal view of T2-T8  
 d-e: *X. nigrirarsis wayanadensis* sub sp.n.d.) Dorsal view e). Hind tibia  
 f). Lateral view of *X. despinosa despinosa*, Krieger  
 g-h: *X. enderleini*, Krieger g). Lateral view h). Dorsal view of thorax

130°; notaulus usually longer than tegula length; scutellum strongly convex to low conical; propodeal carinae incomplete or entirely absent; fore wing with areolet closed; largest bristles of mid and hind tibia widened apically; T1 with dorsolateral carina complete, strong between spiracle and apex.

***Xanthopimpla calva sexcincta* Townes & Chiu, 1970 (Plate 2, Fig. g)**

*Xanthopimpla calva* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 240. Holotype: ♀, the Philippines: Gapan, Nueva Ecija, (CNCI)

*Xanthopimpla calva sexcincta* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 241. Holotype: ♂, Malaysia: North Borneo

**Diagnosis:** Propodeum without carinae, except apical part of lateral longitudinal carina present; first tergite broad, shorter than apical width; T1, T3, T4, T5, and T7 each with two black spots; apex of mid and hind tibia blackish; ovipositor sheath 0.92 x long as hind tibia.

**Distribution:** Previously recorded from Tamil Nadu (Townes & Chiu, 1970)

Table 1 : Showing the species group, species and sub species of *Xanthopimpla* Saussure from the Southern Western Ghats

Sl. No	Species Group	Species	Subsp.
1.	Brachycentra	<i>Xanthopimpla platyura</i> Townes & Chiu	
2.		<i>Xanthopimpla reicherti</i> Krieger	<i>X. r. reicherti</i> Krieger
3.		<i>Xanthopimpla walshae</i> Townes & Chiu	<i>X. w. walshae</i> Townes & Chiu
4.	Citrina	<i>Xanthopimpla enderleini</i> Krieger	
5.		<i>Xanthopimpla aflavolineata</i> Cameron	
6.	Cuneata	<i>Xanthopimpla clivulus</i> Townes & Chiu	<i>X. c. clivulus</i> Townes & Chiu
7.	Elegans	<i>Xanthopimpla elegans</i> (Vollehoven)	i) <i>X. e. cristaminor</i> Townes & Chiu ii) <i>X. e. elegans</i> Vollehoven iii) <i>X. e. kadnurensis</i> subsp.nov. iv) <i>X. e. priyadarsanani</i> subsp.nov.
8.		<i>Xanthopimpla nigratarsis</i> Cameron	<i>X. nigratarsis wayanadensis</i> subsp. nov.
9.		<i>Xanthopimpla tricapus</i> Townes & Chiu	<i>X. t. impressa</i> Townes & Chiu
10.	Incompleta	<i>Xanthopimpla naenia</i> Morley	
11.	Nana	<i>Xanthopimpla alternans</i> Krieger	
12.		<i>Xanthopimpla glaberrima</i> Roman	
13.		<i>Xanthopimpla laticeps</i> Townes & Chiu	<i>X. l. liturata</i> Townes & Chiu
14.		<i>Xanthopimpla nana</i> Schulz	<i>X. n. nana</i> Schulz
15.	Occidentalis	<i>Xanthopimpla despinosa</i> Krieger	<i>X. d. despinosa</i> Krieger
16.		<i>Xanthopimpla exigua</i> Krieger	<i>X. e. exigua</i> Krieger
17.		<i>Xanthopimpla honorata</i> Cameron	<i>X. h. honorata</i> Cameron
18.		<i>Xanthopimpla proximans</i> Townes & Chiu	
19.	Punctata	<i>Xanthopimpla punctata</i> (Fabricius)	
20.	Regina	<i>Xanthopimpla konowi</i> Krieger	
21.		<i>Xanthopimpla lepcha</i> (Cameron)	
22.		<i>Xanthopimpla pedator</i> (Fabricius)	
23.		<i>Xanthopimpla regina</i> Morley	
24.		<i>Xanthopimpla verrucula</i> Townes & Chiu	<i>X. v. apheles</i> Townes & Chiu
25.	Stemmator	<i>Xanthopimpla stemmator</i> (Thunberg)	
26.	Terebatrix	<i>Xanthopimpla conica</i> Cushman	
27.		<i>Xanthopimpla brevicauda</i> Cushman	<i>X. b. nathani</i> Townes & Chiu
28.		<i>Xanthopimpla decurtata</i> Krieger	<i>X. d. detruncata</i> Townes & Chiu
29.		<i>Xanthopimpla sikkimensis</i> Cameron	
30.		<i>Xanthopimpla polyspila</i> Cameron	
31.		<i>Xanthopimpla tonicae</i> Townes & Chiu	
32.	Trunca	<i>Xanthopimpla calva</i> Townes & Chiu	<i>X. c. sexcincta</i> Townes & Chiu
33.		<i>Xanthopimpla trias</i> Townes & Chiu	
34.	Xystra	<i>Xanthopimpla xystra</i> Townes & Chiu	

**Material examined:** 1♀, INDIA: Kerala, Wayanad, Mananthawady (N11°76'92"-E75°98'27"), Manjusha B.M, 20.vii.2015.

**Remarks:** Three subspecies are recognized, *X. calva calcis* Townes & Chiu from Philippines, *X. c. periscelis* Townes & Chiu from Philippines, and *X.c.sexincta* Townes & Chiu from India, Myanmar and Malaysia. The specimens collected from the Southern Western Ghats belong to *X. c. sexincta*.

***Xanthopimpla trias* Townes & Chiu, 1970 (Plate 2, Fig. h)**

*Xanthopimpla trias* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 243. Holotype: ♀, Mysore, India. CNCI.

**Diagnosis:** Propodeum without carinae, stubs of pleural carina present; T1, T4, and T7 each with black band, T3 and T5 entirely yellow; ovipositor 0.45x hind tibia.

**Distribution:** Previously recorded from Karnataka (Townes & Chiu, 1970).

**Material examined:** 1♀, INDIA: Kerala, Kasargod, Neeleshwar (N12°27'21"- E 75°16'32"), Manjusha B.M, 2.vi.2016.

***XYSTRA* SPECIES GROUP**

**Diagnosis:** Scutellum with a lateral carina only at the basal corner or with none; propodeum long and flattened without carinae; submetapleural carina absent; mid and hind tibiae with many stout bristles; fore wing with areolet closed; ovipositor tip with a few coarse transverse ridge on both upper and lower valve.

***Xanthopimpla xystra* Townes & Chiu, 1970**

*Xanthopimpla xystra* Townes & Chiu, 1970. *Mem. Amer. Ent. Inst.*, 14: 303. Holotype: ♀, Coimbatore, Madras, India.(CNCI)

**Diagnosis:** Frons with a median elevation; black colour on ocellar area extended into hind slope of vertex; propodeum long and flattened without carina; ovipositor sheath 0.7 x long as hind tibia.

**Distribution:** Previously recorded from Tamil Nadu, Kerala. (Townes & Chiu, 1970).

**Material examined:** Photographs of Type: 1F, INDIA: Coimbatore, 1400 ft., Apr.1962 Townes & Chiu. CNCI

**Remarks:** The diagnosis is based on the original description (Townes & Chiu, 1970) and the Photographs obtained from the CNCI Ottawa.

**DISCUSSION**

The most relevant work from the Indo-Australian area on the fauna of *Xanthopimpla* Saussure was published by Townes and Chiu (1970), which categorized the genus into 20 species groups, of which 12 are known from the southern Western Ghats. A total of 28 species were documented from the southern Western Ghats. The present study reveals the richness and diversity of the study area. Among the 13 species groups recognized, one species group viz., Cuneata is newly recorded from the southern Western Ghats. Six species are newly recorded from the study area viz, *X. clivulus*, *X. exigua*, *X. laticeps*, *X. nigratarsis*, *X. sikkimensis* and *X. verrucula*. Three new subspecies are also described as part of the study. Thirty four species are documented categorized under thirteen species groups (Table 1). The distribution of the species has been manifested in the map, which clearly reveals the distribution status of the 34 species from the southern Western Ghats.

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