

RESEARCH PAPER

## Annotated catalogue of the flower bugs from India (Heteroptera: Anthocoridae, Lasiochilidae)

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**Abstract.** The present paper provides a checklist of the flower bug families Anthocoridae and Lasiochilidae (Hemiptera: Heteroptera) of India based on literature and newly collected specimens including eleven new records. The Indian fauna of flower bugs is represented by 73 species belonging to 26 genera under eight tribes of two families. Generic transfers of *Blaptostethus pluto* (Distant, 1910) comb. nov. (from *Triphleps pluto* Distant, 1910) and *Dilasia indica* (Muraleedharan, 1978) comb. nov. (from *Lasiochilus indica* Muraleedharan, 1978) are provided. A lectotype is designated for *Blaptostethus pluto*. Previous, as well as new, distributional data and bibliographical references for each taxon are included. The following 11 species are recorded from India for the first time: *Amphiareus ruficollaris* Yamada & Hirowatari, 2003 (Tamil Nadu); *Anthocoris dimorphus* Zheng, 1984 (Himachal Pradesh); *Bilia burma* Yasunaga & Yamada, 2016 (Himachal Pradesh, Karnataka); *Cardiastethus kathmandu* Yamada, 2016 (Uttarakhand); *Lippomanus brevicornis* Yamada & Hirowatari, 2004 (Karnataka, Mizoram, Tripura); *Montandoniola bellatula* Yamada, 2007 (Karnataka); *Physopleurella armata* Poppius, 1909 (Karnataka); *P. flava* Carayon, 1958 (Karnataka); *P. pessonii* Carayon, 1956 (Tamil Nadu); *Rajburicoris stysi* Carpintero & Dellapé, 2008 (Tamil Nadu); and *Xylocoris (Proxylocoris) cerealis* Yamada & Yasunaga, 2006 (Karnataka). The paper provides synthesis of the regional taxonomical work carried out until now, along with biological notes (habitats, prey types, etc.). The paper will serve as baseline data for future studies on Anthocoridae and Lasiochilidae.

**Key words.** Hemiptera, Heteroptera, Anthocoridae, Lasiochilidae, flower bugs, biocontrol, catalog, new combination, taxonomy, India, Oriental Region, Palaearctic Region

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### Introduction

Insects in the family Anthocoridae *sensu lato* (Hemiptera: Heteroptera) are referred to as minute pirate bugs or flower bugs. The Anthocoridae *sensu lato* include three families, Anthocoridae *sensu stricto*, Lasiochilidae, and Lyctocoridae (cf. SCHUH & ŠTYS 1991) about 100 genera with 500–600 species presently described in the world, distributed approximately from 70°N to 56°S (PÉRICART 1996, LATTIN 1999, HENRY 2009). These insects are better known in the Northern Hemisphere than in the Southern

Hemisphere with rich diversity in the tropics and the Holarctic Region. Fewer Palaearctic and Oriental species are discovered in comparison to the number of Nearctic species (CARPINTERO 2002, HORTON 2008). REUTER (1884) provided a landmark monograph of the world Anthocoridae. An excellent overview of Anthocoridae and its related families was also provided by SCHUH & SLATER (1995) in their review of true bug fauna of the world. Several regional monographs and catalogs are available: PÉRICART (1972) (West-Palaearctic Region), ÖNDER (1982) (Turkey), HENRY



(1988) (USA and Canada), CASSIS & GROSS (1995) (Australia), PÉRICART (1996) and AUKEMA et al. (2013) (Palearctic Region), BU & ZHENG (2001) (China), CARPINTERO (2002, 2015) (Neotropical Region), FALAMARZI et al. (2009), GHAHARI et al. (2009), and OSTOVAN et al. (2017) (all Iran), JUNG et al. (2013) (Korea), YAMADA et al. (2016a) (Japan).

Anthocorid bugs are generalist predators, globally used as efficient biocontrol agents (DELIGEORGIDIS 2002, KIM et al. 2008), and hold considerable promise for ecological agriculture in India as well (ANANTHAKRISHNAN & SURESHKUMAR 1985, NASSER & ABDURAHIMAN 2004, BALLAL & GUPTA 2011, BALLAL & YAMADA 2016). However, until now there has been no comprehensive review of minute pirate bugs known from India. The group is inadequately documented, the species are poorly represented in collections, and much confusion exists in naming the species. Some of the major regional contributions include those of DISTANT (1904a,b, 1906, 1910), POPPIUS (1909, 1913), GHAURI (1965, 1972a), RAJASEKHARA (1973), MURALEEDHARAN (1975, 1977a,b,c, 1978), MURALEEDHARAN & ANANTHAKRISHNAN (1974a,b,c, 1978a,b), and recent contributions by YAMADA et al. (2008, 2010a,b, 2011) and BALLAL & YAMADA (2016). The faunal records of anthocorids from India are patchy and very limited but rather interesting, with many of them predaceous on crop pests or pests in storage facilities. Most of the known species are endemic (PÉRICART 1987, 1996) but with affinities to South-Palearctic elements from where the species later dispersed towards the Oriental Region and across the Bering Straits into the Nearctic Region (PÉRICART 1996, LI et al. 2012). Indian anthocorids are important to establish a zoogeographical scheme between East and Southeast Asian species. The lack of any comprehensive taxonomic studies (except the key to genera by MURALEEDHARAN & ANANTHAKRISHNAN 1978b), too few reliable faunal records, and the insufficient knowledge of bionomics of Indian anthocorids do not allow proper evaluation of the biocontrol potential of anthocorids. We expect that the major portion of Indian anthocorids is still to be discovered. The catalogue provided here should represent a basic step for improvement of knowledge on Indian anthocorids.

### Materials and methods

The present study brings together the scattered knowledge on the Anthocoridae and Lasiochilidae known from India. The study is based on available literature data, specimens examined, as well as unpublished information from the authors. In the synonymic lists for known taxa, only selected references, especially covering the Indian subcontinent, are cited.

Abbreviations of specimen depositories:

BMNH	Natural History Museum, London, United Kingdom;
DEIC	Senckenberg Deutsches Entomologisches Institut, Münchenberg, Germany;
DOAT	Insect Collection, Entomology & Zoology Group, Plant Protection Research and Development Office, Department of Agriculture, Bangkok, Thailand;
HNHM	Hungarian Natural History Museum, Budapest, Hungary;
MCSN	Museo Civico di Storia Naturale 'Giacomo Doria', Genova, Italy;

MNHN	Muséum National d'Histoire Naturelle, Paris, France;
MZHF	Zoological Museum, University of Helsinki, Helsinki, Finland;
NBAIR	National Bureau of Agricultural Insect Resources, Bangalore, India;
NHMW	Naturhistorisches Museum, Wien, Austria;
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden;
NIAES	National Institute of Agro-Environmental Sciences, Tsukuba, Japan;
NKUM	Nankai University, Department of Biology, Tianjin, P.R. China;
NMPC	National Museum, Prague, Czech Republic;
NPCI	National Pusa Collection, Indian Agricultural Research Institute, New Delhi, India;
OPU	Osaka Prefecture University, Osaka, Japan;
PMNH	Peabody Museum, New Haven, Connecticut, U.S.A.;
SUT	Suranaree University of Technology, Nakhon Ratchasima, Thailand;
TKPM	Tokushima Prefectural Museum, Tokushima, Japan;
USNM	Smithsonian Institution, National Museum of Natural History, Washington, D.C., U.S.A.;
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen, Denmark;
ZMUH	Zoologisches Museum, Universität Hamburg, Hamburg, Germany;
ZMUM	Zoological Museum, University of Moscow, Moscow, Russia;
ZSI	Zoological Survey of India, Kolkata, India.

## Results

Family ANTHOCORIDAE Fieber, 1836

Tribe Almeidini Carayon, 1972

Genus *Almeida* Distant, 1910

*Almeida pilosa* (Poppius, 1909)

*Cardiastethus pilosus* Poppius, 1909: 21. SYNTYPES: 1 ♀, Ceylon [= Sri Lanka], Henaratgoda (NHMW); 1 ♀, Indonesia: Sulawesi, Makassar [= Ujung Pandang] (MCSN).

*Almeida pilosus*: DISTANT (1910): 301 (new combination).

**Type material examined.** SYNTYPE: ♀, 'Celebes / Makassar / I 74 / O. Beccari' [printed + handwritten], '194' [printed, blue square], 'Museo Civ. / Genova' [printed, orange square], 'Cardiastethus / pilosus n. sp. / B. Poppius det.' [handwritten + printed], 'SYNTYPUS / Cardiastethus / pilosus / Poppius, 1909' [printed + handwritten] (MCSN).

**Distribution in India.** Andhra Pradesh: Tirupati (MURALEEDHARAN & ANANTHAKRISHNAN 1978a); West Bengal: Kolkata (DISTANT 1910).

**General distribution.** Outside India it is known from Indonesia (Sulawesi Archipelago) (DISTANT 1910), Sri Lanka (DISTANT 1910), Taiwan (POPPIUS 1915), China (Hainan, Yunnan) (BU & ZHENG 2001), Japan (YAMADA et al. 2016a).

**Remarks.** There is an alary polymorphism in the species (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

Genus *Lippomanus* Distant, 1904

*Lippomanus brevicornis* Yamada & Hirowatari, 2004

*Lippomanus brevicornis* Yamada & Hirowatari, 2004: 57. HOLOTYPE: ♂, Japan, Ryukyus, Iriomote Island, Uehara (OPU).

**Type material examined.** HOLOTYPE: ♂, '[Ryukyus] / Uehara / Iriomote Is. / Okinawa Pref. / 26. iii. 2002 L.T. / K. Yamada leg.' [printed], 'Holotype ♂ / *Lippomanus brevicornis* / Yamada et Hirowatari, 2004' [printed, pink square], 'OPU-IN-HE / 2009III0003' [printed, with black frame] (OPU).

**Additional material examined.** INDIA: KARNATAKA: Bangalore, Hebbal area, viii.2014, 1 ♀ (TKPM). MIZORAM: Mizoram, iii.2016, 42 ♂♂ 4 ♀♀ (TKPM, NBAIR). TRIPURA: Tripura, 9.iii.2016, 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Bangalore; Mizoram; Tripura. New record from India.

**General distribution.** Japan (YAMADA & HIROWATARI 2004).

#### *Lippomanus hirsutus* Distant, 1904

*Lippomanus hirsutus* Distant, 1904a: 221. SYNTYPES: sex not indicated, Myanmar, Karenee and Tenasserim, Thagata (BMNH).

**Type material examined.** SYNTYPE: ♀, 'Type / H. T.' [printed circle with red border], 'Lippomanus / hirsutus / Dis' [Distant's handwritten], 'Carin Ghecu / 1300–1400 m / L.Fea II–III 88' [handwritten], 'Distant Coll. / 1911–383' [printed], 'Reprepared by / J. Péricart 1985' [Péricart's handwritten], 'Lippomanus / hirsutus Dist. / ♀ holotype / J. Péricart vid. 1985' [handwritten, red square] (BMNH). The type specimen examined here is attached to a holotype label, which has been put by J. Péricart. However, the lectotype designation of this species has not been published so far.

**Distribution in India.** Tamil Nadu: Kodaikanal (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

**General distribution.** Nepal (PÉRICART 1986), Myanmar (DISTANT 1904a), China (Hainan) (BU & ZHENG 2001).

Tribe Anthocorini Fieber, 1836

#### Genus *Anthocoris* Fallén, 1814

##### *Anthocoris annulipes* Poppius, 1909

*Anthocoris annulipes* Poppius, 1909: 31. SYNTYPES: 1 ♂ 1 ♀, India, Darjeeling and Sikkim (NHMW).

**Distribution in India.** Sikkim (POPPIUS 1909); West Bengal: Darjeeling (POPPIUS 1909, DISTANT 1910).

**General distribution.** Endemic.

##### *Anthocoris confusus* Reuter, 1884

*Anthocoris confusus* Reuter, 1884: 194. LECTOTYPE (designated by PÉRICART 1970: 738): ♂, France, Vosges (MNHN).

Detailed list of synonyms was presented by PÉRICART (1996).

**Material examined.** INDIA: HIMACHAL PRADESH: unknown date and collector, 4 ♂♂ 7 ♀♀ (TKPM).

**Distribution in India.** Himachal Pradesh (BALLAL & YAMADA 2016).

**General distribution.** Holarctic (HENRY 1988, PÉRICART 1996, AUKEMA et al. 2013).

##### *Anthocoris dimorphus* Zheng, 1984

*Anthocoris dimorphus* Zheng, 1984: 64, 67. HOLOTYPE: ♂, China, South-western Territory, Sichuan, Mt. Emei (NKUM).

**Material examined.** INDIA: HIMACHAL PRADESH: Shimla, 1 ♂ 1 ♀, 10.–15.ix.2015, C.R. Ballal (NBAIR).

**Distribution in India.** Himachal Pradesh: Shimla. New record from India.

**General distribution.** China (Sichuan) (BU & ZHENG 2001).

##### *Anthocoris flavipes* Reuter, 1884

*Anthocoris flavipes* Reuter, 1884: 80. HOLOTYPE: ♀, Uzbekistan, Iskander (MZHf).

*Anthocoris gyalpo* Hutchinson, 1934: 137. HOLOTYPE: ♂, India, 'Indian Tibet', Leh, Residency Garden (PMNH). Synonymized by ELOV (1976: 377).

**Distribution in India.** Jammu and Kashmir: Ladakh (HUTCHINSON 1934, MANI & SINGH 1961, PÉRICART 1996, BHAGAT 2015).

**General distribution.** Armenia (doubtful record) (PÉRICART 1996), Kazakhstan (PÉRICART 1996), Kirgizia (PÉRICART 1996), Tajikistan (PÉRICART 1996), China (Xizang) (BU & ZHENG 2001), Iran (GHAHARI et al. 2009).

**Biology.** The species was found on a number of important agricultural, horticultural and forest plants and feeds on species of several aphid genera including *Anuraphis* Del Guercio, 1907, *Amphicercidus* Oestlund, 1923, *Aphis* Linnaeus, 1758, *Brachycaudus* Goot, 1913, *Macrosiphoneilla* Guercio, 1911, and *Pemphigus* Hartig, 1839 (BHAGAT 2015).

##### *Anthocoris indicus* Poppius, 1909

*Anthocoris indicus* Poppius, 1909: 32. HOLOTYPE: ♂, India, Darjeeling (NHMW).

**Distribution in India.** West Bengal: Darjeeling (POPPIUS 1909, DISTANT 1910).

**General distribution.** Endemic.

##### *Anthocoris minki* Dohrn, 1860

*Anthocoris minki* Dohrn, 1860: 162. SYNTYPES: Germany, Krefeld (lost, see LE QUESNE 1958: 125).

Detailed list of synonyms was presented by PÉRICART (1996).

**Distribution in India.** Himachal Pradesh (BALLAL & YAMADA 2016).

**General distribution.** Europe, North Africa, Palearctic Asia (PÉRICART 1996, AUKEMA et al. 2013).

**Biology.** The species is a well-known predator of aphid and psyllid pests of many crops in Europe and has been employed as successful natural biocontrol agent against them (mainly in Turkey against pistachio psyllid *Agonoscaena pistaciae* Burckhardt & Lauterer, 1989 and almond aphid *Brachycaudus amygdalinus* Schouteden, 1905). In India, the species has been reported to inhabit peach trees and feed on aphid *Brachycaudus helichrysi* Kaltenbach, 1843 (BALLAL & YAMADA 2016).

**Comment.** There are two subspecies, *A. minki minki* Dohrn, 1860 (Europe) and *A. minki pistaciae* Wagner, 1957 (from Mediterranean to Central Asia and China), but it is not clear which of these is present in India. ÖNDER (1982) believes that there is no significant difference between the two subspecies and they should be treated as synonyms.

##### *Anthocoris muraleedharani* Yamada, 2010

(Fig. 2)

*Anthocoris muraleedharani* Yamada, 2010 in YAMADA et al. (2010a: 416). HOLOTYPE: ♂, India, Bangalore (TKPM).

**Type material examined.** HOLOTYPE: ♂, progeny of the specimens originally collected at 'INDIA: Karnataka / Bangalore, ix. 2008 / N13°01'62.2" / E77°35'05.3" / 932 m above MSL / C. R. Ballal leg.' [printed], 'Host Insect: / *Ferrisia virgata* / Host Plant: / *Bauhinia purpurea* / [Lab. Reared culture]' [printed], 'Holotype ♂ / *Anthocoris muraleedharani* / Yamada, 2010' [printed, red square] (TKPM).

**Additional material examined.** INDIA: KARNATAKA: Bangalore, Attur, x.2014, 1 ♂ 3 ♀♀, from *Magnolia champaka* (L.) Baill. ex Pierre (TKPM).

**Distribution in India.** Karnataka: Attur (this paper), Bangalore (YAMADA et al. 2010a).

**General distribution.** Endemic.

**Biology.** The species inhabits plantations of *Bauhinia purpurea*, feeding on mealybugs *Ferrisia virgata* Cocke-rell, 1893. Observed as a potential predator of *Phenacoccus solenopsis* Tinsley, 1898 and *Paracoccus marginatus* Williams & Granara, 1992 (YAMADA et al. 2010a). The specimens were also collected from the Champaka tree, *Magnolia champaca* (this paper).

#### *Anthocoris nilgiriensis* Muraleedharan, 1977

*Anthocoris nilgiriensis* Muraleedharan, 1977b: 231. HOLOTYPE: ♂, India, Tamil Nadu, Nilgiri Hills, Ooty (ZSI).

**Distribution in India.** Tamil Nadu: Nilgiri Hills, Ooty (MURALEEDHARAN 1977b).

**General distribution.** Endemic.

### Genus *Galchana* Distant, 1910

#### *Galchana humeralis* Distant, 1910

*Galchana humeralis* Distant, 1910: 298. SYNTYPE(S): ♀, India, Shimla (BMNH).

**Type material examined.** HOLOTYPE: ♀, 'Type/H. T.' [printed circle with red border], 'Simla' [handwritten], 'Distant Coll. / 1911-383' [printed], 'Galchana / humeralis / Dis' [Distant's handwritten] (BMNH).

**Distribution in India.** Himachal Pradesh: Shimla (DISTANT 1910).

**General distribution.** Endemic.

### Genus *Temnostethus* Fieber, 1860

#### *Temnostethus (Ectemnus) paradoxus* (Hutchinson, 1934)

*Ectemnus paradoxus* Hutchinson, 1934: 134. HOLOTYPE: ♂, India, 'Indian Tibet', Igu, in the Indus Valley above Leh (PMNH).

*Temnostethus (Ectemnus) paradoxus*: PÉRICART (1972): 84 (*Ectemnus* downgraded to the subgenus of *Temnostethus*).

**Distribution in India.** Jammu and Kashmir: Ladakh (HUTCHINSON 1934, MANI & SINGH 1961, BHAGAT 2015).

**General distribution.** Endemic.

**Biology.** The type series was collected on the bark of *Populus* sp. at altitude of 2417 m a.s.l. (HUTCHINSON 1934). BHAGAT (2015) reported it from high-altitude regions of Ladakh (3000 m a.s.l.), where it inhabits economically important crops and feeds on several aphid genera including *Anuraphis*, *Amphicercidus*, *Aphis*, *Brachycaudus*, *Macrosiphoneilla* and *Pemphigus*.

### Genus *Tetraphleps* Fieber, 1860

#### *Tetraphleps galchanoides* Ghauri, 1972

*Tetraphleps galchanoides* Ghauri, 1972a: 420. HOLOTYPE: ♂, India, Lachung, way to Dhombang (BMNH).

**Type material examined.** HOLOTYPE: ♂, 'Type' [printed circle with red border], 'C. I. B. C. LACHUNG / June 1961' [handwritten], 'feeding on *Adelges* / on hemlock on way to / Dhombang' [handwritten], 'Tetraphleps

/ galchanoides sp. n. / M.S.K. Ghauri det. 1972' [handwritten + printed], 'Pres by / Com Inst Ent' [printed] (BMNH).

**Distribution in India.** Sikkim: Lachung (GHAURI 1972a).

**General distribution.** Outside India known only from South-Western Territory of China (Sichuan, Yunnan) (BU & ZHENG 2001).

**Biology.** The type series was collected on hemlock (*Tsuga* spp.), feeding on *Adelges* sp. (GHAURI 1972a).

#### *Tetraphleps raoi* Ghauri, 1965

*Tetraphleps raoi* Ghauri, 1965: 678. HOLOTYPE: ♂, India, Shillong (BMNH).

**Type material examined.** HOLOTYPE: ♂, 'Type' [printed circle with red border], 'Shillong-Assam / June 191?' [handwritten, one place digit of collecting year unreadable], 'Found feeding / on *Pineus on* / Pine' [handwritten], 'CIBC-15' [handwritten], '93' [printed], 'Tetraphleps / raoi sp. n. / M.S.K. Ghauri det. 1965' [handwritten + printed], 'Pres by / Com Inst Ent / B M 1965-3' [printed] (BMNH).

**Distribution in India.** Meghalaya: Shillong (GHAURI 1965).

**General distribution.** Kenya (introduced: CHACKO 1973, KARANJA & ALOO 1990).

**Biology.** *Tetraphleps raoi* is reported to inhabit Benguet pine (*Pinus kesiya*), feeding on *Pineus* sp. (Adelgidae) (GHAURI 1965, CHACKO 1973). This species was sent from India to Kenya for release against *Pineus pini* (Macquart, 1819) on several *Pinus* spp. KARANJA & ALOO (1990) reported that it established there, and it resulted in the decline of *P. pini* population.

### Tribe Blaptostethini Carayon, 1972

#### Genus *Blaptostethus* Fieber, 1860

##### *Blaptostethus kumbi* Rajasekhara, 1973

*Blaptostethus kumbi* Rajasekhara, 1973: 86. HOLOTYPE: ♂, India, Mysore, Mandya (NPCI).

*Blaptostethus kambu* (incorrect subsequent spelling): MURALEEDHARAN (1977b: 232).

**Distribution in India.** Karnataka: Mandya (RAJASEKHARA 1973); New Delhi (RAJASEKHARA 1973); Tamil Nadu (MURALEEDHARAN 1977b).

**General distribution.** Endemic.

**Biology.** Unlike most species of the genus which inhabit dead plant materials such as clusters of vegetable refuse and the nests of weaverbirds (YAMADA 2008a), the species was reported to inhabit sugarcane leaves (RAJASEKHARA 1973), however no further details regarding its biology were provided in the paper.

##### *Blaptostethus pallescens* Poppius, 1909

(Figs 16–17, 22–24)

*Blaptostethus piceus* var. *pallescens* Poppius, 1909: 41. SYNTYPES: 1 ♀, India, Bombay [= Mumbai] (MCSN); 1 spec., Kenya, 'Ostafrika, Waboniland' (NHMW).

*Blaptostethus pallescens*: CARAYON (1972a): 329 (upgraded to species rank).

**Material examined.** INDIA: KARNATAKA: Bangalore, unknown date and collector, 17 ♂♂ 9 ♀♀ (TKPM, NBAIR).

**Distribution in India.** Karnataka: Bangalore (BALLAL et al. 2009); Maharashtra: Mumbai (POPPIUS 1909); Tamil Nadu: Madras [= Chennai], Coimbatore (MURALEEDHARAN 1977b).

**General distribution.** Réunion (CARAYON 1958b, as *Lasiophiloides plenetii*), Egypt (TAWFIK & EL-HUSSEINI 1971), East Africa (PÉRICART 1996), Madagascar (PÉRICART 1996).

**Biology.** The species inhabits corn (*Zea* sp.), *Terminalis bellarica*, *Tithonia diversifolia* and castor bean plant (*Ricinus communis*) and is found associated with the aphid *Rhopalosiphum maidis* (Fitch, 1856), thrips and the two-spotted spider mite *Tetranychus urticae* Koch, 1836. This predator has also been evaluated as a biocontrol agent and potential predator of the maize stem borer, *Chilo partellus* (Swinhoe, 1885), and *Tetranychus urticae* (JALALI & SINGH 2002; BALLAL et al. 2003a, 2009) and the mealybugs *Phenacoccus solenopsis* and *Paracoccus marginatus* (BALLAL et al. 2012b). It has also been recently collected from *Spathodea campanulata* (rain-drop tree) and from dry fallen leaves and flowers. TAWFIK & EL-HUSSEINI (1971) reported that this species was commonly found on corn and fed on a variety of insects and mites.

#### ***Blaptostethus pluto* (Distant, 1910) comb. nov.**

*Triphleps pluto* Distant, 1910: 307. SYNTYPE: ♀, India, Calcutta [= Kolkata] (BMNH).

**Type material examined:** LECTOTYPE (present designation): ♀, 'Type / H. T.' [printed circle with red border], 'under leaf / space of bamboo / Calcutta / 17-IX-09' [handwritten], 'Distant Coll. / 1911-383' [printed], 'Triphleps / pluto / Dist' [Distant's handwritten] (BMNH).

**Distribution in India.** West Bengal: Kolkata (DISTANT 1910).

**General distribution.** Endemic.

**Biology.** According to the attached label, the type specimen was found under leaf space of bamboo, which is similar to the preferable habitat of *Blaptostethus* species.

**Taxonomy.** While studying the syntype, it became obvious that this species should be transferred to *Blaptostethus* based on the following character combination: labium reaching mid coxae; profemur enlarged and with four long spines on anteroventral surface; ostiolar peritreme curved anteriorly and not reaching anterior margin of metapleuron.

#### **Genus *Blaptostethoides* Carayon, 1972**

##### ***Blaptostethoides* sp.**

(Fig. 6)

**Material examined.** INDIA: KARNATAKA: Mandya, vii.2012, 1 ♂ 4 ♀♀ (TKPM).

**Distribution in India.** Karnataka: Mandya (this paper).

**Biology.** The specimens were collected from sugarcane plants (this paper).

**Remarks.** Judging from the male genitalia, this species is considered to be undescribed. However, there is only a single male available and it is in a bad condition. We refrain from describing it as a new species until enough material is available.

Tribe Cardiastethini Carayon, 1972

#### **Genus *Alofa* Herring, 1976**

##### ***Alofa sodalis* (White, 1879)**

*Cardiastethus sodalis* Buchanan-White, 1879: 142. SYNTYPE(S): sex not indicated, United States, Hawaiian Islands (HNHM).

*Buchananiella sodalis*: REUTER (1884): 681 (new combination).

*Alofa sodalis*: HERRING (1976): 150 (new combination).

**Distribution in India.** No detailed locality given (NASSER & ABDURAHIMAN 1990, as *Buchananiella sodalis*).

**General distribution.** This species is widespread throughout the tropics and subtropics of the world: tropical Africa, Pacific Islands, North, Central and South America, West Indies (CARAYON 1958a, CARPINTERO 2002, LATTIN 2007). It is considered to be native to the Hawaiian Islands (LATTIN 2007).

#### **Genus *Amphiareus* Distant, 1904**

##### ***Amphiareus constrictus* (Stål, 1860)**

(Fig. 1)

*Xylocoris constrictus* Stål, 1860: 44. HOLOTYPE: ♂, Brazil, Rio de Janeiro (NHRS).

*Xylocoris fulvescens* Walker, 1872: 160. LECTOTYPE (designated by PÉRICART 1972: 269, as 'type'): ♂, Ceylon [= Sri Lanka] (BMNH). Synonymized by HERRING (1965: 203).

*Amphiareus fulvescens*: DISTANT (1904): 221 (new generic placement).

*Amphiareus constrictus*: HERRING (1965): 203 (new combination).

**Material examined.** INDIA: KARNATAKA: Mandya, ii.2013, 2 ♂♂ 2 ♀♀ (TKPM, NBAIR). TAMIL NADU: Attur, 6.ii.2014, 1 ♀ (TKPM); Wellington, Ooty, ii.2016, 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Mandya (this paper); Kerala: Kottayam, Thekkady, Trivandrum (MURALEEDHARAN & ANANTHAKRISHNAN 1978a); Meghalaya: Garo Hills, Songsak (MURALEEDHARAN 1977a); Tamil Nadu: Kallar (MURALEEDHARAN & ANANTHAKRISHNAN 1978a), Attur, Wellington (this paper).

**General distribution.** Pan-temperate and pan-tropical areas (PÉRICART 1996, YAMADA 2008b, AUKEMA et al. 2013).

**Biology.** The species is widely distributed, generally occurring in hay stacks, sheaths of palms, nests of birds and leaf litter. It feeds on thrips *Apelaunothrips consimilis* (Ananthakrishnan, 1969) (MURALEEDHARAN & ANANTHAKRISHNAN 1978a). In Karnataka, it was recorded from sugarcane and mango, and found associated with thrips and mites (this paper).

##### ***Amphiareus ruficollaris* Yamada & Hirowatari, 2003**

*Amphiareus ruficollaris* Yamada & Hirowatari, 2003: 298. HOLOTYPE: ♂, Japan, Nara Pref., Kawakami Vill., Kitamata Riv. (OPU).

**Material examined.** INDIA: MEGHALAYA: Khasi Hills reg., Shillong peak, 1850 m, 25°32'8"N 91°52'5"E, 4.–5.vi.1996, 1 ♀, E. Jendek & O. Šauša lgt. (NMPC). TAMIL NADU: Nilgiris, Wellington Ooty, 1 ♂ 1 ♀, 16.ii.2016, C. R. Ballal (NBAIR).

**Distribution in India.** Meghalaya: Khasi Hills; Tamil Nadu: Nilgiris, Wellington Ooty. New record from India.

**General distribution.** Japan (Yamada & Hirowatari 2003), Laos, Malaysia, Thailand, Vietnam (YAMADA 2008b).

**Biology.** The specimens from Tamil Nadu were collected from *Lantana* sp. (this paper).

**Genus *Buchananiella* Reuter, 1884*****Buchananiella crassicornis* Carayon, 1958**

*Buchananiella crassicornis* Carayon, 1958a: 154. HOLOTYPE: ♂, Ivory Coast (MNHN).

**Distribution in India.** Andhra Pradesh: Tirupati (MURALEEDHARAN & ANANTHAKRISHNAN 1974b); Kerala: Devikolam, Kallar, Nilgiris, Palghat, Walayar (MURALEEDHARAN & ANANTHAKRISHNAN 1974b, 1978a); Tamil Nadu: Madras [= Chennai], Kallar (MURALEEDHARAN & ANANTHAKRISHNAN 1974b, 1978a).

**General distribution.** Ivory Coast (CARAYON 1958a), Japan (YAMADA & HIROWATARI 2005), Malaysia (YAMADA & HIROWATARI 2007a), Thailand (YAMADA & HIROWATARI 2007a), Oman (CARAPEZZA et al. 2014), United Arab Emirates (CARAPEZZA et al. 2014).

**Biology.** The species is widely distributed in south India with records suggesting food preference for thrips *Apelelathrips consimilis* (MURALEEDHARAN & ANANTHAKRISHNAN 1978a). This species was also reported to inhabit leaf litter layers in forests, and seems to feed on various small arthropods (MURALEEDHARAN & ANANTHAKRISHNAN 1974b). In south-eastern Asia, this species was, however, never discovered in leaf litter layers in forests, but was found frequently on dead banana leaves (YAMADA & HIROWATARI 2007a) and in Karnataka it was collected from dry fruits of *Lagestromia flos-reginae*. In Oman the species was found preying on mealy bugs infesting mango trees (CARAPEZZA et al. 2014), in Ivory Coast it was found in nests of weaverbirds (Passeriformes: Ploceidae) (CARAYON 1958a).

***Buchananiella garoensis* Muraleedharan, 1977**

*Buchananiella garoensis* Muraleedharan, 1977a: 242. HOLOTYPE: ♀, India, Garo Hills, Songsak (ZSI).

**Distribution in India.** Meghalaya: Garo Hills, Songsak (MURALEEDHARAN 1977a).

**General distribution.** Endemic.

***Buchananiella indica* Muraleedharan, 1977**

(Fig. 12)

*Buchananiella indica* Muraleedharan, 1977a: 240. HOLOTYPE: ♂, India, Garo Hills, Songsak (ZSI).

**Material examined.** INDIA: KARNATAKA: Attur, 5.viii.2015, 4 ♀♀ (TKPM, NBAIR); Bangalore, 24.ix.2015, 1 ♀ (TKPM); Chintamani, ix.2014, 1 ♂ (TKPM). TAMIL NADU: Palani Hills, vi.2014, 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Bangalore (BALLAL et al. 2016), Attur Yelahanka, Chintamani (this paper); Meghalaya: Garo Hills, Songsak (MURALEEDHARAN 1977a); Tamil Nadu: Palani Hills (this paper).

**General distribution.** Endemic.

**Biology.** In Karnataka, it was collected from *Crossandra* dry flowers and *Crotalaria pallida* (BALLAL et al., 2016).

***Buchananiella pseudococci pseudococci* (Wagner, 1951)**

*Cardiastethus pseudococci pseudococci* Wagner, 1951: 143. HOLOTYPE: ♂, Egypt, Cairo, Montaza (coll. Ministry of Agriculture, Cairo, Egypt). *Buchananiella pseudococci pseudococci*: GHAHARI et al. (2009): 50 (new combination).

**Material examined.** INDIA: Tamil Nadu: Salem, iv.2015, 1 ♀ (TKPM).

**Distribution in India.** Kerala: Kozhikode, Thikkodi (YAMADA et al. 2008); Tamil Nadu: Salem (this paper).

**General distribution.** Egypt (WAGNER 1951), Indonesia (CARAYON 1957), Madagascar (CARAYON 1957), Réunion (CARAYON 1957), Iran (GHAHARI et al. 2009), United Arab Emirates (CARAPEZZA et al. 2014). Another subspecies, *B. pseudococci occidentalis* Carayon, 1957, is distributed in western areas of tropical Africa (CARAYON 1957).

**Biology.** The species is reported to feed on mealybug *Saccharicoccus sacchari* (Cockerell, 1895) and Lepidopteran pests *Opisina arenosella* (Linnaeus, 1758) and *Corcyra cephalonica* (Stainton, 1866) (YAMADA et al. 2008). Recently collected from thrips-infested mulberry plants in Salem (this paper).

**Genus *Cardiastethus* Fieber, 1860*****Cardiastethus affinis* Poppius, 1909**

(Fig. 15)

*Cardiastethus affinis* Poppius, 1909: 17. SYNTYPES: 4 spec., Tanzania, Katona, Arusha-Chini (HNHM, MZHF).

**Material examined.** INDIA: KARNATAKA: Bangalore, 18.xii.2015, 1 ♂ (TKPM); Kunigal, viii.2016, 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Bangalore, Kunigal (this paper); Kerala: Kuzhalmannam, Palakkad (YAMADA et al., 2008); Tamil Nadu: Madras [= Chennai] (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

**General distribution.** Tanzania (POPPIUS 1909), United Arab Emirates (CARAPEZZA et al. 2014).

**Biology.** The species is known to inhabit onion, sesame, *Ficus* and mango plantations and is found associated mostly with *Orthaga exvinacea* Hampson, 1891; *Opisina arenosella*, *Corcyra cephalonica* (Stainton, 1866); *Thrips tabaci* Lindeman 1889; *T. palmi* Karny, 1925, and *Frankliniella schultzei* (Trybom, 1910) (POPPIUS 1909, YAMADA et al. 2008). Recorded feeding on colonies of *Hemiberlesia lataniae* infesting agave (this paper).

***Cardiastethus exiguus* Poppius, 1913**

(Figs 13, 19–21)

*Cardiastethus exiguus* Poppius, 1913: 253. HOLOTYPE: ♀, Sri Lanka, Paradenyia (MZHF).

*Cardiastethus pygmaeus* Poppius, 1915: 7. SYNTYPE(S): Taiwan, Anping (DEIC, MZHF). Synonymized by CARAYON (1976: 467).

*Cardiastethus inquilinus* Delamare Deboutteville & Paulian, 1952: 83. HOLOTYPE: Ivory Coast, Len Banco (MNHN). Junior homonym of *C. inquilinus* China & Myers, 1929. Synonymized by CARAYON (1957: 167)

*Cardiastethus pauliani* Lansbury, 1954: 90 (new substitute name for *C. inquilinus* Delamare Deboutteville & Paulian, 1952). Synonymized by CARAYON (1957: 167).

*Cardiastethus pygmaeus pauliani*: CARAYON (1957): 168 (downgraded to subspecies rank).

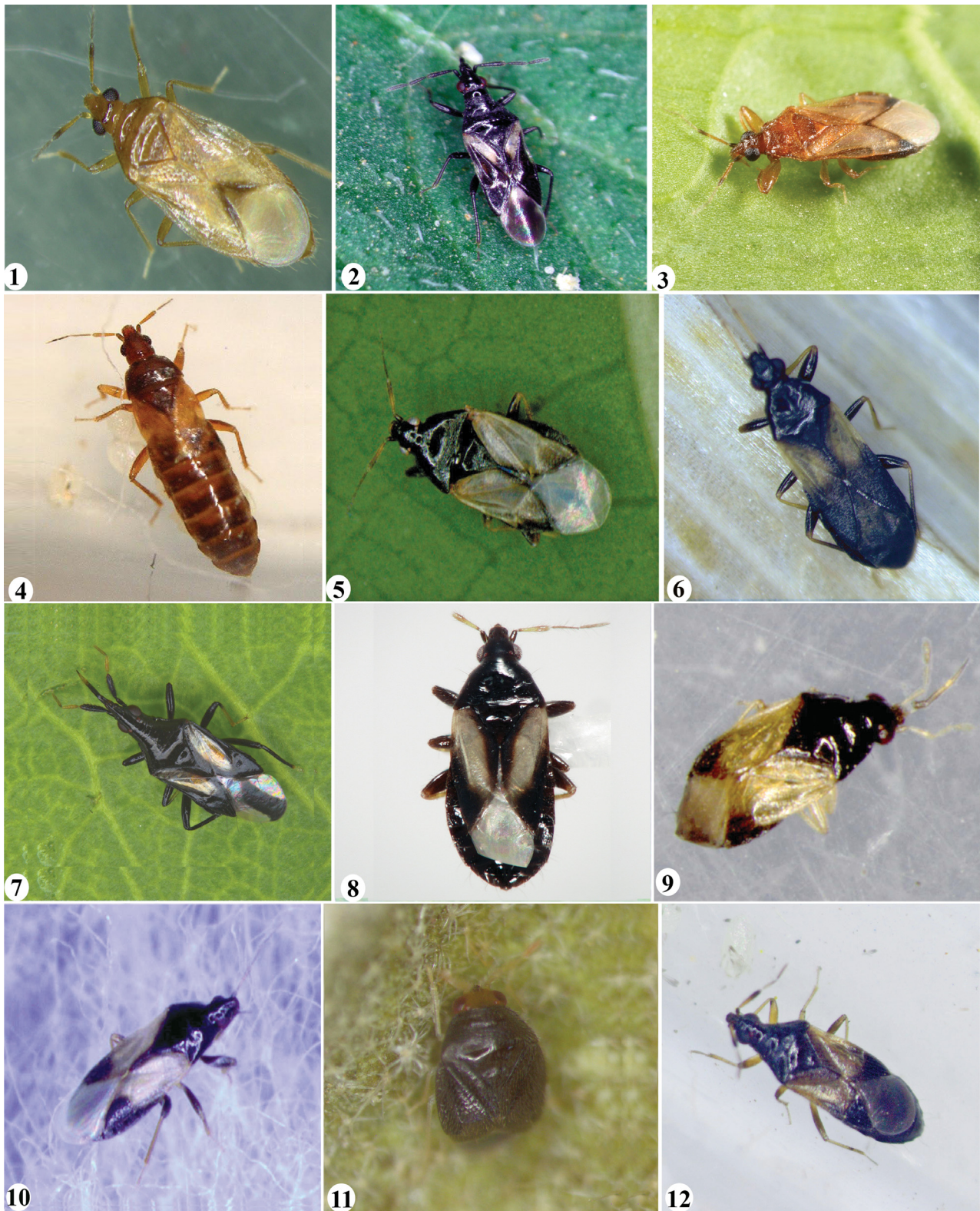
**Material examined.** INDIA: KARNATAKA: Bangalore, ii.2016, 2 ♂♂ 7 ♀♀ (TKPM). KERALA: Trivandrum, xii.2015, 1 ♂ (TKPM).

**Distribution in India.** Andhra Pradesh: Tirupathy (MURALEEDHARAN & ANANTHAKRISHNAN 1978a, as *C. pygmaeus pauliani*); Karnataka: Bangalore (this paper); Kerala: Thekkady (MURALEEDHARAN & ANANTHAKRISHNAN

1978a, as *C. pygmaeus pauliani*); Tamil Nadu: Madras [= Chennai], Dharmapuri, Salem (MURALEEDHARAN & ANANTHAKRISHNAN 1978a); West Bengal: Sagar Hills (MURALEEDHARAN 1975).

**General distribution.** Tropical Africa, China, Japan, Korea, Taiwan, Thailand (AUKEMA et al. 2013, JUNG et al. 2013).

**Biology.** Our observation reveals that *C. exiguus* was



Figs 1–12. Habitus photographs of selected Indian Anthocoridae. 1 – *Amphiareus constrictus* (Stål, 1860); 2 – *Anthocoris muraleedharani* Yamada, 2010; 3 – *Physopleurella armata* Poppius, 1909, from Thailand; 4 – *Xylocoris (Arrostelus) flavipes* (Reuter, 1875); 5 – *Xylocoris (Proxycoris) afer* (Reuter, 1884); 6 – *Blaptostethoides* sp.; 7 – *Montandoniella indica* Yamada, 2011 (source: www.nbair.res.in); 8 – *Xylocoris (Arrostelus) ampoli* Yamada & Yasunaga, 2013; 9 – *Carayonocoris indicus* Muraleedharan, 1977; 10 – *Xylocoris (Proxycoris) confusus* Carayon, 1972; 11 – *Bilia* sp. (this specimen is not examined); 12 – *Buchananiella indica* Muraleedharan, 1977. Photo credits: C. Ballal (1–2, 4–7, 9–12), K. Yamada (3, 8).

collected from coconut, papaya, dry fruits of jamun (*Syzygium cumini*), *Aristolochia indica*, and *Cassia auriculata*. It is also observed to feed on eggs of *Opisina arenosella*, *Corcyra cephalonica*, *Orthaga exvinacea*, *Anadevidia peponis* (Fabricius, 1775), and papaya mealybug (*Paracoccus marginatus*).

#### ***Cardiastethus kathmandu* Yamada, 2016**

*Cardiastethus kathmandu* Yamada, 2016: 13. HOLOTYPE: ♂, Nepal, Kathmandu, Samakhusi (TKPM).

**Material examined.** INDIA: UTTARAKHAND: Bhimtal, 4 ♂♂ 5 ♀♀, 10.xi.2016, C. R. Ballal (NBAIR).

**Distribution in India.** Uttarakhand. New record from India.

**General distribution.** Nepal (YAMADA 2016).

**Biology.** The specimens were collected from *Peltophorum* sp.

#### **Genus *Indocoris***

#### **Muraleedharan & Ananthakrishnan, 1978**

##### ***Indocoris tarsatus***

#### **Muraleedharan & Ananthakrishnan, 1978**

*Indocoris tarsatus* Muraleedharan & Ananthakrishnan, 1978a: 67. HOLOTYPE: ♂, India, Tamil Nadu, Courtallami (ZSI).

**Distribution in India.** Tamil Nadu: Courtallami (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

**General distribution.** Endemic.

**Biology.** The type series was collected from leaf galls of *Vitis* sp. (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

#### **Genus *Orthosoleniopsis* Poppius, 1909**

##### ***Orthosoleniopsis carayoni***

#### **(Muraleedharan & Ananthakrishnan, 1974)**

*Buchananiella carayoni* Muraleedharan & Ananthakrishnan, 1974b: 34. HOLOTYPE: ♂, India, Kerala, Tenmalai (ZSI).

*Orthosoleniopsis carayoni*: MURALEEDHARAN & ANANTHAKRISHNAN (1978a): 68 (new combination).

**Distribution in India.** Kerala: Tenmalai (MURALEEDHARAN & ANANTHAKRISHNAN 1974b, 1978a).

**General distribution.** Endemic.

#### **Genus *Physopleurella* Reuter, 1884**

##### ***Physopleurella armata* Poppius, 1909**

(Fig. 3)

*Physopleurella armata* Poppius, 1909: 12. SYNTYPES: 2 ♂♂, Japan, Bukenji (HNHM); unknown number of specimens, New Guinea, Haveri (MCSN).

**Material examined.** INDIA: KARNATAKA: Kunigal, viii.2016, 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Kunigal. New record from India.

**General distribution.** Australia (GROSS 1954), Japan (POPPIUS 1909), New Guinea (POPPIUS 1909), Hawaii (PÉRICART 1996), China (BU & ZHENG 2001), Philippines (YAMADA & HIROWATARI 2007b), Thailand (YAMADA & HIROWATARI

2007b), Vietnam (YAMADA & HIROWATARI 2007b), Korea (JUNG et al. 2013).

**Biology.** In India it was collected from coconut leaflets (this paper).

##### ***Physopleurella flava* Carayon, 1956**

*Physopleurella flava* Carayon, 1956: 107, 108. HOLOTYPE: ♂, Dahomey [= Benin] (MNHN).

**Material examined.** INDIA: KARNATAKA: Bangalore 1 ♂ 2 ♀♀, 7.vi.2010, C. R. Ballal (NBAIR).

**Distribution in India.** Karnataka: Bangalore. New record from India.

**General distribution.** Benin (CARAYON 1956), Congo (CARAYON 1958b), Ivory Coast (CARAYON 1958b), Madagascar (CARAYON 1958b), Mauritius (CARAYON 1958b), Malaysia (YAMADA & HIROWATARI 2007b), Thailand (YAMADA & HIROWATARI 2007b).

**Biology.** The specimens were collected from dry leaves and fruits of *Ficus* sp.

##### ***Physopleurella indica* Muraleedharan & Ananthakrishnan, 1978**

*Physopleurella indica* Muraleedharan & Ananthakrishnan, 1978a: 69. HOLOTYPE: ♂, India, Kerala, Thenmalai (ZSI).

**Material examined.** INDIA: KARNATAKA: Chikkamagaluru, Mudigere v.2015, 1 ♂ 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Chikkamagaluru (this paper); Kerala: Thenmalai (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

**General distribution.** Endemic.

##### ***Physopleurella loyola* Muraleedharan & Ananthakrishnan, 1978**

*Physopleurella loyola* Muraleedharan & Ananthakrishnan, 1978a: 68. HOLOTYPE: ♂, India, Madras [= Chennai], Loyola College Campus (ZSI).

**Distribution in India.** Tamil Nadu: Chennai (MURALEEDHARAN & ANANTHAKRISHNAN 1978a).

**General distribution.** Endemic.

##### ***Physopleurella pessoni* Carayon, 1956**

*Physopleurella pessoni* Carayon, 1956: 104. HOLOTYPE: ♂, Ivory Coast, Adiopodoumé (MNHN).

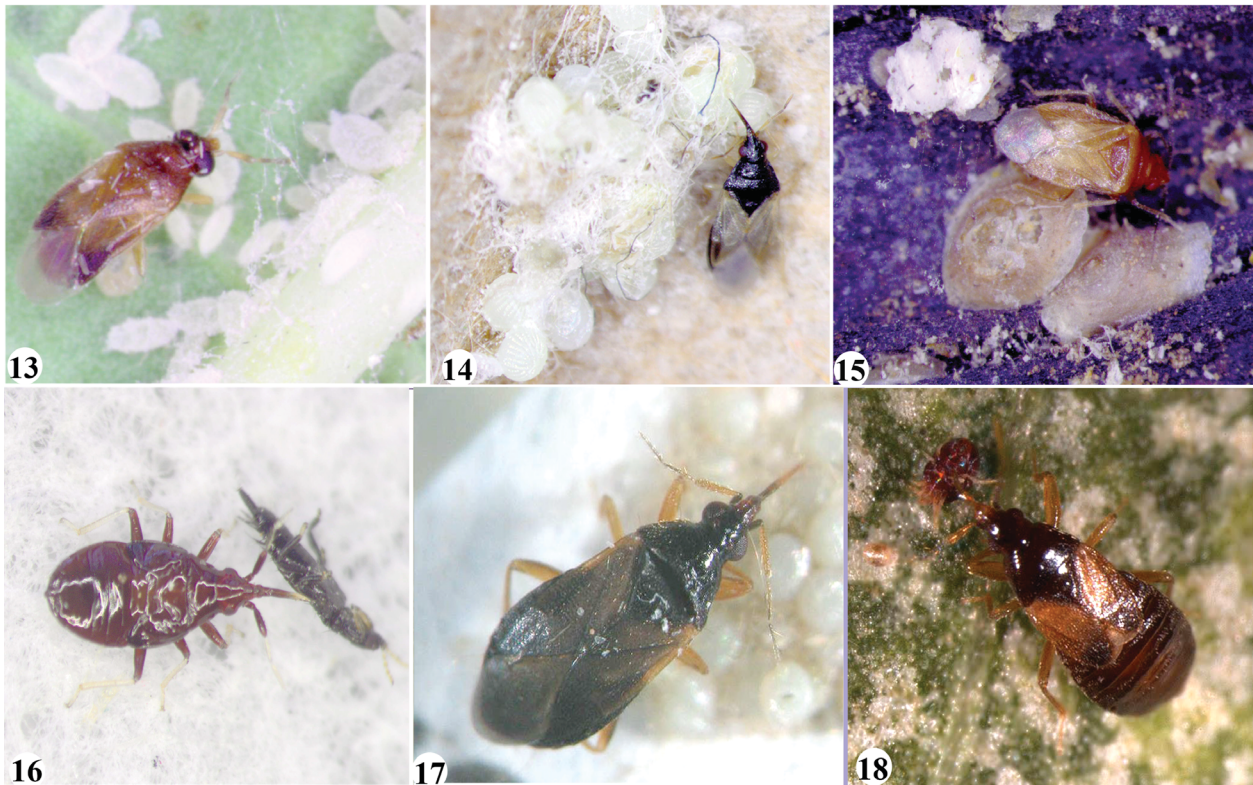
**Material examined.** INDIA: TAMIL NADU: Palani hills, 2 ♂♂ 1 ♀ (TKPM, NBAIR).

**Distribution in India.** Tamil Nadu: Palani hills. New record from India.

**General distribution.** CAMEROON (CARAYON 1956), Ivory Coast (CARAYON 1956), Mozambique (CARAYON 1956), Madagascar (CARAYON 1958b), Mauritius (CARAYON 1958b), Peninsular Malaysia (YAMADA & HIROWATARI 2007b), Indonesia (Bali) (YAMADA & ISHIKAWA 2011).

**Remarks.** *Physopleurella pessoni* is the only known viviparous species in the family Anthocoridae (CARAYON 1956).





Figs 13–18. Habitus photographs of selected Indian Anthocoridae. 13 – *Cardiastethus exiguus* Poppius, 1913, feeding on papaya mealybug; 14 – *Orius* (*Dimorphella*) *tantillus* (Motschulsky, 1863), feeding on eggs of *Helicoverpa armigera* (Hübner, 1808); 15 – *Cardiastethus affinis* Poppius, 1909, feeding on scale insects; 16–17 – *Blaptostethus pallescens* Poppius, 1909, feeding on thrips and *Spodoptera litura* eggs; 18 – *Xylocoris* (*Arrostelus*) *flavipes* (Reuter, 1875), feeding on mite. Photo credits: C. Ballal.

***Physopleurella vichitravarna* Muraleedharan, 1977**

*Physopleurella vichitravarna* Muraleedharan, 1977a: 243. HOLOTYPE: ♀, India, Garo Hills, Songsak (ZSI).

**Distribution in India.** Meghalaya: Garo Hills, Dainadubi, Songsak (MURALEEDHARAN 1977a).

**General distribution.** Endemic.

**Genus *Rajburicoris* Carpintero & Dellapé, 2008**

***Rajburicoris keralanus* Yamada, 2010**

*Rajburicoris keralanus* Yamada, 2010 in YAMADA et al. (2010b: 465). HOLOTYPE: ♂, India, Kerala, Palakkad, Kuzhalmannam (TKPM).

**Type material examined.** HOLOTYPE: ♂, 'INDIA: Kerala / Palakkad / Kuzhalmannam / 13.i.2008 / K. Bindu leg.' [printed], 'Host Insect: / *Liothrips karnyi* / Host Plant: / *Piper nigrum*' [printed], 'Holotype ♂ / *Rajburicoris keralanus* / Yamada, 2010' [printed, red square] (TKPM).

**Distribution in India.** Kerala: Palakkad, Kuzhalmannam (YAMADA et al. 2010b).

**General distribution.** Endemic.

**Biology.** The species is known to inhabit black pepper plantations and feeds on *Liothrips karnyi* (Bagnall, 1924) (YAMADA et al. 2010b).

***Rajburicoris stysi* Carpintero & Dellapé, 2008**

*Rajburicoris stysi* Carpintero & Dellapé, 2008: 506. HOLOTYPE: ♂, Thailand, Ratchaburi Province, Banpong-muan (USNM).

**Material examined.** INDIA: TAMIL NADU: Palani hills, vi.2014, 1 ♂ (TKPM).

**Distribution in India.** Tamil Nadu: Palani hills. New record from India.

**General distribution.** Thailand (CARPINTERO & DELLAPÉ 2008).

Tribe Oriini Carayon, 1958

**Genus *Bilia* Distant, 1904**

***Bilia burma* Yasunaga & Yamada, 2016**

*Bilia burma* Yasunaga & Yamada, 2016 in YASUNAGA et al. (2016b: 546). HOLOTYPE: ♂, Myanmar, Yangon, Pyay Road, National Museum Garden (TKPM).

**Material examined.** INDIA: HIMACHAL PRADESH: Shimla, Tara Devi, 3 ♂♂ 4 ♀♀, 11.ix.2015. KARNATAKA: Kanakapura, 2 ♂♂ 4 ♀♀, 19.vi.2016, C. R. Ballal (NBAIR).

**Distribution in India.** Himachal Pradesh: Shimla; Karnataka: Kanakapura. New record from India.

**General distribution.** Myanmar (YASUNAGA et al. 2016b).

**Biology.** The specimens were collected on egg plants (*Solanum melongena*) and weed *Rubus ellipticus* (this paper).

***Bilia castanea* (Carvalho, 1951)**

*Biliola castanea* Carvalho, 1951: 388. HOLOTYPE: ♀, India, Karnataka, Nandidrug Hill [= Nandi Hills] (BMNH).

**Type material examined.** HOLOTYPE: ♂, 'Type' [printed circle with red border], 'n.s.' [handwritten], 'S. India: / Nandidrug Hill. / 4,500 feet' [printed], 'Pres. by / Dr. T. V. Campbell. / B.M.1928-189' [printed], 'Biliola / castanea n. sp. / J.C.M. Carvalho det. 1951' [handwritten + printed] (BMNH).

**Additional material examined.** INDIA: KARNATAKA: Bangalore, 11.vii.2011, 1 ♂ 1 ♀ (TKPM). TAMIL NADU: Hosur, Salem, iv.2015, 4 ♀♀ (TKPM, NBAIR).

**Distribution in India.** Karnataka: Bangalore, Nandi Hills (CARVALHO 1951, YASUNAGA et al. 2016b); Tamil Nadu: Hosur, Salem (this paper); West Bengal (GHOSH et al. 1981).

**General distribution.** China (Hainan), Taiwan (PÉRICART 1996, BU & ZHENG 2001).

**Biology.** The species inhabits plantations of *Brassica nigra*, grape (*Vitis* sp.), *Nyctanthes arbor-tristis*, *Zizyphus*, mulberry (*Morus* sp.), brinjal (*Solanum melongena*) and is reported to feed on thrips, the aphid *Lipaphis erysimi* (Kaltenbach, 1843) and the two spotted spider mite *Tetranychus urticae* (GHOSH et al. 1981, BALLAL & YAMADA 2016). This species has also been observed feeding on aphids and the eggs and nymphs of cicadellids (CARAYON & MIYAMOTO 1960).

#### *Bilia fracta* Distant, 1904

*Bilia fracta* Distant, 1904b: 480. SYNTYPE(S): Sri Lanka, Peradeniya (BMNH).

**Type material examined.** SYNTYPE: ♀, 'Type / H. T.' [printed circle with red border], 'Peradeniya, / Ceylon, 9.03' [printed + handwritten], 'Distant Coll. / 1911-383' [printed], 'Bilia / fracta Dist' [handwritten] (BMNH).

**Distribution in India.** No Indian state given (MURALEEDHARAN & ANANTHAKRISHNAN 1978b).

**General distribution.** Sri Lanka (DISTANT 1904b, MURALEEDHARAN & ANANTHAKRISHNAN 1978b).

#### Genus *Carayonocoris* Muraleedharan, 1977

##### *Carayonocoris indicus* Muraleedharan, 1977

(Fig. 9)

*Carayonocoris indicus* Muraleedharan, 1977c: 464. HOLOTYPE: ♂, India, Kerala, Nilambar (ZSI).

**Material examined.** INDIA: KARNATAKA: Bangalore, Chikballapur, ix.2014, 1 ♀ (TKPM); Bangalore, iii.2015, 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Bangalore, Chikballapur (this paper); Kerala: Nilambur (MURALEEDHARAN 1977c); Punjab (MURALEEDHARAN & ANANTHAKRISHNAN 1978b); Tamil Nadu: Madras [= Chennai] (MURALEEDHARAN 1977c).

**General distribution.** Endemic.

**Biology.** This species is anthophilous, recorded on *Cassia javanica*, *C. rosea*, and *C. auriculata* (this paper). It is associated with mites and thrips, e.g. *Haplothrips ganglbaueri* Schmutz, 1913 and *Frankliniella schultzei* (MURALEEDHARAN & ANANTHAKRISHNAN 1978b, ANANTHAKRISHNAN & SURESHKUMAR 1985).

#### Genus *Montandoniola* Poppius, 1909

##### *Montandoniola bellatula* Yamada, 2007

*Montandoniola bellatula* Yamada, 2007 in YAMADA et al. (2007: 42). HOLOTYPE: ♂, Indonesia, Bali, Buleleng, Melanting (OPU).

**Material examined.** INDIA: KARNATAKA: Bangalore Rural, Ghati Subramanya, ii.2015, 1 ♂ (TKPM).

**Distribution in India.** Karnataka: Bangalore. New record from India.

**General distribution.** Indonesia: Bali (YAMADA et al. 2007).

**Biology.** The species was collected from *Butea monosperma* and found associated with thrips (this paper).

#### *Montandoniola indica* Yamada, 2011

(Fig. 7)

*Montandoniola moraguesi* (misidentification): MURALEEDHARAN & ANANTHAKRISHNAN (1971), MURALEEDHARAN (1977c), MURALEEDHARAN & ANANTHAKRISHNAN (1978b).

*Montandoniola indica* Yamada, 2011 in YAMADA et al. (2011: 2). HOLOTYPE: ♂, India, Kerala, Palakkad, Kuzhalmannam (TKPM).

**Type material examined.** HOLOTYPE: ♂, 'INDIA: Kerala / Palakkad / Kuzhalmannam / 13.i.2008 / K. Bindu leg.' [printed], 'Host Insect: / *Liothrips karnyi* / Host Plant: / *Piper nigrum*' [printed], 'Holotype ♂ / *Montandoniola indica* / Yamada, 2011' [printed, red square] (TKPM).

**Distribution in India.** Andhra Pradesh (MURALEEDHARAN & ANANTHAKRISHNAN 1978b, as *M. moraguesi*); Karnataka: Bangalore, Magadi, Mercara, Ghati Subramanya (this paper); Kerala: Malappuram, Palakkad, Wynaad (MURALEEDHARAN 1977b, as *M. moraguesi*; MURALEEDHARAN & ANANTHAKRISHNAN 1978b, as *M. moraguesi*; YAMADA et al. 2011); Maharashtra: Panchgani (MURALEEDHARAN & ANANTHAKRISHNAN 1978b, as *M. moraguesi*); Tamil Nadu: Madras [= Chennai], Courtallam, Hosur, Kodaikanal, Tambaram, Yercaud (MURALEEDHARAN 1977c, as *M. moraguesi*; MURALEEDHARAN & ANANTHAKRISHNAN 1978b, as *M. moraguesi*); Uttar Pradesh: Dehra Dun (MURALEEDHARAN & ANANTHAKRISHNAN 1978b, as *M. moraguesi*); West Bengal: Kolkata (MURALEEDHARAN & ANANTHAKRISHNAN 1978b, as *M. moraguesi*; BALLAL et al. 2012a).

**General distribution.** Endemic.

**Biology.** The species inhabits different plants such as black pepper (*Piper nigrum*), *Ficus* and *Terminalia chebula* and preys on variety of insects including gall makers, *Gynaikothrips flaviantennatus* Moulton, 1929; *G. bengalensis* Ananthakrishnan, 1973; *G. uzeli* Zimmermann, 1900; *Schedothrips orientalis* Ananthakrishnan, 1968; *Liothrips karnyi* Bagnall, 1914 (MURALEEDHARAN & ANANTHAKRISHNAN 1971, 1978b; ANANTHAKRISHNAN & VARADARASAN 1977; DEVASAHAYAM & KOYA 1994; DEVASAHAYAM 2000; YAMADA et al. 2011; BALLAL et al. 2012a; BALLAL & YAMADA 2016). This species was collected from jamun (*Syzygium cumini*), bastard teak (*Butea monosperma*), mulberry (*Morus* sp.) and observed to be associated with several thrips species including *Megalurothrips* sp. and mealybug species, viz. *Planococcus citri* (this paper). Recorded feeding on *Gynaikothrips uzeli* infesting *Ficus retusa* (BALLAL et al. 2012a)

**Comment.** PLUOT-SIGWALT et al. (2009) reviewed the specimens of *Montandoniola* from different parts of the world. They concluded that several species were confused under the name *M. moraguesi* and that true *M. moraguesi* is restricted to the Mediterranean region and Africa.

#### Genus *Odontobrachys* Fieber, 1860

##### *Odontobrachys niger* Fieber, 1860

*Odontobrachys niger* Fieber, 1860: 270. SYNTYPE(S): India (depository not stated).

**Distribution in India.** No Indian state distribution provided (FIEBER 1860, DISTANT 1906, MURALEEDHARAN & ANANTHAKRISHNAN 1978b, FORD 1979).

**General distribution.** Endemic.

### Genus *Orius* Wolff, 1811

#### *Orius (Orius) bifilarus* Ghauri, 1972

*Orius (Orius) bifilarus* Ghauri, 1972a: 418. HOLOTYPE: ♂, Pakistan, Rawalpindi (BMNH).

**Type material examined.** HOLOTYPE: ♂, 'Holo- / type' [printed circle with red border], 'Nymph feeding mite on / Cannabis sativa' [handwritten], 'Rawalpindi / 15.i.64' [handwritten], 'C.I.B.C. / M.15.i. 64-1' [handwritten], '47' [handwritten], 'C.I.E. COLL. / No. 19850' [printed + handwritten], 'Pres by / Com Inst Ent / B M 1972-2' [printed], '*Orius* (O.) / bifilarus sp. n. / M.S.K. Ghauri det. 1972' [handwritten + printed] (BMNH).

**Distribution in India.** Punjab: Jalandhar (GHAURI 1972a); Uttar Pradesh (VEER 1984).

**General distribution.** Pakistan (GHAURI 1972a), China (Hunan, Sichuan, Yunnan) (ZHENG & BU 1990, BU & ZHENG 2001), Nepal (PÉRICART 1996).

**Biology.** The species was found on number of plant species, reported to feed on mites, thrips and aphids, namely *Aphis gossypii* Glover, 1877 and *Thrips flavus* Schrank, 1776 (GHAURI 1972a, VEER 1984).

#### *Orius (Orius) lindbergi* Wagner, 1952

*Orius (Orius) lindbergi* Wagner, 1952: 39. HOLOTYPE: ♂, Morocco, Mogador (ZMUH).

**Distribution in India.** Jammu and Kashmir: Kashmir (BHAGAT & LONE 1984, BHAGAT & MATTA 2000, BHAGAT 2015).

**General distribution.** Canary Island, France, Italy (Sicily), Morocco, Portugal, Spain, Tunisia (PÉRICART 1996).

**Biology.** Reported to feed on species of several aphid genera (BHAGAT 2015).

#### *Orius (Orius) niger* (Wolff, 1811)

*Salda niger* Wolff, 1811: 167. SYNTYPES: sex unknown, Germany, Bavaria (lost – see PÉRICART 1996: 126).

*Orius niger*: SCHUMACHER (1922): 338 (new combination).

*Orius (Orius) niger aegyptiacus* Wagner, 1952: 33. HOLOTYPE: ♂, Egypt, Heliopolis (MZHF). Synonymized by PÉRICART (1971: 103).

**Material examined.** INDIA: KARNATAKA: Tumkur, Devarayanadurga, viii.2016, 2 ♂♂ 1 ♀ (TKPM); Kanakapura, x.2016, 3 ♂♂ 6 ♀♀ (NBAIR).

**Distribution in India.** Himachal Pradesh (GHAURI 1972a); Karnataka (BALLAL & YAMADA 2016); Tamil Nadu: Madras [= Chennai], Tambaram (MURALEEDHARAN 1977b, as *O. n. aegyptiacus*).

**General distribution.** Widespread in Europe; North Africa, Palearctic Asia, Yemen, Pakistan, Nepal (GHAURI 1972a,b, PÉRICART 1996, GHANMARI et al. 2009, AUKEMA et al. 2013).

**Biology.** The species has been seen on jasmine plants, *Tecoma stans*, and *Butea monosperma*, where it is associated with thrips (DEVI & GUPTA 2010, BALLAL & YAMADA 2016). In the Palearctic Region, this species is well known as a predator of aphids, thrips, and eggs of Lepidoptera, pentatomids, and mites (CARAYON & STEFFAN 1959, PÉRICART 1972).

#### *Orius (Orius) shyamavarna*

#### Muraleedharan & Ananthkrishnan, 1974

*Orius shyamavarna* Muraleedharan & Ananthkrishnan, 1974a: 39. HOLOTYPE: ♂, India, Kerala, Munnar (ZSI).

*Orius (Orius) shyamavarna*: MURALEEDHARAN (1977b): 233 (subgeneric placement).

**Distribution in India.** Karnataka: Bangalore (MURALEEDHARAN & ANANTHAKRISHNAN 1974a); Kerala: Munnar (MURALEEDHARAN & ANANTHAKRISHNAN 1974a).

**General distribution.** Endemic.

**Biology.** It was collected from *Butea monosperma*, on which it is associated with thrips (this paper).

#### *Orius (Orius) trivandrensis*

#### Muraleedharan & Ananthkrishnan, 1974

*Orius trivandrensis* Muraleedharan & Ananthkrishnan, 1974a: 40. HOLOTYPE: ♂, India, Trivandrum (ZSI).

*Orius (Orius) trivandrensis*: MURALEEDHARAN (1977b): 234 (subgeneric placement).

**Distribution in India.** Kerala: Trivandrum (MURALEEDHARAN & ANANTHAKRISHNAN 1974a).

**General distribution.** Endemic.

#### *Orius (Dimorphella) dravidiensis*

#### Muraleedharan, 1977

*Orius (Heterororius) dravidiensis* Muraleedharan, 1977b: 234. HOLOTYPE: ♂, India, Tamil Nadu, Tanjore (ZSI).

*Orius (Dimorphella) dravidiensis*: YAMADA et al (2016b): 1148 (subgeneric placement).

**Material examined.** INDIA: KARNATAKA: Bangalore, Attur, i.2013, on mango tree, 2 ♂♂ (TKPM); Bangalore, Hebbel, iii.2012, 1 ♂ 1 ♀ (NBAIR); Kanakapura, xii.2013, 1 ♀ (NBAIR); Bangalore outskirts, Savandurga, vi.2015, 1 ♂ 4 ♀♀ (TKPM, NBAIR).

**Distribution in India.** Karnataka: Attur, Hebbel, Kanakapura, Savandurga (this paper); Tamil Nadu: Tanjore (MURALEEDHARAN 1977b).

**General distribution.** Cambodia, Thailand (YAMADA et al. 2016b).

**Biology.** In India, this species has been collected from *Peltophorum ferrugineum*, mango (*Mangifera indica*), *Butea*, *Pongamia*, *Cassia rosea*, *Lagerstromia*, mulberry (*Morus* sp.), *Acacia dealbata*, and was associated with thrips (this paper).

#### *Orius (Dimorphella) latibasis* Ghauri, 1972

*Orius (Dimorphella) latibasis* Ghauri, 1972a: 415. HOLOTYPE: ♂, India, Bangalore (= Bengaluru) (BMNH).

**Type material examined.** HOLOTYPE: ♂, 'Holo- / type' [printed circle with red border], 'collected in the cage of / aphids on Bitter Gourd' [handwritten], 'Bangalore / 10. xii. 64' [handwritten], 'CIBC-IS / Bodhan 53' [handwritten], '41' [handwritten], 'A240' [handwritten], '*Orius* / (*Dimorphella*) sp. / M.S.K. Ghauri det. 1965' [handwritten + printed], '*Orius* (*Dimorphella*) / latibasis sp. n. / M.S.K. Ghauri det. 1972' [handwritten + printed, ones place digit of the year undescribed], 'Pres by / Com Inst Ent / B M 1972-2' [printed] (BMNH).

**Distribution in India.** Karnataka: Bangalore (GHAURI 1972a).

**General distribution.** Endemic.

**Biology.** The species is known to feed on aphids on bitter gourd (*Momordica charantia*) (GHAURI 1972a).

***Orius (Dimorphella) maxidentex* Ghauri, 1972**

*Orius indicus* (misidentification): RAJSEKHARA & CHATTERJI (1970): 364–367).

*Orius (Dimorphella) maxidentex* Ghauri, 1972a: 414. HOLOTYPE: ♂, Pakistan, Hangu (BMNH).

**Type material examined.** HOLOTYPE: ♂, 'Holo / type' [printed circle with red border], '1353' [handwritten], 'adult on Eriobotrya japonica' [handwritten], 'Hangu / 9.12.62' [handwritten], 'C.I.B.C. / PF. 12/62-30' [handwritten], 'Pres by / Com Inst Ent / B M 1972-2' [printed], 'Orius (Dimorphella) / maxidentex sp. n. / M.S.K. Ghauri det. 1972' [handwritten + printed] (BMNH).

**Additional material examined.** INDIA: ANDAMAN NICOBAR ISLANDS: Sippighat, iii.2012, 4 ♀♀ (TKPM, NBAIR). KARNATAKA: Dharwad, v.2016, 1 ♂ 1 ♀ (TKPM); Kunigal, 3.iv.2014, 1 ♂ (TKPM).

**Distribution in India.** Andaman Nicobar Islands (this paper); Karnataka: Bangalore, Kanakapura, Mysore, (GHAURI 1972a), Kunigal (this paper); New Delhi (GHAURI 1972a); Tamil Nadu: Coimbatore, Kovilpatti (GHAURI 1972a, MURALEEDHARAN 1977c).

**General distribution.** Pakistan (GHAURI 1972a), Sudan (GHAURI 1972a), Iran (ERFAN et al. 2010), United Arab Emirates (CARAPEZZA et al. 2014), Thailand (YAMADA et al. 2016b).

**Biology.** The species has been collected from onion (*Allium cepa*), sesame (*Sesamum indicum*), garlic (*Allium sativum*), sorghum (*Sorghum bicolor*), *Brassica nigra*, and reported to feed on thrips such as *Thrips tabaci*, *T. palmi*, *Frankliniella schultzei*, *Scirtothrips dorsalis*, the aphid *Lipaphis erysimi*, the sorghum midge *Contarinia sorghicola* (Coquillett, 1899), and the mite *Eriophyes* sp. (GHAURI 1972a, ANANTHAKRISHNAN & THANGAVELU 1976, RAO 1976, SAXENA 1975, MURALEEDHARAN & ANANTHAKRISHNAN 1978b, KUMAR & ANANTHAKRISHNAN 1984, ANANTHAKRISHNAN & SURESHKUMAR 1985, THONTADARYA & RAO 1987, BALLAL & YAMADA 2016). *Orius maxidentex* was recorded on black gram, watermelon plant, *Wedelia trilobata*, castor, cashew, *Butea* sp., *Cassia fistula*, *Justicia*, *Albizia*, and is associated with thrips species (this paper).

***Orius (Dimorphella) tantillus* (Motschulsky, 1863)**

(Fig. 14)

*Anthocoris tantillus* Motschulsky, 1863: 89. NEOTYPE (designated by GHAURI 1972a: 414): Sri Lanka, Pundalu-oya (BMNH).

*Orius tantillus*: GHAURI (1972a): 411 (redescription).

*Orius (Paraorius) tantillus*: YASUNAGA & MIYAMOTO (1993): 230 (new subgeneric placement).

*Orius (Dimorphella) tantillus*: HERNÁNDEZ & STONEDAHL (1999): 559 (new subgeneric placement).

**Material examined.** INDIA: ARUNACHAL PRADESH: Pasighat, v.2014, 4 ♂♂ 5 ♀♀ (TKPM, NBAIR). MAHARASHTRA: 40 km W. of Pune, Muishi env., 30.ix.–2.x.2005, 5 ♀♀, J. Bezděk lgt. (NMPC); 70 km S. of Pune, Wai env., 2.–7.x.2005, 1 ♂, J. Bezděk (NMPC). RAJASTHAN: Alwar, 30 km N. of Dausa, Gola-Ka-Bas vill., 27°05'31"N 76°18'47"E, 359 m, 24.–26.iii.2004, 1 ♀, P. Šrámek & L. Šejnohová lgt. (NMPC). GUJARAT: Anand, viii.2016, on cotton, 1 ♀ (TKPM).

**Distribution in India.** Arunachal Pradesh: Pasighat (this paper); Gujarat: Anand (this paper); Karnataka: Bangalore, Mandya, Mysore (MURALEEDHARAN & ANANTHAKRISHNAN 1974a); Maharashtra (this paper); Rajasthan: Alwar (this paper); Tamil Nadu: Coimbatore (GHAURI 1972a).

**General distribution.** Iran (GHAHARI et al. 2009), Sri Lanka (DISTANT 1906), Cambodia, Thailand (YAMADA et al. 2016b), Malaysia (MANLEY 1976), China (BU & ZHENG 2001), Tai-

wan (YASUNAGA 1997), Japan (YAMADA et al. 2016b); Australia (GHAURI 1972a, POSTLE et al. 2001), Solomon Islands (GHAURI 1972a), Micronesia (HERRING 1967, GHAURI 1972a); Kenya, Nigeria, Tanzania (HERNÁNDEZ & STONEDAHL 1999). **Biology.** The species inhabits chilli, pepper, tea, rice, groundnut, *Sesbania*, bajra (*Pennisetum glaucum*), *Chrysanthemum*, *Dahlia*, marigold, cotton, and feeds on thrips such as *Thrips tabaci*, *Scirtothrips dorsalis*, *Baliothrips biformis* (Bagnall, 1984), *Caliothrips indicus* (Bagnall 1913), *Microcephalothrips abdominalis* (Crawford, 1910), and *Haplothrips ganglbaueri* (GHAURI 1972a, BALLAL & YAMADA 2016). It was also collected from dry flowers of sugarcane where it was feeding on thrips (this paper).

***Orius (Heterorius) minutus* Linnaeus, 1758**

*Cimex minutus* Linnaeus, 1758: 446. NEOTYPE (designated by PÉRICART 1970: 742): France, near Montereau, Marolles (MNHN).

For further synonyms and references of this species, see PÉRICART (1996) and BU & ZHENG (2001).

**Material examined.** INDIA: ARUNACHAL PRADESH: Pasighat, v.2014, 3 ♂♂ 3 ♀♀ (TKPM, NBAIR).

**Distribution in India.** Arunachal Pradesh: Pasighat (this paper); Jammu and Kashmir: Kashmir (BHAGAT 2015); Tamil Nadu (VISWANATHAN & ANANTHAKRISHNAN 1974).

**General distribution.** Palaearctic species widespread in Europe, North Africa, Transcaucasia, Kazakhstan, Asian Russia, Mongolia, China, Korea, Japan, Thailand (PÉRICART 1996, AUKEMA et al. 2013, YAMADA et al. 2016b).

**Biology.** The species has been reported from quickstick (*Gliricidia sepium*) feeding on the thrips *Taeniothrips distalis* Karny, 1913, *Frankliniella schultzei*, *Haplothrips ganglbaueri*, and several aphid species (VISWANATHAN & ANANTHAKRISHNAN 1974, BHAGAT 2015, BALLAL & YAMADA 2016).

***Orius amnesius* Ghauri, 1980**

*Orius amnesius* Ghauri, 1980: 288. HOLOTYPE: ♂, Nigeria, Kaduna State, Yankara (BMNH).

**Material examined.** INDIA: KARNATAKA: Bangalore, xi.2012, on rose flower, 1 ♂ 1 ♀ (TKPM).

**Distribution in India.** Karnataka: Bangalore (BALLAL & YAMADA 2016).

**General distribution.** Nigeria (GHAURI 1980).

**Biology.** The species was reported as a predator of *Megalurothrips sjostedti* (Trybom, 1910) infesting cowpea (*Vigna unguiculata*) (GHAURI 1980). In India it was recorded on rose plant (*Rosa* sp.).

**Note.** The subgeneric placement of the species has not been established yet.

***Orius sublaevis* (Poppius, 1909)**

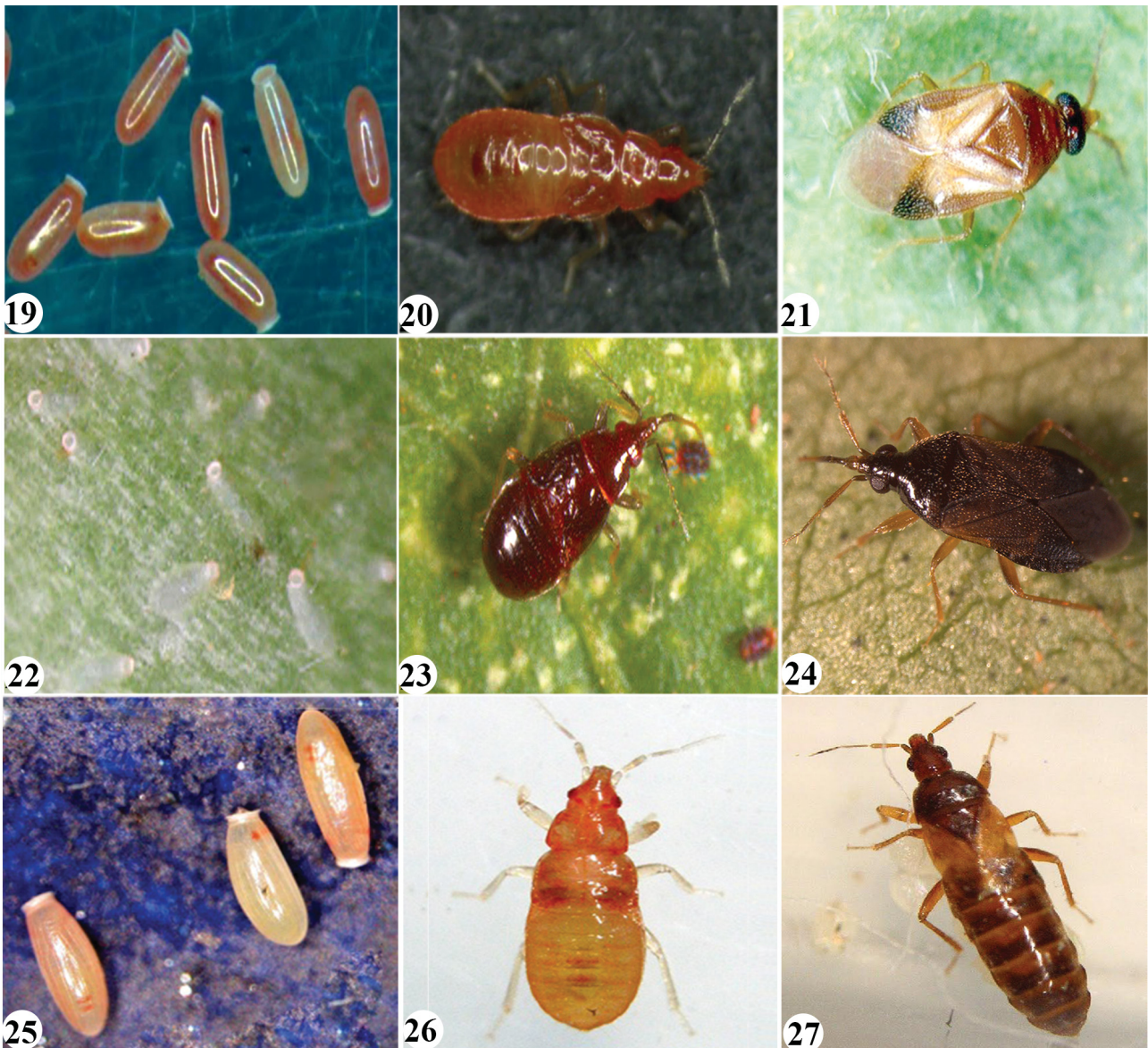
*Triphleps sublaevis* Poppius, 1909: 36. SYNTYPES: China, Sichuan, Tashuiwan-Ljuigupin (ZMAS); India, Darjeeling (NHMW); Indonesia, Sumatra, Si-Rambé (MCSN, MZHF).

*Orius sublaevis*: ZHENG & BU (1990): 26 (new combination).

**Distribution in India.** West Bengal: Darjeeling (POPPIUS 1909, DISTANT 1910).

**General distribution.** China (Sichuan), Indonesia (Sumatra) (POPPIUS 1909).

**Note.** The subgeneric placement of the species has not been established yet (PÉRICART 1996).



Figs 19–27. Life stages of Indian anthocorids (egg, nymph, adult). 19–21 – *Cardiasthethus exiguus* Poppius, 1913; 22–24 – *Blaptostethus pallescens* Poppius, 1909; 25–27 – *Xylocoris flavipes* (Reuter, 1875). Photo credits: C. Ballal.

### *Orius ianthe* (Distant, 1910)

*Triphleps ianthe* Distant, 1910: 305. HOLOTYPE: sex unknown (abdomen lost), India, Calcutta [= Kolkata] (BMNH) (see GHAURI 1972a: 409).

*Orius ianthe*: GHAURI (1972a): 409 (treated as *Orius* without any comment on the new generic combination).

**Type material examined.** HOLOTYPE: sex unknown, 'Type- / H. T.' [printed circle with red border], 'Calcutta' [handwritten], 'Triphleps / ianthe Dist.' [handwritten], 'Distant Coll. / 1911-383' [printed]; pinned, abdomen lost (BMNH).

**Distribution in India.** West Bengal: Kolkata (DISTANT 1910, GHAURI 1972a).

**General distribution.** Endemic.

**Note.** The subgeneric placement of the species has not been established yet.

### *Orius indicus* (Reuter, 1884)

*Triphleps indicus* Reuter, 1884: 101. LECTOTYPE (designated by GHAURI 1972a: 409): ♀, India, Bengalalia (ZMUC).

*Orius indicus*: GHAURI (1972a): 409 (treated as *Orius* without any comment on the new generic combination).

**Distribution in India.** Kerala: Calicut (= Kozhikode) (MURALEEDHARAN & ANANTHAKRISHNAN 1974a); Tamil Nadu: Madras [= Chennai], Kovilpatti (MURALEEDHARAN & ANANTHAKRISHNAN 1974a); West Bengal (GHAURI 1972a).

**General distribution.** Endemic.

**Biology.** The species is known to feed on thrips including *Gynaikothrips fucorum* (Marchal, 1908); *Scirtothrips dorsalis* Hood, 1919; *Megalurothrips nigricornis* (Schmutz, 1913), and *Taeniothrips nigricornis* (Schmutz, 1913) (RAJASEKHARA & CHATTERJI 1970, ANANTHAKRISHNAN & SURESHKUMAR 1985).

**Note.** The subgeneric placement of the species has not been established yet.

### Genus *Pachytarsus* Fieber, 1860

#### *Pachytarsus crassicornis* Fieber, 1860

*Pachytarsus crassicornis* Fieber, 1860: 269. SYNTYPE(S): sex not indicated, 'Ostindien' [= East India] (MNHN).

**Type material examined.** SYNTYPE: sex unknown, 'MUSEUM PARIS / COLL. NOUALHIER 1898' [printed], '*Pachytarsus / crassicornis / type Fieber / Indes or.*' [handwritten], 'type' [printed, red square], '*Pachytarsus / crassicornis / Fieb.*' [Carayon's handwritten]; pinned, abdomen lost (MNHN).

**Distribution in India.** East India (no locality given) (DISTANT 1906, FORD 1979).

**General distribution.** Endemic.

Tribe Scolopini Carayon, 1954

### Genus *Scoloposcelis* Fieber, 1864

#### *Scoloposcelis asiaticus*

#### Muraleedharan & Ananthakrishnan, 1974

*Scoloposcelis asiaticus* Muraleedharan & Ananthakrishnan, 1974c: 511.

HOLOTYPE: ♂, India, Tamil Nadu, Madras [= Chennai] (ZSI).

**Distribution in India.** Karnataka: Mysore (MURALEEDHARAN & ANANTHAKRISHNAN 1974c); Tamil Nadu: Chennai, Thimbam (MURALEEDHARAN & ANANTHAKRISHNAN 1974c).

**General distribution.** Endemic.

**Biology.** The species has been seen feeding on egg clusters and early instars of mycophagous thrips *Ecacanthothrips sanguineus* Bagnall, 1908 and on staphylinid larvae on decaying bark of *Erythrina* sp. (MURALEEDHARAN & ANANTHAKRISHNAN 1974c).

#### *Scoloposcelis contubernalis* (Distant, 1904)

*Ostorodias contubernalis* Distant, 1904a: 219. SYNTYPE(S): North West Himalayas (BMNH).

*Scoloposcelis contubernalis*: POPPIUS (1909): 25 (new combination).

**Distribution in India.** North-western Himalayas (DISTANT 1904a).

**General distribution.** Endemic.

**Biology.** The type series has been reported to inhabit galleries of the beetle *Polygraphus* sp. in spruce-fir (DISTANT 1904a).

#### *Scoloposcelis parallela* (Motschulsky, 1863)

*Anthocoris parallelus* Motschulsky, 1863: 89. LECTOTYPE: (designated by KERZHNER & JANSSON 1985: 38): remnants of a specimen, Sri Lanka, Nura-Ellia [= Nuwara Eliya] Mts. (ZMUM).

*Sesellus parallelus*: DISTANT (1904): 222 (new combination).

*Scoloposcelis parallela*: POPPIUS (1909): 25 (new combination).

**Material examined.** INDIA: ANDAMAN NICOBAR ISLANDS: Andaman Islands, Havelock Island, v.1997, 1 ♂ 5 ♀♀, K. & S. Majer lgt. (NMPC).

**Distribution in India.** Andaman Islands: Havelock Island (this paper); Meghalaya: Garo Hills, Dainadubi (MURALEEDHARAN 1977a); Tamil Nadu: Madras [= Chennai] (MURALEEDHARAN & ANANTHAKRISHNAN 1978b).

**General distribution.** Sri Lanka (DISTANT 1906), Indonesia (POPPIUS 1909), Philippines (POPPIUS 1909), Taiwan (POPPIUS 1915), Micronesia (Guam for USINGER, 1946; Caroline Is., Mariana Is. for HERRING 1967), Australia (CASSIS & GROSS 1995), Papua New Guinea (CASSIS & GROSS 1995), China (BU & ZHENG 2001), Japan (YAMADA et al 2016a).

**Biology.** It lives under the bark of fallen trees (mainly *Erythrina indica*), living among large colonies of *Ecacanthothrips sanguineus* and *Dinothrips sumatrensis*

Bagnall, 1908, feeding on their eggs and larvae (MURALEEDHARAN 1977a, MURALEEDHARAN & ANANTHAKRISHNAN 1978b, BALLAL & YAMADA 2016).

Tribe Xylocorini Carayon, 1972

### Genus *Xylocoris* Dufour, 1831

#### *Xylocoris (Arrostelus) ampoli*

#### Yamada & Yasunaga, 2013

(Fig. 8)

*Xylocoris (Arrostelus) ampoli* Yamada & Yasunaga, 2013 in YAMADA et al. (2013: 497). HOLOTYPE: ♂, Thailand, Suphan Buri Province, Sri Prachan (DOAT). Holotype was transferred from SUT to DOAT because continuous maintenance of the type specimens in SUT would become difficult (YASUNAGA et al. 2016a).

**Type material examined.** HOLOTYPE: ♂, 'THAILAND: Suphan Buri / Sri Prachan / N14°41'18.3" / E100°08'25.8" / 10 m alt., 25.x.2008 / T. Yasunaga & K. Yamada leg.' [printed], 'Holotype ♂ / *Xylocoris (Arrostelus) / ampoli* Yamada & / Yasunaga, 2013' [printed, red square] (DOAT).

**Additional material examined.** INDIA: KARNATAKA: Kanakapura, vi.2016, 8 ♂♂ 14 ♀♀ (TKPM, NBAIR).

**Distribution in India.** Karnataka: Bangalore (BALLAL & YAMADA 2016), Kanakapura (this paper).

**General distribution.** Indonesia (East Kalimantan), Thailand (YAMADA et al. 2013).

**Biology.** Reported from maize (*Zea mays*) plantations (BALLAL & YAMADA 2016) and cauliflower plants (this paper).

#### *Xylocoris (Arrostelus) flavipes* (Reuter, 1875)

(Figs 4, 18, 25–27)

*Piezostethus flavipes* Reuter, 1875: 65. LECTOTYPE (designated by PÉRICART 1970: 746, as 'type'): ♀, Algeria, Biskara (MNHN).

*Triphleps sinui* Narayanan & Chatterji, 1952: 164. HOLOTYPE: ♂ (brachypterous), India, Delhi (NPCI). Synonymized by CARAYON & STEFFAN (1959: 55).

*Triphleps ramae* Narayanan & Chatterji, 1953: 121. HOLOTYPE: ♂ (brachypterous), India, Delhi (NPCI). Synonymized by CARAYON & STEFFAN (1959: 55).

For further synonyms and references of this species see PÉRICART (1996).

**Material examined.** INDIA: KARNATAKA: Hebbal, 18.xii.2015, 9 ♂♂ 7 ♀♀ (NBAIR). RAJASTHAN: Alwar, Naranimata env., 27°08'22"N 76°20'38"E, 31.vii.2002, 1 ♀ (brach.), P. Šrámek lgt. (NMPC).

**Distribution in India.** Andhra Pradesh (BALLAL & YAMADA 2016); Assam (BALLAL & YAMADA 2016); Himachal Pradesh (BALLAL & YAMADA 2016); Jammu and Kashmir (Ladakh) (BHAGAT 2015); Karnataka: Bangalore, Hebbal (this paper); Kerala (BALLAL & YAMADA 2016); Rajasthan: Alwar (this paper); Sikkim (BALLAL & YAMADA 2016); Tamil Nadu (BALLAL & YAMADA 2016).

**General distribution.** Cosmotropical, widespread mainly in the Old World tropics and subtropics and is assumed to be non-indigenous in the Oriental Region (YAMADA et al. 2013). Occasionally introduced to storages in Europe and the USA (HENRY 1988, CASSIS & GROSS 1995, PÉRICART 1996, CARPINTERO 2002).

**Biology.** In India found mainly in stored grains like wheat and rice and feeds on several storage pests including *Tribolium castaneum* (Herbst, 1797) (MUKHERJEE et al. 1971, BALLAL & YAMADA 2016) and bruchids. The species has been reported to predate on 13 species of insects belonging

to three orders (ARBOGAST 1976). In India, besides being recorded in storage bins and warehouses, also recorded on *Butea monosperma*, *Ficus* sp. and maize, found associated with *Megalurothrips* sp. and a few mealybugs (*Planococcus citri*) (this paper).

### *Xylocoris (Proxylocoris) afer* (Reuter, 1884)

(Fig. 5)

*Piezostethus (Piezostethus) afer* Reuter, 1884: 38. LECTOTYPE (designated by PÉRICART 1970: 748): ♀, South Africa, Damara (NHRS).

*Xylocoris afer*: PÉRICART (1970): 748 (treated as *Xylocoris* without any comment on new generic combination).

*Xylocoris (Proxylocoris) afer*: CARAYON (1972b): 595 (new subgeneric placement).

**Material examined.** INDIA: KARNATAKA: Bangalore, Hebbal, viii.2012, 2 ♂♂ 13 ♀♀ (TKPM, NBAIR).

**Distribution in India.** Karnataka: Bangalore (BALLAL & YAMADA 2016).

**General distribution.** Australia (CASSIS & GROSS 1995), Israel (PÉRICART 1996), New Guinea (PÉRICART 1996), subtropical and tropical Africa (PÉRICART 1996), tropical America (CARPINTERO 2002), Yemen (LINNAVUORI & VAN HARTEN 2002).

**Biology.** Reported from the dry fruits of *Ficus* and *Lagerstromia flos-reginae* (BALLAL & YAMADA 2016).

### *Xylocoris (Proxylocoris) cerealis*

Yamada & Yasunga, 2006

*Xylocoris (Proxylocoris) cerealis* Yamada & Yasunaga, 2006 in YAMADA et al. (2006: 526). HOLOTYPE: ♂, Thailand, Songkhla Province, Ranode, rice mill factory (NIAES).

**Material examined.** INDIA: KARNATAKA: Bangalore, Yelahanka, vii.2015, 1 ♂ 1 ♀ (NBAIR). RAJASTHAN: 20 km N. of Dausa, Naranimata env., 400 m, 27°05'46"N 76°17'18"E, 10.ix.2002, 1 ♀, P. Šrámek lgt. (NMPC).

**Distribution in India.** Karnataka: Bangalore; Rajasthan: Dausa. New record from India.

**General distribution.** Thailand (YAMADA et al. 2006).

### *Xylocoris (Proxylocoris) clarus* (Distant, 1910)

*Septicius clarus* Distant, 1910: 296. SYNTYPE(S): India, Calcutta [= Kolkata] (BMNH).

*Xylocoris clarus*: CARAYON (1972a): 347 (new combination).

*Xylocoris (Proxylocoris) clarus*: CARAYON (1972b): 597 (new subgeneric placement).

**Type material examined.** SYNTYPE: ♀, 'Type / H. T.' [printed circle with red border], 'Calcutta' [handwritten], 'Distant Coll. / 1911–383' [printed], 'Septicius / clarus / Dist' [Distant's handwritten] (BMNH).

**Distribution in India.** Meghalaya: Garo Hills, Songsak (MURALEEDHARAN 1977a); West Bengal: Kolkata (DISTANT 1910).

**General distribution.** Outside India known only from Myanmar (DISTANT 1910, CARAYON 1972b).

**Biology.** A leaf-litter inhabiting species feeding on insects and mites including the thrips species *Apelau-nothrips madrasensis* (Ananthkrishnan, 1964) and *A. indicus* (Ananthkrishnan, 1968) (MURALEEDHARAN & ANANTHAKRISHNAN 1978b).

### *Xylocoris (Proxylocoris) confusus* Carayon, 1972

(Fig. 10)

*Xylocoris (Proxylocoris) confusus* Carayon, 1972b: 598. HOLOTYPE: ♀, Mauritania, Bafrechie (MNHN).

**Material examined.** INDIA: KARNATAKA: Bangalore, Yelahanka, ix.2014, 6 ♂♂ 15 ♀♀ (TKPM, NBAIR). RAJASTHAN: 40 km N. by road of Dausa, Alwar, Khoh-Dariba, 380 m, 30.ix.2002, 1 ♂ 1 ♀, P. Šrámek lgt. (NMPC); 20 km N. of Dausa, Golakabas env., 380 m, Sariska reserve, 27°05'46"N 76°17'18"E, 9.–31.x.2002, 1 ♂ 3 ♀♀, P. Šrámek lgt. (NMPC).

**Distribution in India.** Karnataka: Bangalore (BALLAL & YAMADA 2016, this paper); Rajasthan: Dausa, Alwar (this paper).

**General distribution.** North and north-eastern Africa, Mauritania, Saudi Arabia, Yemen, Oman, United Arab Emirates, Kuwait, and Iran (CARAYON 1972b, GHOURI 1985, PÉRICART 1996, LINNAVUORI 2004, CARAPEZZA et al. 2014).

**Biology.** Reported from maize (*Zea mays*) plantations (BALLAL & YAMADA 2016).

Incertae Sedis

### Genus *Cryosternum* Fieber, 1860

#### *Cryosternum flavicorne* Fieber, 1860

*Cryosternum flavicorne* Fieber, 1860: 265. SYNTYPE(S): India (depository not stated).

**Distribution in India.** No Indian state distribution provided (FIEBER 1860, DISTANT 1906).

**General distribution.** Endemic.

### Family LASIOCHILIDAE Carayon, 1972

#### Tribe Lasiochilini Carayon, 1972

#### Genus *Dilasia* Reuter, 1871

#### *Dilasia corticalis* (Reuter, 1884)

*Lasiochilus corticalis* Reuter, 1884: 575. SYNTYPE(S): India, Nikobar Island and Milo, Nankauri (ZMUC).

*Dilasia corticalis*: CARPINTERO (2014): 76 (new combination).

**Distribution in India.** Andaman and Nicobar Islands: Nicobar Islands, Milo Nankauri (REUTER 1884).

**General distribution.** Endemic.

#### *Dilasia indica* (Muraleedharan, 1978) comb. nov.

*Lasiochilus indica* Muraleedharan, 1978: 267. HOLOTYPE: ♂, India: Tamil Nadu, Madras [= Chennai] (ZSI).

**Distribution in India.** Tamil Nadu: Chennai (MURALEEDHARAN 1978).

**General distribution.** Endemic.

**Taxonomy.** MURALEEDHARAN (1978) originally described this species in the genus *Lasiochilus* Reuter, 1871. Judging from his description, the lack of punctures on hemelytra, strong spines on tibiae, and the shape of paramere are more conducive to its placement in *Dilasia*.

### Discussion

A total of 73 species of anthocorid bugs, belonging to 26 genera under 8 tribes in 2 families (Anthocoridae and Lasiochilidae) are known to occur across vast areas of

India. The eight tribes include Almeidini, Anthocorini, Blaptostethini, Cardiaesthethini, Oriini, Scolopini, Xylocorini of Anthocoridae, and Lasiophilini of Lasiophilidae. Among these, Cardiaesthethini is represented by 8 genera (*Alofa*, *Amphiareus*, *Buchananiella*, *Cardiaestethus*, *Indocoris*, *Orthosoleniopsis*, *Physopleurella*, and *Rajburicoris*), Oriini by 6 genera (*Bilia*, *Carayonocoris*, *Montandoniola*, *Odontobrachys*, *Orius*, and *Pachytarsus*), Anthocorini by 4 genera (*Anthocoris*, *Galchana*, *Temnostethus*, and *Tetraphleps*), Almeidini by two genera (*Almeida* and *Lippomanus*), Blaptostethini by 2 genera (*Blaptostethus* and *Blaptostethoides*), while the remaining tribes are represented by a single genus each: Scolopini (*Scoloposcelis*), Xylocorini (*Xylocoris*) and Lasiophilini (*Dilasia*). The most diverse genera in terms of species are *Orius* (14), *Anthocoris* (8), *Physopleurella* (6), *Xylocoris* (6), and *Buchananiella* (4). Four genera, *Bilia*, *Blaptostethus*, *Cardiaestethus*, and *Scoloposcelis*, are each represented by 3 species, while six genera, *Amphiareus*, *Lippomanus*, *Montandoniola*, *Rajburicoris*, *Tetraphleps*, and *Dilasia*, are each represented by 2 species. Eleven genera, *Almeida*, *Alofa*, *Carayonocoris*, *Cryptosternum*, *Galchana*, *Indocoris*, *Odontobrachys*, *Orthosoleniopsis*, *Pachytarsus*, *Temnostethus*, and *Blaptostethoides*, are each represented by a single species. Six out of the 26 genera (*Galchana*, *Indocoris*, *Carayonocoris*, *Cryptosternum*, *Odontobrachys*, and *Pachytarsus*) and 28 out of the 73 species have so far been reported only from India. Habitus photographs of some of the anthocorids from India are provided (Figs 1–12). From India, several anthocorid species have been reported to have attained substantial control over several pest populations, like *Orius maxidentex* and *O. tantillus* on *Helicoverpa armigera* (Insecta: Lepidoptera); *Cardiaestethus exiguus*, *C. affinis* and *Alofa sodalis* on *Opisina arenosella* (Insecta: Lepidoptera); *Blaptostethus pallescens* on *Chilo partellus* (Insecta: Lepidoptera) and *Tetranychus urticae* (Acari: Tetranychidae); *Anthocoris muraleedharani* on *Ferrisia virgata* (Insecta: Hemiptera); *Montandoniola indica* on *Gynaikothrips uzeli* (Insecta: Thysanoptera) and *Xylocoris* spp. on several stored grain pests (BALLAL & YAMADA 2016). Some of the images illustrating predatory behaviour of Indian anthocorids are provided (Figs 13–18). To enhance, production protocols and storage efficacy of anthocorids as promising biocontrol agents; studies on biology and rearing requirements of some of them have also been carried out (BALLAL et al. 2003a, 2012c, 2013; BALLAL & YAMADA 2016; KAUR & VIRK 2011) (Figs 19–27). However, considering that most of India is still unexplored for anthocorids, the true number of species and their potential as biocontrol agents are still unknown.

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