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Conifer-feeding aphids (Insecta: Hemiptera: Aphididae) of India, Bhutan and Nepal with descriptions of three new species of the genus *Cinara*

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Abstract

Here, we present a review of the conifer-feeding aphids of India, Bhutan and Nepal, which includes 30 species. Three new species, viz., *Cinara (Cinara) bhutanica* **sp. nov.**, associated with *Pinus wallichiana* in Eastern Himalaya (Bhutan), *Cinara (Cupressobium) asishghoshi* **sp. nov.**, which infest *Juniperus squamata* and *Cinara (Cupressobium) himalayaensis* **sp. nov.**, which are associated with *Taxus baccata* in Northwest Himalaya (India) respectively, are described and illustrated. A hitherto unknown oviparous female of *Cinara lachnirostris* Hille Ris Lambers is also described and illustrated. *Cinara (Cinara) takahashii* **nom. nov.** is proposed here as a replacement name for *Cinara (Cinara) orientalis* (Takahashi, 1925), which is a junior secondary homonym of *Cinara (Schizolachnus) orientalis* (Takahashi, 1924). *Cinara indica* Verma **syn. nov.** is proposed as new junior synonym of *Cinara confinis* (Koch). *Cinara maculipes* and *Cinara takahashii* **nom. nov.** from Bhutan and *C. tenuipes* from Nepal are reported for the first time. Taxonomical and biological information about the presented species are given along with their distribution. A key to identifying the conifer-feeding aphids of India, Bhutan and Nepal is also provided.

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Keywords: *Aphids, biodiversity, conifers, new species, new synonyms, records, key*

1. Introduction

Gymnosperms represent an important component of the world's plants, because they are the dominant type of vegetation in many ecosystems (Friesen et al. 2001). Coniferous plants are now included in the class Pinopsida and order Pinales, have about 615 extant species and are recognized under the families Araucariaceae, Cephalotaxaceae, Cupressaceae, Phyllocladaceae, Pinaceae, Podocarpaceae, Sciadopityaceae and Taxaceae (Gymnosperm Data Base 2020).

They usually occur in temperate and sometimes in the arctic regions of the world. In the Himalayan mountains of India and its adjacent countries (Bhutan, China, Myanmar, Nepal, Pakistan and

Tibet), these plants are usually restricted to the temperate zone (1350–3300 m a.s.l.), although they can sometimes be found in the subtropical (720–1350 m a.s.l.) and alpine zones (above 3300 m a.s.l.) of the mountains (Contreras-Medina and Luna-Vega 2002).

Coniferous plants infested by aphids on this subcontinent are represented by species of the genera *Abies* (fir), *Cedrus* (cedar), *Picea* (spruce), *Pinus* (pine), *Tsuga* (hemlock) (Pinaceae); *Cupressus* (cypress), *Juniperus* (juniper), *Thuja* (thuja or arborvitae) (Cupressaceae) and *Taxus* (yew) (Taxaceae). Economically, conifers are quite important as they provide the bulk of timber, pencil wood, paper pulp, resin, oil, tar, turpentine (such as Canada balsam),

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fuel, medicine and are even used for tanning (Biswas & Johri 1997; Dar & Dar 2006; Hussain et al. 2006). Thus, an aphid attack on such an important group of plants is a matter of concern for silviculture.

In India, Bhutan and Nepal, there are a few scattered works on some conifer aphids (e.g. Ghosh 1982; Agarwala & Raychaudhuri 1982; Ghosh et al. 1969a, 1969b; Das & Raychaudhuri 1983; Ghosh 1986). Here, a comprehensive account of conifer-infesting aphids is presented for India, Bhutan and Nepal, as recently, Naumann-Etienne & Remaudière (1995), Remaudière & Binazzi (2003a, 2003b) published extensive works on Aphididae of Pakistan.

The bulk of the aphids that have been recorded on conifers come from the subfamily Lachninae. Some others are from the subfamilies Eriosomatinae, Mindarinae and even Aphidinae (Holman 2009; Favret). The total aphid fauna on conifers in India, Bhutan and Nepal, as is evident from this study, consists of 8 genera and 30 species (including three that are new to science). The genus *Cinara* is the predominant group and represents 20 species.

Most conifer aphids complete their life cycle on a single host plant species (they are monoecious). However, species from the subfamily Eriosomatinae have been reported to use conifers as their secondary host. Habib & Ghani (1970) suspected that *Pinus wallichiana* A.B. Jacks was a secondary host of *Epipemphigus imaicus* (Cholodkovsky) but Chakrabarti & Banerjee (1993) found that it was not *Pinus*, but rather *Polygonum alatum* Buch-Ham. ex D. Don (Polygonaceae) that was its secondary host in western Himalaya in India.

Ghosh A.K. et al. (1969b) reported a vagrant winged male of *Hyperomyzus lactucae* (Linnaeus) on *Taxus baccata* and Raychaudhuri et al. (1980) reported a vagrant alate of *Rhopalosiphum rufiabdominale* (Sasaki) from *Abies* sp., respectively. These two species have been kept out of this account because they do not feed on these plants. Basu (1961) reported *Prociphilus* sp. from *Tsuga brumoniensis* (Wall) Carriere & Ghosh (1972) reported *Cinara* sp. from *Pinus* sp., which have also not been included since these materials were not available for us to confirm or refute their exact specific identity. Bhagat (1981) reported an apterous viviparous female of *Lachnus tropicalis* van der Goot on *Pinus wallichiana* in Jammu and Kashmir, India. This species is well known from several species of *Quercus* and also from *Castanea*, *Castanopsis* and *Casuarina equisetifolia* (Ghosh A. K. 1982; Blackman & Eastop, 1994; Holman 2009). However, its occurrence on pine is extremely unusual and might even be the result of misidentification. The family Adelgidae is also not

within the purview of this work. Although some aphids have been reported on snow or on undetermined plant, they were considered to be conifer feeding because of their congeners and hence are included in this work.

Recently Chen et al. (2016) proposed a new subgeneric classification of the genus *Cinara* and *Schizolachmus* Mordvilko, 1909 has been included as a subgenus. Here, we follow this classification and also propose some taxonomical changes within *Cinara*. We describe three new species, viz., *Cinara (Cinara) bhutanica* sp. nov., which associates with *Pinus wallichiana* in Bhutan, *Cinara (Cupressobium) asishghoshi* sp. nov., which infests *Juniperus squamata* and *Cinara (Cupressobium) himalayaensis* sp. nov., which infests *Taxus baccata* in India. We also describe a hitherto unknown apterous oviparous female of *Cinara lachmirostris* Hille Ris Lambers, 1966. We propose the following nomenclatural changes: *Cinara (Cinara) takahashii* nom. nov. is proposed as the new replacement name for *Cinara (Cinara) orientalis* (Takahashi, 1925) and *Cinara indica* Verma, 1970 syn. nov. is proposed as a new junior synonym of *Cinara confinis* (Koch, 1856). We report the first records of *C. maculipes* and *C. takahashii* nom. nov. from Bhutan and *C. tenuipes* from Nepal as well.

2. Material and methods

Aphids were collected in the field, preserved in 75–80% ethyl alcohol, and then brought to the laboratory. They were catalogued, processed through boiling in 5–10% KOH and finally mounted on glass slides. Although Canada balsam was recently used as mounting medium, almost all of the previously collected specimens were mounted in a modified Berlese medium (Blackman & Eastop 1994; Quednau 2010). The aphid species that had previously been reported on different conifers from the area were obtained, as far as possible, for further studies. Sometimes, the same or similar species from other countries were also obtained for taxonomic comparisons.

The following abbreviations (in the descriptions and tables) are used: BL—body length (from the anterior border of the head to the end of the cauda); HW—greatest head width across the compound eyes; MAX W—greatest body width; ANT—antennae or their lengths; ANT I, II, III, IV, V, VI—antennal segments I, II, III, IV, V, VI or their lengths (the ratios between antennal segments are simply given as, e.g. 'VI/III'); LS ANT III—length of longest setae of ANT III; BD III—basal articular diameter of ANT III; BASE—basal part of the last antennal segment or its length; PT—processus terminalis of the last antennal segment or its length;

URS—ultimate segments of the rostrum (IV + V) or their length; FEMORA III—hind femora length; TIBIAE III—hind tibiae length; HT I—first segment of the hind tarsus; HT Ib—basal length of HT I, HT Id—dorsal length of HT I; HT Iv—ventral length of HT I; HT Ii—intersegmental length of HTI; HT II—second segment of the hind tarsus or its length. Alata/e—alate viviparous female(s); ABD—abdominal tergites; aptera/e—apterous viviparous female(s), ovipara/e—apterous oviparous female(s), SIPH—siphunculus or siphunculi.

The host plant information helpful for species identification in the taxonomic key to species are given from the material examined or reference data. The accepted host plant names (in the collection data as in particular species information) are given according to The Plant List (2013) and their records after Holman (2009) and Blackman & Eastop (1994, 2020).

The slides containing the aphid species that were used for this study are deposited in: the Natural History Museum, London (NHM), the University of Calcutta (CU), the University of Kalyani (KU), the Zoological Survey of India (ZSI) and the Zoology Department, University of Silesia in Katowice, Katowice, Poland (DZUS).

The holotypes and paratypes of *Cinara* (*Cupressobium*) *asishghoshi* sp. nov. and *C. (Cupressobium) himalayaensis* sp. nov. currently deposited in the collection of the University of Kalyani, India (KU) will be deposited in National Zoological Collection, Zoological Survey of India (ZSI). The holotype and some paratypes of *C. (Cinara) bhutanica* sp. nov. will be deposited in the NHM. Paratypes will be also deposited in the Hemiptera Collection of the Zoology Department, University of Silesia in Katowice, Katowice, Poland (DZUS) and the Zoological Survey of India (ZSI) after the publication of this work.

3. Results

3.1. Systematic account of the conifer-feeding aphids of India, Bhutan and Nepal

Family: Aphididae
Subfamily: Aphidinae
Tribe: Macrosiphini

1. *Neomyzus circumflexus* (Buckton, 1876)

Subfamily: Eriosomatinae

2. *Prociphilus (Prociphilus) taxus* (Ghosh A. K., Chakrabarti, Chowdhuri & Raychaudhuri, 1969)

3. *Prociphilus (Stagona) himalayaensis* Chakrabarti, 1976

Subfamily: Lachninae

Tribe Eulachnini

4. *Cinara (Cinara) atroalbipes* David, Narayanan & Rajasingh, 1970
5. *Cinara (Cinara) atrotibialis* David & Rajasingh, 1968
6. *Cinara (Cinara) bhutanica* sp. nov.
7. *Cinara (Cinara) chaetorostrata* Ghosh L. K. & Raychaudhuri, 1981
8. *Cinara (Cinara) comata* Doncaster, 1956
9. *Cinara (Cinara) confinis* (Koch, 1856) = *Cinara (Cinara) indica* Verma, 1970 **syn. nov.**
10. *Cinara (Cinara) eastopi* Pintera, 1965
11. *Cinara (Cinara) hottesis* (Ghosh A.K., Basu & Raychaudhuri, 1969)
12. *Cinara (Cinara) lachnirostris* Hille Ris Lambers, 1966
13. *Cinara (Cinara) maculipes* Hille Ris Lambers, 1966
14. *Cinara (Cinara) pilicornis* (Hartig, 1841)
15. *Cinara (Cinara) saraswatae* Das & Raychaudhuri, 1983
16. *Cinara (Cinara) similis* (van der Goot, 1917)
17. *Cinara (Cinara) takahashii* **nom. nov.** = *Cinara (Cinara) orientalis* (Takahashi, 1925)
18. *Cinara (Cinara) tenuipes* Chakrabarti et al., 1974
19. *Cinara (Cinara) tistaensis* Agarwala & Raychaudhuri, 1982
20. *Cinara (Cupressobium) asishghoshi* sp. **nov.**
21. *Cinara (Cupressobium) cupressi* (Buckton, 1881)
22. *Cinara (Cupressobium) himalayaensis* sp. **nov.**
23. *Cinara (Cupressobium) tujafilina* (Del Guercio, 1909)
24. *Cinara (Schizolachnus) orientalis* (Takahashi, 1924)
25. *Eulachnus pumilae* Inouye, 1939
26. *Eulachnus thunbergii* Wilson, 1919
27. *Pseudessigella brachychaeta* Hille Ris Lambers, 1966

Tribe: Stomaphidini

28. *Stomaphis* (*Stomaphis*) aff. *mordvilkoii*
Hille Ris Lambers, 1933

Subfamily: Mindarinae

29. *Mindarus abietinus* Koch, 1857
30. *Mindarus japonicus* Takahashi, 1931

3.2. Review of the species

1. *Neomyzus circumflexus*

Siphonophora circumflexa Buckton, 1876: 130

Remarks. Reddy et al. (1978) reported the occurrence of apterae and alatae of this species on *Pinus kesiya* Royle ex Gordon from Meghalaya, India. Because of its very polyphagous nature, it is found both on monocots and dicots, and sometimes, also on ferns and gymnosperms (different species of *Pinus* and *Picea*) (Blackman & Eastop 1994). However, this species had never been collected on any species of *Pinus* in other parts of the Himalayas.

Distribution. India: Meghalaya and virtually cosmopolitan considering its other host plants.

Host plants. There are over 300 records of this species from different genera and species of plants.

2. *Prociphilus taxus*

Anocaudus taxus Ghosh A.K., Chakrabarti,
Chowdhuri & Raychaudhuri, 1969: 329

Material examined. India: Himachal Pradesh, Khadralla (2590 m a.s.l.), 2 alate sexuparae (paratypes), 26.XI.1968, *Taxus baccata* L, A. N. Chowdhuri leg. (coll. no. 37/68/CU).

Remarks. This species was described from alate sexuparae that were collected on roots of *Taxus baccata* in November, which is certainly a secondary host. Chakrabarti (1987) opined on the morphological similarities of *P. taxus* with several specimens that had been collected on *Syringa emodi* Wall. ex Royle from Garhwal in Uttarakhand. However, confirmation of such a host association requires transfer experiments between these plants.

Distribution. India: Himachal Pradesh, Uttarakhand; Pakistan.

Host plants. *Taxus baccata*, *Tsuga brunoniana* (Wall) Carriere

3. *Prociphilus himalayaensis*

Chakrabarti, 1976: 263

Material examined. India: Himachal Pradesh, Shimla, Tolash, 9 alate sexuparae and 5 nymphs

(holotype and paratypes), 30.X.1970, roots of *Pinus wallichiana*, A.N. Chowdhuri; Uttarakhand, Joshimath, 2 alate sexuparae and 4 nymphs, 13.X.1982, *P. wallichiana* (roots), N. Debnath leg. (coll. No 2162/KU); 9 alate sexuparae, 13.XI.1982, *P. wallichiana* (roots), A.K. Mandal leg. (coll. no. 2166/KU); 3 alate sexuparae, many apterous sexes and nymphs, 28.XI.1982, *P. wallichiana*, P.K. Medda leg. (coll. no. 2217/KU).

Remarks. When performing transfer experiments, Banerjee & Chakrabarti (1993) found, that *Lonicera quinquelocularis* Hardw. (Caprifoliaceae) is the primary host and that it induces leaf-folding galls. They (*op. cit.*) also described its hitherto unknown fundatrix, alata emigrant and ovipara on this plant from Joshimath, Uttarakhand. Blackman & Eastop (1994) opined that the group needs further investigations to sort out any complications. According to those authors, records of spring alate of *P. caryaefitchii* Baker & Davidson on *Lonicera quinquelocularis* in India (Ghosh 1982) apply to *P. himalayaensis*. Similar spring migrants with more secondary rhinaria are known from *Eriobotrya petiolata* Hook. F. (Rosaceae) in West Bengal (NHM, A.N. Basu leg.) but more investigations are required to prove that they are conspecific.

Distribution. India: Himachal Pradesh, Uttarakhand.

Host plants. *Lonicera quinquelocularis*, *Pinus wallichiana*, *Pinus* sp.

4. *Cinara atroalbipes*

Cinara (*Lachmiella*) *atroalbipes* David, Narayanan & Rajasingh, 1970: 415

Material examined. India: Himachal Pradesh, Shimla, 1 aptera, (paratype), 06.VI.1968, *Picea* or *Abies*, K.N. & S.G.R leg. (coll. no. BM 1984-340 NHM); Himachal Pradesh, Shimla, Mashobra, 4 apterae, 19.IV.1966, *Picea smithiana* (Wall.) Boiss, A. N. Chowdhuri leg. (det. H.L.G. Stroyan, NHM 1982-492); Uttarakhand, Valley of Flowers, 10 apterae and 4 nymphs, 12.VI.1978, *Araucaria* sp. D.K. Bhattacharya leg. (coll. no. 605/KU); Ghangaria, 1 aptera and 4 nymphs, 17.IX.1982, *Abies pindrow*, (Royle ex D. Don) Royle, S. Saha leg. (coll. no. 1692/KU); 1 aptera, 28.XII.1965, *Pinus* sp. (coll. No. ZSI/ERS 116)., S.K. Chanda leg.; Upper Shilling, 1 aptera and 3 nymphs, 11.V.1973, *Pinus* sp. (coll. No. ZSI/ERS/ no. 210), A.K. Ghosh leg.; Nongthymmai, 1 aptera and 3 nymphs, 01.XII.1969, sweeping on *Pinus* sp. (coll. No. ZSI), S.K. Bhattacharya leg.

Remarks. This species is currently known from apterae and alatae. Its fore tibiae may also be pale

in contrast to being blackish brown to black as was mentioned in original literature.

Distribution. India: Himachal Pradesh, Uttarakhand.

Host plants: *Pinus longifolia* Salisb., *Pinus* sp., *Abies pindrow*, *Picea smithiana*, *Araucaria* sp.

According to Blackman & Eastop (2020), species of *Picea* may be probably the true host.

5. *Cinara atrotibialis*

David & Rajasingh, 1968: 103

Material examined. India: Meghalaya, Shillong, 1 alata (paratype), 19.V.1967, *Pinus* sp., S.G. Rajasingh leg. (coll. no. 185, BM 1984–340, NHM); 1 aptera, 28.XII.1965, *Pinus* sp., S.K. Chanda leg., det. A.K. Ghosh, Nongthymmai, Khashi & Jayantia Hills, 01. XII.1969, *Pinus* sp., S.K. Bhattacharya leg. (coll. ZSI), Upper Shillong, 1 aptera, 3 nymphs, 11.V.1973, *Pinus* sp., A.K. Ghosh leg. (coll. ZSI), 3 apterae, 08.I.1973, *Pinus kesiya*, Bielawski leg. (coll. no. 4038, BM 1984–340, NHM).

Remarks. This species is so far known by its apterae and alatae, which are found even in December and January, thus indicating an anholocyclic life cycle. Agarwala (1988) studied its development and fecundity under the effects of temperature. Agarwala (1989) and Agarwala & Bhattacharya (1993) provided a note on its biology and niche specialisation, respectively. *Cinara khasyae* Robinson is a synonym of this species (Eastop & Hille Ris Lambers, 1976).

Distribution. India: Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Nagaland and Sikkim; Philippines and Thailand.

Host plants. *Pinus kesiya* var. *langbianensis* (A. Chev.) Gaussen ex N. S. Bui, *P. kesiya*, *P. roxburghii*.

6. *Cinara bhutanica* sp. nov.

(Figures 1, 2, 9; Tables I–III)

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Apterous viviparous female (Figures 1, 2, 9; Tables I, II) – description.

Colour. In life: head and thorax dark brown to black often with lighter waxy longitudinal stripes. Antennae pale brown with darker apical part. Femora dark brown with lighter proximal half. Tibiae dark brown to blackish with paler patch near the proximal half. Abdomen brownish with greyish spinal (sometimes also two pleural) stripes and black paired spinal and marginal patches (Figure 9a–c). Pigmentation in

mounted specimens: head brown. ANT with ANT I and II brown. ANT III yellow with $\frac{1}{4}$ distal end brown. ANT IV and V yellow from basal part to about $\frac{1}{2}$ of length (sometimes ANT IV only with pale basal part). ANT VI light brown. Thorax light brown. Femora of fore and middle legs brown with pale proximal parts. Fore tibiae uniformly brown or with slightly lighter distal and proximal parts. Middle tibiae brown with pale distal and proximal parts. Knee area and distal ends of middle leg brown. Hind femora pale from proximal part to about half of the length, then dark brown. Hind tibiae dark brown with pale patch near proximal part (Figure 1).

Body oval or ellipsoidal. HW 0.47–0.57 × ANT. ANT 0.36–0.41 × BL. ANT III usually without secondary rhinaria (rarely with one rhinarium), longer than ANT IV+V+VI. ANT IV shorter than ANT V with 1–3 small rounded secondary rhinaria. ANT V longer than ANT VI with one rounded primary rhinarium with sclerotic rosette and one small rounded secondary rhinarium (Figure 2a). ANT VI with PT 0.32–0.37 × BASE, with one rounded primary rhinarium with sclerotic rosette and 6 accessory rhinaria. Other antennal ratios: VI/III 0.29–0.37, V/III 0.45–0.50, IV/III 0.32–0.37. ANT covered by long, fine and pointed setae 0.07–0.17 mm long. LS ANT III 3.00–3.75 × BD III. Head chaetotaxy: head densely covered by long, fine and pointed or slightly blunt setae, 0.12–0.18 mm long (Figure 2c). Rostrum reaches ABD I–III. URS 0.41–0.54 × ANT III, 1.31–1.45 × ANT VI and 0.93–1.00 × HT II with 8 fine and pointed accessory setae (Figure 2d). Hind legs covered by long, fine and pointed setae, longer than the width of tibiae, 0.15–0.20 mm long on femora and 0.15–0.20 mm long on tibiae. HT I basal length 0.66–0.80 × dorsal, 0.29–0.40 × ventral and 0.62–1.00 × intersegmental length, without dorso-lateral setae and with about 19–20 ventral setae. HT II 0.41–0.54 × ANT III and 1.39–1.46 × ANT VI. Siphuncular cones large and setose, about 6.70–8.40 × SIPH pore. Dorsal cuticle smooth. Dorsal side of body with large paired, spinal sclerotic plates on metanotum, ABD I and ABD V–VII. ABD II–IV without sclerites or with few small sclerites at setal bases. ABD VIII in form of broken band with 18–22 setae. Dorsal abdominal setae long, fine and pointed 0.13–0.19 mm long on ABD I–VII and 0.18–0.22 on ABD VIII. Genital plate transverse oval. Cauda semi-circular with many long, fine and pointed setae.

Alate viviparous female (Figure 2; Tables I, III) – description.

Colour. In life: unknown. Pigmentation in mounted specimens: head and thorax brown.



Figure 1. *Cinara bhutanica* sp. nov. – general view.

Antennae uniformly brown. Legs brown, abdomen pale or yellow with brown sclerotisation.

Body oval, HW $0.38\text{--}0.46 \times \text{ANT}$. ANT $0.38\text{--}0.44 \times \text{BL}$. ANT III longer than ANT IV+V+VI with 16–21 medium-sized and rounded secondary rhinaria in one row, ANT IV shorter than ANT V with 4–5 rounded secondary rhinaria. ANT V longer than ANT VI with one big, rounded primary rhinarium at the apex with sclerotic rosette and one smaller secondary rhinarium (Figure 2b). ANT VI with PT $0.33\text{--}0.40 \times \text{BASE}$, with one big primary rhinarium and 6 accessory rhinaria. Other antennal ratios: VI/III $0.27\text{--}0.30$, V/III $0.44\text{--}0.47$,

IV/III $0.35\text{--}0.36$. Antennae covered by long, fine and pointed setae $0.07\text{--}0.17$ mm long, LS III $4.00\text{--}5.33 \times \text{BD III}$. Head chaetotaxy: head densely covered by long, fine and pointed setae, $0.13\text{--}0.18$ mm long. Rostrum reaches ABD I. URS $0.36\text{--}0.38 \times \text{ANT III}$, $1.24\text{--}1.40 \times \text{ANT VI}$ and $1.24\text{--}1.40 \times \text{HT II}$ with 8–9 fine and pointed accessory setae. Hind legs covered by long, fine and pointed setae, longer than the width of tibiae, $0.10\text{--}0.24$ mm long on femora and $0.10\text{--}0.23$ mm long on tibiae. HT I basal length $0.55\text{--}0.58 \times \text{dorsal}$, $0.29\text{--}0.31 \times \text{ventral}$ and $0.64\text{--}0.66 \times \text{intersegmental length without dorso-lateral setae and with about}$

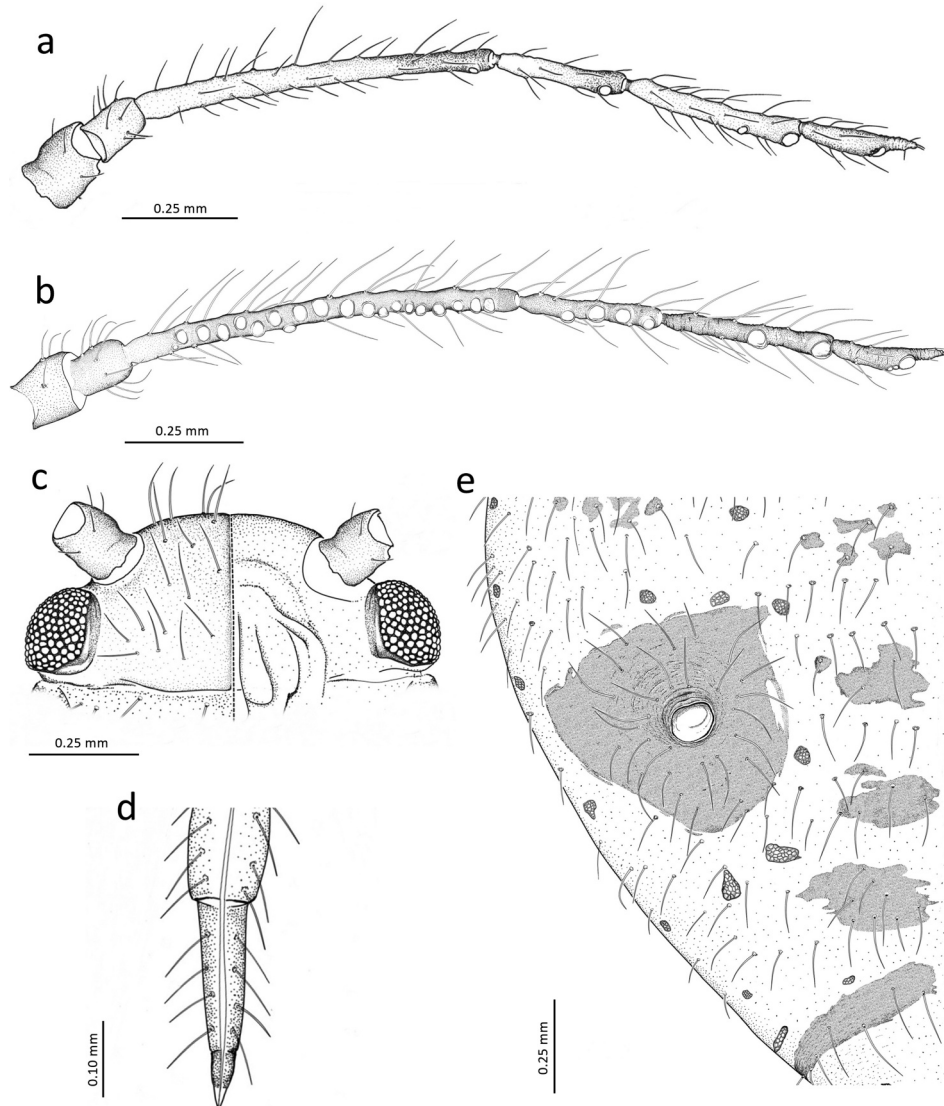


Figure 2. *Cinara bhutanica* sp. nov. – morphological details: (a) antenna of apterous viviparous female, (b) antenna of alate viviparous female, (c) head of apterous viviparous female, (d) ultimate rostral segments, (e) abdomen of apterous viviparous female.

18 ventral setae. HT II 0.37–0.41 × ANT III and 1.29–1.55 × ANT VI. SIPH cones large and setose, 7.50–8.00 × SIPH pore. Dorsal cuticle smooth. ABD VIII with 19–21 setae. Dorsal abdominal setae long, fine and pointed 0.15–0.22 mm long on ABD I–VII and 0.20–0.25 on ABD VIII. Genital plate transverse oval. Cauda semi-circular with many long, fine and pointed setae.

Measurements of holotype: BL 4.55, MAX W 2.65; ANT 1.70; ANT III:IV:V:VI 0.68:0.25:0.34: (0.17 + 0.05); URS (IV+V) 0.24 + 0.06; HT I 0.17; HT II 0.32; SIPH cone width 0.67.

Material examined: Holotype: Bhutan: Bumthang, Apterous viviparous female indicated by “H”, 10. VI.1985 from *Pinus* sp., CIEA (coll. no. 17186/185/NHM). Paratypes: 2 apterae, one alata and one nymph, (coll. no. 17186/185/1/NHM); 2 apterae, 1 alata and two nymphs, (coll. no. 17186/185/2/NHM); 3 apterae, 1 alata, (coll. no. 17186/185/3/NHM); 4 apterae, (coll. no. 17186/205/NHM), collection data as in the holotype; Bumthang, 1 alata, 2 nymphs, 10.VI.1985, *Pinus* sp. (coll. nil, no. CIEA 17186, 20/87, NHM); Simtokha, 6 apterae, 02. VI.2003 from *Pinus wallichiana*., D. Das leg. (coll.

Table I. Measurements (in mm) of apterous and alate viviparous females of *Cinara bhutanica* sp. nov., and apterous viviparous females of *Cinara asishghoshi* sp. nov. and *Cinara himalayaensis* sp. nov.

Character	<i>Cinara bhutanica</i>		<i>Cinara asishghoshi</i>	<i>Cinara himalayaensis</i>
	aptera	alata		
BL	3.95–4.67	3.97–4.90	3.17–3.86	4.85–2.25
MAX W	2.25–2.80	1.67–2.32	1.90–2.27	3.22–3.37
HW	0.83–0.84	0.75–0.82	0.69–0.72	0.80–0.84
ANT	1.43–1.75	1.77–1.97	1.24–1.48	1.84–1.92
ANT III	0.55–0.73	0.74–0.82	0.39–0.50	0.66–0.72
ANT IV	0.20–0.26	0.27–0.30	0.19–0.22	0.27–0.30
ANT V	0.27–0.34	0.35–0.38	0.21–0.27	0.33–0.34
ANT VI	0.20–0.22	0.20–0.24	0.25–0.26	0.33–0.34
BASE	0.15–0.17	0.15–0.18	0.195–0.200	0.24–0.26
PT	0.05–0.06	0.05–0.06	0.05–0.06	0.08–0.09
ROSTR	1.22–1.40	0.95–1.40	1.12–1.25	1.20–1.30
URS	0.29–0.30	0.28–0.30	0.33–0.35	0.36–0.40
FEMORA III	1.50–2.00	1.82–2.12	1.05–1.25	1.95–2.02
TIBIAE III	2.50–3.07	3.07–3.42	1.77–1.95	3.02–3.20
HT Ib	0.050–0.060	0.045–0.050	0.050–0.060	0.070–0.075
HT Id	0.070–0.075	0.080–0.090	0.025–0.030	0.045–0.055
HT Iv	0.150–0.170	0.155–0.165	0.100–0.110	0.130–0.145
HT Ii	0.060–0.080	0.070–0.075	0.065–0.080	0.080
HT II	0.30–0.32	0.31–0.32	0.31–0.32	0.42–0.45
SIPH cone	0.62–0.76	0.47–0.60	0.40–0.70	0.32–0.37
GP L	0.20–0.22	0.16–0.26	0.20–0.25	0.26–0.28
GP W	0.42–0.45	0.35–0.45	0.48–0.52	0.55–0.65

Table II. Shared and particular morphological differences between apterous viviparous females of *C. bhutanica*, *C. eastopi* and *C. tenuipes*.

Character	<i>Cinara eastopi</i>	<i>Cinara bhutanica</i> and <i>C. tenuipes</i>
Abdominal sclerotization	ABD II–IV without paired spinal sclerotic plates	ABD II–IV with paired spinal sclerotic plates
Sclerotized rostrum groove	1.70–1.80	1.20–1.50
HT I dorso-lateral setae	1	0
URS/HT II	1.03–1.06	0.93–1.00
URS/ANT III	0.57–0.59	0.41–0.54
ANT IV+ANT V	0.61–0.63	0.47–0.60
Character	<i>Cinara eastopi</i>	<i>Cinara bhutanica</i>
ANT VI	0.23–0.24	0.20–0.22
ABD VIII setae	26–30	18–22
ANT V/ANT III	0.55–0.59	0.45–0.50
ANT IV/ANT III	0.40–0.47	0.32–0.37
HT Ib/HT Id	1.00–1.08	0.66–0.88
Character	<i>Cinara eastopi</i>	<i>Cinara tenuipes</i>
URS/ANT VI	1.45–1.48	1.28–1.34
HT II/ANT VI	1.40–1.43	1.36–1.39
HT II/BASE	1.83–1.94	1.73–1.78
URS/BASE	1.94–2.00	1.63–1.82
Character	<i>Cinara bhutanica</i>	<i>Cinara tenuipes</i>
ANT VI	0.20–0.22	0.23–0.24
SIPH cone/SIPH pore	6.70–8.44	5.75–5.87
ANT VI/ANT III	0.29–0.37	0.39–0.41
ANT V/ANT III	0.45–0.50	0.51–0.58
HT II/ANT III	0.41–0.51	0.55–0.56
HT II/BASE	1.87–2.00	1.73–1.78

no. 10189/KU); Paro, 7 apterae, 04.VI.2003 from *Pinus* sp., D. Das leg. (coll. no. 10218/KU); Simtokha, 38 nymphs, 29.XI.2012 from *Pinus*

wallichiana, S. Sarkar leg. (coll. no. 10261/KU); Trongsa, 2 apterae, 24.X.1999 from *Pinus* sp., D. Das leg. (coll. no. 10050/KU); Thimphu, 3

Table III. Morphological differences between alate viviparous females of *C. bhutanica*, *C. eastopi* and *C. tenuipes*.

Character	<i>Cinara eastopi</i>	<i>Cinara bhutanica</i>
III TIBIAE longest setae	0.26–0.28	0.22–0.23
ABD VIII setae	23–30	19–21
ANT III rhinaria	13–15	16–21
ANT IV rhinaria	2–4	4–5
ANT VI/ANT III	0.30–0.31	0.27–0.30
ANT V/ANT III	0.51–0.55	0.44–0.47
ANT IV/ANT III	0.39–0.41	0.35–0.36
ANT III/ANT IV+V+VI	1.05–1.07	1.19–1.23
URS/ANT III	0.43–0.45	0.36–0.38
HT II/ANT III	0.45	0.37–0.41
HT I b/HT I i	0.52–0.60	0.64–0.66
SIPH cone/SIPH pore	5.50–6.83	7.50–8.00
Character	<i>Cinara bhutanica</i>	<i>Cinara tenuipes</i>
ANT III rhinaria	16–21	12–13
ANT IV rhinaria	4–5	2
ANT VI/ANT III	0.27–0.30	0.35–0.36
ANT V/ANT III	0.44–0.47	0.50
ANT IV/ANT III	0.35–0.36	0.38–0.39
ANT III/ANT IV+V+VI	1.19–1.23	1.11–1.12
URS/ANT III	0.36–0.38	0.48–0.49
HT II/ANT III	0.37–0.41	0.50
LS ANT III/ANT II BD	4.00–5.33	2.50–2.81
SIPH cone/SIPH pore	7.50–8.00	6.66–7.00
HT I b/HT I d	0.55–0.58	0.62
HT I b/HT I v	0.29–0.31	0.32
HT II/HT I	1.87–2.00	2.25
Character	<i>Cinara eastopi</i>	<i>Cinara tenuipes</i>
ABD VIII setae	23–30	20
ANT/BL	0.44–0.45	0.35–0.41
ANT VI/ANT III	0.30–0.31	0.35–0.36
ANT V/ANT III	0.51–0.55	0.50
ANT III/ANT IV+V+VI	1.05–1.07	1.11–1.12
URS/ANT III	0.43–0.45	0.48–0.49
URS/ANT VI	1.40–1.47	1.36–1.38
URS/BASE	1.93–2.00	1.88
HT II/ANT III	0.45	0.50
HT II/ANT VI	1.47–1.50	1.42
LS ANT III/ANT III BD	4.00	2.50–2.81
HT I b/HT I v	0.28–0.30	0.32

apterae and 1 nymph, 30.XI.2012 from *P. wallichana*, S. Chakrabarti leg. (coll. no. 10285/KU).

Diagnosis. *Cinara bhutanica* together with *C. eastopi* and *C. tenuipes* are related to *C. takahashii*, due to the presence of large paired spinal patches or sclerites on the thorax and abdomen. *Cinara takahashii* differs from the rest of species (*C. bhutanica*, *C. eastopi* and *C. tenuipes*) by the pigmentation of its legs, which are characterised by uniformly brown or with short pale part of fore and middle tibiae (uniformly pale in *C. takahashii*) and about ¼ distal part of ANT III brown (only the very apex darker in *C. takahashii*). Apterous viviparous females of *Cinara bhutanica* differ from *C. eastopi* by ABD I–IV without sclerotic patches or with only a few small sclerites (sclerotic patches and sclerites on all of the ABD tergites in *C. eastopi*), a shorter sclerotised part

of stylet groove – 1.22–1.40 mm (1.75–1.78 mm in *C. eastopi*), 18–22 setae on ABD VIII (26–30 in *C. eastopi*), HT I without dorso-lateral setae (one seta in *C. eastopi*), lower ratio of ANT V:ANT III – 0.45–0.50 (0.55–0.59 in *C. eastopi*) and lower ratio of HT Ib:HT Id – 0.66–0.80 (1.00–1.08 in *C. eastopi*). Alate viviparous females of the new species differ from those of *C. eastopi* by higher number of secondary rhinaria on ANT III – 16–21 (13–15 in *C. eastopi*), a smaller number of setae on ABD VIII – 19–21 (23–30 in *C. eastopi*), higher ratio of the SIPH cone:SIPH pore – 7.50–8.00 (5.50–6.80 in *C. eastopi*), hind tibiae setae not longer than 0.23 mm long (up to 0.28 mm in *C. eastopi*), lower ratio of ANT V:ANT III – 0.44–0.47 (0.51–0.55 in *C. eastopi*) and lower ratio of URS:ANT III – 0.36–0.38 (0.43–0.45 in *C. eastopi*). Due to the lack of

spinal sclerites on ABD I–IV, the new species is also similar to *C. tenuipes*. A comparison with the type material of the latter revealed several differences in both morphs. Apterous viviparous females of the new species can be distinguished from *C. tenuipes* by shorter ANT V, longer ANT VI and their ratios, e.g. ANT VI:ANT III 0.39–0.41 (0.29–0.37 in *C. tenuipes*), ANT V:ANT III 0.45–0.50 (0.51–0.58 in *C. tenuipes*). Alate viviparous females of *C. bhutanica* differ from *C. tenuipes* in: higher number of secondary rhinaria on ANT III – 16–21 (12–13 in *C. tenuipes*) and ANT IV – 4–5 (2 in *C. tenuipes*), lower ratio URS:ANT III – 0.36–0.38 (0.48–0.49 in *C. tenuipes*) and longer antennal setae – LS ANT III:BD III 4.00–5.33 (2.50–2.81 in *C. tenuipes*). Detailed differences between those three species are given in Tables II and III.

Etymology: The specific name is adjective, derived from Bhutan – the country from which the species has been collected.

Remarks: Blackman & Eastop (2020) stated that the dorsal abdomen of *C. eastopi* is characterised by paired dark patches or broken groups of sclerites on ABD TERG 1–8, which are sometimes reduced on 2–5. In fact, the second part of the characters in the previous sentence refers to the new species. The specimens and biological notes of *C. orientalis* reported by Chakrabarti & Das (2014) from Bhutan refer to the new species.

Distribution and biological notes. The species is so far known only from Bhutan where it is associated with *Pinus wallichiana* and probably other undetermined species of *Pinus*. Colonies of *C. bhutanica* live at the bases on woody twigs and are visited by ants (Figure 9a, b). There is also parasitoid of this species as few mummies were observed in some colonies (Figure 9c). So far, no sexual morphs were recorded but it very likely, is a holocyclic species.

7. *Cinara chaetorostrata*

Ghosh & Raychaudhuri, 1981: 173

Material examined. India: Himachal Pradesh, Kufri (2500 m a.s.l.), 1 Alata (holotype), 15. XII.1973, on snow, L.K. Ghosh leg. (coll. ZSI).

Remarks. This rather poorly known species is still known only from an alate viviparous female but this morph can be easily distinguished from other species due to the numerous accessory setae on URS, no more than four, small secondary rhinaria and quite long setae on ANT III.

Distribution. India: Himachal Pradesh.

Host plant. Unknown. Probably a species of *Pinus*.

8. *Cinara comata*

Cinara (Lachniella) comata Doncaster, 1956: 111

Material examined. India: Uttarakhand, Tehri Garhwal Mt. Gangotri III (18 000–22 000 ft.), 1 alata (paratype), -.IX.1952, on permanent snow, H. F. Lamprey leg., 8/53 (coll. no 010109318 NHM); Tehri Garhwal Mt. Gangotri III (5455–6667 ft.), 1 alata (paratype), -.IX.1952, on snow H.F. Lamprey leg., (NHM); Joshimath (1875 m a.s.l.), 1 aptera and 10 nymphs, 26.V.1983, *Picea* sp., B. Das leg. (coll. no. 2329/KU); Himachal Pradesh, Rhotang Pass (13,800 ft.), 2 alatae, 05.VI.1955, on snow, A. P. Kapur leg. (coll. C.I.E. 14764, no. 17, NHM, det. J.P. Doncaster); Kufri, 1 alata, 07. VI.1968, *Pinus* sp. (det. S.K. David, collection 128), K. Narayanan & S.G. Rajasingh leg.; Jammu and Kashmir, Pahalgaoon, 1 aptera, 14.V.1970, *Picea smithiana*, K. Narayanan leg. (coll. No. S.K. David collection 1216).

Remarks. Chakrabarti et al. (1988) wrongly reported some specimens as being *C. comata* from an unidentified conifer plant. We examined them (coll. no. 605/KU) and found that it was *C. atrolbipes*. A possible host of this species is *Picea smithiana* (Naumann-Etienne & Remaudière, 1995).

Distribution. India: Himachal Pradesh, Jammu and Kashmir and Uttarakhand; Pakistan.

Host plants. *Picea smithiana*, *Pinus* sp.

9. *Cinara confinis*

Lachnus confinis Koch, 1856: 245

Cinara indica Verma, 1970: 96 **syn. nov.**

Material examined. India: Uttarakhand, Mussorie (1970 m a.s.l.), 1 alata, VII.1920, *Cedrus deodara* (Roxb. ex D. Don) G. Don. (underbark), S.N. Chatterjee leg. (NHM); Gangotri (3040 m a.s.l.), 1 alata, 1 alate male and 1 ovipara, 03.X.1982, *C. deodara*, S. Saha leg. (coll. no. 1847/KU); Himachal Pradesh, Rohtang Pass (4182 m a.s.l.), 1 alata, 04.VI.1955, on snow, A.P. Kapur leg. (det. J.P. Doncaster, C.I.E. 14764, N:7, NHM); 1 alata, Rhotang Pass, 05.VI.1955, on snow, A.P. Kapur leg. (det. J.P. Doncaster, C.I.E. 14764, N:16, NHM).

Additional material examined. Turkey: Bolu-Aladag (1360 m a.s.l.), 1 aptera, 04.VII.1964, *Abies bornmuelleriana* Mattf. H. Canakçioğlu leg. (coll. no. 91A, 748/64, NHM); Bursa, Uludag, 3 apterae, 04.VIII.1964, *A. bornmuelleriana* (on thick

bark), R.N.B.P. leg. (det. H.L.G. Stroyan, coll. no. B 49, BM 1982–492, NHM); England: Surrey, Kew, 1 alata, 24. V.1971, *Abies grandis* (Douglas ex D. Don) Lindi, H.K. Averyshaw leg. (coll. No. 459/71, NHM); Greece: Mt. Parnes, nr. Athens, 1 aptera, 27.VI.1974 from *A. cephalonica* Loudon, L. A. Mound leg. (coll. no. 1291, NHM).

Remarks. This species appears to have a plasticity of characters and intermediates in all of its characters (Eastop 1972). The body size, rostral length, length of the setae on tergites and colour of the tibiae are variable. We have collected its both male and female along with viviparous alata on *Cedrus deodara* from Uttarakhand in India.

Verma (1970) described *Cinara indica* based on a single aptera on *Cedrus deodara* from Jammu and Kashmir. The holotype was not available but an analysis of the given characters indicated that it falls within the range of *C. confinis*. Blackman & Eastop (1994) also commented that it might be a small aberrant form of *C. confinis*. Accordingly, *C. indica* Verma is proposed here to be a junior synonym of *C. confinis* (Koch). This species, particularly the larger form, is known to produce a good amount of honeydew. *Cinara confinis* is rather common on *Abies pindrow* in Galiat, Pakistan above 2000 m a.s.l. (Naumann-Etienne & Remaudière 1995).

Distribution. India: Himachal Pradesh, Jammu and Kashmir, Uttarakhand; Argentina, Canada, Europe, North America, Pakistan, Turkey, Russian Far East.

Host plants. On several species of *Abies*. Occasionally on *Cedrus*.

10. *Cinara eastopi*

Pintera, 1965: 62 (Tables II, III)

Material examined. India: Himachal Pradesh, Rothang Pass, 1 alata (paratype), 05.VI.1955, on snow, A.P. Kapur leg. (coll. no. BM 1984–340); 1 alata (paratype) (coll. no. NHMUK 010127332), 1 alata (coll. no. NHMUK 010127343), 2 alatae (coll. no. NHMUK 010127330); Konain, 24–30.V.1922, under bark of *Pinus wallichiana*, S.N. Chatterjee leg. (coll. no. NHMUK 010127350), 1 aptera (coll. no. NHMUK 010127347); Bhutan: Thimphu, 1 alata, 02.V.1985, vagrant from *Malus* sp. (coll. CIEA 17186/T128, NHM); 1 alata, 06.V.1985, vagrant from *Prunus* sp., (coll. CIEA17186/131, NHM); 1 aptera, 06.V.1985, vagrant from *Prunus* sp., (coll. CIEA17186/128, NHM); 2 alatae, 2 apterae, 26.VI.1985, from “pine”, (coll. CIEA17186/225, NHM); Taktsang, 1 aptera, 05.

VI.2003, from *Pinus* sp., D. Das leg. (coll. no. 10232; KU).

Remarks. *Cinara eastopi* is a member of a similar and closely related complex of species with *C. bhutanica* sp. nov. and *C. tenuipes*. The main differences between *C. eastopi* and the two other species are the presence of paired spinal sclerotic plates on ABD I–IV (absent on *C. bhutanica* and *C. tenuipes*), a much longer sclerotised part of the rostrum groove 1.70–1.80 mm (1.20–1.50 in the other species) and one dorso-lateral seta on HT I (absent in the other species). The main morphological differences between the apterous and alate viviparous females of the species from the “*eastopi*” complex species are given in Tables II and III.

Distribution: Bhutan, India: Himachal Pradesh, Pakistan.

Host plants: *Pinus wallichiana*.

11. *Cinara hottesis*

Indocinara hottesis Ghosh A.K., Basu & Raychaudhuri, 1969: 249

Material examined: India: Shimla, 2 apterae, VIII.1966, *Isodon japonicus* (Burm.f.) H. Hara, A.N. Chowdhuri leg. (coll. 48/70; 010109796, NHM).

Remarks. According to Blackman & Eastop (2020), immatures of *Cinara laportei* (Remaudière) were collected in Himachal Pradesh (NHM collection, A. N. Chowdhuri leg.). An examination of these specimens during the visit in the NHM revealed that they were immatures of *Cinara hottesis* (det. M. Kanturski). Representatives of this species were supposed to be collected from *Isodon japonicus* (previously *Plectranthus japonicus*) which very unlikely is the true host. *Cinara hottesis* most probably feeds on *Cedrus* species.

Distribution. India: Himachal Pradesh.

Host plants. Probably species of *Cedrus*.

12. *Cinara lachnirostris*

Hille Ris Lambers, 1966: 201

Oviparous female (Figures 3, 4; Table IV) – description.

Colour. In life: unknown. Pigmentation in mounted specimens: Head brown, ANT brown with paler ANT III. Legs pale brown with distal part of femora, very bases and apices of tibiae dark brown (Figure 3). Body oval. HW 0.42–0.5 × ANT. ANT 0.53–0.61 × BL. ANT III without secondary rhinaria, shorter than ANT IV+V+VI (Figure 4a). ANT IV shorter than ANT V. ANT V as long as or slightly

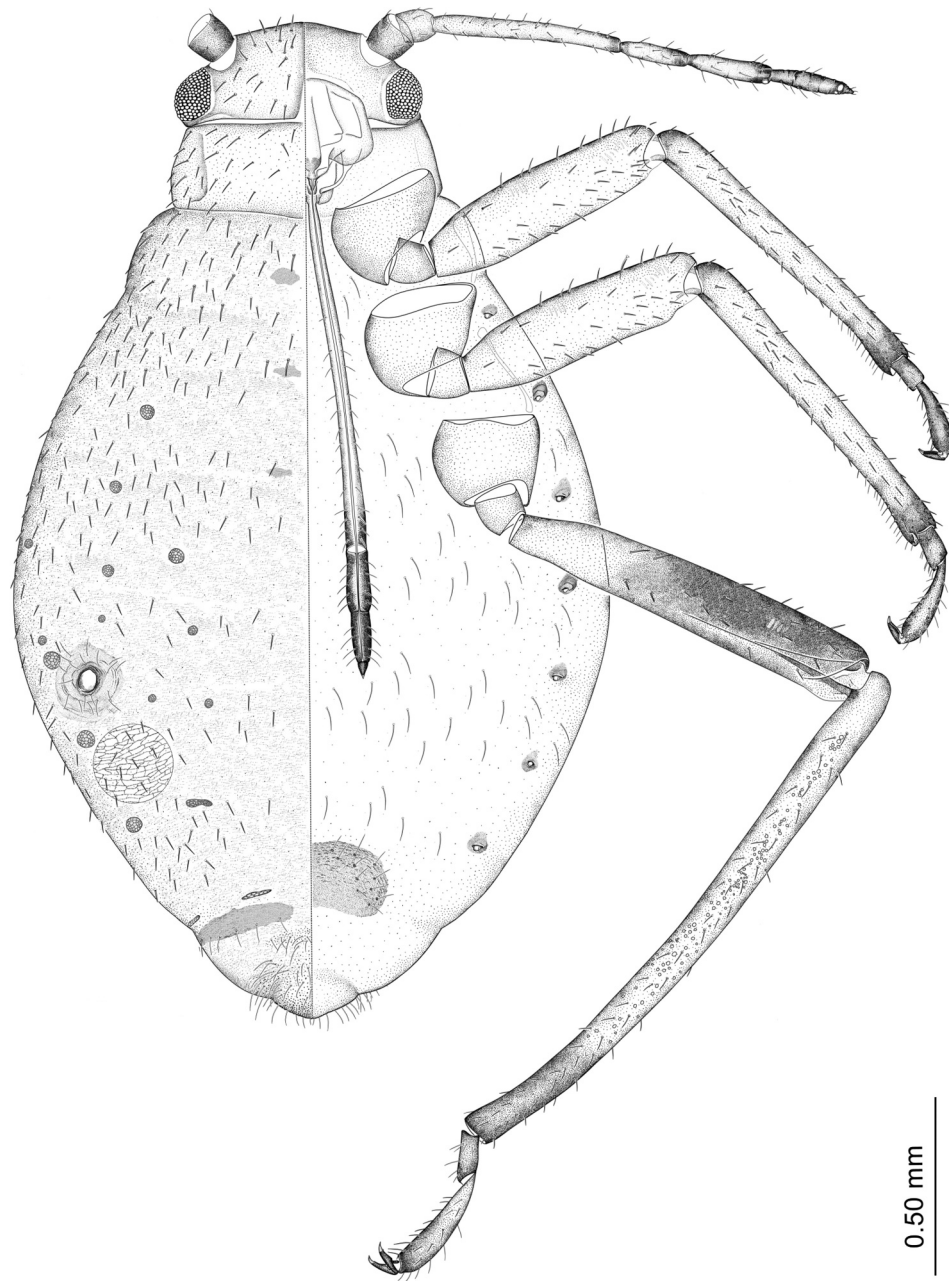


Figure 3. Oviparous female of *Cinara lachnirostris* – general view.

shorter than ANT VI, and ANT VI with PT $0.30\text{--}0.37 \times \text{BASE}$, with one rounded primary rhinarium and 6 accessory rhinaria. Other antennal ratios: VI/III $0.45\text{--}0.51$, V/III $0.45\text{--}0.51$, IV/III $0.37\text{--}0.45$. ANT covered by acute, thorny, stiff setae, LS ANT III $0.042\text{--}0.052$ mm long, $0.72\text{--}0.92 \times \text{BD III}$. Head chaetotaxy: head covered by thick stiff setae with acute apices, longest ones $0.42\text{--}0.52$ mm long and $0.72\text{--}0.92 \times \text{BD III}$ (Figure 4b). URS $0.54\text{--}0.55 \times \text{ANT III}$, $1.05\text{--}1.25 \times \text{ANT VI}$ and $0.80\text{--}0.95 \times \text{HT II}$ with

7–8 short accessory setae (Figure 4c). Legs covered mostly by stiff, thorny, acute or blunt setae. Longest setae on TIBIAE III $0.45\text{--}0.59$ mm long and $0.39\text{--}0.48 \times$ their width in the middle. TIBIAE III slightly swollen, with about 50–60 pseudosensoria (Figure 4d, e). HT Id $0.63\text{--}0.65 \times \text{HT IV}$ and $1.83\text{--}2.00 \times \text{HT Ib}$; HT II $0.58\text{--}0.68 \times \text{ANT III}$ and $1.27\text{--}1.32 \times \text{ANT VI}$. Abdominal tergites with stiff, thorny setae that have pointed or blunt apices; marginal and pleural setae longer than spinal ones, longest marginal setae

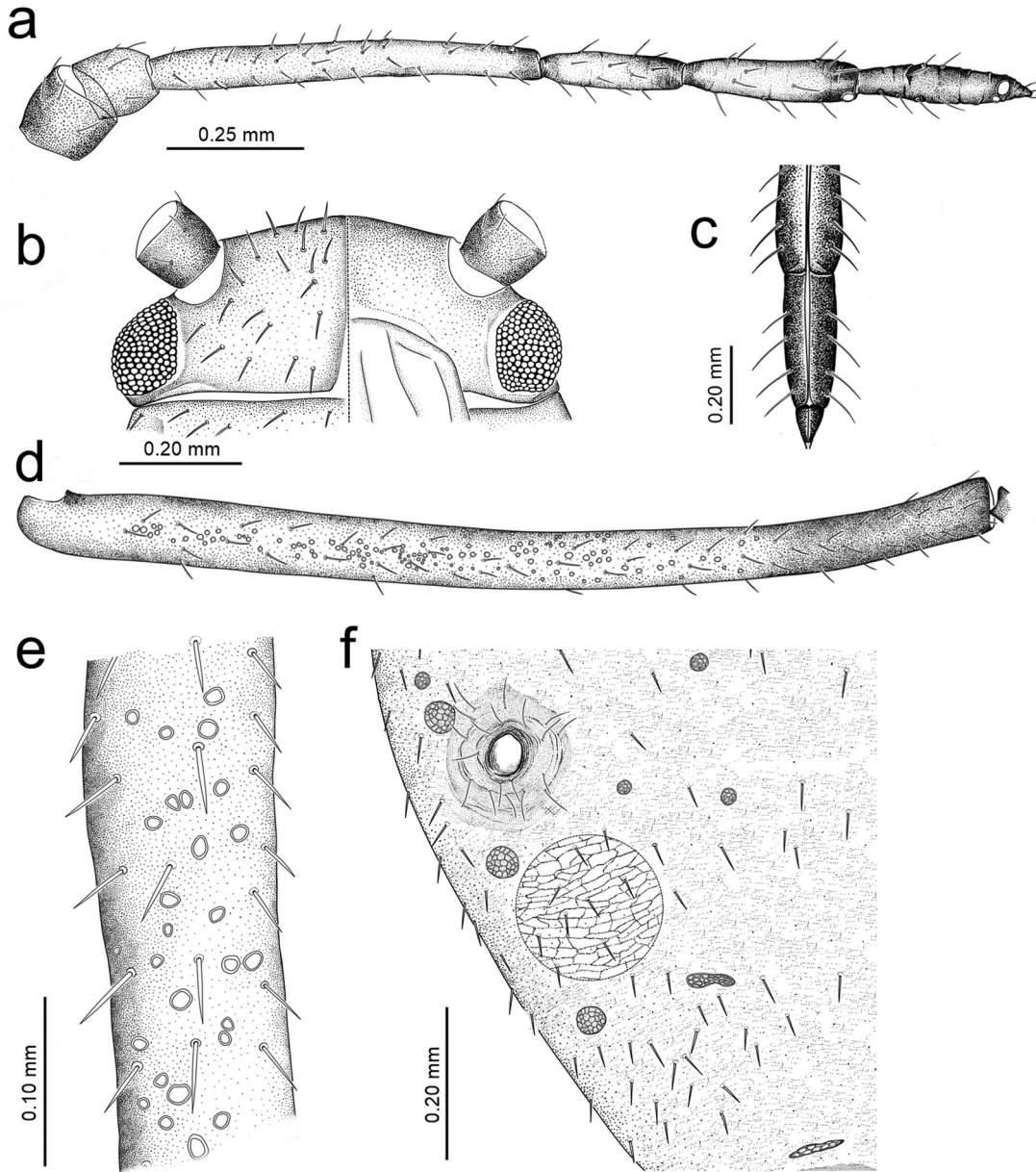


Figure 4. Oviparous female of *Cinara lachnirostris* – morphological details: (a) antenna, (b) head, (c) ultimate rostral segments, (d) hind tibia with pseudosensoria, (e) pseudosensoria on hind tibiae, (f) abdomen.

on anterior abdominal tergites 0.042–0.052 mm long and $0.72\text{--}0.92 \times \text{BD III}$, while shortest spinal ones are 0.009–0.012 mm long and $0.16\text{--}0.21 \times \text{BD III}$. Siphuncular cones small, with fewer surrounding setae (Figure 4f).

Material examined. Pakistan (West): Murree (2121 m a.s.l.), 4 apterae (paratypes), 3.VII.1964,

Pinus wallichiana, van den Bosch leg., (coll. no. P-3d; BM 1965–645 & BM 1984–340, NHM); India: Jammu and Kashmir, Kashmir, 2 oviparae

and 1 probable ovipara (with hind limbs broken), date not mentioned, *Pinus roxburghii*, M. Lone leg. (coll. no. V/KU).

Remarks. This species was so far known by its aptera and an insufficient description of its alata (Remaudière & Binazzi 2003). Bhagat (1981) reported alata from Kashmir. Here, a hitherto unknown ovipara of *C. lachnirostris* is described. Moreover, an examination of its paratypes revealed that one specimen contained 9 and 3 secondary

Table IV. Measurements (in mm) of oviparous females of *Cinara lachnirostris*.

Character	<i>Cinara lachnirostris</i> Oviparous female
BL	3.14–3.42
MAX W	1.88–2.17
HW	0.80–0.84
ANT	1.84–1.92
ANT III	0.66–0.72
ANT IV	0.27–0.30
ANT V	0.33–0.34
ANT VI	0.33–0.34
BASE	0.24–0.26
PT	0.08–0.09
ROSTR	1.20–1.30
URS	0.36–0.40
FEMORA III	1.95–2.02
TIBIAE III	3.02–3.20
HT I b	0.070–0.075
HT I d	0.045–0.055
HT I v	0.130–0.145
HT I i	0.080
HT II	0.42–0.45
SIPH cone	0.32–0.37
GP L	0.26–0.28
GP W	0.55–0.65

rhinaria on ANT III and ANT IV, respectively, while the others completely lacked them. This specimen seems to be an alatoid. In Pakistan, this species is common on *Pinus wallichiana* (Naumann-Etienne & Remaudière, 1995).

Distribution. India: Jammu and Kashmir; Pakistan.

Host plants. *Pinus wallichiana*.

13. *Cinara maculipes*

Hille Ris Lambers, 1966: 203 (Figure 9d)

Material examined. Pakistan: Murree, 1 aptera (paratype), 03.VII.1964, *Pinus wallichiana*, vanden Bosch leg. (coll. no. VII-3C, BM 1984–340, NHM slides); India: Himachal Pradesh, Shimla, 1 alata, 22.V.1970, *Pinus* sp., K. Narayanan leg. (det. S.K. David) (coll. no. 1246, David collection); Uttarakhand, Bhuinder (3000 m a.s.l.), 3 apterae and 3 nymphs, 18.IX.1982, *Pinus* sp. (coll. no. 1734/KU), A.K. Mandal leg.; Tapoban (1829 m a.s.l.), 3 apterae and 6 nymphs, 30.IX.1982, *Pinus* sp., P.K. Medda leg. (coll. no. 1841/KU); 2 apterae, 29.IX.1982, *Pinus* sp. (coll. no. 1809/KU), 2 apterae and 2 nymphs, 30.IX.1982 (coll. No. 1839/KU), A. K. Mandal leg.; 2 nymphs, (coll. No. 1840/KU), 7 nymphs, 12.VI.1983 (coll. no. 2384/KU), N. Debnath leg.; 4 apterae, 1 alata and 2 nymphs,

12.VI.1983 (coll. No. 2389/KU), 2 apterae and 1 nymph, 12.VI.1983 (coll. No. 2390/KU), S. Saha leg.; 8 nymphs, 15.VII.1983 (coll. No. 2743/KU), 3 alatae and 1 nymph, 15.VII.1983 (coll. no. 2757/KU), B. Das leg.; 1 aptera, 10 nymphs, 15.VII.1983 (coll. No. 2765), K. Dey leg.; Joshimath (c 1875 m a.s.l.), 1 aptera, 29.IX.1982, *Pinus* sp., P.K. Medda leg. (coll. no. Pn1/KU); 4 nymphs, 21.IX.1982, *Pinus* sp. (coll. no. 1755), N. Debnath leg.; 4 apterae, 24.IX.1982, *P. wallichiana* (coll. No. 1777/KU), 2 nymphs, 25.IX.1982, *Pinus* sp. (coll. no. 1782), 2 apterae, 1 alate male, 3 oviparae and 1 nymph, 10.XII.1982, *P. wallichiana*, (coll. no. 2224/KU), S. Saha leg.; 3 apterae and 3 nymphs, 13.V.1983, *P. wallichiana* (coll. no. 2293), K. Dey leg.; 2 apterae and 2 nymphs, 25.V.1983, *Pinus* sp. (coll. no. 2338/KU), B. Das leg.; Rari (c 2220 m a.s.l.), 7 apterae and 12 nymphs, *Pinus* sp. (coll. no. 1962/KU), S. Saha leg.; Sankri, 5 nymphs, *Pinus* sp. (coll. no. 2502/KU), B. Das leg.; Taluka (c1959 m a.s.l.), 2 apterae and 11 nymphs, *Pinus* sp. (coll.no. 3836/KU), S. Saha leg.; Dhakuri (c2621 m a.s.l.), 2 nymphs, 22.VIII.1984, ?*Pinus* sp. (coll.no. 4273/KU), S. Saha leg.; Osla (c 2559 m a.s. l.), 1 aptera and 2 nymphs, 08.IX.1984, *Pinus* sp., (coll. no. 4527/KU), S. Saha leg.; 6 apterae and 9 nymphs, 08.IX.1984, *Pinus* sp., B. Das leg.; Bhutan, Simtokha, 1 aptera, 16.V.2001, *P. roxburghii*, D. Das leg. (coll. no. 10091/KU), 8 apterae and 5 nymphs, 29.XI.2012, S. Chakrabarti leg. (coll. no. 10260/KU); Thimphu, 5 apterae, 30.XI.2012, *P. wallichiana*, S. Chakrabarti leg. (coll. no. 10285/KU).

Remarks. The oviparae that were examined had normal hind tibiae in contrast to the description of Chakrabarti & Raha (1988). The occurrence of sexuales indicates its holocyclic life on pine in the region. This species is common on *P. wallichiana* in Pakistan (Naumann-Etienne & Remaudière 1995) and Jammu and Kashmir in India. This species also feeds on *P. wallichiana* in Bhutan (Figure 9d).

Distribution. Afghanistan, Bhutan (first record), India: Himachal Pradesh, Jammu and Kashmir, Uttarakhand; Pakistan. According to Holman (2009), there are three records of this species from *Picea abies* in Korea (Okamoto & Takahashi 1927; Szelegiewicz 1974; Lee et al. 1994). We studied these papers and no information was given about *C. maculipes*. We are of the opinion that there must be a mistake about the records of this species from Korea in Holman 2009.

Host plants: *Pinus patula*, *P. roxburghii* and *P. wallichiana*. Records from *Picea abies* from Korea given by Holman (2009) seem to be incorrect.

14. *Cinara pilicornis*

Aphis pilicornis Hartig, 1841: 369

Material examined. USA: California, Arcadia, 3 apterae and 1 nymph, 24.IV.1971, *Picea pungens*, H. G. Walker leg. (coll. no. 887–71, 123/74, NHM); Sweden: Småland Bergkvara, 2 apterae, 21.VI.1981, *Picea abies*, R. Danielsson leg. & det.

Remarks. In India, only an alata was collected on snow (Ghosh 1982) but this specimen was not available for study. Elsewhere, this species is known to infest species of *Picea* and sometimes *Tsuga heterophylla* (Raf.) Sarg. Scheurer (1998) observed in Poland that this species has two possible ways for annual succession of generations: one the first way has usual 4–5 generations after the fundatrix during the period of vegetation growth, the last generation being bisexual. In the other way, the fundatrix of the second generation produces sexuales that produce winter eggs even in July. This situation is exactly like lower mountain range in Germany.

Distribution. India: Himachal Pradesh; Australia, countries in North and South America, Europe, Russia, Japan, New Zealand, Turkey.

Host plants. The species lives on numerous species of *Picea*.

15. *Cinara saraswatae*

Cinara saraswatae Das & Raychaudhuri, 1983: 54

Material examined. Nepal: Nagarkot, 2 apterae and 3 nymphs (paratypes), 11.X.1976 (date different from original description), *Pinus* sp., B. C. Das leg. (coll. no. B 13/CU).

Remarks. It is so far known by aptera from the type collection only. Examination of two apterae (paratypes) reveals several discrepancies from the original description: ANT III lacks secondary rhinaria; primary rhinaria ciliated and with a chitinised rim; ANT III longer (1.95–2.11 × SIPH cone diameter). ANT VI with 4 subapical and 3 apical setae on PT.

Distribution. Nepal.

Host plants. *Pinus* sp.

16. *Cinara similis* (van der Goot)

Lachnus similis van der Goot, 1917: 182

Remarks. Van der Goot (1917) described this species from a single alata with damaged hind wings on an undetermined plant. The holotype was deposited at the Indian Museum, Kolkata but now known to be lost (Ghosh 1982). After its original description,

no further collection or report is known. Though the host plant is not determined, yet it might occur on conifer plant as evident from the trend of host association of the species of the genus *Cinara*. The validity of this species seems to be questionable.

Distribution. India: Himachal Pradesh.

Host plant. Unknown.

17. *Cinara takahashii* nom. nov.

Cinara (*Cinara*) *orientalis* (Takahashi, 1925). Junior homonym of *Cinara* (*Schizolachnus*) *orientalis* (Takahashi, 1924)

Dilachnus orientalis Takahashi, 1925: 37

Material examined. India: Uttarakhand, Gangotri, 1 aptera and 4 nymphs, 03.X.1982, *Pinus* sp., P.K. Medda leg. (coll. no. 1846/KU); Joshimath, 1 aptera and 1 nymph, 21.VII.1983, *Pinus* sp., K. Dey leg. (coll. no. 2816/KU); 3 apterae, 21.VII.1983, *Pinus* sp., N. Debnath leg. (coll. no. 2817/KU); 3 apterae and 1 alatoid aptera, 06.VI.1984, *P. wallichiana*, S. Saha leg., (coll. no. 3892/KU); 4 apterae, 6.VI.1984, *Pinus* sp. (exposed root), A.K. Mandal leg. (coll. no. 3901/KU); 1 aptera, 07.VI.1984, *P. wallichiana*, S. Chakrabarti leg. (coll. no. 3902/KU); 2 apterae and 1 alata, 23.XI.1984, *Picea* sp., B. Das leg. (coll. no. 4741/KU); Bhutan, Simtokha, 3 apterae, 15.V.2001 (coll. no.10093/KU), *P. roxburghii* Sarg., Simtokha, 4 apterae, 22.X.1999, (coll. no. 10046/KU); Chelella, 2 apterae, 2 alatae and 6 nymphs, 05.VI.2003, (coll. No. 10247/KU), Chelalla, 2 apterae and 3 nymphs, 04.VI.2003 (coll. No. 10215/KU), *Pinus* sp., S. Chakrabarti leg.; Nepal: Jumla, 2 apterae and 1 alata, date nil., *Picea* sp., S. Scheurer leg.

Additional specimens examined. Japan, 1 aptera and 1 alata, 20.V.1981, host plant and collector written in Japanese (labelled as *Cinara orientalis* (coll. no. 72 37-1-1-1, BM 1990–3).

Remarks. The relevant taxonomical and nomenclatural details are summarised as follows: Takahashi (1924: 74) described *Unilachnus orientalis* as a new species from Taiwan (former Formosa). In the immediately subsequent year, the same author described *Dilachnus orientalis* also from Taiwan (Takahashi 1925: 37). *Unilachnus* Wilson, 1919 is considered as a synonym of *Schizolachnus* Mordvilko, 1909 and *Dilachnus* Baker, 1919 as synonym of *Cinara* Curtis, 1835 (Nieto Nafria et al. 2011). Chen et al. (2016: 568) recognised *Schizolachnus* as a subgenus of *Cinara*. After that, two available names are known that have the same spelling (ICZN 1999, Art. 53.3) and *Cinara*

(*Cinara*) *orientalis* (Takahashi, 1925) become a junior secondary homonym of *Cinara* (*Schizolachmus*) *orientalis* (Takahashi, 1924) (ICZN 1999, Art. 57.3). So far, no junior synonym is known for *Cinara* (*Cinara*) *orientalis* Takahashi (1925) and it became necessary to propose a new replacement name under the Art. 60 (ICZN 1999). Accordingly, a new name – *Cinara* (*Cinara*) *takahashii* nom. nov. is proposed for *Cinara* (*Cinara*) *orientalis* Takahashi, 1925 to honour Late Riochi Takahashi – Japanese aphidologist who was working for several years on the aphid fauna of Taiwan (former Formosa) and Japan.

Distribution. India: Himachal Pradesh, Uttarakhand; Bhutan (first record), China, Japan, Korea, Nepal, Pakistan and Taiwan.

Host plants. *Pinus armandii* Franch., *P. densiflora* Siebold & Zucc., *P. koraiensis* Siebold & Zucc., *P. tabuliformis* Carrière, *P. yunnanensis* Franch., *P. roxburghii*, *P. wallichiana*.

Remarks. This species is a new record from Bhutan.

18. *Cinara tenuipes*

Cinara abieticola tenuipes Chakrabarti & Ghosh A. K, 1974 in Chakrabarti et al. 1974: 522

Material examined: India: Himachal Pradesh, Shimla, Mashobra (2149 m a.s.l.), 1 alata, 06.IV.1970, host plant unknown, A.N. Chowdhuri leg. (coll. no. BM 1984–340; 01018467); 1 aptera (paratype), (coll. no. BM 1984–340; 010128286); 1 aptera and 1 alata (paratypes), 06.IV.1970, *Abies* sp., A.N. Chowdhuri leg. (Paratypes of *Cinara tenuipes* Chakrabarti & Ghosh (coll. no. 22/70/CU); Nepal: Kathmandu, 1 aptera and 2 alatae, 01.10.1971, *Picea* sp. (probable misidentification), S. Chakrabarti leg. (coll. no. 1, 2 and 3 KU).

Remarks. Blackman & Eastop (2020) stated that the “paratypes in the BMNH collection seem to be small, long-haired specimens of the ‘*eastopi/orientalis*’ group”. An examination of the type material of this species together with material of *C. eastopi* and *C. bhutanica* revealed several morphological differences – see the *C. eastopi* and *C. bhutanica* sections and Tables II and III. In the light of those differences, we propose that the full status of this species be held.

Distribution. India: Himachal Pradesh; Nepal (first record).

Host plants. Different species of *Abies*, *Picea* and *Pinus*.

19. *Cinara tistaensis*

Agarwala & Raychaudhuri, 1982: 2

Material examined. India: Sikkim, Lachung (2900 m a.s.l.), 2 apterae and 2 nymphs (paratypes), 14.V.1978, *Abies* sp., B.K. Agarwala leg. (coll. no. SL 45, May, CU).

Remarks. This species is so far known only by the apterae viviparae from the type collection.

Distribution. India: Sikkim.

Host plants. *Abies* sp.

20. *Cinara asishghoshi* sp. nov.

(Figures 5, 6; Tables I, V)

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Apterous viviparous female (Figures 5, 6; Table I) – description.

Colour. In life: adult females brownish, nymphs greenish. Pigmentation in mounted specimens: head yellowish to brown. ANT with ANT I and ANT II brown. ANT III, IV and V pale brown with only tips brown, ANT VI pale on proximal half and brown on distal half. Legs with femora pale brown or yellowish on proximal half or more but brown on distal part; tibiae brown at distal tip and knee but yellowish or pale brownish or sometimes brownish in between. Abdomen pale with brown SIPH and sclerotisation. Genital plate, anal plate and cauda brown (Figure 5).

Body egg shaped. HW 0.48–0.55 × ANT. ANT 0.38–0.39 × BL. ANT III without secondary rhinaria as long as or shorter than ANT IV+V+VI. ANT IV shorter than ANT V with 1–2 small rounded secondary rhinaria. ANT V slightly shorter than ANT VI with one rounded primary rhinarium without sclerotic rosette and one small rounded secondary rhinarium. ANT VI with PT 0.25–0.30 × BASE with one rounded primary rhinarium without sclerotic rosette and 6 accessory rhinaria (Figure 6a); other antennal ratios: VI/III 0.52–0.64, V/III 0.53–0.60, IV/III 0.44–0.52. ANT covered by medium-length, thick setae with pointed and blunt apices, 0.060–0.085 mm long; LS III 1.87–2.12 × BD III. Head chaetotaxy: head densely covered by medium-length, thick, pointed and blunt setae, 0.05–0.12 mm long (Figure 6b). Rostrum reaches ABD III. URS 0.70–0.84 × ANT III, 1.32–1.34 × ANT VI and 1.06–1.09 × HT II with 6 fine and pointed accessory setae (Figure 6c). Hind legs covered by medium-length, thick, pointed and blunt setae, not longer than the width of tibiae, 0.050–0.085 mm long on femora and 0.050–0.850 mm long on tibiae. HT I basal length 1.83–2.00 × dorsal, 0.50–0.55 × ventral and 0.71–0.84 × intersegmental length, without dorso-

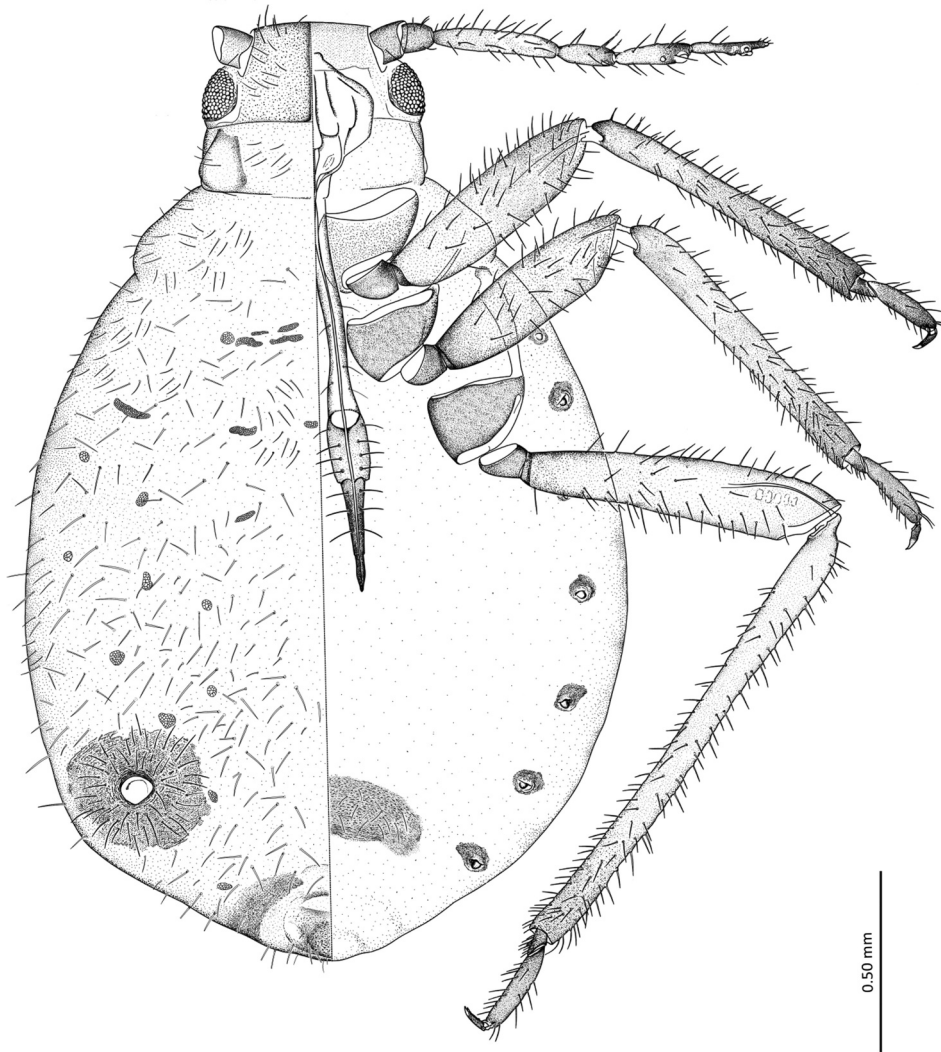


Figure 5. *Cinara asishghoshi* sp. nov. – general view.

lateral setae and with about 12 ventral setae. HT II 0.64–0.79 × ANT III and 1.23–1.24 ANT VI. SIPH cones large, rounded and setose, about 4.44–8.75 × SIPH pore. Dorsal cuticle smooth. Dorsal side of abdomen covered by medium to long, thick and stiff setae with pointed and blunt apices, 0.09–0.12 mm long on ABD I–VII and 0.12–0.15 on ABD VIII (Figure 6d). ABD VIII in form of broken sclerotic band with 14–20 setae. Genital plate transverse oval with 35–40 setae. Cauda semi-circular with many long, fine and pointed setae.

Infestation. Adults and nymphs were infesting the apical twigs of the host plant.

Material examined. Holotype: India: Uttarakhand, Garhwal, Gangotri, Bhojbasa (c 2900 m a.s.l.), aptera, 07.IX.1983 from *Juniperus squamata* Buch-Ham ex D. Don,

A. K. Mandal leg. (coll. no. 3243/KU). Paratypes: 8 apterae and 15 nymphs, collection data as in the holotype.

Diagnosis. The new species appears to be close to *C. juniperi* (De Geer) in its host association, in the distribution of secondary rhinaria on the ANT segments, the number of setae on the base of ANT VI and some other body proportions but differs in having thick, shorter dorsal setae with acute and blunt apices (in *C. juniperi* dorsal setae are flagellate or semi-flagellate with fine apices), longest setae on ANT III, anterior abdominal tergites and on dorsal side of tibiae 0.11–0.17 mm, 0.15–0.18 mm and 0.17–0.21 mm long and 3.33–4.17, 4.06–4.80 × BD III and 2.34–3.48 × the width of tibiae in midpoint, respectively), shorter length of URS (0.19–0.23 mm long in *C. juniperi*) and also in different pigmentation on tibiae

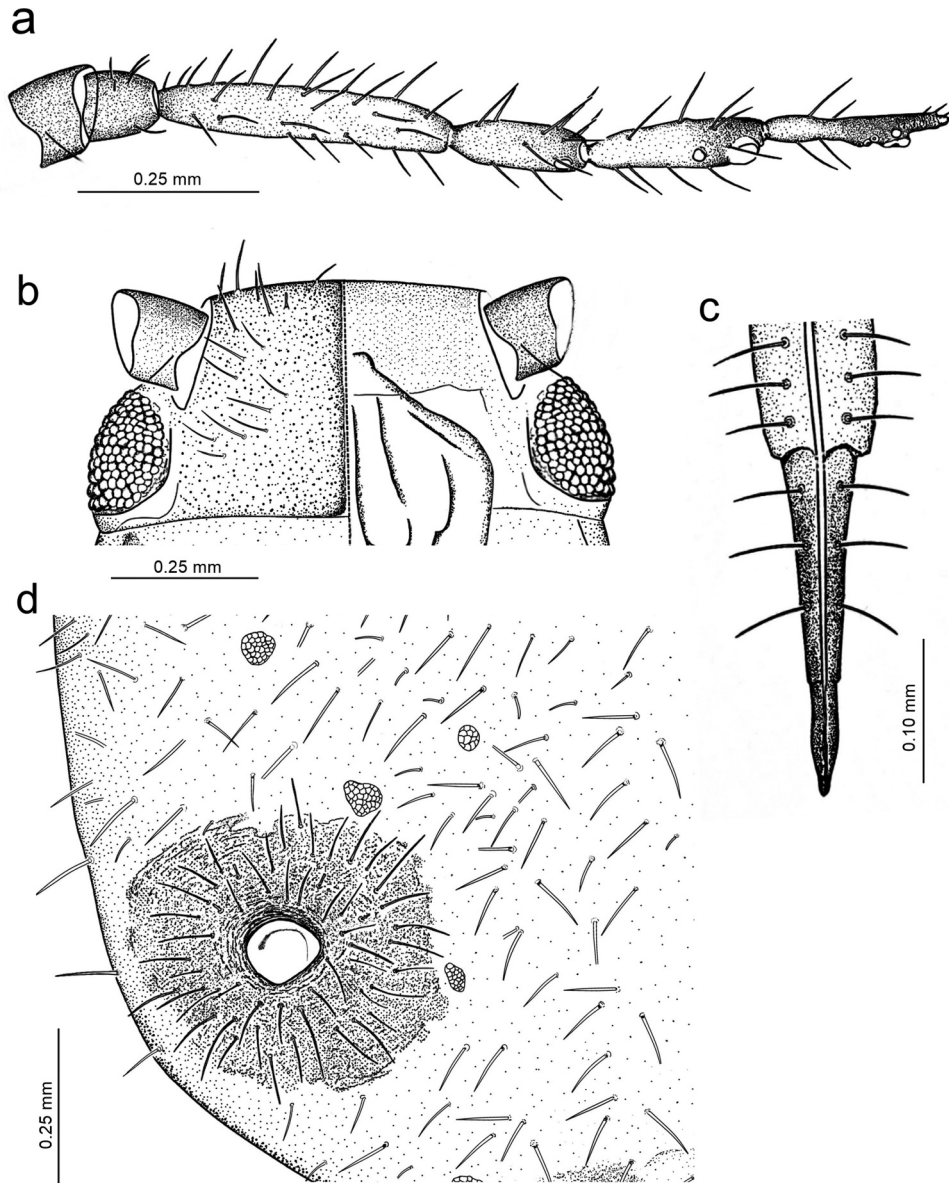


Figure 6. *Cinara asishghoshi* sp. nov. – morphological details of apterous viviparous female: (a) antenna, (b) head, (c) ultimate rostral segments, (d) abdomen.

(uniform brown or dark brown in *C. juniperi*). Detailed morphological differences between the new species and other most common species from the subgenus *Cupressobium* are given in Table V.

Distribution. India: Uttarakhand.

Etymology: We had the pleasure of naming the species to honour Indian Aphidologist, the late Dr. Asish Kumar Ghosh.

Host plant. *Juniperus squamata*.

21. *Cinara cupressi*

Lachnus cupressi Buckton, 1881: 46

Material examined. India: Sikkim, Lachung (2900 m a.s.l.), 1 aptera, 6.VI.1975, *Juniperus recurva* Buch.-Ham. ex D. Don, collector not mentioned (coll. no. PE 34/CU), det. B.K. Agarwala; Poland: Warszawa, Koszykowa, 6 apterae, 8. IX.1961, *Thuja occidentalis* L., H. Szelegiewicz leg., (coll. no. R1535, ZMPA).

Remarks. We examined some representative specimens (on loan from the NHM and Zoological Institute, Polish Academy of Sciences, Warsaw, Poland) of this species collected from Italy, Tanzania, Kenya and Poland. This species is common on species of *Cupressus* but also occurs on other

Table V. Morphological differences between apterous viviparous females of the new and common species of the subgenus *Cupressobium*.

Character	<i>Cinara asishghoshi</i>	<i>Cinara juniperi</i>
Body setae	Thick and stiff	Fine and hair-like
Fore tibiae pigmentation	Brown with slightly paler middle section	Light brown with darker knee area
Hind tibiae	Light brown with darker distal ends	Brown with darker knee area
Basal setae	9	5–7
RV/RIV	0.34–0.50	0.56–0.59
ANT VI/ANT III	0.52–0.64	0.70–0.79
ANT IV/ANT V	0.81–0.91	0.55–0.75
URS/HT II	1.06–1.09	0.65–0.72
URS/ANT III	0.70–0.84	0.60–0.66
URS/ANT VI	1.32–1.34	0.82–0.90
Character	<i>Cinara asishghoshi</i>	<i>Cinara tujafilina</i>
Fore and middle femora pigmentation	Brown with pale bases	Pale
Setae	Thick and stiff	Fine and hair-like
Basal setae	9	12–14
PT/BASE	0.25–0.30	0.16–0.23
ANT/BL	0.38–0.39	0.27–0.31
HW/ANT	0.48–0.55	0.70–0.80
URS/ANT III	0.70–0.84	0.90–1.66
URS/ANT VI	1.31–1.34	1.40–1.56
Character	<i>Cinara himalayaensis</i>	<i>Cinara cupressi</i>
Abdominal sclerites	Two pairs of spinal sclerites on ABD I–VII	Sometimes few sclerites on ABD VI–VII
Fore and middle tibiae	Brown	Pale with dark knee area
Hind tibiae	Brown with slightly paler middle section	Pale with dark distal and proximal ends
ABD VIII setae	10–16	19–21
R IV/R V	2.27–2.80	1.87–2.17
R V/R IV	0.35–0.44	0.46–0.53
HW/ANT	0.41–0.45	0.53–0.60
URS/ANT VI	1.05–1.21	1.22–1.30
HT Ib/HT II	0.87–0.93	0.57–0.80

plants of Cupressaceae. Though its sexual forms are known in Europe, its anholocyclic life is also prevalent in areas with mild winters (Blackman & Eastop 1994, 2020).

Distribution. India: Sikkim; Africa, Australia, Colombia, Europe, New Zealand, North America, South America and Southwest Asia.

Host plants. Cupressaceae, mostly on different species of *Cupressus* and *Juniperus*.

22. *Cinara himalayaensis* sp. nov.

(Figures 7, 8; Tables I, V)

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Apterous viviparous female (Figures 7, 8; Table I)

Description. *Colour* in life: adult females and nymphs brownish. Pigmentation in mounted specimens: head sclerotised, brown. ANT with ANT I and II brown. ANT III, IV, V and VI pale with brown distal part or tip. Legs with pale femora on proximal half or slightly more or less of it but brown or dark brown on distal part; tibiae brown with very ends being dark brown.

Abdomen pale with brown SIPH and sclerotisation. Genital plate, anal plate and cauda brown (Figure 7).

Body egg shaped. HW 0.41–0.45 × ANT. ANT 0.35–0.38 × BL. ANT III without secondary rhinaria, longer than ANT IV+V+VI. ANT IV shorter than ANT V and has 1–2 small rounded secondary rhinaria. ANT V as long as ANT VI with one rounded primary rhinarium without sclerotic rosette and one small rounded secondary rhinarium. ANT VI with PT 0.30–0.37 × BASE with one rounded primary rhinarium without sclerotic rosette and 6 accessory rhinaria (Figure 8a). ANT VI with 5–6 basal, 3–4 apical and 3 subapical setae. Other antennal ratios: VI/III 0.47–0.50, V/III 0.47–0.50, IV/III 0.40–0.43. ANT covered by long, fine and pointed setae with fine apices, 0.10–0.23 mm long. LS III 4.00–4.60 × BD III. Head chaetotaxy: head densely covered by long, fine and pointed setae, 0.12–0.20 mm long (Figure 8b). Rostrum reaching hind coxae. URS 0.52–0.60 × ANT III, 1.05–1.21 × ANT VI and 0.85–0.88 × HT II, with 4 fine and pointed accessory setae (Figure 8c). Hind legs covered by long, fine and pointed setae, longer than the width of tibiae, 0.15–0.25 mm long on femora and 0.14–0.30 mm long on tibiae. HT

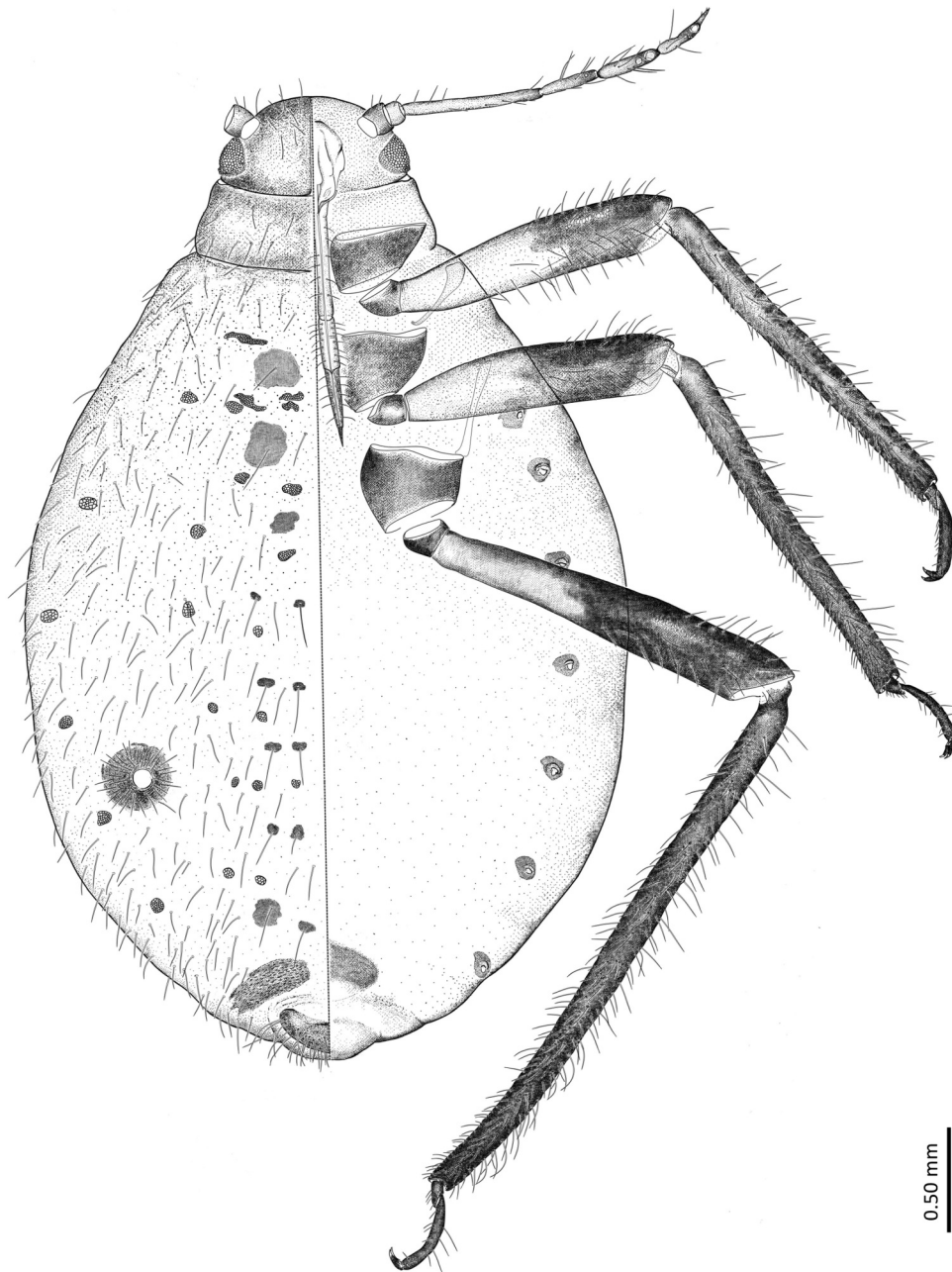


Figure 7. *Cinara himalayaensis* sp. nov. – general view.

I basal length $1.27\text{--}1.66 \times$ dorsal, $0.48\text{--}0.57 \times$ ventral and $0.87\text{--}0.93 \times$ intersegmental length without dorso-lateral setae and with about 16 ventral setae. HT II $0.60\text{--}0.68 \times$ ANT III and $1.23\text{--}1.36 \times$ ANT VI. SIPH cones medium sized, rounded and setose about $3.30\text{--}4.57 \times$ SIPH pore. Dorsal cuticle smooth. Dorsal side of abdomen covered by long, fine and pointed setae, $0.17\text{--}0.25$ mm long on ABD I–VII and $0.18\text{--}0.20$ mm long on ABD VIII. ABD VIII in form of broken band with 10–16 setae. Spinal setae on ABD III–VII arising from paired of

rounded or irregular shaped scleroites (Figure 8d). Genital plate transverse oval with 24–28 setae. Cauda semi-circular with many long, fine and pointed setae.

Infestation. Brownish adults and nymphs were infesting the shoots.

Material examined. Holotype: India: Uttarkhand: Garhwal Himalaya, Har-ki-doon (3700 m a.s.l.), aptera, 01.VI.1984, *Taxus baccata*, K. Dey leg. (coll. No 3865/KU). Paratypes: 2 apterae and 5 nymphs, collection data as in holotype.

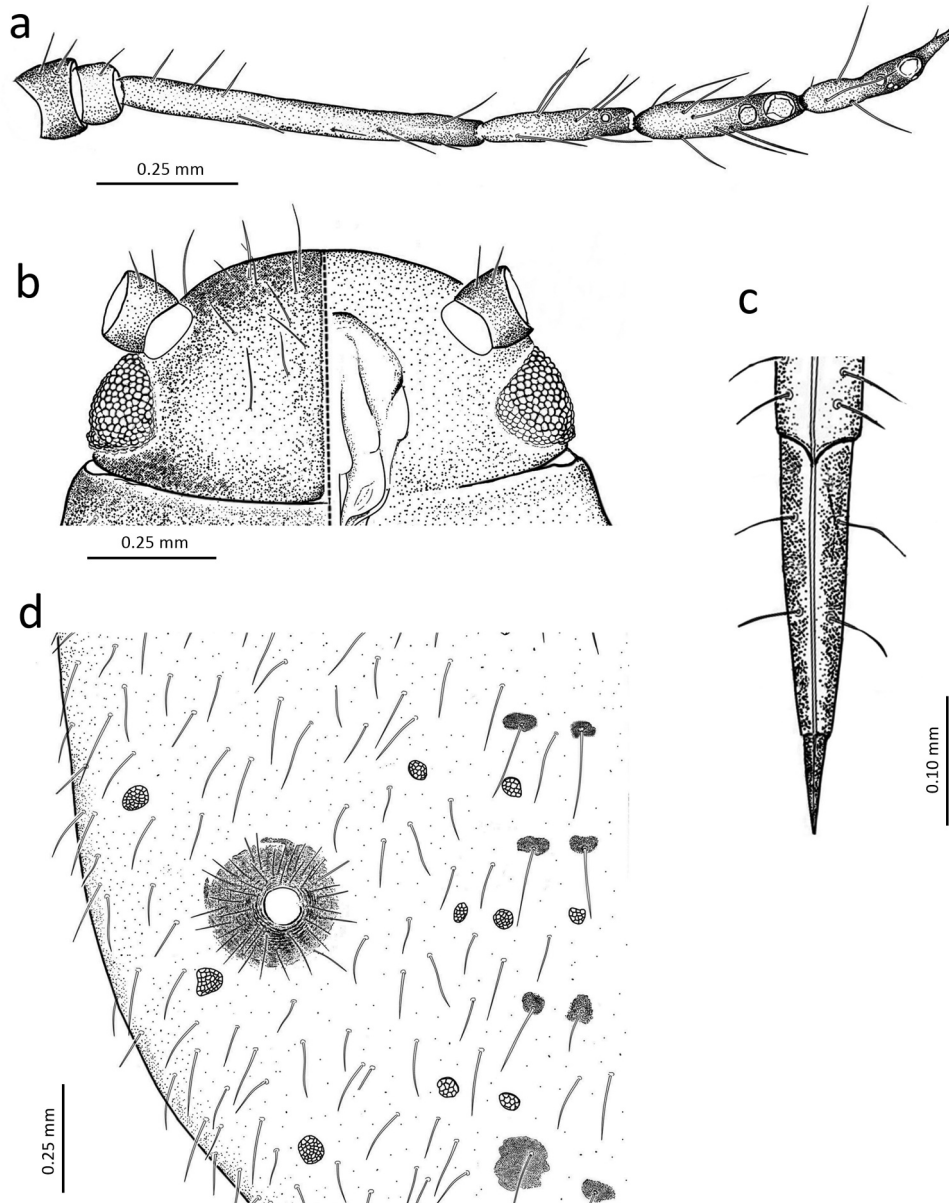


Figure 8. *Cinara himalayaensis* sp. nov. – morphological details of apterous viviparous female: (a) antenna, (b) head, (c) ultimate rostral segments, (d) abdomen.

Diagnosis. *Cinara himalayaensis* differs from all other species of the subgenus *Cupressobium* because of its dark tibiae and by the spinal setae arising from paired scleroites. This species is close to *C. tistaensis* in SIPH cone size, the features of the primary rhinaria, the absence of secondary rhinaria on ANT III but their presence on ANT IV and V, four accessory setae on the URS, the number of basal and subapical setae on PT, the slender prolongation of PT, a similar pigmentation of the femora and tibiae, a somewhat similar tendency in the pale abdominal dorsum with scattered sclerotic patches at the hair bases and the nature of the

body setae. However, it differs in its host association, in the ratio of PT:BASE – 0.30–0.37 (0.46–0.56 in *C. tistaensis*), PT:ANT III – 0.11–0.13 (0.18–0.22 in *C. tistaensis*), longer URS – 0.36–0.40 mm (0.30–0.35 mm *C. tistaensis*) and in a shorter/longer mixture of the basal setae on ANT VI (all setae longer than *C. tistaensis*, also 5–7 in number). An examination of three nymphs (visually appearing to be a second instar) of the new species, it was observed that the URS was 0.38–0.39 mm while in the two examined nymphs (second instar) of *C. tistaensis* showed that it was about 0.31 mm. Thus, the nymphs of

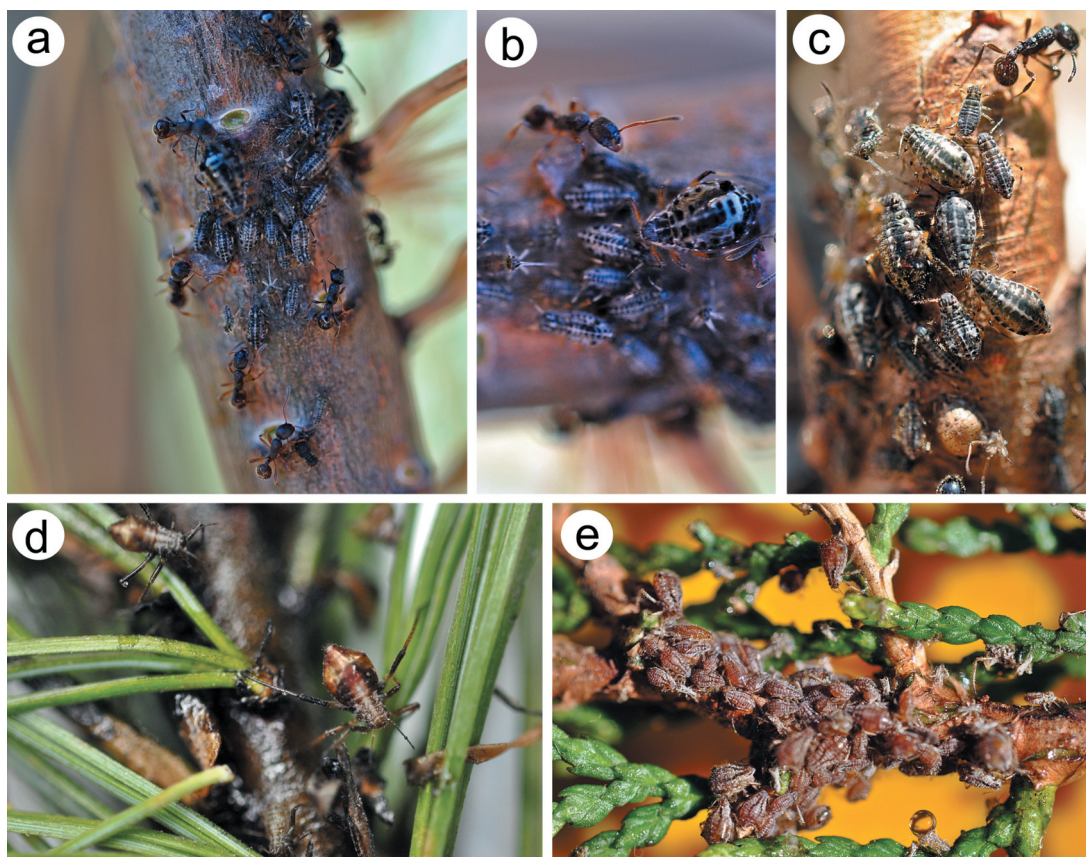


Figure 9. *Cinara* species in life: (a) colony of *Cinara bhutanica* on a woody branch of *Pinus wallichiana*, (b) pigmentation of apterous viviparous female of *C. bhutanica*, (c) colony of *C. bhutanica* on a woody branch with a mummy after a parasitoid infestation, (d) apterous viviparous females of *C. maculipes* on *P. wallichiana*, (e) colony of *C. tujafilina* on *Thuja*.

C. himalayaensis sp. nov. also remain distinct from those of *C. tistaensis*. The new species because of its dark pigmented legs is similar furthermore to *C. (Cupressobium) lalazarica* Remaudière & Binazzi, 2003b which is associated with *Juniperus communis* in Northern Pakistan (Remaudière & Binazzi 2003b) but both species differ from each other in numerous significant morphological characters. *Cinara himalayaensis* differ from *C. lalazarica* first of all by much larger body size, 4.85–5.25 mm (2.94–3.55 in *C. lalazarica*), the presence of dark pigmented spinal scleroites at setal bases on ABD III–VII (scleroites at setal bases present only on ABD VII in *C. lalazarica*), 10–16 setae on ABD VIII (16–22 setae in *C. lalazarica*), URS with only 4 accessory setae (6–7 accessory setae in *C. lalazarica*), ANT III setae up to 0.20–0.23 mm and LS III 4.0–4.6 × BD III (ANT III setae only up to 0.11 mm and LS III 1.70–2.30 × BD III in *C. lalazarica*). Furthermore, the new species differ from *C. lalazarica* by longer URS, 0.36–0.40 mm (0.29–0.33 in *C. lalazarica*), higher ratio of ANT III/SIPH, 1.94–2.15 (1.30–1.60 in *C. lalazarica*), higher

ratio of ANT III/URS, 1.65–1.91 (1.20–1.50 in *C. lalazarica*), ANT III/ANT IV, 2.30–2.44 (1.70–2.10 in *C. lalazarica*) and PT/BASE, 0.30–0.37 (0.17–0.29 in *C. lalazarica*). Detailed morphological differences between the new species and other most common species from the subgenus *Cupressobium* are given in Table V.

Distribution. India: Uttarakhand.

Etymology. The specific name is adjective, derived from the Himalayas – where the species occurs.

Host plant. *Taxus baccata* L.

23. *Cinara tujafilina*

Lachniella tujafilina Del Guercio, 1909: 288 (Figure 9e)

Material examined. India: Uttarakhand, Uttarkashi (1200 m a.s.l.), 2 apterae, 1 alata and 2 nymphs, 28.XI.1984, *Thuja occidentalis* L., Bist & Rana leg. (coll. no. CIEA 167 30, NHM); Himachal Pradesh, Solan, Kotlabarog, 3 apterae and 3 nymphs,

19.VI.1991, *Thuja* sp., collector not mentioned (coll. no. IIE 21977 33, 72/92, NHM); Sikkim, Gangtok, 1 aptera and 3 nymphs, indet plant, P. Mondal leg. (coll. no. PC-49/CU); Bhutan, Thimphu, 5 apterae, 1 alata and 4 nymphs, 14.V.2001, *Platycladus orientalis* (L.) (coll. no. 10074/KU), 5 apterae, 2 alate and 4 nymphs, *Juniperus* sp., (coll. no.10075/KU), D. Das leg., 1 alata and 4 nymphs, 01.VI.2003, *Juniperus* sp. S. Chakrabarti leg. (coll. no.10164/KU); Paro, 8 apterae and 7 nymphs, 01.XI.2012, (coll. No. 10290/KU), 6 apterae and 5 nymphs, 01.XI.2012 (coll. no. 10292/KU), S. Chakrabarti leg.; 16 apterae and 16 nymphs, 02.XI.2012, *P. orientalis*., (coll. no.10291/KU), S. Sarkar leg.; Nepal: Baneshwar, 2 apterae, 6.X.1974, *Thuja* sp., K.C. Sharma leg. (coll. no. 435/74, 22, NHM).

Remarks. This species infests different plants of the family Cupressaceae, including species of *Callitris*, *Chamaecyparis*, *Cupressus*, *Juniperus*, *Platycladus*, *Thuja* and *Waddingtonia*. Raychaudhuri et al. (1978) observed that the summer forms have a shorter body and shorter tibial setae compared to those of the winter forms with reference to the specimens collected in Darjeeling (West Bengal) and Sikkim, India. It is mostly anholocyclic, but in colder regions the sexual phase may occur (Durak & Durak 2015). In India, this species forms medium sized to large colonies on the woody parts of the branches (Figure 9e).

Distribution. Almost cosmopolitan with a much wider distribution in the warmer parts of world.

Host plants. *Thuja* and occasionally on *Cupressus*, *Juniperus*, *Platycladus* and *Thuja*.

24. *Cinara* (*Schizolachnus*) *orientalis*

Unilachnus orientalis Takahashi, 1924: 74

Schizolachnus orientalis (1924); Ghosh 1982: 75

Remarks. Ghosh (1978) reported its apterae from Manipur, which were not available for the present study. It is the sole species of this subgenus known from the Indian subcontinent. It is holocyclic (Inouye 1970). Previously, *Schizolachnus* was treated as separate genus but the recent results of Chen et al. (2016) placed it within *Cinara* as a subgenus (Favret, 2020).

Distribution. India: Manipur; China, Japan, Korea and Taiwan.

Host plants. *Pinus densiflora* Siebold & Zucc., *P. kesiya*, *P. luchuensis* Mayr, *P. massoniana* Lamb and *P. thunbergi* Parl.

25. *Eulachmus pumilae*

Inouye, 1939: 134

Material examined. India: Arunachal Pradesh (NEFA), Tenga, 1 aptera, 20.XII.1965, *Pinus* sp., S.K. Bhattacharya leg. (misidentified as *Eulachmus cembrae* Börner by L.K. Ghosh 1970) (coll. ZSI).

Remarks. *Eulachmus cembrae* Börner was considered to be a synonym of *E. pumilae* by Inouye (1970) and later also by Blackman & Eastop (1994). Remaudière & Remaudière (1997), however, treated them as a separate species due to presence of two accessory setae on the URS in *E. pumilae*. Kanturski & Wieczorek (2014) listed additional differences when describing their sexuales.

Distribution. China, India: Arunachal Pradesh; Japan, Korea and East Siberia.

Host plants. *Pinus koraiensis* Siebold & Zucc., *P. parviflora* Siebold & Zucc., *P. pumila* (Pall.), *P. strobus* L.

26. *Eulachmus thunbergii*

Wilson, 1919: 3

Material examined. India: Meghalaya, Shillong, 2 apterae and 1 nymph, 10.I.1960, *Pinus kesiya*, A.K. Ghosh leg. (coll. no. 683/CU); 1 aptera and 1 alata, 23.XII.1966, *Pinus* sp., (det. A.K. Ghosh); 1 aptera and 2 alatae, 11.III.1971, *Pinus kesiya*, S. Sarkar leg. (coll. no. PLA 3865/CU); Arunachal Pradesh (NEFA), towards Tenga, 1 alata, 20.XII.1965, *Pinus* sp., S.K. Bhattacharya leg. (det. A. K. Ghosh) (coll. ZSI).

Remarks. One aptera from Shillong (coll. no. PLA 3865/CU) is characterized by the presence of two secondary rhinaria on ANT III and one on ANT IV. Most probably there is a complex of very similar species in different parts of Asia and on different *Pinus* species.

Distribution. India: Arunachal Pradesh, Manipur, Meghalaya, Nagaland; Australia, China, Japan, Java, Korea, Philippines, Siberia and Taiwan.

Host plants. On many Asiatic *Pinus* species.

27. *Pseudessigella brachychaeta*

Hille Ris Lambers, 1966: 219

Material examined: Pakistan, Punjab, Murree, 1 aptera, 4.VII.1964, *Pinus wallichiana*, Robert van den Bosch leg. (coll. no. 1984-340/NHM) (paratype); 1 aptera, India, Jammu and Kashmir, Yousmarg, 5 apterae, 17.XI.2015, *Pinus wallichiana*, Shahid Ali Akbar leg. (coll. no. 11/15/01Ind/DZUS).

Remarks. Until recently, *Pseudessigella* was the least known Eulachnini genus from the type material from Pakistan. Kanturski et al. (2017a) reported this monotypic genus from India (Jammu and

Kashmir) and the same Kanturski et al. (2017b) described an oviparous female and dwarfish male.

Distribution. India: Jammu and Kashmir; Pakistan.

Host plants. *Pinus wallichiana*.

28. *Stomaphis* aff. *mordvilkoii*

Hille Ris Lambers, Ris 1933: 199

Remarks. Raychaudhuri et al. (1980) reported 1 aptera on *Cedrus deodara* in Himachal Pradesh, India and commented on its closeness to *Stomaphis longirostris* (Fabricius). The latter, however, is known to occur on different species of *Salix* and *Populus* (Depa & Mróz, 2013). However, the specimen was not available for examination to confirm its identity.

Distribution. India: Himachal Pradesh.

29. *Mindarus abietinus*

Koch, 1857: 278

Material examined. India: Jammu and Kashmir, Gulmarg, 2 nymphs, 28.V.1972, *Abies* sp., T.K. Sengupta leg. (coll. ZSI); Sanasar, 7 alatae, 12. & 13.VI.1982, *Cedrus deodara*, Anil Gupta leg.; Uttarakhand, Sakri, many alatae, 30.V.1984, *Abies* sp., S. Chakrabarti leg. (coll. no. 3827/KU).

Remarks. The balsam twig aphid can be a serious pest for its hosts. Blackman & Eastop (1994, 2020) preferred to call all of the East Asian specimens *Mindarus japonicus* Takahashi although there is quite probable possible that they could be a new undescribed species.

Distribution. India: Jammu and Kashmir, Uttarakhand; Europe, Japan, Lebanon, North America, Pakistan, Siberia and Turkey.

Host plants. On numerous species of *Abies* as well as on some records from *Cedrus deodara*, *Picea glauca* (Moench) Voss and *Pseudotsuga menziesii* (Mirb.) Franco.

30. *Mindarus japonicus*

Takahashi, 1931: 137

Remarks. Bhagat (1981) first recorded alatae of this species on *Abies pindrow* in Jammu and Kashmir, India. We were not able to obtain these specimens for the study although it is probable that this could be a new undescribed species.

Distribution. India: Jammu and Kashmir; Japan, Korea, Nepal and Siberia.

Host plants. On many species of *Abies*. Also recorded on *Picea smithiana*.

Key to the conifer-infesting aphids of India, Bhutan and Nepal

(Based on apterous viviparous females unless otherwise mentioned)

1. In alate, forewing with radial sector arising from base of pterostigma; pterostigma long, narrow, pointed, extending up to wing apex; media of forewing normally once branched; secondary rhinarium transverse, oval, rather narrow; SIPH pore-shaped; cauda short, tongue-shaped and subtriangular 2
 - In alate, forewing with radial sector originating from the middle or distal part of pterostigma; without this combination of characters 3
2. ANT III of alate often has up to 20 (range 12–27) secondary rhinaria that lie in a single row, mostly extending completely across the width of the segment; mostly on *Abies* *Mindarus abietinus*
 - ANT III of alate usually has more than 24 (range 25–35) secondary rhinaria, many of those on proximal half, not extending across full width of segment but rather sitting in two rows; on *Abies* *Mindarus japonicus*
3. SIPH and cauda elongated, first tarsal chaetotaxy 3.3.3.; PT distinctly longer than BASE; abdominal dorsum with a large dark horseshoe-shaped patch; on *Pinus* and *Picea* *Neomyzus circumflexus*
 - SIPH absent or pore-like or on low situated cones; cauda rounded or semicircular 4
4. First tarsal segments of adults have less than 9 ventral setae; ANT, at least in alate sexuparae, 6-segmented; SIPH absent at least when infesting conifers as secondary hosts 5
 - First tarsal segments of adults with 9 or more ventral setae (if fewer, then ANT 5-segmented); SIPH present, either simply pore-like or on hairy cone, or slightly elevated and hairless 6
5. URS with at least a narrow pale subapical zone and $1.33\text{--}1.50 \times \text{HT II}$ in alate sexuparae; anal plate protrudes posteriorly as a cylindrical anocaudal process having a semilunar cauda; ANT III, IV, V and VI with 18–22, 8–10, 6–10 and 3–5 annular ciliated secondary rhinaria, respectively; on roots of *Taxus baccata* *Prociphilus taxus*
 - URS without a pale subapical zone and $0.70\text{--}0.82 \times \text{HT II}$ in alate sexuparae; no

- anocaudal process; ANT III, IV, V and VI with 38–49, 12–17, 14–21 and 9–14 annular ciliated secondary rhinaria, respectively; on roots of *Pinus wallichiana* ***Prociphilus himalayaensis***
6. URS very long, much longer than body, obtuse with segment 5 usually reduced and coalesced; does not feed on needles; media of forewings in alate distinct ***Stomaphis* aff. *mordvilkoii***
 — URS lance shaped, distinctly divided in to RIV and V; media of forewings in alate indistinct, radial sector straight and short 7
7. Body elongate or egg-shaped; URS short and usually blunt with segment V reduced and fused with segment IV; SIPH slightly elevated without any surrounding setae; usually feeds on needles 8
 — Body rounded or globose; URS lance-like with segment V distinct from segment IV; SIPH on small to large sclerotic cone has many setae; usually feeds on twigs, bark and roots. If on needles, then heavily covered by wax 10
8. Antennae 5 segmented; on *Pinus wallichiana* ..
 ***Pseudessigella brachychaeta***
 — Antennae 6 segmented 9
9. Longest setae on ANT III and dorsal side of body very short, not longer than width of segments; no scleroites at setal bases
 ***Eulachnus pumilae***
 — Longest setae on ANT III and dorsal side of body long, longer than width of segments; sclerites present at setal bases
 ***Eulachnus thunbergii***
10. URS evidently elongated. RV slender. In life, on branches and trunks 11
 — URS shortened. RV triangular. In life, on needles ***Cinara* (*Schizolachnus*) *orientalis***
11. Primary rhinaria (on ANT V and VI) without sclerotised rim. Paired spinal sclerotic plates only from mesonotum to ABD I–II (subgenus *Cupressobium*) 12
 — Primary rhinaria (on ANT V and VI) with sclerotised rim (if no sclerotised rim, then dorsum had no large spinal sclerotic plates). Dorsum with large paired spinal sclerotic plates on ABD I–II and at least ABD V–VII (subgenus *Cinara*) 15
12. Femora pale 13
 — Femora at least in distal part (usually from middle) dark 14
13. Dorsal setae very fine, hair-like. ANT III setae at least 2x segment diameter or more
 ***Cinara tujafilina***
- Dorsal setae thick and stiff. ANT III setae not more than 1.5x the segment diameter ..
 ***Cinara asishghoshi* sp. nov.**
14. Tibiae pale with only proximal and distal parts dark. Dorsal abdomen without spinal scleroites at setal bases ***Cinara cupressi***
 — Tibiae uniformly dark. Dorsal abdomen with spinal scleroites at setal bases
 ***Cinara himalayaensis* sp. nov.**
15. SIPH with very thick, thorny and blackish setae ***Cinara hottesis***
 — SIPH with fine and rather hair-like setae ... 16
16. Dorsal body setae, particularly the spinal ones on abdomen upto ABD V or ABD VI, very short (longest spinal setae on anterior abdominal tergites 0.011–0.016 mm long), very stiff 17
 — Dorsal body setae much longer, whether spinal or others and often fine 18
17. Legs, particularly femora with conspicuous pantherine spots (i.e. maculate); ANT VI shorter than ANT V; BL 3.61–5.02 mm
 ***Cinara maculipes***
 — Legs without spots; ANT VI longer than ANT V; BL 2.40–2.90 mm . ***Cinara lachnirostris***
18. In alate, media of forewings once branched 19
 — In alate, media of forewings twice branched 21
19. In alate, SIPH diameter about 0.32 mm
 ***Cinara chaetorostrata***
 — In alate, SIPH diameter only about 0.13 mm 20
20. In alate, longest seta on ANT III/b.d.III 5.4–6.6; PT/ANT III 0.06–0.07; ANT III/ANT VI 1.7–2.1; ANT IV/ANT VI 0.78–0.95; ANT V with one secondary rhinarium; on *Picea smithiana* ***Cinara comata***
 — In alate, longest seta on ANT III/b.d.III 3.5; PT/ANT III 0.1; ANT III/ANT VI 2.5; ANT IV/ANT VI 1.0; ANT V without secondary rhinaria ***Cinara similis***
21. Dorsal side of abdomen with large paired spinal sclerotic plates at least on ABD I–II and V–VII 22
 — Dorsal side of abdomen without large paired spinal sclerotic plates (besides small sclerites or scleroites on the whole surface) 25
22. Fore and middle tibiae uniformly pale with brown distal and proximal apices; ANT III pale with only very apical end brown
 ***Cinara takahashii* nom. nov.**
 — Fore and middle tibiae uniformly brown or with small pale patches near the apical end; ANT III pale with about ¼ of length brown 23

23. In apterae, ABD II–V with paired sclerotic spinal plates. Sclerotised part of rostrum groove more than 1.70 mm, HT I with one dorso-lateral seta. In alate, ABD VIII with 23–30 setae; ANT/BL 0.44–0.45; ANT V/ANT III 0.51–0.55; ANT IV/ANT III 0.39–0.40; URS/ANT VI 1.40–1.47 ***Cinara eastopi***
 — In apterae, ABD II–IV without paired sclerotic spinal plates (sometimes with small scattered sclerites or scleroites). Sclerotised part of rostrum groove less than 1.60 mm, HT I without dorso-lateral setae. In alate, ABD VIII with 19–21 setae; ANT/BL 0.38–0.44; ANT V/ANT III 0.44–0.50; ANT IV/ANT III 0.38–0.39; URS/ANT VI 1.24–1.40 **24**
24. In apterae, SIPH cone/SIPH pore 6.70–8.44, HT II/ANT III 0.41.0.51, HT II/BASE 1.87–2.00. In alate, ANT III with 16–21 secondary rhinaria, ANT IV with 4–5 secondary rhinaria, URS/ANT III 0.36–0.38, LS/BD III 4.00–5.33, HT II/ANT III 0.37–0.41 ***Cinara bhutanica* sp. nov.**
 — In apterae, SIPH cone/SIPH pore 5.75–5.87, HT II/ANT III 0.55.0.56, HT II/BASE 1.73–1.78. In alate, ANT III with 12–13 secondary rhinaria, ANT IV with 2 secondary rhinaria. URS/ANT III 0.48–0.49, LS/BD III 2.50–2.81, HT II/ANT III 0.50 . ***Cinara tenuipes***
25. Barring the sclerotic bar ABD VIII, most setae on abdominal dorsum with individual sclerites at their bases, so that abdomen looks printed against the pale white base; tibiae and tarsi almost black; HT Id 0.60–0.68 × HT Iv and 3.00–3.40 × HT Ib ***Cinara atrotibialis***
 — At best, scattered sclerites developed at bases of some dorsal setae on abdomen **26**
26. SIPH cone diameter usually more than 0.38 mm (rarely 0.31 m) ... ***Cinara confinis***
 — SIPH cone diameter usually less than 0.24 mm (rarely 0.27 m) **27**
27. ABD dorsum and ANT with comparatively fewer sparse setae; setae on posterior tergites blackish; HT Id 0.30–0.38 × HT Iv and 0.46–0.50 × HT Ib; on *Picea smithiana*, *Abies pindrow* and *Araucaria* .. ***Cinara atroalbipes***
 — ABD dorsum and ANT with many setae; setae on posterior tergites pale **28**
28. Tibiae uniformly dark to black ***Cinara tistaensis***
 — Tibiae pale at proximal or middle part to a lesser or greater extent **29**
29. PT 0.38–0.50 × BASE with 3 apical and 4 subapical setae; BASE with about 10 setae; on *Pinus* sp. ***Cinara saraswatae***
 — PT about 0.14–0.33 × BASE body, particularly the legs, with many fine setae that had flagellate apices; abdomen with hardly any sclerotic patches except ones on ABD VIII and scattered brown intersegmental muscle sclerites; on *Picea* and *Tsuga heterophylla* ***Cinara pilicornis***

Blackman & Eastop (2020) key to *Cinara* on *Pinus wallichiana* with proposed changes:

1. Hairs on at least ABD TERG 3–6 very short, maximally 40 µm or less. SIPH cones small, with maximum diameter equal to or less than length of R IV **2**
 — Longest hairs on ABD TERG 3–6 at least 60 µm. Diameter of SIPH cones usually much greater than length of R IV **3**
2. BL 3.7–4.9 mm. Legs conspicuously maculate. ANT VI (incl. PT) shorter than V ***Cinara maculipes***
 — BL 2.4–2.9 mm. Legs not maculate. ANT VI (incl. PT) longer than V . ***Cinara lachnirostris***
3. Dorsal abdomen with paired dark patches or broken groups of sclerites on ABD TERG 1–8 (Fig. 80A; sometimes reduced on 2–5). R IV with 8–12 accessory hairs **4**
 — Dorsal abdomen with scattered small sclerites on ABD TERG 1–6 (fig. 80B, C) and transverse bars on 7 and 8. R IV with 4–7 accessory hairs) **6**
4. In apterae, ABD II–V with paired sclerotic spinal plates. In both morphs, sclerotised part of rostrum groove more than 1.70 mm, HT I with one dorso-lateral seta .. ***Cinara eastopi***
 — In apterae, ABD II–IV without paired sclerotic spinal plates (sometimes with small scattered sclerites or scleroites). In both morphs, sclerotised part of rostrum groove less than 1.60 mm, HT I without dorso-lateral setae **5**
5. In apterae, SIPH cone/SIPH pore 6.70–8.44, HT II/ANT III 0.41.0.51, HT II/ASE 1.87–2.00. In alate, ANT III with 16–21 secondary rhinaria, ANT IV with 4–5 secondary rhinaria, URS/ANT III 0.36–0.38, LS/BD III 4.00–5.33, HT II/ANT III 0.37–0.41 ***Cinara bhutanica* sp. nov.**
 — In apterae, SIPH cone/SIPH pore 5.75–5.87, HT II/ANT III 0.55.0.56, HT II/ASE 1.73–1.78. In alate, ANT III with 12–13 secondary rhinaria, ANT IV with 2 secondary rhinaria.

- URS/ANT III 0.48–0.49, LS/BD III 2.50–2.81, HT II/ANT III 0.50 *Cinara tenuipes*
6. Longest hairs on dorsal side of hind tibia 70–130 μm , shorter than or about equal to width of tibia at midpoint. HT I 0.16–0.22 mm (fig. 76A) *Cinara pinimariniae*
- Longest hairs on dorsal side of hind tibia 120–230 μm , often 1.5 \times width of tibia at midpoint or longer. HT I 0.22–0.33 mm (fig. 76B) *Cinara pinea*

Blackman & Eastop (2020) key to aphids on species of *Taxus* with proposed changes

1. SIPH absent, R IV+V 7.0–8.0 \times ANT PT *Prociphilus taxus*
- SIPH present, R IV+V less than 4.50 \times ANT PT 2
2. SIPH rounded, setose cones, R IV+V 4.22–4.50 \times ANT PT *Cinara himalayaensis* sp. nov.
- SIPH tubular, R IV+V 0.2–0.4 \times ANT PT ... *Elatobium momii*

Fragment of Blackman & Eastop's (2020) key to aphids on *Juniperus* with proposed changes(from couplet 23: Hind tibiae mostly pale or at least with an extensive pale region between the dark base and apex):

24. Tibiae dark only at apices ("knees" pale) 24
- Tibiae dark at least at both apices and bases ("knees"dark) 28
25. Setae on ANT and dorsal side of body thick, rigid, pointed and blunt *Cinara asishghoshi* sp. nov.
- Setae on ANT and dorsal side of body fine, hair-like and pointed 25
26. R III (third segment of rostrum) with more than 28 hairs, R IV+V with 6–8 accessory hairs, ANT PT with 3 subapical hairs, ANT V and sometimes also ANT IV with a secondary sensorium *Cinara tujafilina*
- R III (third segment of rostrum) with fewer than 18 hairs, R IV+V with 4–5 accessory hairs, ANT PT with 2 subapical hairs, ANT V without a secondary sensorium 26

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Disclosure statement

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