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A Review of the Genus Dialeuronomada Quaintance & Baker (Hemiptera: Aleyrodidae) with Descriptions of Two New Species【Research report】

Dialeuronomada屬之種類以及兩新種（半翅目：粉蝨科）【研究報告】

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Abstract

The whitefly genus Dialeuronomada Quaintance & Baker is reviewed. This genus is so far represented by 14 species. In this paper two species, namely D. remadaviae Dubey & Sundararaj and D. rubiphaga Dubey & Sundararaj, are described as new to science. A key to the Indian species of Dialeuronomada is given.

摘要

本文整理Dialeuronomada屬之14種粉蝨。同時描述2新種：D. remadaviae Dubey & Sundararaj以及D. rubiphaga Dubey & Sundararaj。文中並附印度產本屬之檢索表。

Key words: taxonomy, Aleyrodidae, Dialeuronomada, new species

關鍵詞: 分類、粉蝨科、Dialeuronomada、新種

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A Review of the Genus *Dialeuronomada* Quaintance & Baker (Hemiptera: Aleyrodidae) with Descriptions of Two New Species

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ABSTRACT

The whitefly genus *Dialeuronomada* Quaintance & Baker is reviewed. This genus is so far represented by 14 species. In this paper two species, namely *D. remadaviae* Dubey & Sundararaj and *D. rubiphaga* Dubey & Sundararaj, are described as new to science. A key to the Indian species of *Dialeuronomada* is given.

Key words: taxonomy, Aleyrodidae, *Dialeuronomada*, new species

Introduction

Quaintance and Baker (1917) erected *Dialeuronomada* as a subgenus under the genus *Dialeurodes* Cockerell. It was represented by two species namely *D.* (*Dialeuronomada*) *dissimilis* Quaintance & Baker and *D.* (*Dialeuronomada*) *ixorae* Singh from India (Mound and Halsey, 1978). Sundararaj and David (1991) raised *Dialeuronomada* from the rank of subgenus to generic rank (Quaintance and Baker, 1917) with descriptions of 10 new species from India. Jensen (1999) studied the cladistic relationships within a large sample of the world's diversity of *Dialeurodes* Cockerell including two species of *Dialeuronomada,* viz. *D. dissimilis* and *D. ixorae,* and his results supported the recognition of *Dialeuronomada* as a valid genus. It is apparently an Oriental genus with India at the western limit of its range. Regu and David (1993) and Meganathan and David (1994) described one new species each under *Dialeuronomada* and thus the total number species of known under this genus is 14. In this paper, two new species *D. rubiphaga* Dubey & Sundararaj sp. nov. and *D. remadeviae* Dubey & Sundararaj sp. nov. are described and illustrated. A key to the genus is also provided. New biological data are indicated by asterisks. The description of the two species brings the total described species of *Dialeuronomada* to 16.

Genus *Dialeuronomada* Quaintance & Baker, 1917

Type species**:** *Dialeurodes* (*Dialeuronomada*) *dissimilis* Quaintance and Baker,

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1917. Proc. US Natn. Mus. 51: 424, by monotypy; *Dialeuronomada* Quaintance & Baker, as full genus, Sundararaj and David, 1991. Hexapoda 3(1&2): 27-47.

Diagnosis: Puparia elliptical or oval; pale yellowish to white; margin crenulate and all around with 12 pairs of setae; submargin with suture-like lines running mesad from margin; a peripheral row of characteristic papillae on submedian area; tracheal pores distinct and armed within with lobe-like projections; folds distinct with stipples extending up to pro- and metathoracic legs; longitudinal molting suture reaching margin and transverse molting suture not reaching margin. Vasiform orifice broadly subcordate, almost semicircular, its inner caudal and lateral margins armed with comb of teeth; operculum almost entirely filling orifice; lingula concealed. Minute seta at base of meso- and metathoracic legs present (Sundararaj and David, 1991).

Abbreviations used for type depositories

ANIC – Australian National Insect Collection, CSIRO Entomology, Canberra, ACT, Australia.

BMNH – The Natural History Museum, London, UK

BVD – Prof. B. V. David, President, Sun Agro Biotech Research Centre, Porur, Chennai, India

FRI – Forest Research Institute, Dehra Dun, India.

IARI – Indian Agricultural Research Institute, New Delhi, India.

IWST – Institute of Wood Science and Technology, Bangalore, India.

NMNH – National Museum of Natural History, Tel Aviv University, Israel.

NTU – National Taiwan University, Taipei, Taiwan , R.O.C.

SMTD – Staatliches Museum fur Tierkunde, Dresden, Germany.

USNM – Systematic Entomology Laboratory, US Department of Agriculture, Beltsville, MD, USA.

ZMU – Zoological Museum, Universitetsparken, Department of Zoology, Copenhagen, Denmark.

ZSI – Zoological Survey of India, Calcutta, India.

Key to the species of *Dialeuronomada*

1. Puparium white ---------- 2
-- Puparium brown***rubiphaga*** Dubey & Sundararaj sp. nov.
2. A peripheral row of papillae absent from submedian area ---------- 3
-- A peripheral row of papillae present on submedian area ---------- 4
3. A pair of large semicircular papillae laterad of 8th abdominal segment and a pair of small papilla laterad of 7th abdominal segment, distinct median brown patch present on thoracic and 1st abdominal segment, stipples extending beyond mesothoracic legs ---------***granulata*** Sundararaj & David
-- Papillae absent from abdominal segments, median brown patch absent from cephalothorax and abdominal segments, stipples not extending beyond mesothoracic legs ---------- ***remadeviae*** Dubey & Sundararaj sp. nov.
4. Peripheral row of papillae on submedian area with no extension on the subdorsum of prothorax and metathorax and on submedian area of 1st abdominal segment---------- 5
-- Peripheral row of papillae on submedian area with extension of papillae on subdorsum of prothorax and metathorax and with or without papillae on submedian area of 1st abdominal segment---------- 7
5 Peripheral row of papillae on submedian area extending from cephalothorax to abdomen ---------- 6
-- Peripheral row of papillae on submedian area restricted to abdomen -----***keralaensis*** Meganathan & David
6. Puparium without waxy secretion;

dorsal setae short: cephalic, 1st abdominal and caudal setae each 10 μm long and 8th abdominal setae 7.5 μm long; venter reticulated ---------- ------***dissimilis*** (Quaintance & Baker)

-- Puparium with thick bands of waxy fluff; dorsal setae long: cephalic and 8th abdominal setae each 37.5 μm long, 1st abdominal and caudal setae each 35 μm long; venter with rounded markings---------- ***ixorae*** (Singh)

7. Row of papillae extending inwards towards median area from submedian row of papillae on 1st abdominal segment ----------8

-- No extension inwards of papillae towards median area from submedian row of papillae on 1st abdominal segment---------- 9

8. Vasiform orifice longer than wide (47.5~50 x 45~47.5 μm); lacking enlarged papilla laterad of vasiform orifice; venter with honeycomb-like markings---------- ----***ayyanarensis*** Sundararaj & David

-- Vasiform orifice as long as wide (40 x 45 μm); an enlarged papilla laterad of vasiform orifice present; venter with rounded markings ---------- --------- ***canthiae*** Sundararaj & David

9. One or 2 enlarged papillae laterad of vasiform orifice present----------10

-- Lacking enlarged papillae laterad of vasiform orifice ----------13

10. Enlarged papillae near vasiform orifice without finger-like processes; caudal pore with no papillae on sides ----------11

-- Enlarged papillae near vasiform orifice with 5 or 6 finger-like processes; a pair of papillae on either side of caudal pore present---------- -------- ***palmatus*** Sundararaj & David

11. Abdominal segment sutures without tubercles; ventral stipples on thoracic tracheal folds extending up to anterior abdominal spiracles----------12

-- Abdominal segment sutures with tubercles; ventral stipples on thoracic tracheal folds not extending beyond base of mesothoracic legs ---------- --------- ***saklespurensis*** Regu & David

12. Puparium 0.68 mm long, 0.59 mm wide; 14 crenulations in 0.1 mm; subdorsum free from papillae---------- ---------- ***martini*** Sundararaj & David

-- Puparium 0.70~0.89 mm long, 0.59~0.74 mm wide; 19~21 crenulations in 0.1 mm; subdorsum with sparsely distributed papillae---------- ----- ***nagpurensis*** Sundararaj & David

13. Subdorsum without honeycomb-like markings; venter with round or elliptical markings; subdorsum of cephalothorax and 1st abdominal segment without sparsely distributed papillae ----------14

-- Subdorsum with honeycomb-like markings; venter with stomata-like markings; subdorsum of cephalothorax and 1st abdominal segment with sparsely distributed papillae---------- -------***biventralis*** Sundararaj & David

14. Puparium 0.71~0.91 mm long, 0.56~0.70 mm wide; row of papillae not bending inward towards rostrum from submedian area anterior of prothorax ----------15

-- Puparium 0.93~1.40 mm long, 0.76~1.20 mm wide; row of papillae formed by clusters of minute papillae bending inward towards rostrum anterior of prothorax ---------- -------***giganticus*** Sundararaj & David

15. Margin with 15~16 crenulations in 0.1 mm; cephalic, 1st and 8th abdominal setae respectively, 22.5, 25, and 10 μm long; laterad of 2nd abdominal segment with enlarged papilla---- ***binkae*** Sundararaj & David

-- Margin with 17 or 18 crenulations in 0.1 mm; cephalic, 1st and 8th eighth abdominal setae respectively, 15, 20, and 10 μm long; laterad of 2nd abdominal segment without enlarged papilla- ***russellae*** Sundararaj & David

1. *Dialeuronomada ayyanarensis*

Sundararaj & David

Dialeuronomada ayyanarensis Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: GOA: Kulem, 7 puparia, ex *Canthium coromandelicum*, 28 Feb. 2001, A. K. Dubey. KARNATAKA: Kudremukh National Park, 4 puparia, ex *Bischofia javanica*, 8 July 2001, A. K. Dubey; 5 puparia, ex *Holigrana grahamii*, 8 Aug. 2001, A. K. Dubey; 1 puparium, ex *Naringi crenulata*, 12 Aug. 2001, A. K. Dubey; 3 puparia, ex *Phyllanthus emblica*, 8 Aug. 2001, A. K. Dubey. KARNATAKA: Kumargiri, 9 puparia, ex *Randia rugulosa*, 11 Sept. 2001, A. K. Dubey; 1 puparium, ex *Cinnamomum malabatrum,* 10 Sept. 2001, A. K. Dubey (IWST).

Host plants: *Mimusops* sp. (Sundararaj and David, 1991); **Bischofia javanica, *Canthium coromandelicum, *Cinnamomum malabatrum, *Holigrana grahamii, *Naringi crenulata, *Phyllanthus emblica,* and **Randia rugulosa.*

Distribution: India: Tamil Nadu (Sundararaj and David, 1991), *Goa, and *Karnataka.

2. *Dialeuronomada binkae* Sundararaj & David

Dialeuronomada binkae Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: KARNATAKA: Unachali Falls, 5 puparia, ex *Olea dioica*, 19 Feb. 2001, A. K. Dubey; 2 puparia, ex *Atalantia racemosa*, 19 Feb. 2001; 1 puparium, ex *Ixora coccinea*, 19 Feb. 2001, A. K. Dubey. KARNATAKA: Yellapur, 1 puparium, ex *Atalantia monophylla,* 11 Oct. 2001, A. K. Dubey. KERALA: Silent Valley, 9 puparia, ex *Smilax prolifera*, 11 May 2001, A. K. Dubey. TAMIL NADU: Kodaikanal, 1 puparium, ex *Oxalis* sp., 13 Mar. 2001, A. K. Dubey. TAMIL NADU: Dodda-Betta, 1 puparium, ex *Neolitsea zeylanica*, 10 Mar. 2001, A. K. Dubey (IWST).

Host plants: *Pavetta* sp. (Sundararaj and David, 1991), **Atalantia monophylla, *A. racemosa, *Ixora coccinea, *Neolitsea zeylanica, *Olea dioica, *Oxalis* sp.,* and **Smilax prolifera.*

Distribution: India: Maharashtra, (Sundararaj and David, 1991), *Karnataka, *Tamil Nadu, and *Kerala.

3. *Dialeuronomada biventralis* Sundararaj & David

Dialeuronomada biventralis Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: KARNATAKA: Jog Falls, 1 puparium ex unidentified plant, 29 Feb. 2001, A. K. Dubey. KARNATAKA: Kalathagiri, 1 puparium, ex *Ruta graveolens*, 10 Mar. 2001, A. K. Dubey (IWST).

Host plants: *Antidesma* sp. (Sundararaj and David, 1991) and **Ruta graveolens*.

Distribution: India: Tamil Nadu (Sundararaj and David, 1991) and *Karnataka.

4. *Dialeuronomada canthiae* Sundararaj & David

Dialeuronomada canthiae Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: KARNATAKA: Kudremukh National Park, 7 puparia, ex *Bischofia javanica*, 8 Aug. 2001, A. K. Dubey. KERALA: Calicut, 1 puparium, ex *Olea dioica*, 1 Jan. 2001, A. K. Dubey (IWST).

Host plants: *Canthium dicoccum, Olea dioica* (Sundararaj and David, 1991), and **Bischofia javanica.*

Distribution: India: Tamil Nadu (Sundararaj and David, 1991) and *Karnataka.

5. *Dialeuronomada dissimilis* (Quaintance & Baker)

Dialeurodes (*Dialeuronomada*) *dissimilis*

(Quaintance & Baker), 1917: Proc. US Natn. Mus. 51: 424.

Dialeuronomada dissimilis: Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: KARNATAKA: Kalathagiri, 1 puparium, ex *Ruta graveolens*, 10 Mar. 2001, A. K. Dubey. KARNATAKA: Jog Falls, 9 puparia, ex unidentified plant, 29 Jan. 2001, A. K. Dubey. KARNATAKA: Kumargiri, 1 puparium, ex unidentified plant, 10 Sept. 2001; 1 puparium, ex unidentified plant, 19 Sept. 2001, A. K. Dubey. TAMIL NADU: Jawadhi Hills, 18 puparia, ex *Ixora pavetta,* 19 Mar. 2001, A. K. Dubey. KARNATAKA: (IWST).

Host plants : *Ixora* sp. (Singh, 1931), *Pavetta* sp. (David and Subramaniam, 1976), *Antidesma menasu*, *Hydnocarpus wightiana*, *Phyllanthus myrtifolis* (Sundararaj and David, 1991), **Ixora pavetta*, and **Ruta graveolens*.

Distribution: India: Bihar (Singh, 1931), Tamil Nadu (David and Subramaniam, 1976), Uttar Pradesh (Quaintance and Baker, 1917), and *Karnataka.

6. *Dialeuronomada gigantica* Sundararaj & David

Dialeuronomada gigantica Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: KARNATAKA: Saklaspur, Holotype puparium ex unidentified plant, 17 Mar. 1967, B.V. David (BVD).

Host plant: Unidentified plant (Sundararaj and David, 1991).

Distribution: Karnataka (Sundararaj and David, 1991).

7. *Dialeuronomada granulata* Sundararaj & David

Dialeuronomada granulata Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: TAMIL NADU: Sivakasi, Holotype puparium ex *lxora coccinea*, 25 Feb. 1988, S. Jayaselvan (BVD).

Host plant: *lxora coccinea* (Sundararaj and David, 1991).

Distribution: India: Tamil Nadu (Sundararaj and David, 1991).

8. *Dialeuronomada ixorae* (Singh)

Dialeurodes ixorae Singh, 1931: Mem. Dept. Agric. India. Entomol. Ser. 12(1): 38.

Dialeurodes ixorae: David and Subramaniam, 1976: Rec. Zool. Surv. India 70: 191-192.

Dialeuronomada ixorae: Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: GOA: Volpoi, 1 puparium, ex *Ixora coccinea,* 28 Mar. 2001, A. K. Dubey. KARNATAKA: Jog Falls, 12 puparia, ex *Flemingia macrophylla*, 29 Feb. 2001, A. K. Dubey. KARNATAKA: Gokarna, 1 puparium, ex *Ixora coccinea,* 5 Feb. 2001, A. K. Dubey. KARNATAKA: Kudremukh National Park, 1 puparium, ex *Olea dioica*, 10 Aug. 2001, A. K. Dubey (IWST).

Host plants: *Ixora coccinea* (Singh, 1931), *Mimusops hexandra* (Rao, 1958), *Antidesma acidum, Aporosa lindleana, Tarenna asiatica,* (Sundararaj and David, 1991), *Archronycha zeylanicum, Atalantia monophylla* (Meganathan and David, 1994), **Flemingia macrophylla,* and **Olea dioica*.

Distribution: India: Tamil Nadu (Singh, 1931; Sundararaj and David, 1991), Andhra Pradesh (Rao, 1958), Kerala (Meganthan and David, 1994), and *Karnataka.

9. *Dialeuronomada keralaensis* Meganathan & David

Dialeuronomada keralaensis Meganathan and David. 1994: FIPPAT Entomol. Ser. 5: 1-66.

Material examined: INDIA: KERALA: Sispara (Silent Valley), Holotype puparium ex *Ilex walkeri*, 2206 MSL, 29 Oct. 1991, P. Meganathan (BVD).
Host plant: *Ilex walkeri* (Meganathan and David, 1994).
Distribution: India: Kerala (Meganathan and David, 1994).

10. *Dialeuronomada palmata* Sundararaj & David
Dialeuronomada palmata Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: TAMIL NADU: Munchirai, Holotype puparium ex unidentified climber, 6 Aug. 1987, R. Sundararaj (BVD).
Host plant: Unidentified climber (Sundararaj and David, 1991).
Distribution: India: Tamil Nadu (Sundararaj and David, 1991).

11. *Dialeuronomada martini* Sundararaj & David
Dialeuronomada martini Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: KARNATA KA: Gokarna, 1 puparium, ex *Ixora* sp., 5 Mar. 2001, A. K. Dubey. KARNATAKA: Unachali Falls, 2 puparia, ex *Atalantia racemosa,* 19 Feb. 2001, A. K. Dubey. TAMIL NADU: Jawadhi Hills, 2 puparia, ex *Glochidion zeylanicum*, 18 Mar. 2001, A. K. Dubey (IWST).
Host plants: *Ixora* sp. (Sundararaj and David, 1991), **Atalantia racemosa,* and **Glochidion zeylanicum*.
Distribution: India: Tamil Nadu (Sundararaj and David, 1991), and *Karnataka.

12. *Dialeuronomada nagpurensis* Sundararaj & David
Dialeuronomada nagpurensis Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: TAMIL NADU: Jamunamarathur Hills, 2 puparia, ex *Sapindus emarginatus,* 18 Mar. 2001, A. K. Dubey (IWST).
Host plants: *Ixora* sp. (Sundararaj and David, 1991) and **Sapindus emargintus*.
Distribution: India: Maharashtra (Sundararaj and David, 1991) and *Tamil Nadu.

13. *Dialeuronomada remadeviae* Dubey & Sundararaj sp. nov. (Fig. 1)

Puparium: White, with little waxy secretion; oval, slightly constricted at caudal and tracheal pore areas. 0.90~1.57 mm long, 0.72~1.38 mm wide; found singly on undersurface of leaves. Margin regularly crenulate, 20~21 crenulations in 0.1 mm. Anterior and posterior marginal setae 34 and 36 μm long, respectively; 12 pairs of marginal setae: 5 pairs anterior to thoracic tracheal pores and 7 pairs posterior to it. Thoracic and caudal tracheal pores distinct with chitinized rim.
Dorsum: Dorsum granulated. Submargin not separated from dorsal disc, submarginal lines evident. Longitudinal molting suture reaching margin and transverse molting suture reaching submargin. Submedian area with no row of granulations or papillae. Submedian pockets present on pro-meso- and meso-metathoracic Abdominal segment VII shorter than VIII.
Chaetotaxy: Cephalic setae 7 μm long, 1st abdominal setae 18 μm long, 8th abdominal setae cephalolaterad of vasiform orifice 14 μm long and caudal setae not discernible. Vasiform orifice subcordate, 48~73 μm long, 42~58 μm wide; operculum subcordate, 22~34 μm long, 28~42 μm wide, inner wall of vasiform orifice with comb of teeth. Lingula concealed. Lacking thoracic and caudal tracheal furrows. Minute pores and porettes scattered throughout dorsum.

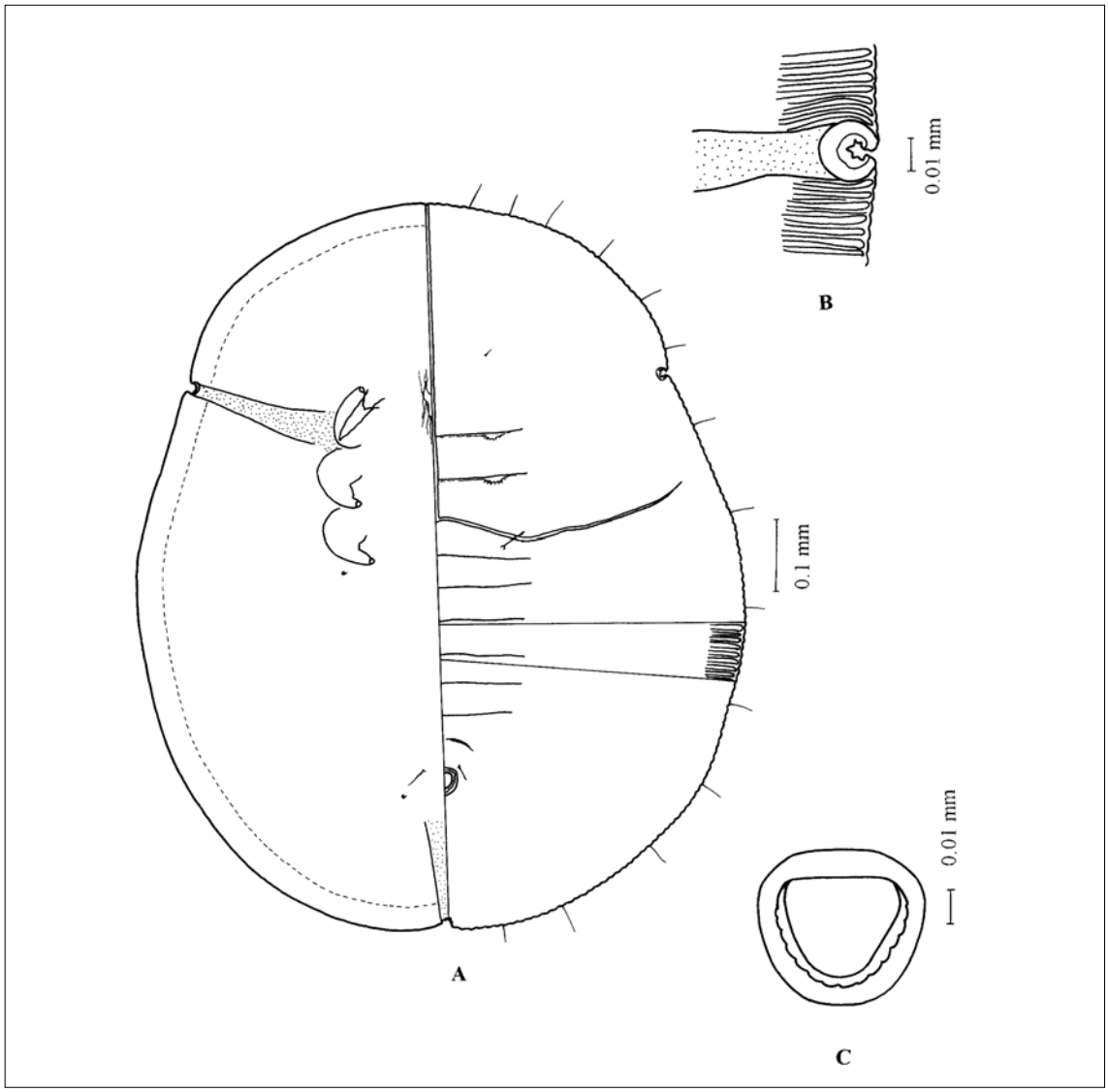

Fig. 1. *Dialeuronomada remadeviae* Dubey and Sundararaj sp. nov. A, Puparium; B, thoracic tracheal fold; C, vasiform orifice.

Venter: Paired ventral abdominal setae 27 μm long, 83 μm apart. Thoracic and caudal tracheal folds indicated by stipples, stipples on thoracic tracheal folds not extending beyond mesothoracic legs. Antennae reaching base of prothoracic legs. Distinct submarginal ventral fold running from cephalus to posterior caudal end.

Material examined: Holotype puparium, INDIA: KARNATAKA: Kudremukh National Park, ex unidentified plant, 18 Aug. 2001, A. K. Dubey (FRI). Paratypes: 10 puparia, data same as for holotypes (ANIC, BMNH, IARI, IWST, NMNH, NTU, SMTD, USNM, ZMU, and ZSI).
Host plant: Unidentified plant.
Distribution: India: Karnataka.

Etymology: Named after Dr. O. K. Remadevi, Head, Wood Biodegradation Division, Institute of Wood Science and Technology, for her encouragement during the course of this study and the facilities provided.
Comments: This species resembles *D. granulata* Sundararaj & David in the absence of submedian row of the papillae, but differs in the absence of the median brown patch on the thoracic and 1st abdominal segment, by the enlarged semicircular papilla laterad of the abdominal segments, and the stipples not extending beyond the mesothoracic legs.

14. *Dialeuronomada rubiphaga* Dubey & Sundararaj sp. nov. (Fig. 2)

Puparium: Brown, with little waxy secretion; oval, broadest at IV/V abdominal segments and slightly constricted at pro-mesothoracic segments suture region; 0.72~0.92 mm long, 0.60~0.78 mm wide, found singly on under surface of leaves. Margin irregularly crenulate, 14~22 crenulations in 0.1 mm. Thoracic and caudal tracheal pore areas invaginated in a pore with inner teeth. Anterior and posterior marginal setae respectively, 39 and 34 μm long, 12 pairs of marginal setae: 5 pairs cephalad of thoracic tracheal pore and 7 pairs caudad of it.
Dorsum: Dorsum marked by polygonal markings, absent from submarginal area. Peripheral row of papillae on submedian area, apically slightly extending towards submarginal area with little extension laterad of abdominal segments and not extending to median area of cephalothoracic and abdominal segments, 3 pairs of enlarged papillae present: 1 pair each on pro- and mesothorax and 1st abdominal segment on submedian area. Submargin not separated from dorsal disc. Longitudinal molting suture reaching margin and transverse molting suture reaching submargin.
Chaetotaxy: Four pairs of dorsal setae with distinct bases: fine thread-like cephalic and 1st abdominal setae 26 and 33 μm long, respectively, 8th abdominal setae cephalolaterad of vasiform orifice 30 μm long and caudal setae 32 μm long. Vasiform orifice subcircular, inner wall of vasiform orifice with comb of teeth, 38~47 μm long, 30~46 μm wide; operculum subcordate, 22~27 μm long, 26~32 μm wide. Lingula concealed. Thoracic tracheal furrows absent where caudal tracheal furrow indicated.
Venter: Paired ventral abdominal setae 9 μm long, 24~34 μm apart. Thoracic and caudal tracheal folds with stipples, stipples in thoracic tracheal folds not extending beyond mesothoracic legs. Antennae reaching base of prothoracic legs.
Material examined: Holotype puparium, INDIA: GOA: Volpoi, ex *Pavetta* sp. (Rubiaceae), 27 Feb. 2001, A. K. Dubey (FRI). Paratypes, 10 puparia, data same as for holotype (ANIC, BMNH, IARI, IWST, NMNH, NTU, SMTD, USNM, ZMU, and ZSI).
Host plant: *Pavetta* sp.
Distribution: India: Goa.
Etymology: Named after its host plant family Rubiaceae.
Comments: This species resembles *Dialeuronomada martini* Sundararaj & David in having a submedian row of papillae, but differs in having polygonal markings on the dorsum and by the absence of enlarged papillae laterad of the vasiform orifice.

15. *Dialeuronomada russellae* Sundararaj & David
Dialeuronomada russellae Sundararaj and David, 1991: Hexapoda 3(1&2): 27-47.

Material examined: INDIA: GOA: Kulem, 9 puparia, ex unidentified plant, 27 Jan. 2001, A. K. Dubey. KARNATAKA: Kudremukh National Park, 7 puparia, ex *Strychnos dalzellii,* 7 Aug. 2001; 2 puparia, ex *Canthium angustifolium,* 9 Aug. 2001; 2 puparia, ex *Olea dioica,* 8

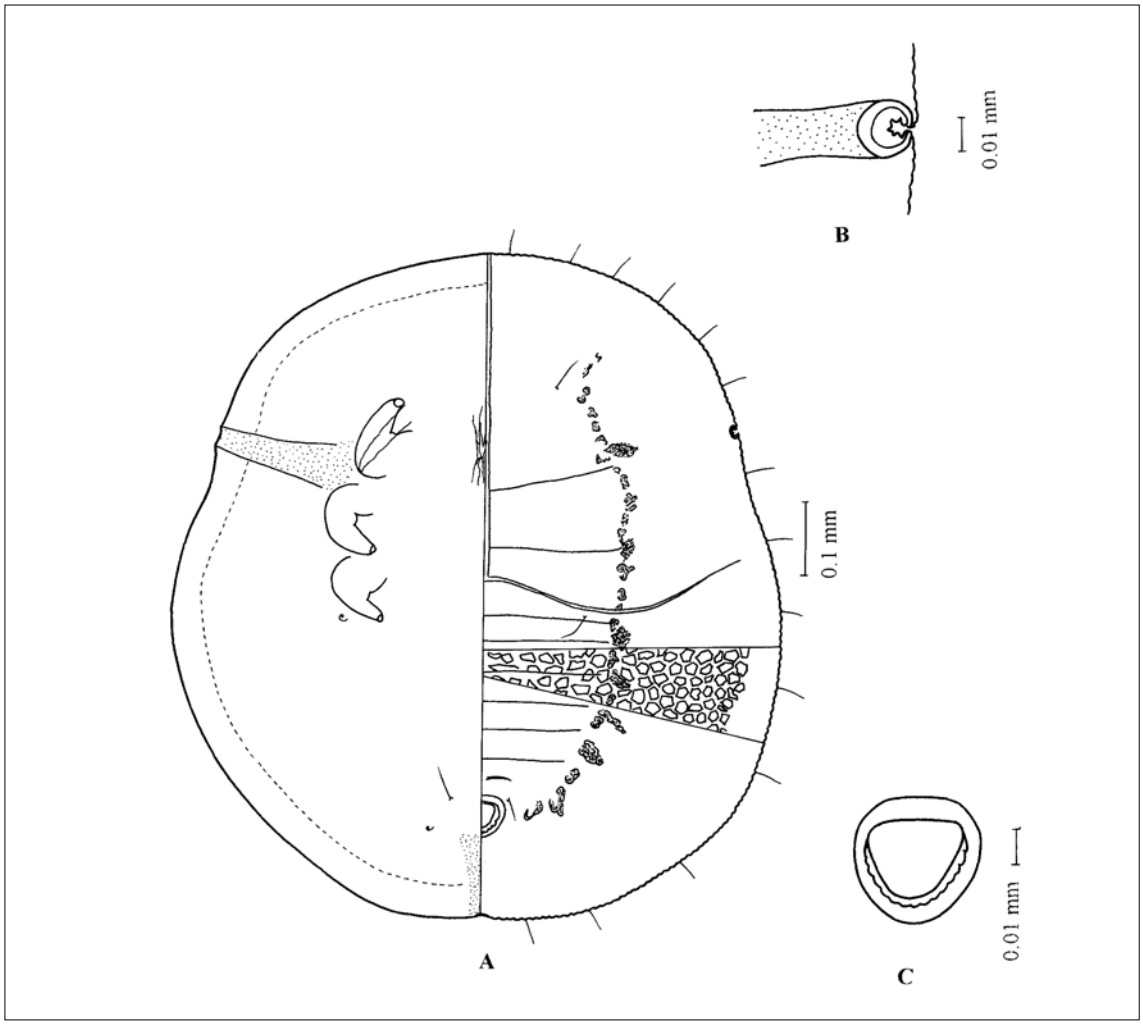

Fig. 2. *Dialeuronomada rubiphaga* Dubey and Sundararaj sp. nov. A, Puparium; B, thoracic tracheal fold; C, vasiform orifice.

Aug. 2001; 7 puparia, ex *Syzygium* sp., 6 Aug. 2001; 3 puparia, ex *Bischofia javanica,* 8 Aug. 2001; 1 puparium, ex *Phyllanthus emblica*, 6 Aug. 2001 A. K. Dubey. KARNATAKA: Puspagiri Wildlife Sanctuary, 10 puparia, ex *Smilax zeylanica*, 8 Sept. 2001; 1 puparium, ex *Dimocarpus longon*, 9 Sept. 2001; 5 puparia, ex unidentified plant, 9 Sept. 2001, A. K. Dubey. KARNATAKA: Idegundi, 12 puparia, ex *Canthium rheedii*, 18 Feb. 2001, A. K. Dubey. KARNATAKA: Unachali Falls, 3 puparia, ex *Syzygium* sp., 19 Jan. 2001; 1 puparium, ex unidentified plant, 19 Sept. 2001, A. K. Dubey. KARNATAKA: Kumargiri, 5 puparia, ex *Strychnos dalzellii,* 10 Sept. 2001; 2 puparia, ex *Antidesma* sp., 9 Sept. 2001; 3 puparia, ex *Psychotria* sp., 8 Sept. 2001; 2 puparia, ex *Nothopegia* sp., 9 Sept. 2001, A. K. Dubey. KARNATAKA: Jog Falls, 1 puparium, ex unidentified plant, 29 Jan. 2001; 3 puparia, ex unidentified plant, 29

Jan. 2001; 3 puparia, ex *Olea dioica*, 1 Jan. 2001, K. Regu. TAMIL NADU: Jamunamarathur Hills, 7 puparia, ex unidentified plant, 27 Jan. 2001, A. K. Dubey (IWST).

Host plants: *Olea dioica* (Sundararaj and David, 1991), **Antidesma* sp., **Bischofia javanica, *Canthium rheedii, *C. angustifolium, *Dimocarpus longon, *Nothopegia* sp., **Phyllanthus emblica, *Psychotria* sp., **Symplocos* sp., **Smilax zeylanica, *Strychnos dalzellii,* and **Syzygium* sp.

Distribution: India: Tamil Nadu (Sundararaj and David, 1991), *Karnataka, *Kerala, and *Goa.

16. *Dialeuronomada saklespurensis* Regu & David

Dialeuronomada saklespurensis Regu and David 1993: J. Bombay Nat. Hist. Soc. 89: 82-87.

Material examined: INDIA: KARNATA KA: Saklaspur, Holotype puparium ex *Dimocarpus longon*, 4 Feb. 1990, K. Regu (BVD).

Host plant: *Dimocarpus longon* (Regu and David, 1993).

Distribution: India: Karnataka (Regu and David, 1993).

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References

David, B. V., and T. R. Subramaniam. 1976. Studies on some Indian Aleyrodidae. Rec. Zool. Surv. India 70: 133-233.

Jensen, A. 1999. Cladistic of sampling of the world's diversity of whiteflies of the genus *Dialeurodes* (Hemiptera: Aleyrodidae). Ann. Entomol. Soc. Am. 92(3): 359-369.

Meganathan, P., and B. V. David. 1994. Aleyrodidae fauna (Aleyrodidae: Homoptera) of Silent valley, a tropical evergreen rain-forest, in Kerala, India. FIPPAT Entomol. Ser. 5: 1-66.

Mound, L. A., and S. H. Halsey. 1978. Whitefly of the World. A Systematic Catalogue of the Aleyrodidae (Homoptera) with Host Plant and Natural Enemy Data. British Museum (Natural History) and John Wiley and Sons, Chichester, UK, 340 pp.

Quaintance, A. L., and A. C. Baker. 1917. A contribution to our knowledge of the whiteflies of the subfamily Aleyrodinae (Aleyrodidae). Proc. US Natn. Mus. 51: 335-445.

Rao, A. S. 1958. Notes on Indian Aleyrodidae (Whiteflies) with special reference to Hyderabad. Proc. 10th Int. Cong. Entomol. 1: 331-326.

Regu, K., and B. V. David. 1993. On three new species of whiteflies of the tribe Dialeurodine Sampson, 1943 (Aleyrodidae: Homoptera) from India. J. Bombay Nat. Hist. Soc. 89: 82-87.

Singh, K. 1931. A contribution towards our knowledge of the Aleyrodidae (whiteflies) of India. Mem. Dept. Agric. India. Entomol. Ser. 12: 1-98.

Sundararaj, R., and B. V. David. 1991. Ten new species of *Dialeuronomada* Quaintance & Baker from Indian subcontinent. Hexapoda 3: 27-47.

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*Dialeuronomada*屬之種類以及兩新種（半翅目：粉蝨科）

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摘　要

本文整理 *Dialeuronomada* 屬之 14 種粉蝨。同時描述 2 新種：***D. remadaviae*** Dubey & Sundararaj 以及 ***D. rubiphaga*** Dubey & Sundararaj。文中並附印度產本屬之檢索表。

關鍵詞：分類、粉蝨科、*Dialeuronomada*、新種