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Identity of the citrus leaf mining flea beetle in northeast India and nomenclatural changes in *Amphimela* (Coleoptera: Chrysomelidae: Galerucinae: Alticini)

Kaniyarikkal D. Prathapan[1,*]

Abstract

The identity of the citrus leaf mining flea beetle in northeast India, hitherto misidentified as *Sebaethe fulvipennis* (Illiger) (Coleoptera: Chrysomelidae), is corrected as *Podagricomela nigripes* Medvedev. Following the merger of *Clitea* Baly and *Throscoryssa* Maulik with *Amphimela* Chapuis, *Amphimela mauliki* Prathapan, **new name** is proposed as the replacement name for *Throscoryssa citri* Maulik, as *Amphimela citri* (Maulik, 1928) is a junior secondary homonym of *Amphimela citri* (Bryant, 1922). *Amphimela ceylonica* (Chen), **new combination** is proposed for *Clitea ceylonica* Chen.

Key Words: *Podagricomela nigripes*; Oriental Region; pest

Resumen

La identidad del escarabajo pulga minador de hojas del cítrico en el noreste de la India, identificado hasta ahora erróneamente como *Sebaethe fulvipennis* (Illiger) (Coleoptera: Chrysomelidae), es corrigido a *Podagricomela nigripes* Medvedev. Se propone la siguiente fusión de los géneros *Clitea* Baly y *Throscoryssa* Maulik con *Amphimela* Chapuis; se propone *Amphimela mauliki* Prathapan, como nombre nuevo para *Throscoryssa citri* Maulik; *Amphimela citri* (Maulik, 1928) es un homónimo secundario de *Amphimela citri* (Bryant, 1922) y se propone *Amphimela ceylonica* (Chen) como una nueva combinación para *Clitea ceylonica* Chen.

Palabras Clave: *Podagricomela nigripes*; Región Oriental; plaga

The genera of flea beetles (Chrysomelidae: Galerucinae: Alticini) associated with the citrus family Rutaceae are *Amphimela* Chapuis and *Podagricomela* Heikertinger (Jolivet & Hawkeswood 1995). Jolivet (1979) listed Chrysomelidae associated with Rutaceae in the tropical and temperate regions. Members of other genera reported on Rutaceae may rest accidentally or nibble on the leaves, but the plants are not real hosts (Jolivet & Hawkeswood 1995).

The leaf mining flea beetle, hitherto identified as "*Sebaethe fulvipennis* (Illiger)" is a major pest of Assam lemon, *Citrus limon* (L.) Osbeck in northeast India (Rao et al. 2002; Shylesha et al. 2003). It was first recorded on citrus from Meghalaya by Padmanaban et al. (1990). Rao et al. (2002) studied its spatial distribution on Assam lemon and Shylesha et al. (2003) provided the biology. Study of the specimens collected on Assam lemon from Meghalaya revealed that the leaf mining flea beetle of northeast India is *Podagricomela nigripes* Medvedev. This was confirmed by comparing them with a paratype of the species. The generic name "*Sebaethe* Baly" is a junior synonym of *Hemipyxis* Chevrolat, and the trophic selections of the genus are limited to Lamiaceae and Verbenaceae (Jolivet & Hawkeswood 1995) and certainly do not include Rutaceae (see Jolivet 1979). Moreover, *Podagricomela* with widely placed antennal sockets, closed procoxal cavities, and regularly punctate striate elytra is morphologically unrelated to *Hemipyxis* having closely placed antennal sockets, open procoxal cavities, and confused, fine elytral punctation. *Hemipyxis fulvipennis* having a black head and pronotum is unlikely to be confused with *P. nigripes* having an entirely red-brown or yellow-brown dorsum. Occurrence of the genus *Podagricomela* in India was not known, and *P. nigripes* was awaiting formal description and naming when Padmanaban et al. (1990) reported occurrence of the leaf mining flea beetle on citrus. Probably lack of knowledge of the genus in India has led to its misidentification.

The genus *Podagricomela* is represented by 22 species distributed in the Oriental Region and the adjoining areas (Konstantinov & Vandenberg 1996; Medvedev 2002), of which 10 occur in China (Zhang & Yang 2004) and 3 in India (Medvedev 2002). Host plants are known for 7 species, including *P. nigripes*, and 2 of them are important pests of citrus in China (Chen 1936b; Zhang & Yang 2004). *Podagricomela*, closely allied to *Amphimela*, is separated from the latter by the deep, transverse suprafrontal sulcus separating vertex from frontal ridge (vertex in *Amphimela* is inseparable from frontal ridge as there is no transverse suprafrontal sulcus separating the 2 sclerites). The interantennal space is broad in both genera and the frontal ridge appears broader than long, not forming a T-shaped transverse anterofrontal ridge. However, the frontal sclerite is flat between antennal sockets in *Amphimela*, whereas the same is raised between antennal sockets in most *Podagricomela* species.

Other flea beetles associated with Rutaceae in India include *Amphimela citri* Prathapan, **new name** (Maulik 1928; Clausen 1931) and *A. mahouti* Chapuis on citrus (Jolivet 1979) and *A. indica* (Jacoby) (Maulik 1926) and *A. picta* (Baly) (Maxwell-Lefroy & Howlett 1909; Stebbing 1914; Beeson 1919; Misra & Fletcher 1919; Fletcher 1920, 1921; Maulik 1926; Ayyar 1940; Batra 1969; Scherer 1969) on *Aegle marmelos* (L.)

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Corrêa. Pests of citrus in India are poorly known, and the latest review dates back to 1945 (Pruthi & Mani 1945).

The genus *Amphimela* in India and Sri Lanka is represented by 5 species after merger of *Clitea* and *Throscoryssa* with *Amphimela* (Medvedev 2001; Konstantinov & Prathapan 2008). Here, *Podagricomela nigripes* is redescribed and illustrated, and the species of *Amphimela* still placed in *Clitea* and *Throscoryssa* are formally transferred to *Amphimela.*

Materials and Methods

Dissecting techniques and descriptive terminology follow Konstantinov (1998). The specimens will be deposited in the following collections: Natural History Museum, London, United Kingdom (BMNH); personal collection of L. Medvedev, Moscow, Russia (LMC); National Bureau of Agricultural Insect Resources, Bangalore, India (NBAIR); University of Agricultural Sciences, Bengaluru, India (UASB); National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM); and Travancore Insect Collection, Kerala Agricultural University, Vellayani, India (KAU).

Results

Podagricomela nigripes Medvedev (Figs. 1–9)

Podagricomela nigripes Medvedev (1993: 372), Medvedev (2002: 209 [key], 210), Zhang & Yang (2004: 273, 277).

DESCRIPTION

Length 3.43–3.72 mm, width 2.37–2.64 mm, 1.40–1.44 times longer than wide. General color brick red in life, fades to reddish brown to yellowish brown in preserved specimens (Fig. 1). Basal 3 or 4 antennomeres red-brown to yellow-brown, concolorous with dorsum; distal 7 or 8 antennomeres pitch-black. All legs piceous, except all coxae, trochanters concolorous with general color of body, distal tarsomeres tinted brown.

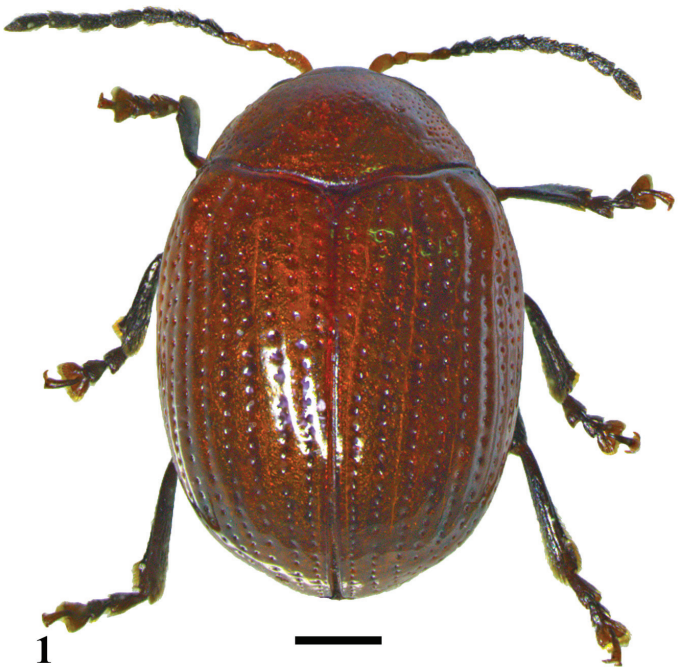


Fig. 1. *Podagricomela nigripes*, dorsal habitus; scale bar = 0.5 mm.

Head (Fig. 2) with vertex shiny, profusely minutely punctate, larger punctures sparse, unevenly distributed. Supracallinal sulcus, orbital sulcus deep and wide, almost straight. Transverse suprafrontal sulcus separating vertex from frontal ridge deeper than supracallinal sulcus. Antennal calli separated by a distance equal to 0.67–1.08 times diameter of antennal socket. Antennal callus wider than long, transverse-oblique. Frontal ridge wider than long, convex between antennal sockets, anteriorly flat to concave. Frontoclypeal suture with a row of long setae, interrupted in middle. Labrum with 6 setiferous pores bearing long setae, arranged in a row of 3 each on either side. Labrum about 2 times wider than long, anterior margin with a small notch and a lobe covering notch, evident only in macerated specimens. Mandible with 5 denticles. Maxillary palpus 4-segmented; 2nd and 3rd palpomeres subequal; 3rd widest; 4th longest, shorter than 2 times length of 3rd. Labial palpus 3-segmented, 1st palpomere shortest, 2nd widest, 2nd and 3rd subequal in length. Antenna not reaching half of elytra over pronotum; proportionate length of antennomeres (*n* = 2; 1st onwards): 1: 0.52–0.53: 0.56–0.60: 0.60–0.72: 0.66–0.76: 0.70–0.92: 0.80–0.90: 0.83–0.92: 0.86–0.92: 0.86–0.92: 1.20–1.32.

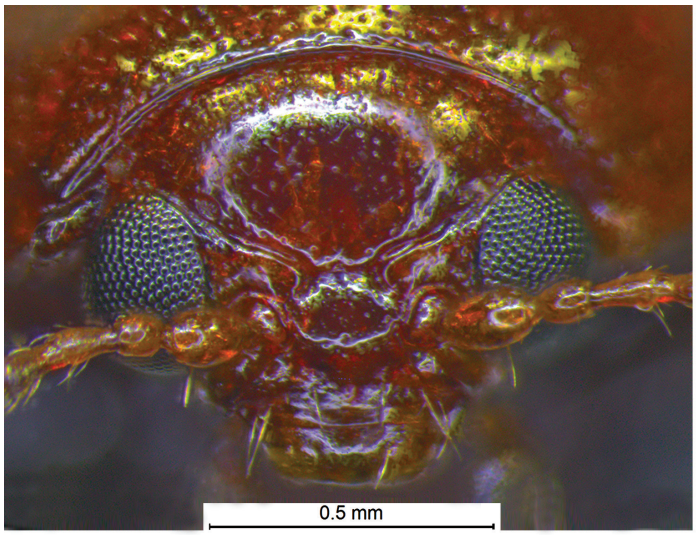
Pronotum 0.96–1.02 mm long, 1.75–2.02 mm wide, 1.82–1.98 times wider than long. Pronotal disc densely punctured, density and size of punctures distinctly greater than those on vertex. Pronotal punctures much smaller than those on elytra, stronger laterally than medially. Lateral margin evenly curved, nearly as wide anteriorly as posteriorly. Anterolateral callosity transverse, projecting forward, with seta bearing pore on upper lateral face; anterior margin of callosity strongly curved (Fig. 3). Posterolateral callosity slightly projecting beyond lateral margin. Scutellum triangular, a little wider than long, shiny, minutely punctate.

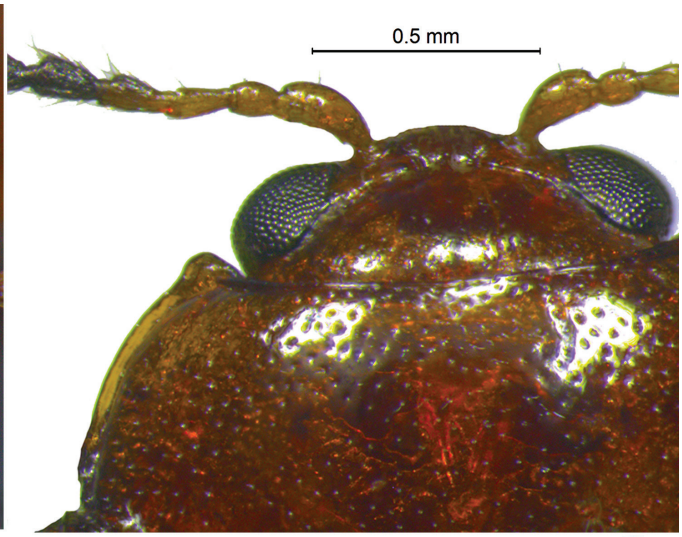
Elytra widest at anterior one-third. Humeral callus with a shallow depression posteriorly. Fifth row of punctures (excluding scutellar row) forms a depression along mesal side of humeral callus. Sixth and 7th rows begin posterior to humeral callus; with a shallow depression posterior to humeral callus. Elytral punctures about 4–6 times stronger than pronotal punctures in middle of elytral disc. Distance between punctures in a row less than diameter of a puncture; width of elytral interstices generally more than diameter of a puncture in middle of disc; interstices minutely punctate. Maximum width of elytral epipleura slightly less than maximum width of profemur. Elytral epipleura slightly inclined outwardly in proximal one-third, distinctly outwardly inclined beyond one-third. Mesepimeron, metepisternum each with a row of very strong punctures.

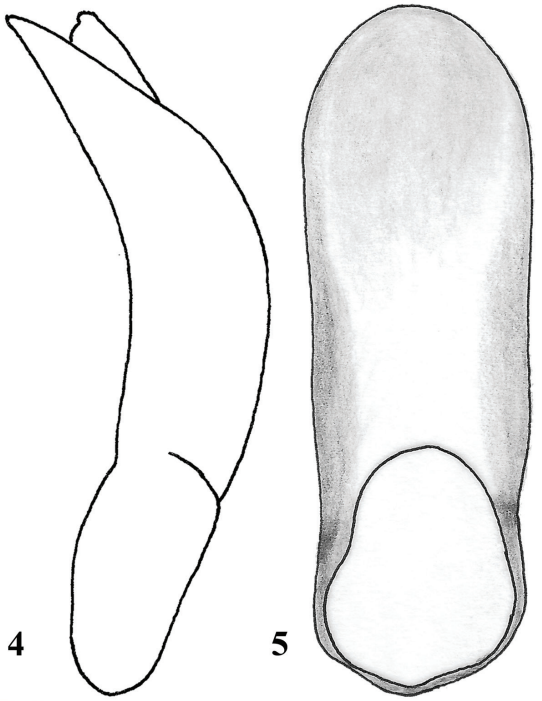
Shortest width of prosternal intercoxal process more than shortest distance between anterior margin of prosternum to procoxal cavity. Prosternum and mesosternum with coarse punctures. Mesosternal intercoxal process with deeply emarginated posterior margin. Metasternum without bold punctures, except a few laterally. Metatibia with a sharp ridge all along its dorsal side. All 1st tarsomeres ventrally with plumose capitate setae in male, with plumose pointed setae in female.

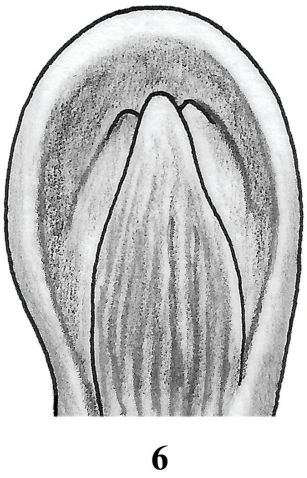
Proportionate length of tarsomeres (*n* = 2; 1st onwards) in female: protarsomeres 1: 0.82–0.88: 1.00–1.12: 1.53–1.71; mesotarsomeres 1: 0.79–1.12: 0.84–1.18: 1.58–1.82; metatarsomeres 1: 0.64–0.81: 0.64–0.81: 1.16–1.38; in male: protarsomeres 1: 0.77–0.82: 0.94–1.00: 1.62–1.78; mesotarsomeres 1: 0.75–0.84: 0.85–0.89: 1.40–1.58; metatarsomeres 1: 0.68–0.74: 0.76–0.89: 1.20–1.53. Length–width ratio of tarsomeres (*n* = 2; 1st onwards) in female: protarsomeres 0.85–1.00: 0.82–0.88: 0.59–0.61: 2.90; mesotarsomeres 0.81–1.00: 0.88–0.95: 0.53–0.65: 2.82–3.33; metatarsomeres 1.00–1.32: 0.89: 0.55–0.63:

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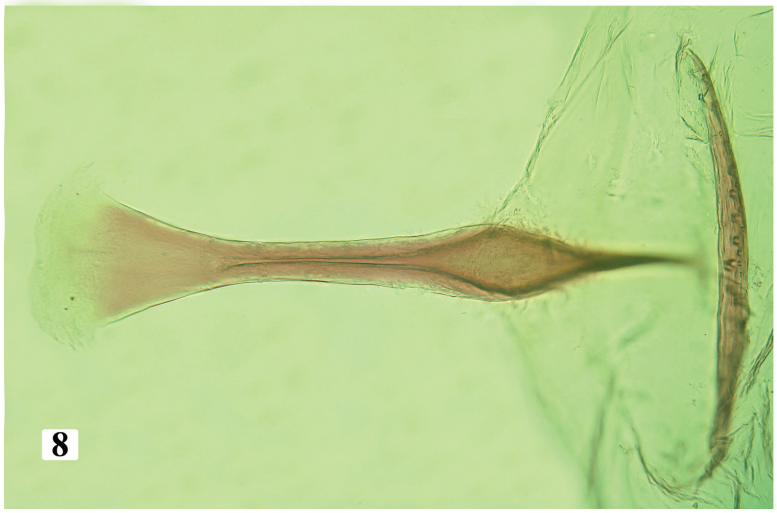


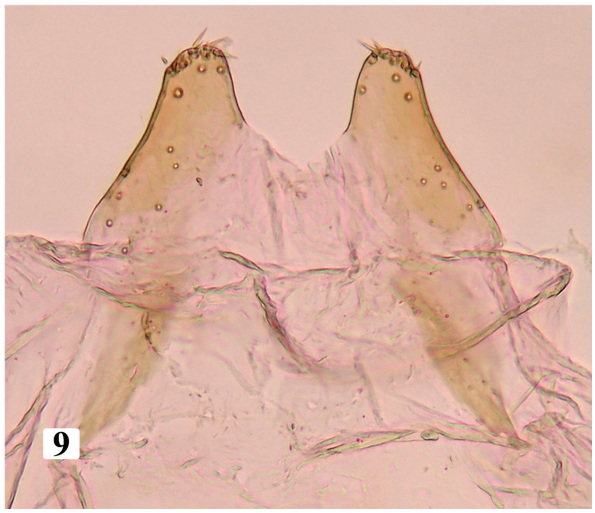












Figs. 2–9. *Podagricomela nigripes* (specimens from Meghalaya); scale bar = 0.5 mm; **2.** head, frontal view; **3.** anterior pronotal callosity and head, dorsal view; **4.** median lobe of aedeagus, lateral view; **5.** median lobe of aedeagus, ventral view; **6.** median lobe of aedeagus, distal opening; **7.** spermatheca; **8.** tignum; **9.** vaginal palpi.

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2.64–3.22; in male: protarsomeres 0.76–0.82: 0.78–0.82: 0.61–0.63: 2.75–3.56; mesotarsomeres 0.80–0.83: 0.77–0.89: 0.61–0.57: 2.66–3.00; metatarsomeres 0.90–1.19: 0.76–0.92: 0.65–0.72: 2.64–3.00.

Spermatheca with pump undifferentiated from receptacle; receptacle nearly 2 times longer than pump, pump forms acute angle with receptacle, outer side of receptacle concave, inner side convex; duct forms loop away from receptacle, sharply curved towards receptacle, not coiled (Fig. 7). Tignum channeled along middle, wider proximally, proximal end unsclerotized, narrowed in middle, distal end pointed, posterior margin of membranous portion forms a transverse sclerotized band (Fig. 8). Vaginal palpi fused in proximal three-quarters by membranous area; sclerotized laterally and posteriorly, narrowing towards posterior end, apex with a few short setae, long seta absent; both vaginal palpi together as long as wide (Fig. 9). Length of spermathecal receptacle 0.44 mm, length of tignum 0.63 mm, length of vaginal palpi 0.26 mm.

Aedeagus 0.97 mm long, in lateral view strongly curved, with acute apex (Fig. 4); in ventral view, parallel sided with rounded apex, ventral surface convex proximally, flat apically (Fig. 5); distal opening partially covered by a trifid lamina with longitudinal, sclerotized striations (Fig. 6). Arms of tegmen as long as stem.

DISTRIBUTION

Bhutan, India (West Bengal, Meghalaya), China (Xizang).

BIOLOGY

Described in Padmanaban et al. (1990), Rao et al. (2002), and Shylesha et al. (2003).

REMARKS

Podagricomela nigripes can be differentiated from the other 2 Indian species by the color of the dorsum. Dorsum is brick red to yellow brown in *P. nigripes*, whereas in *P. decempunctata*, dorsum is yellow with 5 black spots on the elytra. Apparently, this species is misplaced in *Podagricomela*. *Podagricomela metallica* Medvedev is distinctly larger (4.3 mm) than the other 2 species (3.20–3.72 mm), and its dorsum is metallic blue.

MATERIAL EXAMINED

Type material. PARATYPE ♂. Labels: (1) MagghalDhara/ 26-IV-1983 / 1,200 m (White label); (2) Darjeeling D. / India Bhakta B. (White label); (3) PARATYPUS/ Podagricomela nigripes / L Medvedev (Red label) (LMC).

Other material examined. 2♂, 1♀ Bhutan: env. Punakha/ 27.6058333°N, 89.8738333°E / 19-IX-2005 / 1,400 m / coll. K. Mahat, K. D. Prathapan (USNM); 10♂, 4♀ India: Meghalaya / Barapani / 25.6882222°N, 91.9180833°E / 993 m / 24-IX-2013 / coll. D. Prathapan & K. Shameem / Ex *Citrus*; 6 ♂ same locality and collectors, 21-IX-2013; India: West Bengal / Puntibari UBKV Campus / 26.3971389°N, 89.3857778°E / 35 m / 12-I-2017 / coll. K. D. Prathapan (BMNH, USNM, UASB, NBAIR, KAU).

Amphimela ceylonica (Chen), **new combination**

Clitea ceylonica Chen (1936a: 84), Kimoto (2003: 39).

COMMENTS

Except this species, all other species in *Clitea* are currently placed in *Amphimela* (Doberl 2010).

Amphimela mauliki Prathapan, **new name**

Throscoryssa citri Maulik (1928: 160), Clausen (1931: 1–13), Hoffmann (1935: 509), Chen (1936b: 383, 657), Gressitt & Kimoto (1963: 788), Scherer (1969: 8, 17, 227), Doberl (2010: 561).

ETYMOLOGY

Named after Samarendra Maulik, who originally described this species as *T. citri*.

COMMENTS

Maulik (1928) erected the monotypic genus *Throscoryssa* for a single species *citri* from Assam. *Throscoryssa* was synonymized with *Clitea* (Konstantinov & Prathapan 2008), which is a synonym of *Amphimela* Chapuis (Medvedev 2001). Bryant (1922) described *Cercyonia citri* from the Gold Coast in Africa as a serious pest of citrus plants. Scherer (1961) synonymized *Cercyonia* with *Amphimela*. As *Amphimela citri* (Maulik 1928) is a junior secondary homonym of *Amphimela citri* (Bryant 1922), a replacement name is proposed here as per article 60.3 of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature 1999).

Acknowledgments

I am grateful to L. N. Medvedev and A. Moseyko for the loan of a paratype of *Podagricomela nigripes*. Jennie Unnikrishnan, Ge Deyan, B. Padmanaban, A. N. Shylesha, and C. L. Staines provided essential literature. H. M. Yeswanth helped with habitus photography of *P. nigripes*. Critical reviews by C. A. Viraktamath and J. Poorani greatly improved the manuscript. My work on leaf beetles is funded by the Indian Council of Agricultural Research through the Network Project on Insect Systematics.

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