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# ARTIGO / ARTÍCULO / ARTICLE
# New distributional records of Delphacidae (Hemiptera: Fulgoroidea) from Chile.

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**Abstract:** *Chionomus haywardi* (Muir, 1929) (previously known for Argentina and Uruguay), *Syndelphax dissipatus* (Muir, 1926) (previously known for Ecuador, Brazil, Panamá and Costa Rica) and *Dicranotropis bipectinata* Muir, 1926 (previously known for Ecuador) are recorded for the first time from Chile. Additionally, the known distribution range of *Delphacodes darwini* Muir, 1929 (previously known only from Los Lagos region) is expanded up to Coquimbo region and *Delphacodes kuscheli* Fennah, 1955 (previously known from Juan Fernández Islands, Argentina and Uruguay) is recorded for first time from continental Chile. Photographs and diagnostic characters of the males are provided.
**Key words:** Hemiptera, Fulgoroidea, Delphacidae, Delphacini, *Chionomus*, *Syndelphax*, *Dicranotropis*, *Delphacodes*, *Delphacodes kuscheli*, Faunistics, Chile.

**Resumen: Nuevos registros de distribución de Delphacidae (Hemiptera: Fulgoroidea) de Chile.** Se registran por primera vez para Chile las especies *Chionomus haywardi* (Muir, 1929) (previamente conocida de Argentina y Uruguay), *Syndelphax dissipatus* (Muir, 1926) (previamente conocida de Ecuador, Brasil, Panamá y Costa Rica) y *Dicranotropis bipectinata* Muir, 1926 (previamente conocida de Ecuador). Adicionalmente, el rango de distribución conocido de *Delphacodes darwini* Muir, 1929 (previamente conocida sólo de la región de Los Lagos) se amplía hasta la región de Coquimbo y *Delphacodes kuscheli* Fennah, 1955 (previamente conocida del archipiélago de Juan Fernández, Argentina y Uruguay) se registra por primera vez para Chile continental. Se proporcionan fotografías y caracteres diagnósticos de los machos.
**Palabras clave:** Hemiptera, Fulgoroidea, Delphacidae, Delphacini, *Chionomus*, *Syndelphax*, *Dicranotropis*, *Delphacodes*, *Delphacodes kuscheli*, Faunística, Chile.

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## Introduction

Delphacidae (Hemiptera: Fulgoroidea), including 2152 described species and 411 genera (Bourgoin 2017), is the most economically important family within the Fulgoroidea (Urban *et al.* 2010). It is characterized by the presence of a movable spur (the calcar) at the apex of the hind tibia (Bartlett 2014). Up to this date, 25 species classified in 11 genera have been recorded from Chile (Spinola 1852, Bergroth 1924, Muir 1927, 1929, 1934, Fennah 1955, 1957, 1965, 1969, Aguilera 1972, Remes-Lenicov 1996, Rioja *et al.* 2006, 2010, Remes-Lenicov & Rioja 2007, Gonzon & Bartlett 2007, Rossi-Batiz 2014, Campodonico 2015). Among these, 10 species have been recorded in Chile only from the Juan Fernández Islands, and one is shared between insular and continental Chilean territories (Fennah 1955, 1957, Campodonico 2015).

## Materials and methods

For identification, Muir (1926, 1929), Fennah (1955, 1957), Remes-Lenicov & Tesón (1978) and

Weglarz (2012) were followed. For observation of the male genitalia, the abdomen was removed and placed in a saturated KOH solution at room temperature for about 24 hours. When cleared, it was neutralized. Posterior to dissection and examination in glycerine under both stereoscopic and optical microscope, pieces were stored in a micro vial pinned below the respective specimen. Photographs of specimens (Figs. 1-41) were taken with a conventional digital camera adapted to stereoscopic and optical microscopes. The maps (Figs. 42-44) were developed with ArcGIS®.

The material examined was deposited on the following collections: Museo Entomológico, Facultad de Ciencias Agronómicas, Universidad de Chile, Santiago, Chile (MEUC); Museo Nacional de Historia Natural, Santiago, Chile (MNNC); Juan F. Campodonico Particular Collection, Santiago, Chile (JFCW); University of Delaware Insect Research Collection, Newark, DE, USA (UDCC).

## Results

***Chionomus haywardi* (Muir, 1929)** (Figs. 1-8, 43)

*Delphacodes haywardi* Muir, 1929 - Muir (1929:83); Remes-Lenicov & Virla (1996:165); Tesón & Remes-Lenicov (1983:322); Remes-Lenicov & Virla (1999:11); Remes-Lenicov *et al.* (2000:93); Velázquez *et al.* (2003:669).
*Chionomus haywardi* (Muir, 1929) – Fennah (1971:324) (Combination); Weglarz (2012:44).
*Delphacodes collaris* Remes-Lenicov & Tesón, 1978 – Remes-Lenicov & Tesón (1978:17); Tesón & Remes-Lenicov (1983:322) (Synonymy).

**Material examined: CHILE: VALPARAÍSO REGION: Marga-Marga province:** Quilpué, Fundo El Carmen, 33°02'S, 71°27'W, 90-120 m, 14.III.2015, J.F. Campodonico leg., 2♂♂ (macropterous), 1♀ (macropterous) (JFCW); Las Cruces, 33°29'S, 71°38'W, 10 m, 18.VII.2016, J.F. Campodonico leg., 1♂ (macropterous) (JFCW); **METROPOLITANA REGION: Santiago province:** Vitacura, Plaza Los Tribunales, 33°22'S, 70°32'W, 765 m, 19.V.2015, J.F. Campodonico leg., sweeping, 4♂♂ (macropterous), 1♀ (macropterous) (JFCW), 2♂♂ (macropterous), 1♀ (macropterous) (MNNC), 2♂♂ (macropterous), 1♀ (macropterous) (UDCC); Maipú, Quebrada de la Plata, 33°29'S, 70°54'W, 650 m, 25.V.2016, J.F. Campodonico leg., sweeping, 1♂ (macropterous) (JFCW), 2♂♂ (macropterous), 1♀ (macropterous) (MEUC); **MAULE REGION: Talca province:** Putú, 35°40'S, 72°11'W, 11 m, 16.VII.2016, J.F. Campodonico leg., sweeping, 3♂♂ (macropterous) (JFCW).

**Male genitalia:** Pygofer (Figs. 4-5) with opening as an inverted triangle; armature of diaphragm distinctly projecting caudad; anal tube (Fig. 6) with two converging spines directed ventrad; parameres (Fig. 7) wide and short, narrower at the middle, inner angle acute and outer angles rounded; aedeagus (Fig. 8) tubular, wider near base, slightly curved dorsad (Muir 1929, Remes-Lenicov & Tesón 1978, Weglarz 2012).

Previously recorded from Argentina and Uruguay (Muir 1929, Remes-Lenicov *et al.* 2000). Description of female in Remes-Lenicov & Tesón (1978) and Tesón & Remes-Lenicov (1983). Immature stages described by Remes-Lenicov & Virla (1996). *Chionomus haywardi* has been syndicated as a vector of Mal de Río Cuarto maize virus in Argentina (Velázquez *et al.* 2003).

***Syndelphax dissipatus* (Muir, 1926) (**Figs. 9-16, 42)

*Delphacodes dissipata* Muir, 1929 - Muir (1926:33).
*Syndelphax dissipatus* (Muir, 1929) - Fennah (1967:76) (Combination); Bartlett & Kunz (2015:600).

**Material examined: CHILE: ARICA AND PARINACOTA REGION: Arica province:** Km. 23, Lluta, 12.VI.1968, N. Hichins leg., 1♀ (macropterous) (MEUC); Km. 23, Lluta, 13.VI.1968, N. Hichins leg., 1♂ (macropterous) (MEUC); **ATACAMA REGION: Huasco province:** Freirina, 10.X.2015, J.F. Campodonico leg., sweeping, 2♂♂ (brachypterous), 1♂ (macropterous), 2♀♀ (brachypterous), 2♀♀ (macropterous) (JFCW), 1♂ (brachypterous), 1♀ (brachypterous) (MNNC), 1♂ (brachypterous) (MEUC), 2♂♂ (brachypterous) (UDCC).

**Male genitalia:** Opening of pygofer (Fig. 12) a little wider than long; armature of diaphragm (Fig. 13) as a large, subconical process shagreened along the sides; anal tube (Fig. 14) with two large flat spines arising from the middle of the ventral side and the ventro-apical margin curved ventrad; parameres (Fig. 15) broad at basal half, at apical half narrow with outer and inner margins concave, apex truncate, slightly sinuous, angles slightly produced; aedeagus (Fig. 16) subtubular, slightly wider at base, orifice in a dorso-apical position (Muir 1926).

Previously recorded for Ecuador, Brazil, Panamá and Costa Rica (Muir 1926, Fennah 1967, Bartlett & Kunz 2015). Specimens from Freirina were collected by sweeping on wetland vegetation.

***Dicranotropis bipectinata* Muir, 1926** (Figs 17-24, 42)

*Dicranotropis bipectinata* Muir, 1926 - Muir (1926:25).

**Material examined: CHILE: TARAPACÁ REGION: Tamarugal province:** Mamiña, 20°04'S, 69°12'W, 2750 m, 29.I.2016, J.F. Campodonico leg., sweeping, 1♂ (brachypterous) (JFCW).

**Male genitalia:** Pygofer (Figs. 20-21) with latero-ventral and medio-ventral processes; anal tube (Fig. 22) with two large, curved spines on the ventral side; parameres (Figs. 23-24) furcate, main projection slightly sinuous, gradually tapering to apex, second projection arises about middle of the antero-lateral surface of the main projection and curved upwards with apex curved laterad; aedeagus (Fig. 22) with two conspicuous comb-like processes, in lateral view curved, wide at base, dorsal margin convex, ventral margin concave, orifice long (Muir 1926).

Previously recorded for Ecuador (Muir 1926). Specimen from Mamiña collected by sweeping riparian vegetation.

***Delphacodes darwini* Muir, 1929** (Figs. 25-32, 44)

*Delphacodes darwini* Muir, 1929 - Muir (1929:78); Bourgoin (2017).

**Material examined: CHILE: COQUIMBO REGION: Elqui province:** Vicuña, 4.X.1966, R. Charlin leg., 1♂ (macropterous) (MEUC); **VALPARAÍSO REGION: Los Andes province:** Los Andes, 6.XI.1979, G. Barría leg., 2♂♂ (macropterous) (MEUC); **Valparaíso province:** Humedal de Mantagua, 32°52'S, 71°30'W, 11 m, 28.XII.2014, J.F. Campodonico leg., sweeping, 1♂ (brachypterous) (JFCW); **METROPOLITANA REGION: Santiago province:** Vitacura, Plaza Los Tribunales, 33°22'S, 70°32'W, 765 m, 19.V.2015, J.F. Campodonico leg., sweeping, 1♂ (macropterous) (JFCW); Cerro Renca, 26.XII.1983, G. Arriagada leg., 1♂ (macropterous) (MNNC); Antumapu, 6.XI.1978, G. Barría leg., 3♂♂ (macropterous), 6♀♀ (brachypterous) (MEUC); Antumapu, 19.XII.1978, G. Barría leg., 3♂♂ (macropterous), 8♀♀ (brachypterous) (MEUC); Antumapu, 25.VI.1979, G. Barría leg., 1♂ (brachypterous) (MEUC); Antumapu, 4.IX.1979, G. Barría leg., 1♂ (brachypterous) (MEUC); **Cordillera province:** Pirque, 13.VII.1979, G. Barría leg., 2♂♂ (brachypterous) (MEUC); **MAULE REGION: Talca province:** Putú, 35°40'S, 72°11'W, 11 m, 16.VII.2016, J.F. Campodonico leg., sweeping, 3♂♂ (brachypterous) (JFCW); **LOS RÍOS REGION: Valdivia province:** Panguipulli, Puyumen, 39°40'S, 72°17'W, 150 m, 19.IX.2015, J.F. Campodonico leg., sweeping, 2♂♂ (brachypterous), 2♀♀ (brachypterous) (JFCW); Chaihuín, 39°57'S, 73°34'W, 5 m, 11.II.2015, J.F. Campodonico leg., sweeping, 1♂ (brachypterous) (JFCW); **LOS LAGOS REGION: Chiloé province:** Caulín, I.2015, J.M. Contreras leg., sweeping, 2♂♂ (brachypterous), 4♀♀ (brachypterous) (JFCW).

**Male genitalia:** Pygofer (Figs. 28-29) with a large anal emargination, anal angles widely produced, rounded and curved; armature of diaphragm as a small plate, truncated at apex; anal tube (Fig. 30) with the medio-ventral margin of apex produced ventrad and with two broad, spines arising from the ventral surface and curved basad; parameres (Fig. 31) long, flattened, widest on the apical half, subtruncate at apex; aedeagus (Fig. 32) with the orifice on the upper surface and some minute teeth just basad of the orifice (Muir 1929).

Previously only recorded for Chiloé, Los Lagos Region (Muir 1929). Photograph of the type in Bourgoin (2017).

***Delphacodes kuscheli* Fennah, 1955** (Figs 33-41, 43)

*Delphacodes kuscheli* Fennah, 1955 - Fennah (1955: 137); Fennah (1957:383); Remes-Lenicov & Tesón (1978:22); Tesón & Remes-Lenicov (1983:320); Remes-Lenicov *et al.* (1985:251); Grilli & Gorla (1997:45); Remes-Lenicov & Virla (1999:9); Remes-Lenicov *et al.* (2000:93); Truol *et al.* (2001:39); Grilli & Gorla (2002:187); Remes-Lenicov *et al.* (2008:25).

**Material examined: CHILE: VALPARAÍSO REGION: Valparaíso province:** Humedal de Mantagua, 32°52'S, 71°30'W, 11 m, 28.XII.2014, J.F. Campodonico leg., sweeping, 5♂♂ (brachypterous), 1♂ (macropterous), 4♀♀ (brachypterous), 1♀ (macropterous) (JFCW), 3♂♂ (brachypterous) (MNNC), 3♂♂ (brachypterous) (MEUC), 3♂♂ (brachypterous) (UDCC).

**Male genitalia:** Pygofer (Figs. 36-37) in posterior view almost circular; dorsal margin of diaphragm with two triangular lobes; anal tube (Figs. 38-39) with each latero-apical angles produced ventrad in a slender spine; parameres (Fig. 40) broad, "S" shaped with the latero-apical angle strongly produced; aedeagus (Fig. 41) abruptly bent near base, distal portion tubular, porrect, with a ridge thickening traversing each side almost through the whole length (Fennah 1955, 1957).

Previously recorded for Robinson Crusoe Island, Juan Fernández (Chile), Argentina and Uruguay (Fennah 1955, Remes-Lenicov & Tesón 1978, Remes-Lenicov *et al.* 2000). This record fills the gap between Juan Fernández Islands and the oriental side of the southern cone. Description of the female in Remes-Lenicov & Tesón (1978) and Tesón & Remes-Lenicov (1983). Immature stages described by Remes-Lenicov *et al.* (2008). This species has being extensively studied for being the main vector of Mal de Río Cuarto maize virus in Argentina (e.g. Remes-Lenicov *et al.* 1985, Grilli & Gorla 1997, 2002, Truol *et al.* 2001).

## Discussion

*Syndelphax dissipatus* and *Dicranotropis bipectinata* are tropical elements that reach their southern distribution limits in wet habitats between the arid areas of northern Chile. On the other side, *Chionomus haywardi*, *Delphacodes darwini* and *Delphacodes kuscheli* are elements distributed on the southern cone of America, to which is added the colonization of Juan Fernández Islands by the last species. With these records the number of species and genera recorded from Chile ascend up to 28 and 12 respectively and the number of Chilean species shared between the continent and Juan Fernández Islands rises up to two. It is worthy to mention that the South American species assigned to *Delphacodes* Fieber, 1866 and *Dicranotropis* Fieber, 1866 do not actually belong to these genera and their classification need to be revised.

Two species with agricultural importance in Argentina are recorded from the neighbouring country. However, unlike Argentina, the studies related with the phytosanitary role of Delphacidae are scarce in Chile and limited to the far north (Rioja *et al.* 2006, 2010). Faunistic and taxonomical investigations on Chilean Delphacidae should be an input to facilitate research for future studies on their phytosanitary importance.

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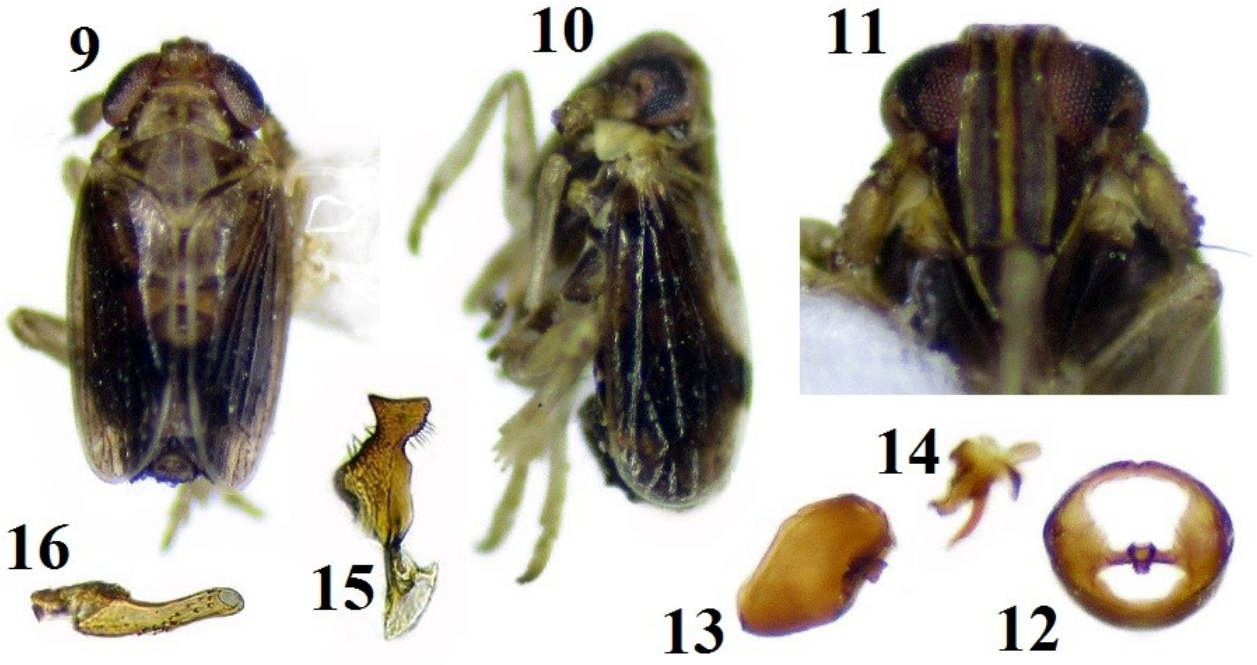
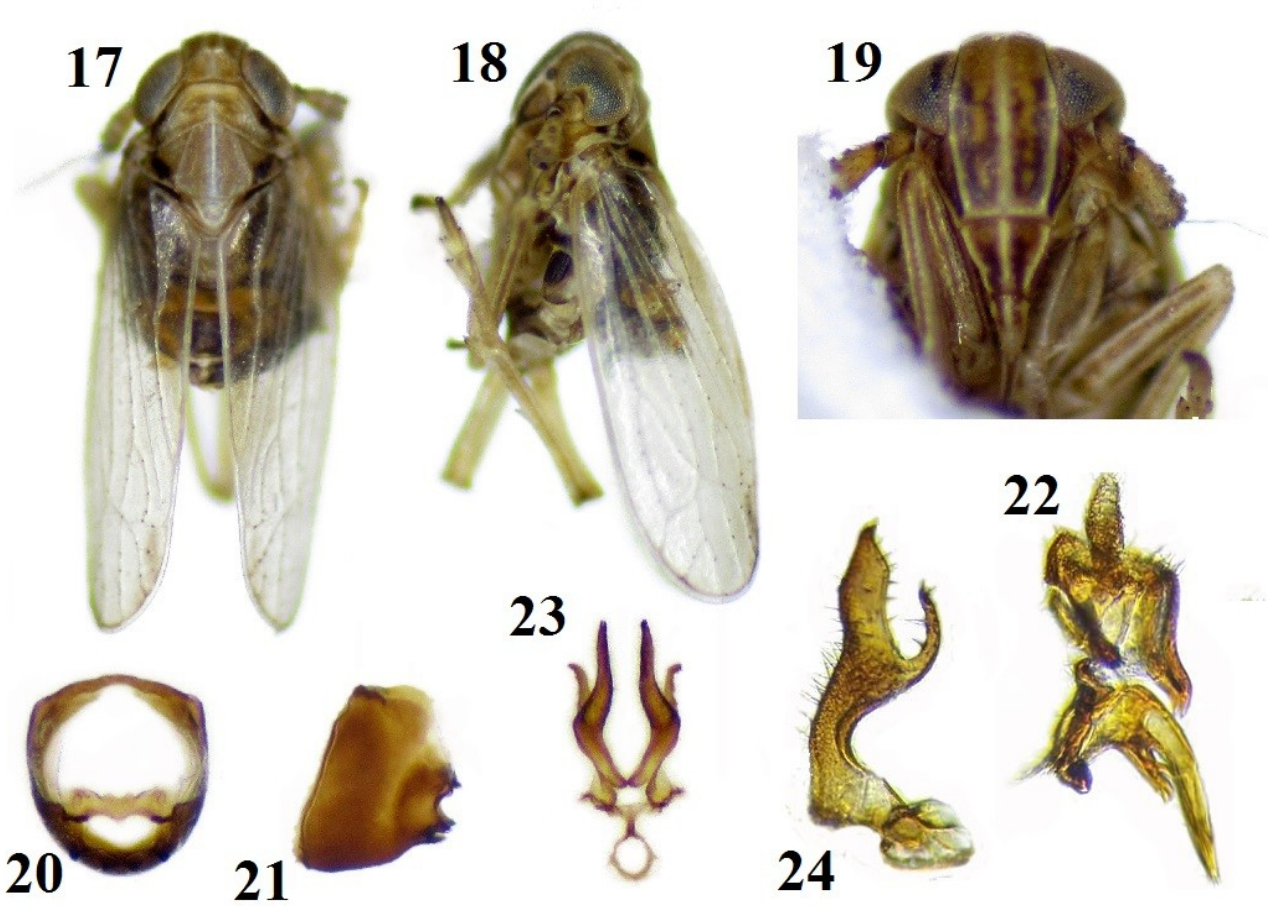
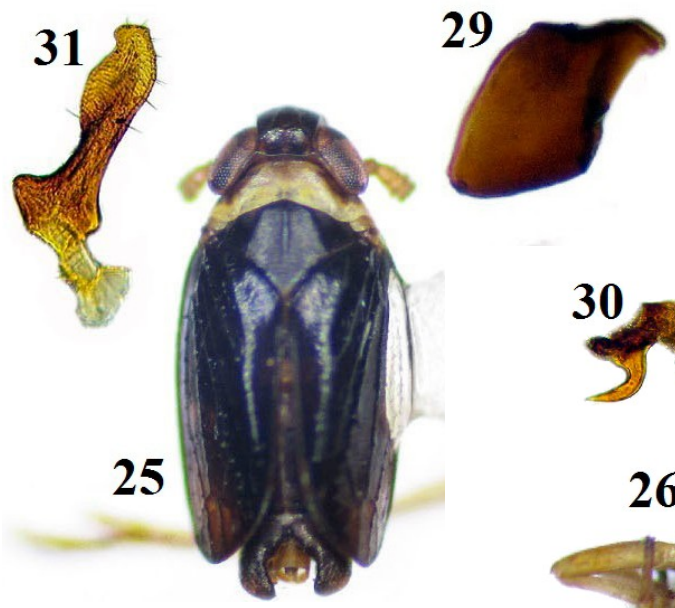
**Figs. 1-8.-** *Chionomus haywardi*, macropterous male. **1.-** Habitus, dorsal view. **2.-** Habitus, lateral view. **3.-** Head, frontal view. **4.-** Pygofer, caudal view. **5.-** Pygofer, lateral view. **6.-** Anal tube, lateral view. **7.-** Right paramere, caudal view. **8.-** Aedeagus, lateral view.



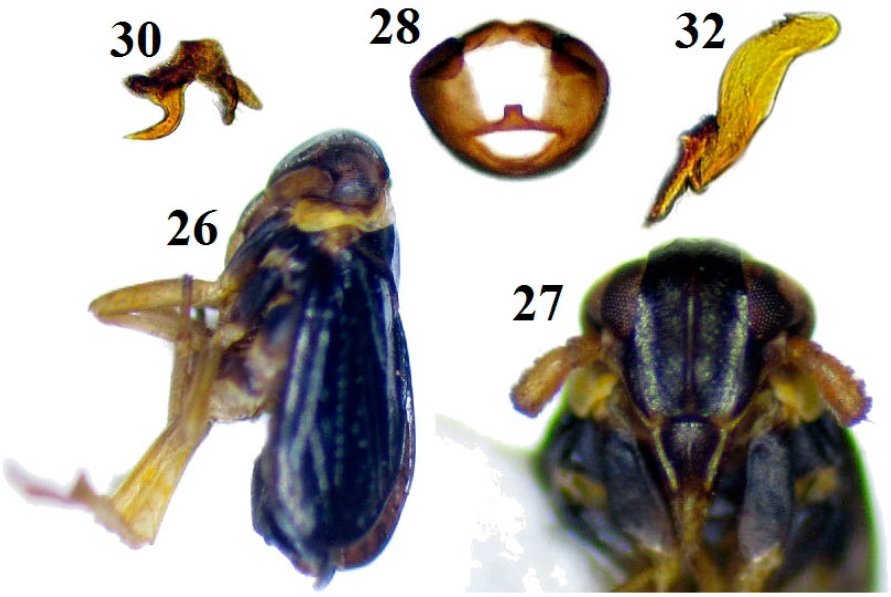

**Figs. 9-16.-** *Syndelphax dissipatus*, brachypterous male. **9.-** Habitus, dorsal view. **10.-** Habitus, lateral view. **11.-** Head, frontal view. **12.-** Pygofer, caudal view. **13.-** Pygofer, lateral view. **14.-** Anal tube, lateral view. **15.-** Right paramere, caudal view. **16.-** Aedeagus, lateral view.

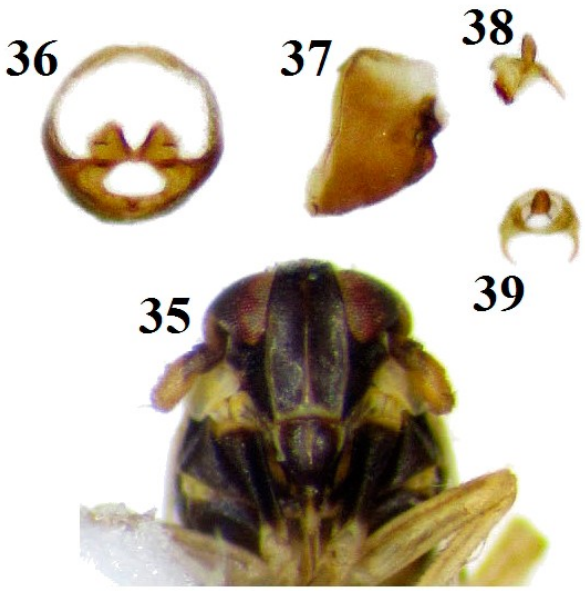



**Figs 17-14.-** *Dicranotropis bipectinata*, brachypterous male. **17.-** Habitus, dorsal view. **18.-** Habitus, lateral view. **19.-** Head, frontal view. **20.-** Pygofer, caudal view. **21.-** Pygofer, lateral view. **22.-** Anal tube and aedeagus, lateral view. **23.-** Parameres, caudal view. **24.-** Right paramere, latero-caudal view.

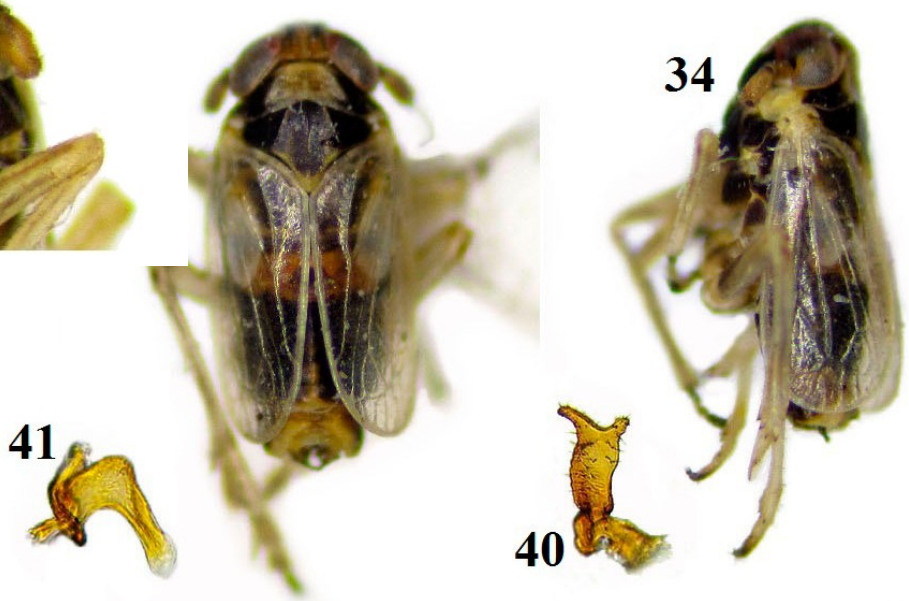



**Figs. 25-32.-** *Delphacodes darwini*, brachypterous male. **25.-** Habitus, dorsal view. **26.-** Habitus, lateral view. **27.-** Head, frontal view. **28.-** Pygofer, caudal view. **29.-** Pygofer, lateral view. **30.-** Anal tube, lateral view. **31.-** Right paramere, caudal view. **32.-** Aedeagus, lateral view.




**Figs. 33-41.-** *Delphacodes kuscheli*, brachypterous male. **33.-** Habitus, dorsal view. **34.-** Habitus, lateral view. **35.-** Head, frontal view. **36.-** Pygofer, caudal view. **37.-** Pygofer, lateral view. **38.-** Anal tube, lateral view. **39.-** Anal tube, caudal view. **40.-** Right paramere, caudo-lateral view. **41.-** Aedeagus, lateral view.



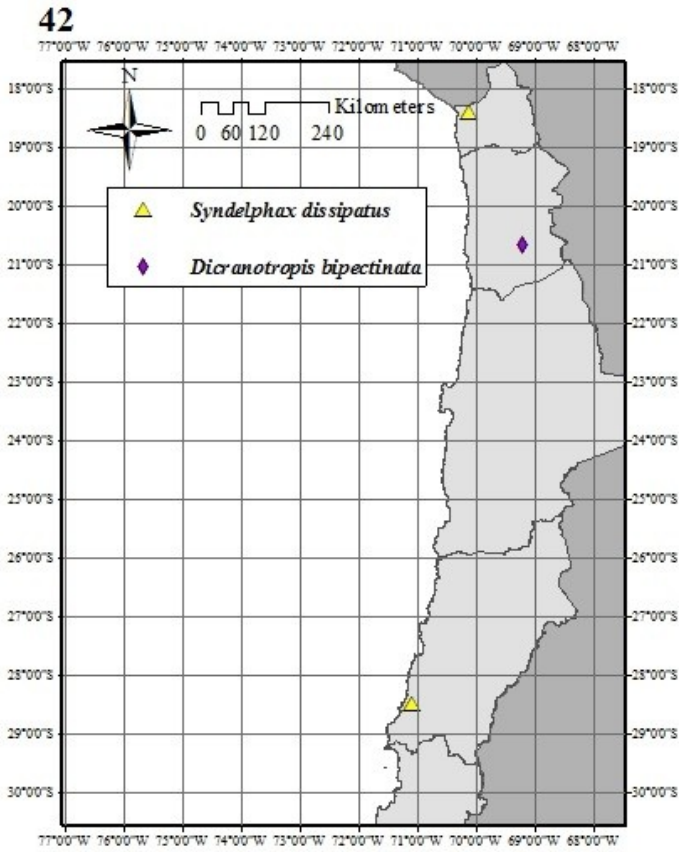



**Fig. 42.-** Distribution map of *Dicranotropis bipectinata* and *Syndelphax dissipatus*.

**Fig. 43.-** Distribution map of *Delphacodes kuscheli and Chionomus haywardi*.

**Fig. 44.-** Distribution map of *Delphacodes darwini*.