Study of the genus *Lissonota* (Hymenoptera: Ichneumonidae: Banchinae) in southern Iran

A. Amiri¹, A. A. Talebi² and C. R. Castillo³, E. Rakhshani⁴ and H. Hajianbar⁴

¹ 1. Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box: 14115-336, Tehran, Iran.
³ 3. Department of Plant Protection, College of Agriculture, University of Zabol, Zabol, Iran.
⁴ Corresponding author. E-mail: talebi@modares.ac.ir

Abstract
A survey was conducted to determine the species of the genus *Lissonota* Gravenhorst, 1829 in two Iranian southern provinces of Fars and Hormozgan from February 2011 through August 2013. Six species were identified of which five species are recorded for the first time from Iran. The newly recorded species are as follows: *Lissonota bivittata* Rohwer, 1920 and *Atrophini* Seyrig, 1932 containing *Banchus* Fabricius, 1798, *Glyptini* Cushman & Holmgren, 1939, *Exetastes* Fabricius, 1798, *Fonscolombe* Gravenhorst, 1829, *L. pimplator* (Zetterstedt, 1838) and *L. proxima* Fonscolombe, 1854. An updated checklist of Iranian *Lissonota* species is presented.

Key words: *Lissonota*, taxonomy, Fars, Hormozgan, Iran

Introduction
The family Ichneumonidae with 39 subfamilies and more than 24000 species is one of the largest families in the class Insecta (Quicke, 2015). It has been estimated that this family contains about 60,000 to 100,000 species worldwide (Townes et al., 1965). Ichneumonid wasps parasitize mainly the immature stages of holometabolous insects (Wahl & Sharkey, 1993) and a few species are predators of spider eggs, as well as ectoparasitoids of post-embryonic spiders (Arachnida: Araneae) (Miller et al., 2013). The subfamily Banchinae comprises three tribes including Banchini Wesmael, 1845, Glyptini Cushman & Rohwer, 1920 and Atrophini Seyrig, 1932 containing 65 genera and at least 1758 species (Yu et al., 2012). All species are koinobiont endoparasitoids of larvae of Lepidoptera (Çoruh & Özbek, 2013).

*Lissonota* Gravenhorst, 1829 with 388 species is the largest genus in the tribe Atrophini (Yu et al., 2012) and are endoparasitoids of various lepidopterous larvae in stems, buds and leaf rolls (Townes, 1969). The greatest diversity of *Lissonota* species occurs in the Old world (Yu et al., 2012) where the taxonomy of this genus has been comparatively better studied (Meier, 1935; Bain, 1970; Kasparyan, 1981; Rey del Castillo, 1989). Kasparyan (1981) published a key to about 150 species of the genus in the European part of USSR. Iranian ichneumonids have been studied by Masnadi et al. (2010), Barahoei et al. (2012) and Mohammadi–Khoramabadi et al. (2013a,b). Barahoei et al. (2012) provided a checklist containing 10 species from two tribes Banchini and Atrophini and the four genera *Banchus* Fabricius, 1798, *Exetastes* Gravenhorst, 1829, *Lissonota* Gravenhorst, 1829 and *Arenetra* Holmgren, 1859. Faunistic studies on Banchinae including the genus *Lissonota* have been carried out in the north and northwest of Iran (Ghahari et al., 2010; Masnadi et al., 2010; Mohammadi–Khoramabadi et al., 2016). Here, we present new data on the occurrence of *Lissonota* species in Hormozgan and Fars provinces and provide an updated checklist of the Iranian *Lissonota* species.

Materials and methods
Malaise traps and sweep nets were used in Fars and Hormozgan provinces from February 2011 through August 2013. The provinces include forests, rangelands, desert plants, mangrove (*Avicennia marina*) (Mozaffarian, 1991; Soltaniipoor, 2005; Zacifi, 2001), fruit orchards (tropical and non-tropical trees), and agro-ecosystems (fig. 1). A total of 24 Malaise traps were used. The specimens were treated
with a mixture of Alcohol (60%) /Xylene (40%) for two days and with Amyl acetate for the next two days (AXA) and finally placed on the filter paper for drying (van Achterberg, 2009). The dried specimens were then card mounted and labeled. Morphological terminology predominantly follows Townes (1969) and Yoder et al. (2010). Microsculpture terminology follows Eady (1968). Relevant literatures were used for the identification of the specimens (Meier, 1935; Bain, 1970; Kasparyan, 1981; Rey del Castillo, 1989). Illustrations were made using an Olympus TM AX70 microscope and Olympus TM SZX9 stereomicroscope equipped with a Sony TM digital camera. A series of 4-5 captured images were merged into a single in-focus image using the image-stacking software Combine ZP1.0. The specimens are deposited at the Collection of Department of Entomology, Tarbiat Modares University (TMUC), Tehran, Iran.

**Results**

A total of 27 specimens of the genus *Lissonota* were collected representing six species (*L. bivittata* Gravenhorst, 1829, *L. elypeator* Gravenhorst, 1820, *L. impressor* Gravenhorst, 1829, *L. piniplator* (Zetterstedt, 1838), *L. proxima* Fonscolombe, 1854 and *L. (Loxonota) flavovariegata* Lucas, 1849). Among them, *L. (Loxonota) flavovariegata* has been previously recorded from Iran, while the other five species are new for the Iranian fauna. The species are listed alphabetically and diagnostic characters presented for the newly recorded species.

**Lissonota bivittata** Gravenhorst, 1829

**Material examined:** Iran, Hormozgan province, Bandar Abbas, Zakin (27°28'53" N, 56°18'27" E, 680 m a.s.l.), 27.VI.2011, 1♂, Malaise trap, Leg.: A. Ameri

---

![Fig. 1. Habitats of Fars and Hormozgan provinces of Iran where the *Lissonota* specimens were collected.](image-url)
Diagnosis: Male (fig. 2, A): Body length 7.0–7.5 mm; clypeus convex medially, about 1.74x as wide as long (fig. 2, B); malar space 0.7.0–0.75x width of mandibular base; face 1.7x as wide as height (fig. 2, B), sparsely punctate; antenna 39 segmented, first flagellomere 1.3x as long as second flagellomere; face and frons finely punctate; temple finely punctate, its length in dorsal view 0.57x as long as eye width (fig. 2, C); occipital carina dorsally complete (fig. 2, C); notauli short and shallow; mesoscutum finely and evenly punctuate; mesopleuron finely punctate (fig. 2, D); fore wing 4.9–5.0 mm (fig. 2, E); propodeum with basal transverse carina (fig. 2, F); first metasomal tergite about 2.1x and second about 1.3x as long as posterior width (fig. 2, G); hind femur 4.7x as long as its broad; Coloration: face and clypeus reddish brown, mandible red (tooth black); antenna brown, vertex black, frontal orbit white and continues to vertex, mesonutum and scutellum yellow, tegula whitish yellow, pleura whitish yellow, propodeum black, metasomal tergites darkish brown with white strips on posterior margin, fore and mid coxae and trochanters white, hind trochanter yellow.

General distribution: East and West Palaearctic (Yu et al., 2012). New to Iran.

Fig. 2. *Lissonota bivittata*, male; A. Adult, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma, lateral view; E. Fore wing; F. Propodeum, dorsal view; G. Metasoma, dorsal view.

*Lissonota clypeator* (Gravenhorst, 1820)

Material examined: Iran, Fars province, Eghlid, Sedeh, Zava (30°44′17″ N, 52°08′31″ E 2130 m a.s.l.), 17. VI.2013, 2♀, 2♂, sweep net, Leg.: A. Amiri

Diagnosis: Female (fig. 3, A): Body length 12–13.5 mm; clypeus convex medially, about 2.66x as wide as height (fig. 3, B); malar space 1.0–1.1x width of mandibular base; face 2.16x as wide as height (fig. 3, B), finely punctuate; antenna 42–43 segmented, first flagellomere 1.73x as long as second flagellomere; face and frons finely punctuate; temple finely punctuate, its length in dorsal view 0.62x as long as eye width (fig. 3, C); occipital carina dorsally complete; notauli absent, mesonutum finely and evenly punctuate; mesopleuron finely punctate; mesoscutum finely and evenly punctuate; mesonutum and scutellum yellow, tegula whitish yellow, pleura whitish yellow, propodeum black, metasomal tergites darkish brown with white strips on posterior margin, fore and mid coxae and trochanters white, hind trochanter yellow.

General distribution: East and West Palaearctic (Yu et al., 2012). New to Iran.

Fig. 3. *Lissonota clypeator*, female; A. Adult, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma, lateral view; E. Fore wing; F. Propodeum, dorsal view; G. Metasoma, dorsal view.
Shahrmian (30°54′L), reported from north of Iran (Amol, Mazandaran province) (Hooshyar et al., 2010), Fars province (current study).

**Diagnosis:** Female (fig. 4, A): Body length 10–11 mm; clypeus convex medially, about 2.2x as wide as high (fig. 4, B), punctate basally; malar space 0.75x basal width of mandible; face 2.12x as wide as high (fig. 4, B), densely punctate; antenna 35-36 segmented, first flagellomere 1.48x as long as second flagellomere; temple finely punctate, its length in dorsal view 0.7x eye width (fig. 4, C); occipital carina dorsally complete; notauli absent, mesonotum densely punctate; mesepimeron punctuate (fig. 4, D); fore wing 7.5 mm (fig. 4, E); propodeum with posterior transverse carina (fig. 4, F); first metasomal tergite about 1.3x as long as apical width, and uniformly convex (fig. 4, G), wrinkly-punctured, second tergite square, its length 0.86x apical width, very finely striated; ovipositor longer than body; hind femur 4.9x as long as wide. Coloration: Face black, clypeus brown, mandible at the middle brown (base and tooth black), antenna black, vertex black, thorax black, metasomal tergites black, all coxae and trochanters black, legs reddish brown, apex of hind tibia dark, hind tarsi black.

**Male:** Antenna with 41-43 segments, other features as female.

**General distribution:** East and West Palaearctic, Nearctic (Yu et al., 2012), New to Iran.

**Remark:** *Lissonota clypeator* has been recently reported from north of Iran (Amol, Mazandaran province) (Hooshyar et al., 2014), but based on its figures it is mistakenly identified and it is obviously *L. flavovariegata*.

**Lissonota (Loxonota) flavovariegata** (Lucas, 1849)

**Material examined:** Iran, Fars province, Eghlid, Shahrmian (30°54′39" N, 52°28′16" E, 2120 m a.s.l.), 05.VII.2012, 3♂, 3♀, Malaise trap, Leg.: A. Amiri.

**Diagnosis:** Female: Body length 9.5–11 mm; fore wing 7.1 mm; Head: face about 2.2x as wide as high, convex medially; distance from lateral ocellus to eye 1.2–1.3x diameter of ocellus; temple finely 92unctuate, its length in dorsal view 0.57x eye width; antenna with 45 segments; malar space 0.95x as wide as basal width of mandible; mesopleuron and metapleuron densely 92unctuate, the space between points equal to or less than their diameters; length of second tergite 0.94–0.97x as long as its apical width, 92unctuate densely; ovipositor with straight apex, its length less than 1.1x as long as body. Coloration: Head and thorax black, clypeus black in base and reddish brown in apex, coxae and trochanters black, femur and tibia red, first and second tarsomeres red, tarsomeres 3–5 brown, tergites 1–5 reddish brown, tergites 6 and 7 black.

**Distribution in Iran:** Mazandaran (Ghahari et al., 2010), Fars province (current study).

**General distribution:** West Palaearctic (Yu et al., 2012).

**Lissonota impressor Gravenhorst, 1829**

**Material examined:** Iran, Fars province, Eghlid, Shahrmian (30°54′39" N, 52°28′16" E, 2120 m a.s.l.), 10.VII.2013, 2♂, 1♀, Malaise trap, Leg.: A. Amiri.

**Diagnosis:** Female (fig. 5, A): Body length 10–11 mm; clypeus convex medially, about 2.2x as wide as high (fig. 5, B), punctate basally; malar space 0.88x as wide as basal width of mandible; face 2.08x as wide as high (fig. 5, B), punctate; antenna 30-32 segmented, first flagellomere 1.25x as long as second flagellomere; occipital carina dorsally complete; notauli absent, mesonotum densely punctate; mesepimeron punctuate (fig. 5, D); fore wing 7.5 mm (fig. 5, E); propodeum with posterior transverse carina (fig. 5, F); first metasomal tergite about 1.3x as long as apical width, and uniformly convex (fig. 5, G), wrinkly-punctured, second tergite square, its length 0.86x apical width, very finely striated; ovipositor longer than body; hind femur 4.9x as long as wide. Coloration: Face black, clypeus brown, mandible at the middle brown (base and tooth black), antenna black, vertex black, thorax black, metasomal tergites black, all coxae and trochanters black, legs reddish brown, apex of hind tibia dark, hind tarsi black 1–4 black.

**Male:** Body length 10–11 mm, antenna with 41 flagellomeres, mid and hind coxae black.

**General distribution:** West Palaearctic (Yu et al., 2012), New to Iran.

**Lissonota pimplator** (Zetterstedt, 1838)

**Material examined:** Iran, Fars province, Eghlid, Shahrmian (30°54′39" N, 52°28′16" E, 2120 m a.s.l.), 05.VII.2012, 1♂, 7♀, Malaise trap, Leg.: A. Amiri.

**Diagnosis:** Female (fig. 5, A): Body length 8.70–10 mm, clypeus convex medially, about 2.1x as wide as high (fig. 5, B), punctate basally; malar space 0.88x as wide as basal width of mandible; face 2.08x as wide as height (fig. 5, B), punctate; antenna 30–32 segmented, first flagellomere 1.25x as long as second flagellomere; occipital carina dorsally complete; temple with fine scattered punctures, its length in dorsal view 0.48x eye width (fig. 5, C); notauli absent, mesonotum densely punctate, punctures larger and less (in number) than those of second tergite, posterior lateral edges of pronotum, scutellum and mesepimeron finely punctate.
Lissonota proxima Fonscolombe, 1854

Material examined: Iran, Fars province, Eghlid, Dejekord (30°44′01″ N, 51°57′07″ E, 2075 m a.s.l.), 10.VII.2013, 2♂, 3♀, Malaise trap, Leg.: A. Amiri

Diagnosis: Female (fig. 6, A): Body length 10–10.5mm; clypeus almost 1.9x as wide as high (fig. 6, B), finely punctate in base; malar space as long as basal width of mandible; face 2.35x as wide as high (fig. 6, B), densely punctate; antenna 39–41 segmented, first flagellomere 1.6x as long as second one; occipital carina dorsally complete; temple finely punctate; its length in dorsal view 0.46x eye width (fig. 6, C); mesopleuron densely and finely punctuate (fig. 6, D), notauli absent; fore wing 6mm (fig. 6, E); propodeum with posterior transverse carina (fig. 6, F); first metasomal tergite almost 1.3x as long as apical width, second tergite almost transverse (fig. 6, G), 0.72x as long as its apical width; ovipositor shorter than body; hind femur 5.2x as long as wide. Coloration: Body black, antenna, head, thorax and metasomal tergites black, legs red, apex of hind tibia and hind tarsus reddish brown.

General distribution: West Palaearctic (Yu et al., 2012), New to Iran.
Amiri et al. Study of the genus *Lissonota* …

**Discussion**

The results of this study showed that *Lissonota* in southern region of Iran is a medium sized genus with low number of each species probably because of spatial distribution of the host plants. *Lissonota* is a species-rich genus (388 species) and the majority of the recorded species are widely distributed in West Palaearctic regions (Yu *et al.*, 2012; kasparyan, 1981). All of newly discovered species in this survey attack rangeland, agroecosystem, fruits and ornamental orchards pests of the order Lepidoptera (Yu *et al.*, 2012). The biology of the species remain unknown awaiting further ecological studies in southern regions. Clearwing moths (Lep.: Sessidae) is one of the important hosts of *L. pimplator* and *L. clypeator* (Yu *et al.*, 2012) that were collected in the same area where the twig borer pests occurred. Including our findings, the number of Iranian records of *Lissonota* species increased to thirteen (Table 1).

![Fig. 4. Lissonota impressor, female; A. Adult, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma, lateral view; E. Fore wing; F. Propodeum, dorsal view; G. Metasoma, dorsal view.](image-url)
**Fig. 5.** *Lissonota pimplator*, female; A. Adult, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma, lateral view; E. Fore wing; F. Propodeum, dorsal view; G. Metasoma, dorsal view.

<table>
<thead>
<tr>
<th><em>Lissonota</em> species</th>
<th>Distribution in Iran (provinces)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lissonota bivittata</em> Gravenhorst, 1829</td>
<td>Hormozgan</td>
<td>Current study</td>
</tr>
<tr>
<td><em>L. clypeator</em> Gravenhorst, 1820</td>
<td>Fars</td>
<td>Current study</td>
</tr>
<tr>
<td><em>L. (Loxonota) flavovariegata</em> (Lucas, 1849)</td>
<td>Mazandaran, Fars</td>
<td>Ghahari <em>et al.</em> (2010); Current study</td>
</tr>
<tr>
<td><em>L. fundator</em> (Gravenhorst, 1820)</td>
<td>Mazandaran</td>
<td>Hooshyar <em>et al.</em> (2014)</td>
</tr>
<tr>
<td><em>L. impressor</em> Gravenhorst, 1829</td>
<td>Fars</td>
<td>Current study</td>
</tr>
<tr>
<td><em>L. (Loxonota) lineata</em> Gravenhorst, 1829</td>
<td>Not exactly defined</td>
<td>Kolarov &amp; Ghahari (2005)</td>
</tr>
<tr>
<td><em>L. magdalenae</em> Pfänkuch, 1921</td>
<td>Ardabil</td>
<td>Masnadi <em>et al.</em> (2010)</td>
</tr>
<tr>
<td><em>L. (Loxonota) mediterranea</em> Seyrig, 1927</td>
<td>Mazandaran, Ardabil</td>
<td>Ghahari <em>et al.</em> (2010); Ghahari &amp; Jussila (2011)</td>
</tr>
<tr>
<td><em>L. oculatoria</em> (Fabricius, 1798)</td>
<td>Golestân, Azerbaiján-e-Sharghi</td>
<td>Ghahari <em>et al.</em> (2010); Ghahari &amp; Jussila (2011)</td>
</tr>
<tr>
<td><em>L. palpalis</em> Thomson 1889</td>
<td>Kurdestan</td>
<td>(Mohammadi-Khoramabadi <em>et al</em>., 2016)</td>
</tr>
<tr>
<td><em>L. pimplator</em> (Zetterstedt, 1838)</td>
<td>Fars</td>
<td>Current study</td>
</tr>
<tr>
<td><em>L. proxima</em> Fonscolombe, 1854</td>
<td>Fars</td>
<td>Current study</td>
</tr>
<tr>
<td><em>L. versicolor</em> (Gravenhorst, 1820)</td>
<td>Mazandaran</td>
<td>Hooshyar <em>et al.</em> (2014)</td>
</tr>
</tbody>
</table>
**Fig. 6.** *Lissonota proxima*, female; A. Adult, lateral view; B. Head, frontal view; C. Head, dorsal view; D. Mesosoma, lateral view; E. Fore wing; F. Propodeum, dorsal view; G. Metasoma, dorsal view.

**Acknowledgments**

We would like to thank the Department of Entomology, Tarbiat Modares University for providing financial support for this research. We cordially thank Dr. Dicky Yu for sending useful papers. The authors thank the three anonymous reviewers for their valuable comments and suggestions on the earlier version of this paper.

**References**


Received: 11 March 2016
Accepted: 1 September 2016