

Three new records of the genus *Lomatia* Meigen, 1822 (Diptera: Bombyliidae) from Iran

Saeedeh HAKIMIAN¹, Ali Asghar TALEBI^{1,*}, Babak GHARALI² and Samira FARAHANI¹

1. Department of Entomology, Faculty of Agriculture, Tarbiat Modares University,
P.O.Box: 14115-336, Tehran, Iran.

2. Department of Entomology, Research Center for Agriculture and Natural Resources,
Shahid Beheshti Blvd. No. 118, P. O. Box: 34185- 618, Ghazvin, Iran.

* Corresponding author, A.A. Talebi, E-mial: talebia@modares.ac.ir

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Abstract. The genus *Lomatia* Meigen, 1822 (Diptera: Bombyliidae) was studied in the central and northern parts of Iran. The specimens were collected using Malaise traps during 2010 and 2011. Four species of the genus *Lomatia* were identified; three of them are recorded for the first time from Iran, namely: *L. abbreviata* Villeneuve, 1911, *L. lateralis* (Meigen, 1820) and *L. polyzona* Loew, 1869, in addition to *L. shelkovnikovi* Paramonov which was previously recorded in Iran. Morphological characters, geographical distributions, and an identification key for the four collected species are provided.

Key words: Diptera, Bombyliidae, *Lomatia*, female genitalia, Iran.

Introduction

Family Bombyliidae, commonly called bee flies, is one of the largest families of Diptera (Brachycera) with more than 4600 known species worldwide (Evenhuis & Greathead 2003). These flies occur in all continents, but most common in arid and semiarid environments (Hull 1973), and poorly represented in the Arctic, Antarctic and oceanic Islands. The larvae are predators or parasitoids of eggs and larvae of other insect such as other Diptera, Hymenoptera, Coleoptera and Lepidoptera (Du Merle 1975). Some species are important natural enemies of major pests including locusts and grasshoppers, armyworms, slug and nettle caterpillars, and tsetse flies (Evenhuis & Greathead 1999). Adults generally feed on nectar and pollen, thus may play an important role in pollination of wild flowers (Hull 1973).

The genus *Lomatia* Meigen, 1822 (Diptera: Bombyliidae: Lomatiinae) occurs only in the Palaearctic region and contains 36 known species (Evenhuis & Greathead 1999). The species of this genus develop as larval parasitoid of beetles of the family Tenebrionidae (Du Merle 1972) or as predator of grasshopper eggs (Bezzi 1924).

According to the world catalog of bee flies (Evenhuis & Greathead 1999) and the recent study of Karimpour (2012), eight species of this genus have previously been recorded

from Iran, namely: *L. armeniaca* Paramonov, 1924, *L. belzebul* (Fabricius, 1794), *L. lachesis* (Megerle in Meigen, 1820), *L. persica* Paramonov, 1924, *L. rogenhoferi* Nowicki, 1868, *L. superba* Loew, 1869, *L. alecto* Loew, 1846 (Evenhuis & Greathead 1999) and *L. shelkovnikovi* (Karimpour 2012). In the present study, four species of genus *Lomatia* collected from some parts at central and northern Iran are briefly reviewed, and basic information for future ecological studies is provided.

Materials and methods

Material for this study was collected from some parts of central and northern Iran using malaise traps during 2010 and 2011 (Fig. 1). Samples were collected between March and November. The specimens were extracted from the malaise traps and sorted weekly. Specimens were dehydrated with 99.6% ethanol for 5-10 minutes and then placed in a pure solution of hexamethyldisilazane (HMDS) for 15-20 minutes. The specimens finally placed in a glass plate for drying. The dried specimens were then labeled. Morphological terminology follows Greathead and Evenhuis (1997), McAlpine (1981), Zaitzev (1966) and Paramonov (1931).

Female genitalia preparations were made by macerating the apical portion of abdomen in cold 10% KOH for 14-15 hours, and then washed with distilled water and transferred to fresh glycerin. All specimens are deposited in the insect collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran.



Figure 1. Iran- Alborz, Ghazvin, Tehran, Gilan and Markazi provinces, where specimens have been collected.

Results

In this study, four species: *L. abbreviata*, *L. lateralis*, *L. polyzona*, *L. shelkownikovi* were collected and identified. Three species: *L. Lateralis*, *L. abbreviate*, *L. polyzona* are new records for the fauna of Iran so the number of species of the genus *Lomatia* known from Iran rise to eleven.

Genus *Lomatia* Meigen, 1822

Type species: *Anthrax belzebul* Fabricius, 1794, by subsequent designation (Westwood, 1840: 131).

This genus can be distinguished by the following characters: postcranium with a deep or shallow trough around a divided occipital foramen; compound eyes with bisecting line; head very broad when viewed from the front, cross vein r-m in apical ¼ of discal cell, body mainly black and frequently with narrow yellow markings across posterior margins of abdominal tergites, frons and face wide, abdomen broad, length of wing usually about half length of body, R₅ cell open, wing infuscated along anterior margin as far as r-m cross vein and extending across radial sector and sometimes discal cell (Greathead & Evenhuis 1997).

Key to species of the genus *Lomatia* collected from some parts of central and northern Iran

1. Cells c, r₁, r₂ and br yellow or brownish yellow (Fig. 2A & B).....2
 - Cells c, r₁, r₂ and br brown or dark brown (Fig. 2 C- E)3
2. Cells c, r₁, r₂ and br brownish yellow (Fig. 2A), mesonotum and scutellum covered with white hairs, tergites with hind margins yellow, width of yellow posterior margins of abdominal tergites about ½ length of tergites, medially slightly narrow and interrupted, antero-lateral sides of abdominal tergites 5-7 covered with tufts of black hairs (Fig. 3A)..... *L. shelkownikovi* Paramonov
 - Cells c, r₁, r₂ and br yellow, (Fig. 2B), mesonotum and scutellum covered by yellow hairs, all tergites with hind margins yellow, about 2/3 of first tergite yellow, yellow hind margins of abdominal tergites at most 1/3 of tergites length laterally, continuous in middle, all tergites covered with yellow hairs (Fig. 3B) *L. lateralis* (Meigen)
3. Cells c, r₁ and br brown or dark brown (Fig. 2D & E), tergites 1- 6 with hind margins yellow, tergite 7 entirely black, yellow hind margins narrow, very narrow in the middle but not interrupted, lateral margins of tergites covered with yellow hairs and scattered black hairs (Fig. 3D), color pattern of abdominal sternites variable and covered with yellow hairs (Fig. 4D- F)..... *L. polyzona* Loew
 - Cells c, r₁ and br cells brown (Fig. 2C), all tergites with hind margins yellow, about 2/3 of first tergite yellow, yellow hind margins of abdominal tergites as wide as width of hind femora and interrupted in the middle, lateral margins of tergites 3-7 covered with yellow hairs and scattered black hairs (Fig. 3C), abdominal sternites yellow with yellow hairs (Fig.4C)..... *L. abbreviata* Villeneuve

Lomatia polyzona Loew, 1869

Material examined: Iran, Tehran province, Faculty of Agriculture, 35°44'34.14''N, 51°09'52.32''E, 1388 m. a.s.l., 15.vi.2010, (1♀); Gilan province, Ghazi Chak, 36°45'57.54''N, 50°19'35.22''E, 1803 m. a.s.l., 21.vi.2010, (1♀); 28.vi.2010, (2♀), 05.vii.2010, (5♀); Alborz province, Sar ziarat, 35°55'10.38''N, 51°06'51.24''E, 1980 m. a.s.l., 22.vi.2010, (1♀); Alborz province, Arangeh, 35°55'07.20''N, 51°05'09.24''E, 1891 m. a.s.l., 29.vi.2010, (1♀); Markazi province, Farahan, Davood Abad, 34°17'32.19''N, 49°51'27.76''E, 3207 m. a.s.l., 08.vi.2011, (1♂); Ghazvin province, Kuhin, 36° 22 '14.22''N, 49°40'02.28''E, 1514 m. a.s.l., 22.vi.2011, (1♀); leg. S. Farahani (Fig. 1).

General distribution: Albania, Armenia, Azerbaijan, Greece (Crete, Lesbos, Rhodes), Gruzia, Iran, Italy (Sicily), Macedonia, Romania, Syria, Turkey, former Yugoslavia.

Diagnosis (female): (Fig. 5D), Head: face covered with white and pale yellowish hairs; frons covered with white or yellowish hairs and scattered black hairs; scape and pedicel covered with white scale, scape covered with black and yellow hairs; proboscis as long as head. Thorax: mesonotum and scutellum covered with yellow hairs; prosternum covered with white and yellow hairs. Wing: cells c, r₁ and br brown to dark brown; discal cell and wing margin transparent; r₅ cell open (Fig. 2D & E). Halter: apex yellow with brown spot, basally brown. Legs: black, covered by white scale and scattered black bristly hairs; empodium absent. Abdomen: tergites 1- 6 with yellow hind margins; tergite 7 entirely black; yellow hind margins narrow, very narrow in the middle but not interrupted; lateral margin of tergites

covered with yellow hairs and scattered black hairs; antero-lateral sides of first abdominal segment covered with dense yellow hairs (Fig. 3D), color pattern of abdominal sternites variable and covered with yellow hairs (Fig. 4D-F).

Female genitalia: as in Fig. 6C

Lomatia abbreviata Villeneuve, 1911

Synonym: *Lomatia nigrifacies* Villeneuve, 1911.

Material examined: Iran, Alborz province, Sar ziarat, 35°55'10.38''N, 51°06'51.24''E, 1980 m. a.s.l., 19.vii.2010, (2♀); leg. M. Kheyrandish (Fig. 1).

General distribution: Algeria, Greece, Iran, Israel, Italy, Morocco, Romania, Spain, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan.

Diagnosis (female): (Fig. 5C), Head: face and frons covered with white and yellow hairs; scape covered with yellow hairs; proboscis as long as head;. Thorax: mesonotum and scutellum covered with yellow hairs; prosternum covered with white and pale yellow hairs. Wing: cells c, r₁ and br brown; discal cell and wing margin transparent; r₅ cell open (Fig. 2C). Halter: apex yellow, basally brown. Legs: black, covered with white scale, yellow hairs and scattered black bristly hairs; empodium absent. Abdomen: tergites with yellow hind margins; almost 2/3 of first tergite yellow; yellow hind margins of abdominal tergites as wide as width of hind femora and interrupted in the middle; lateral margin of tergites 3-7 covered with yellow, with hairs and scattered black hairs; antero-lateral sides of first abdominal segment covered with dense white hairs (Fig. 3C); abdominal sternites

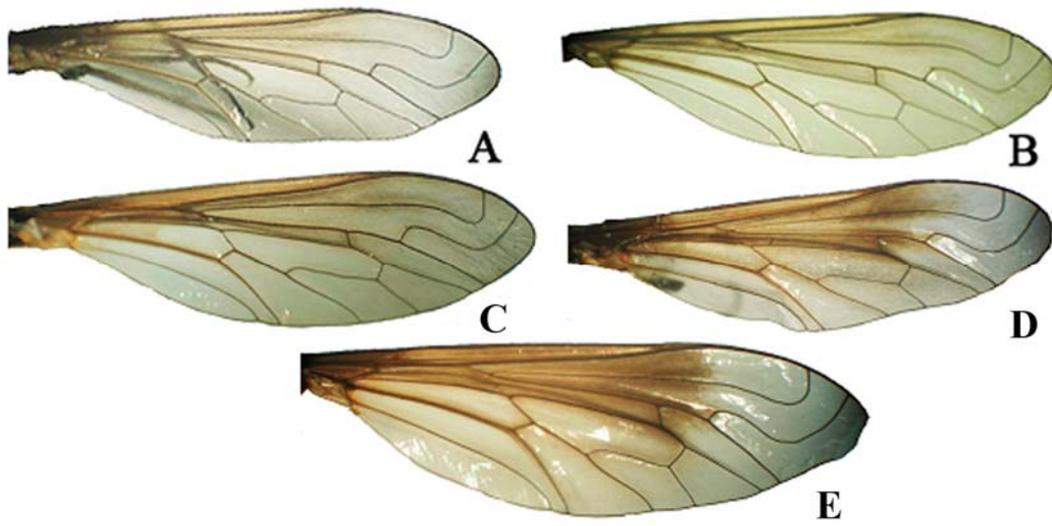


Figure 2. Wing venation: **A-** *Lomatia shelkovnikovi*, **B-** *L. lateralis*, **C-** *L. abbreviata*, **D & E-** *L. polyzona*.

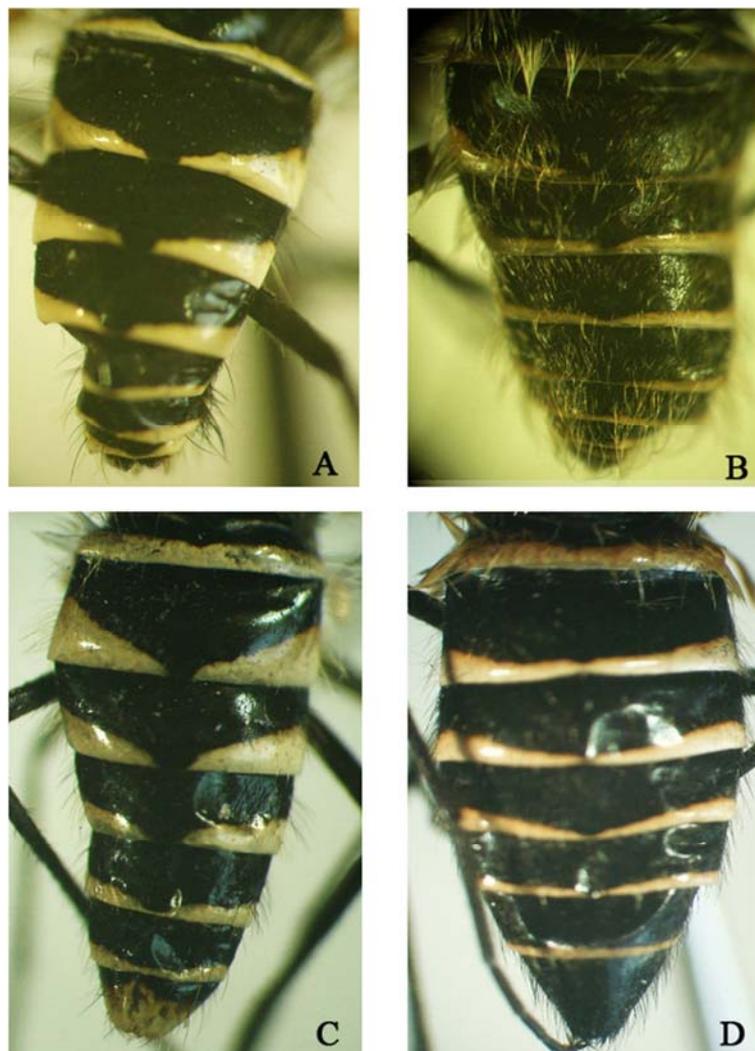


Figure 3. Dorsal view of abdominal tergites: **A-** *Lomatia shelkovnikovi*, **B-** *L. lateralis*, **C-** *L. abbreviata*, **D-** *L. polyzona*.

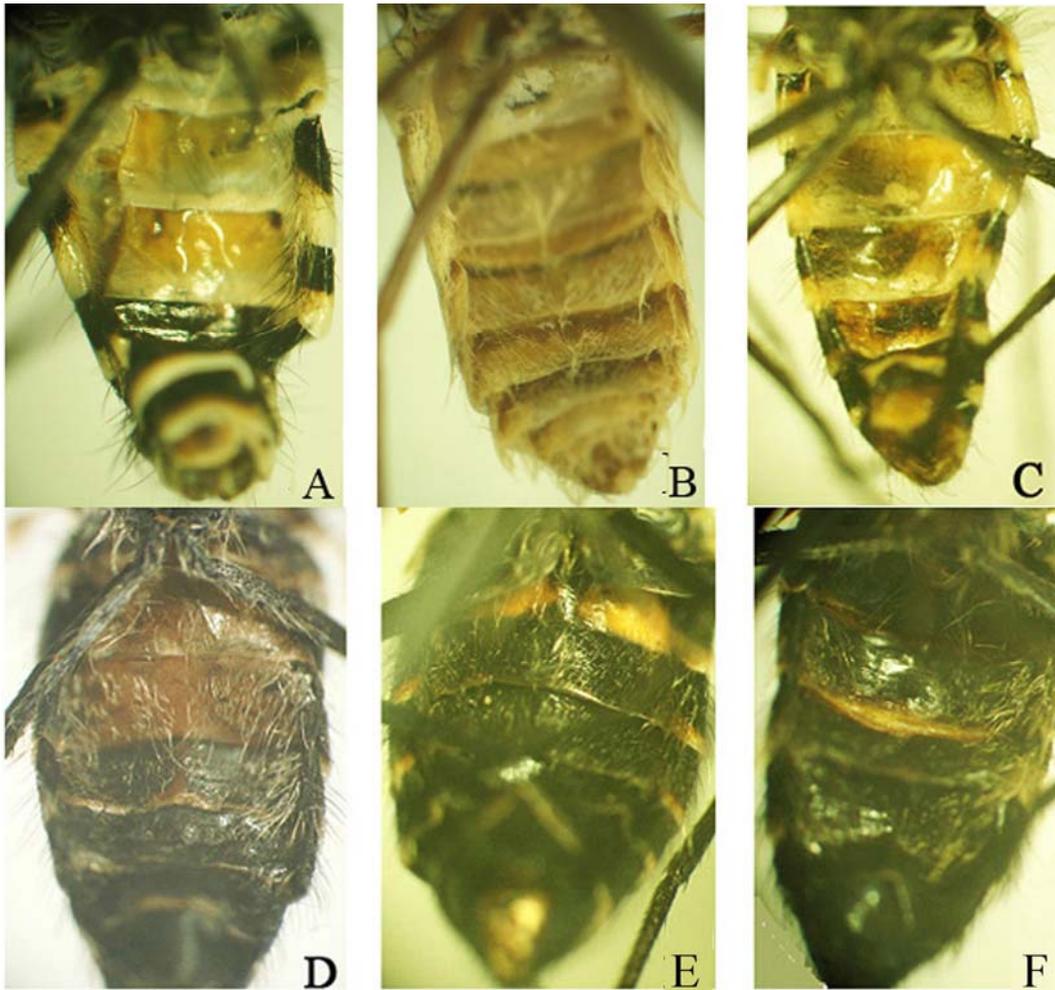


Figure 4. Ventral view of abdominal sternites:
A- *Lomatia shelkovnikovi*, **B-** *L. lateralis*, **C-** *L. abbreviata*, **D, E& F-** *L. polyzona*.

yellow with yellow hairs (Fig. 4C).

Female genitalia as in Fig. 6B.

***Lomatia lateralis* (Meigen, 1820)**

Synonyms: *Stygia lateralis* Meigen, 1820.

Material examined: Iran, Markazi province, Farahan, Davood abad, 34°17'32.19''N, 49°51'27.76''E, 3207 m. a.s.l., 08.vi.2011, (6♀, 2♂); leg. S. Farahani (Fig. 1).

General distribution: Algeria, Armenia, Austria, Azerbaijan, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Gruzia, Hungary, Iran, Italy, Libya, Macedonia, Moldova, Morocco, Poland, Romania, Russia (SET), Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkmenistan, Ukraine, former Yugoslavia.

Diagnosis (female) (Fig. 5B): Head: face and frons covered with white hairs; scape covered with yellow hairs; proboscis as long as head; Thorax: mesonotum and scutellum covered by yellow hairs; prosternum covered with white hairs. Wing: cells c, r₁ and br yellow, discal cell and wing margin transparent; r₅ cell open (Fig. 2B). Halter: apex yellow; basally brownish yellow. Legs: black, covered by white scale, yellow hairs and scattered black bristly hairs; empodium absent. Abdomen: tergites with yellow hind margins; about 2/3 of first tergite yellow; yellow hind margins of abdominal tergites at most 1/3 of tergites length, uninter-

rupted medially; all tergites covered with yellow hairs; antero-lateral sides of first abdominal segment covered with dense yellow hairs (Fig. 3B); abdominal sternites yellow with yellow hairs (Fig. 4B).

Female genitalia: as in Fig. 6A.

***Lomatia shelkovnikovi* Paramonov, 1924**

Material examined: Iran, Alborz province, Sar ziarat, 35°55'10.38''N, 51°06'51.24''E, 1980 m.a.s.l., 22.vi.2010, (1♂); leg. M. Kheyrandish (Fig. 1).

General distribution: Armenia, Azerbaijan, Iran.

Diagnosis (male) (Fig. 5A): Head: face covered with white hairs; frons covered with dense white and scattered black hairs; scape and pedicel covered with black hairs; proboscis as long as head. Thorax: mesonotum and scutellum covered with white hairs; prosternum covered with white hairs. Wing: cells c, r₁ and br brownish yellow; discal cell and wing margin transparent; r₅ cell open (Fig. 2A). Halter: apex yellow, basally brownish yellow. Legs: black, covered by white scales, black hairs and scattered black bristly hairs; empodium absent. Abdomen: tergites with yellow hind margins; yellow hind margins of abdominal tergites about 1/2 of tergites length, medially slightly narrow and interrupted; antero-lateral sides of first abdominal segment covered with dense white hairs; antro-lateral sides of abdominal segments

1-4 covered with yellow hairs and antero-lateral sides of abdominal segments 5-7 covered with tufts of black hairs (Fig. 3A); abdominal sternites yellow with yellow hairs (Fig. 4A).

Only males have been collected in the studied area.

Female genitalia in all species are very similar and only the length of apical spermathecal duct and sperm pump are slightly different. Spermathecal reservoir globular, apical spermathecal duct sclerotized, brown, sperm pump membranous, brown, with well sclerotized upper and lower valve, basal spermathecal duct membranous, common

spermathecal duct short, shorter than apical ones; furca as two separate bars and sclerotized (Figure. 6 A-C).

Discussion

Little information is available on the genus *Lomatia* in Iran. Species of this genus have been reported from tropical, temperate and Mediterranean climates (Evenhuis & Greathead 1999). According to Paramonov (1931) in *L. polyzona*, face

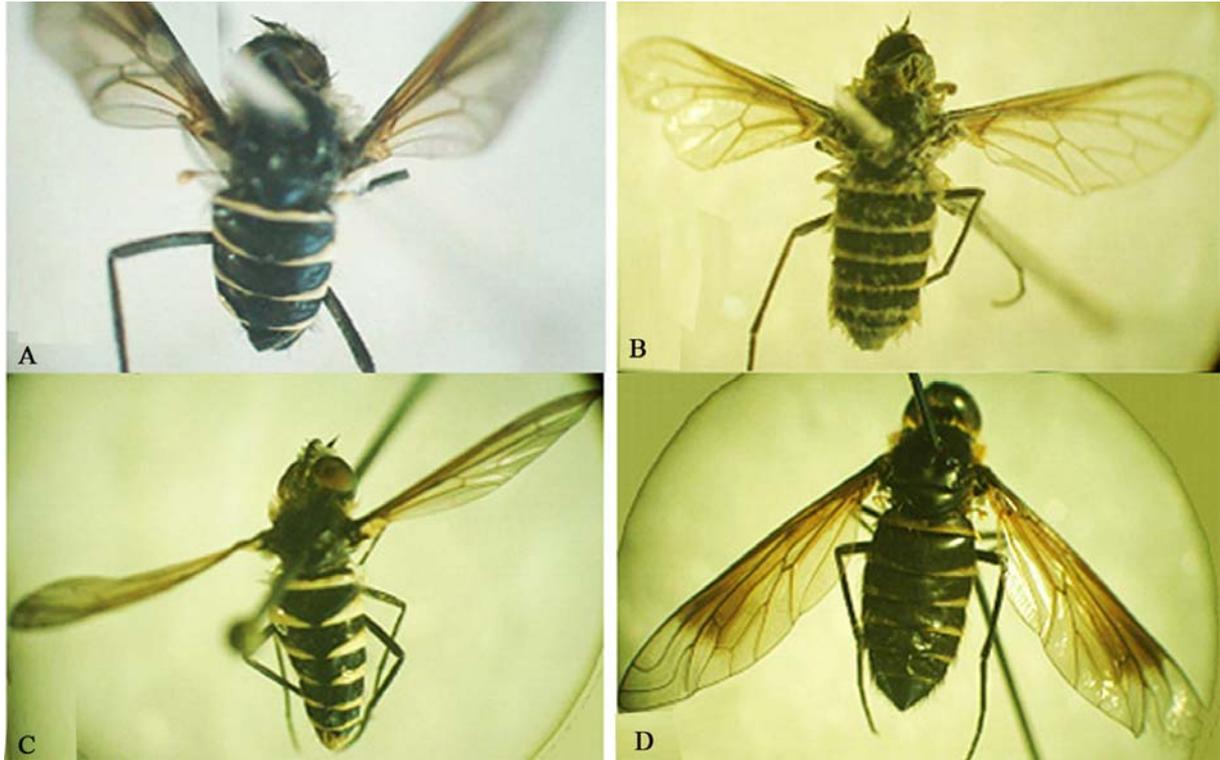


Figure 5. Dorsal habitus of adults:
A- *Lomatia shelkownikovi*, B- *L. lateralis*, C- *L. abbreviata*, D- *L. polyzona*.



Figure 6. Female genitalia.
A- *Lomatia lateralis*, B- *L. abbreviata*, C- *L. polyzona*

covered with black hairs and wing infuscation in male is yellow, however, the Iranian specimens have some white and pale yellowish hairs on the face and wing infuscation in males and females are brown or dark brown. Paramonov (1931) also described *L. shelkownikovi* with yellow hind margins of abdominal tergites very narrow but in Iranian specimens are much wider. Based on the original description of *L. abbreviata* (Paramonov 1931) tergite 1 has yellow hind margins and the lateral margins of abdomen covered with black hairs, however, in Iranian specimens tergite one has white hind margins and lateral margins of tergites 3-7 covered with yellowish white hairs and scattered black hairs. In our idea some of morphological characters are influenced much by environmental variables.

Adult flies of the genus *lomatia* have an internal structure called the sand chamber which is used to gather small particles of sand or other substrates that are glued to the eggs before they are dropped. It is presumed that this gives the fly more control over where they put the eggs (Greathead & Evenhuis 1997) The immature stages of most Bombyliidae are unknown, they are being considered mainly as parasitic or predacious on immature of other insects. Therefore, the Bombyliidae are economically important as biological pest control agents. Based on the current and previous studies the number of known species of the genus *Lomatia* from Iran raised to eleven. However, our knowledge about Bombyliidae is constricted and more investigations are necessary to achieve a good understanding of Iranian fauna.

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