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Faunistic contributions of the subfamily Lixinae (Coleoptera: Curculionidae) from Iranian rangelands

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ABSTRACT. From 2009 to 2012, 16 species of Curculionidae (Coleoptera) from the subfamily Lixinae Schoenherr were collected on 17 species of food plants in Iranian rangelands. Identified species belong to seven genera in the tribes Lixini and Cleonini. The host plants from which they were collected were in the families Asteraceae, Fabaceae, Apiaceae, Campanulaceae, Brassicaceae and Zygophyllaceae. Of the 16 species that we captured, two (*Lixus subfarinosus* Desbrochers, 1893 and *Larinus remissus* Faust, 1889) represent the first records from Iran. These new data also extend the known ranges of several species (*Larinus fucatus* Faust, 1894, *Larinus grisescens* Gyllenhal, 1835, *Microlarinus rhinocylloides* Hochhuth, 1847 and *Bangasternus planifrons* (Brulle, 1832) in Iran. The distribution of beetles and their associated host plants are presented and ecological notes on each species are provided.

Key words: weevils, Lixini, Cleonini, distribution, new record, Iran

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Introduction

Iran's rangelands cover over 90 million hectares (54.8% of the total land area of the country) and play important roles in soil protection and annual dry forage production (DOE 2010). Pest infestations, interacting with biotic (e.g. grazing) and abiotic (e.g. drought, fire, and others) conditions can be responsible for reducing both plant density and production in these rangelands (Pennell *et al*. 2005).

Several studies have been conducted to document the diversity of the curculionid subfamily Lixinae in Iran. Broumand (1998) reported a total of 42 species of Lixini, 47 species of Cleonini and one species of Rhinocyllini, which are represented in the insect collection of the Plant Pests and

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Disease Research Institute of Iran. However, Legalov *et al.* (2010), listed a total of 84 species of Lixini, 111 species of Cleonini and six species of Rhinocyllini from Iran. Twelve species of Lixini, seven species of Cleonini and three species of Rhinocyllini were captured in and adjacent to Iranian rice fields (Ghahari *et al.* 2010), while 14 species of weevils belonging to the tribes Lixini and Cleonini were captured in sugar beet fields in Khorasan Razavi province (Sadeghi *et al.* 2010) and nine species belonging to the Lixini were reported from the southern part of the Kerman region (Shahriyari-Nejad *et al.* 2013). Recently, Gültekin and Podlussany (2012) described two new species in the genus *Larinus* Dejean, 1821 from Iran.

Previous reports have identified host plants for various genera in the curculionid subfamily Lixinae. For example, weevil species in the genus *Microlarinus* Hochhuth, 1847 develop in stems or seed capsules of *Tribulus* spp. (Zygophyllaceae), weevils in the genera *Bangasternus* Gozis, 1882 and *Rhinocyllus* Germar, 1817 feed in flower heads of the Cardueae (Asteraceae), members of the genus *Nefis* Gültekin, 2013 feed on flower heads of plants in Cardueae and Inulae (Asteraceae) (Gültekin 2008, 2013), species from the genus *Cleonis* Dejean, 1821 attack stems and roots of Asteraceae (Gültekin 2004).

The current paper documents the rangeland members of the subfamily Lixinae captured in Iranian rangelands during a seven year period. Map of Iran with the investigated provinces (Fig. 1) and the recorded host plants for each species are compared with prior reported areas from other regions.

Material and methods

The specimens examined for this contribution were collected during 2009-2012 from rangelands in seven provinces of Iran including: Qom, West Azarbaijan, Isfahan, Ardabil, Lorestan, Kohgiluyeh and Boyer-Ahmad and Ghazvin .The beetles were collected either directly (by hand, aspirator, and sweep net) or by rearing them from infested plant material. Each specimen was identified to genus and the locality, date of collection and host plants species on which the specimen was collected/recorded. Specimens were identified to species by Dr. Levent Gültekin (Atatürk University of Turkey) and were deposited in the collection of Curculionidae in the Arthropod Museum of the Research Institute of Forests and Rangelands of Iran. Asterisk indicates the species recorded in Iran for the first time.

Results

There were 16 species of weevils from the subfamily Lixinae captured during this study. The 16 species are represented in seven genera: one species of *Cleonis* Dejean, 1821, eight species of *Larinus* Dejan, 1821, three species of *Lixus* Fabricius, 1801 and one species each in the genera *Microlarinus* Hochhuth, 1847, *Nefis* Gültekin, 2013, *Bangasternus* Gozis, 1882 and *Rhinocyllus* Germar, 1817. Two of the species that were captured in this study (*Larinus remissus* Faust, 1889 and *Lixus subfarinosus* Desbrochers, 1893) represent new records for Iran.

Tribe Cleonini Schoenherr, 1826
Cleonis pigra (Scopoli, 1763)

Material examined: West Azarbaijan province, Urmia (37°32'N, 45°4'E, 1344 m), 18.v.2012, 1♂, on *Cirsium* sp. (Asteraceae), leg.: Z. Hashemi.

Remarks: *Cleonis pigra* has been previously reported from various Iranian provinces: East Azarbaijan, West Azarbaijan, Ardabil, Lorestan, Mazandaran, Golestan, Hamadan, Kermanshah and Khuzestan (Broumand 1998; Legalov *et al*. 2010). The current specimen was collected while

feeding on *Carduus nutans* L. of Bandar-Gaz (Ghahari and Colonnelli 2012). In North America, *C. piger* has been tested as a biological control agent for use against *Cirsium arvense* (L.) (Gassmann *et al.* 2002).

Tribe Lixini Schoennherr, 1823
***Larinus arabicus* Capiomont, 1874**

Material examined: Qom province, Kahak (34°23'N, 50°51'E, 1445 m), 22.v.2011, 2♀♀, on *Echinops robustus* Bunge. (Asteraceae), leg.: A. Mohammadpour.

Remarks: *Larinus arabicus* has previously been reported from various Iranian provinces: West Azarbaijan, Golestan, Qom, Khorasan, Mazandaran, Isfahan and Sistan Baluchestan (Broumand 1998; Legalov *et al.* 2010; Gültekin and Podlussany 2012).

***Larinus fucatus* Faust, 1891**

Material examined: Qom province, Veshnave (34°14'N, 50°59'E, 2014 m), 02.vii.2011, 2♀♀, on *Echinops robustus* Bunge. (Asteraceae), leg.: A. Mohammadpour.

Remarks: *Larinus fucatus* was previously reported in Iran from a single location, Isfahan (Gültekin and Podlussany 2012). The current record expands the recorded range of *L. fucatus* into a second Iranian province (Qom province).

***Larinus grisescens* Gyllenhal, 1835**

Material examined: Qom province, Hosein Abad mish mast (34°36'N, 51°1'E, 879 m), 13.vii.2011, 2♀♀, on *Carthamus tinctorius* L. (Asteraceae), leg.: A. Mohammadpour; Qom province, Ghahan (34°43'N, 50°15'E, 1552 m), 24.vii.2011, 2♀♀, on *Carthamus tinctorius* L. (Asteraceae), leg.: A. Mohammadpour; Kohgiluyeh and Boyer-Ahmad province, poshte koohe basht (30°33'N, 50°56'E, 1070 m), 24.iv.2011, 1♂, 2♀♀, on *Astragalus cephalanthus* Dc. (Fabaceae), leg.: A. Salahi.

Remarks: *Larinus grisescens* was previously reported from only a single location in Iran, Golestan province (Ghahari *et al.* 2011). Our data expand the known range of this weevil in Iran and confirm its presence within other provinces in central and southern parts of the country.

***Larinus hedenborgi* Boheman, 1845**

Material examined: Kohgiluyeh and Boyer-Ahmad province, Koohgol (30°51'N, 51° 31' E, 2468 m), 12.v.2012, 2♂♂, 1♀, on *Prangos* sp. (Apiaceae), leg.: A. Salahi.

Remarks: *Larinus hedenborgi* has previously been reported from the provinces of East Azarbaijan, Kohgiluyeh and Boyer-Ahmad, Hamadan and Lorestan (Gültekin and Podlussany 2012).

***Larinus latus* (Herbst, 1784)**

Material examined: West Azarbaijan province, Ghasemloo Valley (37°20'N, 45°9'E, 1343 m), 21.vii.2011, 3♂♂, on *Carduus onopordioides* Fisch.Ex Bieb. (Asteraceae), leg.: Z. Hashemi; West Azarbaijan province, Ghasemloo Valley (37°20'N, 45°9'E, 1343 m), 21.vii.2010, 7♂♂, on *Cirsium haussknechtii* Boiss. (Asteraceae), leg.: Z. Hashemi.

Remarks: Karimpour (2008) noted that *Larinus latus* plays an important role in control of *Onopordun* sp. in Urmia. *Larinus latus* has previously been reported from various Iranian provinces: East Azarbaijan, West Azarbaijan, Ardabil, Mazandaran, Ghazvin, Qom, Tehran, Lorestan, Isfahan, Fars, Hormozgan, Kermanshah and Kordestan (Broumand 1998).

***Larinus modestus* Gyllenhal, 1835**

Material examined: Kohgiluyeh and Boyer-Ahmad province, Koohgol (30°51'N, 51°31'E, 2468 m), 12.v.2011, 3♂♂, 1♀, on *Astragalus fasciculifolius* (Fabaceae), leg.: A. Salahi.

Remarks: *Larinus modestus* was previously reported from provinces in central and southern Iran: Lorestan, Isfahan, Kohgiluyeh

and Boyer-Ahmad and Zangan (Gültekin and Podlussany 2012).

***Larinus remissus* Faust, 1889 ***

Material examined: Ghazvin province, Ghazvin (36°16'N, 49°59'E, 1305 m), 18.vii.2010, 1♂, 4♀♀, on *Centaurea aucheri* (Dc.) Wagenitz. (Asteraceae), leg.: A. Zarnegar.

Remarks: This report represents the first record of *Larinus remissus* from Iran. Previously, *L. remissus* had only been recorded from Armenia and Azerbaijan (Gültekin and Fremuth 2013).

***Larinus sturnus* (Schaller, 1783)**

Material examined: Qom province, Nevis (34°43'N, 50°11'E, 1755 m), 24.iv.2011, 2♀♀, on *Mindium laevigatum* (Vent.) Rech.F. (Campanulaceae), leg.: A. Mohammadpour; Qom province, Karamjegan (34°17'N, 50°50'E, 2067 m), 28.vi.2011, 3♀♀, on *Cirsium congestum* Fisch. et C.A. Mey. (Asteraceae), leg.: A. Mohammadpour.

Remarks: *Larinus sturnus* has previously been reported from several provinces in Iran including Isfahan, Ghazvin, Gilan, Hamadan, Kordestan and Mazandaran provinces (Brumand 1998).

***Lixus albomarginatus* Boheman, 1842**

Material examined: West Azarbaijan province, Ghasemloo Valley (37° 20' N, 45° 9' E, 1343 m), 18.vii.2010, 1 ♂, 5 ♀♀, on *Sophora alopecuroides* L. (Fabaceae), leg.: M. R. Zargaran.

Remarks: *Lixus albomarginatus* has previously been reported from three Iranian provinces including East Azarbaijan, Sistan and Baluchestan and Tehran (Shahriyari-Nejad et al. 2013).

***Lixus obesus* Petri, 1904**

Material examined: Kohgiluyeh and Boyer-Ahmad province, Koohgol (30°51'N, 51°31'E, 2468 m), 12.v.2011, 2♂♂, 1♀, on *Prangos ferulacea* (L.) Lindle (Apiaceae), leg.: A. Salahi; Kohgiluyeh and Boyer-Ahmad province, Koohgol (30°51'N, 51°31'E, 2468 m), 16.vi.2011, 1♂, 2♀♀, on *Prangos scabra* Nabelek (Apiaceae), leg.: A. Salahi.

Remarks: *Lixus obesus* had only been reported from a single location in Iran, a rice field in Mazandaran province in northern Iran (Ghahari *et al.* 2010). The current report expands the distribution of the weevil within the country and establishes that *L. obesus* also occurs in southern Iran.

***Lixus subfarinosus* Desbrochers, 1893 ***

Material examined: Qom province, Veshnave (34°14'N, 50°59'E, 2014 m), 10.vi.2012, 2♀♀, on *Fibigia umbellata* (Boiss.) Boiss. (Brassicaceae), leg.: A. Mohammadpour.

Remarks: This report represents the first record of this species from Iran. There are previous records from Egypt, Tunisia, Arab Emirates, Iraq and Yemen (Gültekin and Fremuth 2013).

***Microlarinus rhinocylloides* Hochhuth, 1847**

Material examined: Lorestan province, Qalaie (33°0'N, 49°41'E, 2068 m), 18.v.2011, 1♂, 8♀♀, on *Tribulus terrestris* L. (Zygophyllaceae), leg.: F. Piruzi; Ardabil province, Kosar (38°14'N, 48°18'E, 1348 m), 10.vi.2011, 1♀, 5♂♂, on *Tribulus terrestris* L. (Zygophyllaceae), leg.: D. Aligholizadeh.

Remarks: This report expands the range of *M. rhinocylloides* within Iran where it had previously only been recorded from Gilan province (Borumand 1998).

***Nefis brevirostris* (Hochhuth, 1851)**

Material examined: Isfahan province, Isfahan (32°39'N, 51°40'E, 1579 m), 22.vi.2010, 1♂, 3♀♀, on *Prangos ferulacea* (L.) Lindl. (Apiaceae), leg.: A.R. Haghshenas.

Remarks: This report confirms the presence of *N. brevirostris* in Isfahan

province as previously reported by Gültekin (2013).

***Bangasternus planifrons* (Brulle, 1832)**

Material examined: Qom province, Ghahan (34°43'N, 50°15'E, 1552 m), 24.vii.2011, 3♀♀, on *Carthamus tinctorius* L. (Asteraceae), leg.: A. Mohammadpour.

Remarks: *Bangasternus planifrons* has previously been reported to occur in Chaharmahal and Bakhtiari province on *Ricinus communis* (Euphorbiaceae) (Ghahari *et al*. 2010). The current report expands the known range of the weevil into a second province (Qom).

***Rhinocyllus conicus* (Frölich, 1792)**

Material examined: West Azarbaijan province, Ghasemloo Valley (37°20'N, 45°9'E, 1343 m), 15.vii.2010, 1♂, 5♀♀, on *Cirsium echinus* (Beib.) Hand.-Mazz. (Asteraceae), leg.: M. R. Zargaran.

Remarks: This report confirms the presence of *R. conicus* in Iran and expands its distribution into an additional province – West Azarbaijan. *Rhinocyllus conicus* had previously been recorded from East Azarbaijan, Ardabil, Qazvin and Tehran provinces (Borumand 1998).

Discussion

We report the capture of 16 species of weevils belonging to the subfamily Lixinae from multiple habitats across Iran. The weevils were associated with 17 different host plant species belonging to 11 genera and multiple plant families. Some of the recorded host plants have medicinal and/or industrial value and the cultivation of such plants is encouraged both to protect natural biodiversity and to protect the plants from over-exploitation (DOE 2010). For example, Milk thistle, *Silybum marianum* (L.) Gaertn (Asteraceae), is used in the treatment of various liver diseases. Large population of the *Larinus latus* Herbst (seed head flower weevil) have been recorded on Milk thistle in Egypt (Ottai and Abdel-Moniem 2006). When high population densities of pest beetles occur on such cultivated medicinal plants, it is necessary to control the pest using appropriate techniques. Some Lixini weevils can be beneficial in that they feed on noxious weeds and therefore play a role as biological control agents in the suppression of these unwanted plants, especially in rangeland habitats.

Most of the Lixini species captured during this study were associated with Asteraceae, one of the largest and most diverse plant families (Memariani *et al*. 2016). Some of the plants within the Asteraceae, such as thistle in the genera *Carduus*, *Cirsium*, and others are economically important noxious weeds (Gültekin 2005). Some of the weevil species captured during this project, such as *R. conicus*, *C. pigra* and *L. latus*, have been introduced into North America for use as biocontrol agents. In the current study, these weevils were associated with *Cirsium* sp., *C. echinus*, *C. haussknechtii*, *Prangos ferulacea*, and *Carduus onopordioides* suggesting that these beetles may aid in natural control of these noxious weeds.

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Figure 1. Map of Iran with the investigated provinces in grey.

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فون سرخرطومی‌هـای زیرخـانواده Lixinae Schoenherr (Coleoptera: Curculionidae) در مراتع ایران

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چکیده: در سال‌های ۱۳۹۲-۱۳۸۷ سرخرطومی‌های زیرخانواده Lixinae مرتبط با گیاهان مرتعی مناطق مختلف اکولوژیک ایران بررسی گردید. در این بررسی ۱۶ گونه متعلق به قبیله Lixini و Cleonini از گیاهان میزبان خانواده Asteraceae، Fabaceae، Apiaceae، Campanulaceae، Brassicaceae و Zygophyllaceae جمع‌آوری و شناسایی شد. دو گونه‌ی *Lixus subfarinosus* Desbrochers, 1893 و *Larinus remissus* Faust, 1889 برای اولین بار از ایران گزارش می‌شوند. برای برخی گونه‌ها شامل *Larinus fucatus* Faust, 1894، *Larinus grisescens* Gyllenhal, 1835، *Microlarinus rhinocylloides* Hochhuth, 1847 و *Bangasternus planifrons* (Brulle, 1832) دامنه پراکنش جدید معرفی شد. پراکنش، گیاهان میزبان و اطلاعات اکولوژیک هر یک از گونه ها ارایه شده است.

واژگان کلیدی: سرخرطومی، Lixini، Cleonini، پراکنش، گزارش جدید