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Noctuidae of Khabr National Park, part II. A new species of the genus *Polymixis* Hübner, [1820] from Iran (Lepidoptera: Noctuidae, Xyleninae)

Asghar Shirvani

Abstract

Present paper includes the result of the new expeditions carried out in order to collect Noctuidae from Khabr National Park, Kerman, south of Iran. The description of a new *Polymixis* species, *Polymixis* (*Eremophysa*) *fakherehsabae* Shirvani, sp. nov. is given. The new species is compared with its close relatives, besides, bionomic and distribution of *P. fakherehsabae* are presented together with the adult and the male genitalia illustrations. Provincial distribution of the species belonging to the subgenus *Eremophysa* Boursin, 1958 in Iran is provided.
Keywords: Lepidoptera, Noctuidae, Xyleninae, *Polymixis*, new species, taxonomy, Iran.

Noctuidae del Parque Nacional de Khabr, parte II.
Una nueva especie del género *Polymixis* Hübner, [1820] de Irán
(Lepidoptera: Noctuidae, Xyleninae)

Resumen

El presente trabajo incluye el resultado de las nuevas expediciones realizadas para recolectar Noctuidae en el Parque Nacional de Khabr, Kerman, al sur de Irán. Se describe una nueva especie de *Polymixis*, *Polymixis (Eremophysa) fakherehsabae* Shirvani, sp. nov. La nueva especie se compara con sus parientes cercanos, además, se presenta la bionomía y la distribución de *P. fakherehsabae* junto con el adulto y las ilustraciones de la genitalia del macho. Se proporciona la distribución provincial de las especies pertenecientes al subgénero *Eremophysa* Boursin, 1958 en Irán.
Palabras clave: Lepidoptera, Noctuidae, Xyleninae, *Polymixis*, nueva especie, taxonomía, Irán.

Introduction

At the first attempt to explore and identify the noctuid moths s. l. of Khabr National Park (KNP) (Kerman, Iran), Shirvani (2012a) reported 42 species including one new record for the country. After a decade, new expeditions were conducted again to investigate the biodiversity of this territory. One of the results of these efforts is describing a new species belonging to the subgenus *Eremophysa* Boursin, 1958 the genus *Polymixis* Hübner, [1820] of subtribe Antitypina Forbes & Franclemont, 1954 (Keegan et al. 2021; Lafontaine & Fibiger, 2006). The genera associated with the subtribe Antitypina differ from those in Xylenina Guenée, 1837 in having a short ampulla on the clasper (Fibiger & Lafontaine, 2005). The genus *Polymixis*, one of the largest paraphyletic genera of trifine Noctuidae, comprises more than seventy described species in the Palearctic region (Ronkay et al. 2001). With new discoveries during

the last decades, the taxonomic interpretation of the species-groups of *Polymixis* is debatable due to the lack of recognized autapomorphies and may be resolved using comprehensive molecular phylogenetic analysis (Benedek et al. 2021).

Eremophysa was first established by Boursin (1958) as a genus for *Polymixis gracilis* (Brandt, 1941), *Polymixis hedygramma* (Brandt, 1941), *Polymixis scrophulariae* (Wiltshire, 1952), *Polymixis acharis* (Püngeler, 1901) and *Polymixis calamistis* (Hampson, 1906). Dividing the large complex genus *Polymixis* into 11 subgenera, Hacker & Ronkay (1992) downgraded *Eremophysa* to a subgenus of *Polymixis* that includes large and relatively light colored species whit tubular vesica constituted of several diverticula armed with a bundle of cornuti (distal diverticulum) and large cornuti (proximal diverticula). The subgenus *Eremophysa* with mainly autumnal flying adults comprises, so far, 11 species and three subspecies in the Palearctic (Hacker & Ronkay, 1992; Ronkay & Gyulai, 2006; Gyulai et al. 2014) none of them occurring in the Europe.

Five *Polymixis* species of the subgenus *Eremophysa*, all with Iranian type locality have been described from Iran (Shirvani, 2012b). The present paper describes a new species, *Polymixis* (*Eremophysa*) *fakherehsabae* Shirvani, sp. nov. from south of Iran, Khabr National Park, Kerman. The new species is compared with its close relatives and the information on the bionomic and distribution of *P. fakherehsabae* are presented together with the adult and the male genitalia illustrations. Provincial distribution of the species belonging to the subgenus *Eremophysa* in Iran is provided.

Material and Methods

Abbreviations used:

KNP = Khabr National Park, Kerman, Iran
SHBUK = Shahid Bahonar University of Kerman, Kerman, Iran

Adult moths were collected by LED light trap (a handmade structure including 24 UV, one blue, one green and one white LEDs arranged on a three-dimension structure, powered by 12-V batteries) in October 2021. The specimens were photographed by a Canon digital camera (Power Shot A710) and the photographs of the genitalia were taken by an Olympus SZH stereomicroscope with an Omax (18 Mp) A35180U3 digital camera.

Results

"Palearctic species of the genus *Polymixis* Hübner, [1820], subgenus *Eremophysa* Boursin, 1958:"

P. colluta (Draudt, 1934)
= *parka* Sukhareva, 1976
subsp. *apotheina* Brandt, 1938
= *laristana* Brandt, 1941
subsp. *exspectata* Hacker, 1987
P. argillosa Boursin, 1970
P. scrophulariae (Wiltshire, 1952)
P. acharis (Püngeler, 1901)
= *intermissa* Boursin, 1944
subsp. *afghana* Boursin, 1963
P. calamistis (Hampson, 1906)
P. gracilis (Brandt, 1941)
P. rohrei Boursin, 1961
P. omanensis Boursin, 1970
P. hedygramma (Brandt, 1941)

P. pirkadatka Ronkay & Gyulai, 2006
P. fakherehsabae Shirvani, sp. nov.
P. serratilinea Gyulai, Ronkay & Ronkay, 2014

Polymixis colluta apotheina (Brandt, 1938)
Sidemia apotheina Brandt, 1938, *Ent. Rdsch., 55*, 522
L.T.: IRAN, Karaj

Distribution in IRAN: Fars, Sistan-va-Balouchestan, Lorestan (Brandt, 1941), Kerman (Shirvani et al. 2012), Hormozgan (Lehmann et al. 2009), Khuzestan, Golestan, Khorasan-e-Shomali, Kohgiluyeh-va-Boyerahmad, Kurdistan (Shahreyari-Nejad et al. 2018). Golestan, Khorasan (Wieser & Stanselmaier, 2005), Tehran, Azarbayjan-e-Gharbi (Ebert & Hacker, 2002).

Polymixis scrophulariae (Wiltshire, 1952)
Sidemia scrophulariae Wiltshire, 1952. *Bull. Soc. Fouad 1er Ent., 36*, 194
L.T.: IRAN, Fars

Distribution in IRAN: Fars (Wiltshire, 1952).

Polymixis gracilis (Brandt, 1941)
Sidemia gracilis Brandt, 1941. *Mitt. münch. ent. Ges., 31*, 849
L.T.: IRAN, Laristan, Sistan-va-Balouchestan

Distribution in IRAN: Lorestan, Sistan-va-Balouchestan (Brandt, 1941; Ebert & Hacker, 2002)

Polymixis hedygramma (Brandt, 1941)
Sidemia hedygramma Brandt, 1941. *Mitt. münch. ent. Ges., 31*, 849
L. T.: IRAN, Laristan, Sistan va Balouchestan

Distribution in IRAN: Lorestan, Sistan-va-Balouchestan (Ebert & Hacker, 2002), Khorasan-e-Jonubui (Shahreyari-Nejad et al. 2018).

Polymixis pirkadatka Ronkay & Gyulai, 2006
Polymixis pirkadatka Ronkay & Gyulai, 2006. *Esperiana, 12*, 217
L. T.: IRAN, Esfahan.

Distribution in IRAN: Esfahan (Ronkay & Gyulai, 2006).

***Polymixis fakherehsabae* Shirvani, sp. nov.**

Holotype: 1 ♂, IRAN, Prov. Kerman, Baft, Khabr National Park, 2360 m., 28º51‘0“N 56º22‘22“E, 7-8-X-2021, leg. Asghar Shirvani, Slide No. AS806m (coll. SHBUK). Paratype: 1 ♂, same date and location, Slide No. AS818m (coll. SHBUK).

Diagnosis: *Polymixis fakherehsabae* Shivani, sp. nov. is the closest relatives of *P. pirkadatka* and *P. hedygramma.* The new species differs externally from *P. pirkadatka* by the narrower and greyish forewing and from *P. hedygramma* by the smaller size. The male genitalia of the three species are quite different, *P. fakherehsabae* has semi-globular penicular lobes, longer sacculus, shorter vesica, a strong thorn like cornutus and just one cornutus situated on the median diverticulum.

Description: Wingspan 38-44 mm (Figure 1). Length of forewing 19-22 mm. male, antennae finely bipectinate with fasciculate cilia. Palpi porrect, third segment very long, upturned, with brown scales. Head small, eyes large, globular. Head, collar, tegulae and thorax unicolorous grey-ochreous. Forewings long and narrow, costal margin slightly arched apically. Ground colour pale ochreous, basal dash absent, antemedial and postmedial lines present, fine, sinuous, greyish light brown, median area marked with brown scales forming a semi rectangle posteriorly, subterminal and terminal lines indistinct. Orbicular and reniform stigmata small, with bright outlines, claviform stigma obsolescent,

fringes as ground colour. Hindwings small, whitish ochreous, discal spot absent, crosslines missing, fringes white. Underside of wings white, shining.

Figure 1. *Polymixis fakherehsabae* Shirvani, sp. nov., male adults. **A.** Holotype, Iran, Kerman, Baft, Khabr National Park. **B.** Paratype, Iran, Kerman, Baft, Khabr National Park.

Male genitalia (Figure 2): Uncus short, chevron-shaped, more, or less hairy. Tegumen short, penicular lobes semi globular, densely hairy. Vinculum short, V-shaped, juxta large, long, sub-deltoidal, sclerotized. Valva elongate, symmetrical, finely constricted at basal one-third. Sacculus longer than wide, clavus as a short lobe. Harpe narrow, clasper very long, sclerotized, slightly asymmetrical, with acute apical section and finely rounded triangular sub-apical process. Cucullus small, rounded corona present. Aedeagus cylindrical, carina with small sclerotized ventro-lateral plate, longer and weaker dorso-lateral bar present. Vesica long, tubular, everted dorso-laterally, narrow basally, with a fine basal cornutus. Distal two third broad, curved, medially with long and strong thorn-like cornutus, terminal section with small conical diverticulum covered with long setiform cornuti, median diverticulum (opposite to setiform cornuti) saccate, armed with terminal thorn-like cornutus.

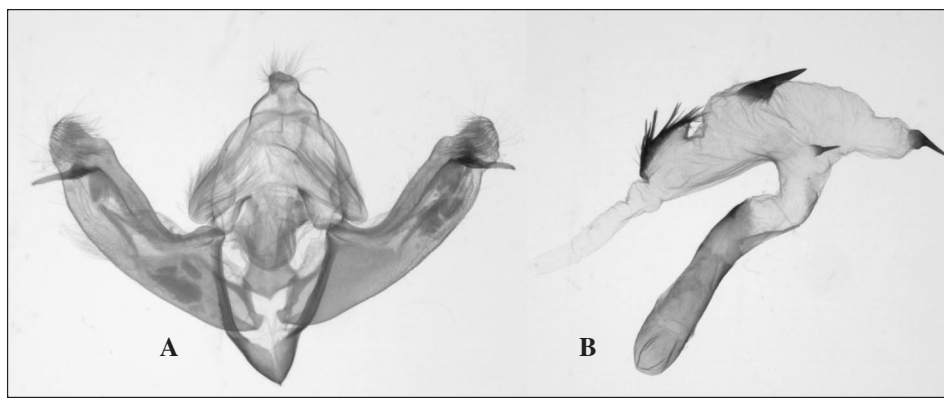

Figure 2. *Polymixis fakherehsabae* Shirvani, sp. nov., male genitalia. **A.** Armature. **B.** Aedeagus and everted vesica.

Bionomics: The two known specimens were collected by the light trap in the mountain slope with short hills covered by *Artemisia* spp., *Astragalus* spp. and sparsely by *Pistacia atlantica* Desf. (Anacardiaceae) plants. The larval food plant and their biology is unknown.

Etymology: The new species named in honor of Fakhereh Saba (1920-2007). Saba and her husband, Alireza Afzalipour (1909-1993), were founders of Shahid Bahonar University of Kerman.

Discussion: The subgenus *Eremophysa* comprises the species/subspecies mostly inhabiting Central Asia. Of them, *P. omanensis* and *P. colluta exspectata* are recorded from Oman and Turkey respectively. Univoltine species with autumnal adults (adult *P. argillosa* and *P. acharis* fly in July) that majority of them are rather restricted to certain areas and known based on one sex. This subgenus is characterized by the light-ochreous colored adults with tubular vesica consisted of diverticula, thorn-like cornuti and terminal field of fine cornuti (Boursin, 1958; Hacker & Ronkay, 1992). With the increase in the number of new species discoveries, new molecular and morphological phylogenetic analyses are needed, in order to make monophyletic groups, to revise and redefine the large and complex polyphyletic noctuid genera (e.g.: the genus *Polymixis*). The elements of the wing pattern and the genitalia of *P. fakherehsabae*, *P. pirkadatka* and *P. hedygramma* show the close relationship among these three species making a distinct lineage within the subgenus *Eremophysa* of *Polymixis.*

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Asghar Shirvani
Research and Technology Institute of Plant Production (RTIPP)
Shahid Bahonar University of Kerman
Kerman
IRÁN / *IRAN*
E-mail: shirvani@uk.ac.ir
https://orcid.org/0000-0002-4647-1030

y / *and*

Department of Plant Protection
Faculty of Agriculture
Shahid Bahonar University of Kerman
Kerman
IRÁN / *IRAN*

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