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Article

First record of the genus *Zygaenoprocris* Hampson, 1900 (Lepidoptera: Zygaenidae) from Türkiye (Turkey)

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Abstract
Zygaenoprocris persepolis (Alberti, 1938) is found in eastern Türkiye (Turkey). This is the first record of the genus *Zygaenoprocris* Hampson, 1900 (Lepidoptera: Zygaenidae) from Türkiye. The larval host-plant of *Z. persepolis* in Türkiye is *Atraphaxis spinosa* L.

Key words Lepidoptera, Zygaenidae, Procridinae, *Zygaenoprocris*, *Z. persepolis*, *Atraphaxis*, Türkiye.

Introduction

This publication is a continuation of our investigations of the family Zygaenidae in Türkiye (Efetov *et al.* 2010; Can Cengiz *et al.* 2018; Can *et al.* 2019, 2022; Ulaşlı et al. 2018; Ulaşlı & Can 2021).

The family Zygaenidae is divided into five subfamilies (Efetov 1999b, Efetov *et al.* 2014b, Efetov & Tarmann 2017a) and includes more than 1000 species (Efetov & Tarmann 1995b, 1999a, b, 2013a, b, 2014a, b, 2016a, b, 2017b, 2019, 2022a, b, 2024; Efetov 1996a, b, 1997a, b, 1998, 2001a–c, 2006, 2010; Efetov *et al*. 2004, 2006, 2015, 2018, 2019a, b, 2022, 2023; Efetov & Hayashi 2008; Efetov & Savchuk 2009; Efetov & Knyazev 2014; Knyazev *et al*. 2015; Subchev *et al*. 2016; Razov *et al*. 2017; Vrenozi *et al*. 2019; Gernaat *et al*. 2022; Sondhi *et al*. 2023).

In recent years, intensive research with or without the use of sex pheromones and sex attractants has greatly expanded our knowledge of the Zygaenidae (Lepidoptera) fauna of Türkiye (Efetov *et al.* 2010; Can Cengiz *et al*. 2018; Can *et al*. 2019, 2022). According to the published data, the family Zygaenidae is represented in Türkiye by 56 species from two subfamilies: Procridinae (24 species) and Zygaeninae (32 species) (Mollet 1995; Efetov 2004a, 2005; Can Cengiz *et al*. 2018; Can *et al*. 2022; Hofmann & Tremewan 2017, 2020a, 2020b; Ulaşlı & Can 2021). Until now only five genera of

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Zygaenidae, viz. *Zygaena* Fabricius, 1775, *Theresimima* Strand, 1917, *Rhagades* Wallengren, 1863, *Adscita* Retzius, 1783, and *Jordanita* Verity, 1946, were known in Türkiye (Efetov, 2004a). This publication is focused on the discovery of the sixth genus, *Zygaenoprocris* Hampson, 1900, and 57th species, *Zygaenoprocris persepolis* (Alberti, 1938), on the territory of Türkiye.

Zygaenoprocris is a well separated group in the tribe Procridini (Lepidoptera: Zygaenidae, Procridinae). Hampson (1900: 225) described this taxon to accommodate a single species, viz. *Zygaenoprocris chalcochlora* Hampson, 1900, known at that time only from Pakistan. Alberti (1939: 30) proposed to consider *Zygaenoprocris* as a subgenus of the genus *Procris* [Fabricius in Illiger], 1807. He also used this status later in his revision of the Zygaenidae (Alberti 1954: 332). At that time, nothing was known about the biology of *Zygaenoprocris* and its studied distribution was limited only to Pakistan, Afghanistan and Iran. (Alberti also erroneously included *Procris capitalis* (Staudinger, 1879), a species distributed in Turkey, Greece and Macedonia, into *Zygaenoprocris*. This taxon was excluded from *Zygaenoprocris* by Efetov (1994) and Efetov and Tarmann (1994). It is *Adscita capitalis* (Staudinger, 1879) now). Later *Zygaenoprocris* was recorded by Efetov for Armenia (Efetov 1990) and Turkmenistan (Efetov 1991). Efetov also was the first scientist who found the larval host-plant of *Zygaenoprocris* (Efetov 1991) and described its early stages (Efetov 1994b). Sex attractants of *Zygaenoprocris* were discovered by Efetov *et al.* (2011, 2014a). Efetov also described three new species of *Zygaenoprocris* from Turkmenistan and Afghanistan (Efetov 1991, 1994a) and published new data on the systematics, synonymy, distribution and morphology of *Zygaenoprocris* (1992a, b, 1993, 1996a, b, 1997c, 1999a, 2001b, c, 2003, 2004a–c). Mollet & Tarmann (2007) and Keil (2002, 2020) subsequently described a few species and subspecies of *Zygaenoprocris* from Iran and obtained new data on the morphology and biology of *Zygaenoprocris* (Mollet 2003; Keil, 2014, 2016a, b).

Efetov (1994) and Efetov & Tarmann (1994, 1995a) in a revision of *Zygaenoprocris*, maintained the subgeneric rank of this taxon (in the genus *Adscita* Retzius, 1782) and included 10 species in it. Subsequent research significantly increased our knowledge of the biology and morphology (including the chaetotaxy of the first instar larvae (Efetov & Tarmann 1999b; Efetov *et al.* 2000)) of this group and showed a highly isolated position of *Zygaenoprocris*. As a result, Efetov (2000, 2001a) resurrected this taxon from subgeneric to generic level and divided it into three subgenera. Mollet (2001) described a fourth subgenus, viz. *Efetovia* Mollet, 2001.

Hampson (1900) and Alberti (1954) mentioned the shape of the antenna with the very broad spoon-like club distally as the main character of *Zygaenoprocris*. However, Efetov found that the clubbed distal part of the antenna became spoon-shaped only in dry specimens; in fresh examples it is balloon-like without a concavity (Efetov 1994, Efetov & Tarmann 1994). Moreover, some *Zygaenoprocris* species have narrower club than some *Adscita* species (Efetov, 1994). The main characters of *Zygaenoprocris* that separate it from *Adscita* are (Efetov 1994, Efetov & Tarmann 1994):

1, foreleg with long tibial epiphysis (absent in *Adscita*),

2, proboscis yellow (black or blackish brown in *Adscita*).

Efetov & Tarmann (2024) in their recently published 'An annotated catalogue of the Procridinae of the World' summarized all new data on the genus *Zygaenoprocris*, described a fifth subgenus and included into the genus 14 species with distribution in northern South Asia (Pakistan, Afghanistan) northeastern West Asia (Armenia, Iran) and southern Central Asia (Turkmenistan).

Results

During the field work in the Province Iğdır of eastern Türkiye in June 2024 Onat and Özgü Başbay found two adult procridine larvae feeding on *Atraphaxis spinosa* L. Further investigations were completed by Konstantin Efetov. Both larvae pupated, but only one moth (male) emerged from one of them on 19 July 2024.

Material examined

2 adult larvae, 21.VI.2024, Türkiye, Prov. Iğdır, 33–33.5 km W of Tuzluca, vic. village Akçay, 1480 – 1770 m above sea level (Figure 1).

First larva: pupation 5.VII.2024, male ex pupa 19.VII.2024.

Second larva: pupation 7.VII.2024, pupa died.



Figure 1. Habitat of *Zygaenoprocris persepolis* (Alberti, 1938). Türkiye, Prov. Iğdır, W of Tuzluca, vic. village Akçay. Photo: O. Başbay.

Examination of the genitalia of this male shows that it is *Zygaenoprocris persepolis* (Alberti, 1938), a species of the subgenus *Molletia* Efetov, 2001a.

We provide below the descriptions of the larva, pupa and male of *Zygaenoprocris persepolis* from Türkiye.

Description of the larva

Final instar (Figures 2, 3). Body with black dorsal, dorsolateral, lateral and basal stripes; space between mediodorsal and dorsolateral stripes and under lateral stripe white; space between dorsolateral and lateral stripes orange-brown. Verrucae brown, each with two types of setae: long white setae and short brown setae. With the exception of the verrucae, body completely covered with small black dots, more densely on mediodorsal and dorsolateral lines; under high magnification every dot represents sclerotized multispined tubercle. Head and dorsal plate of first thoracic segment dark brown. Before pupation larva changes colour, the body with the exception of stripes become yellowish brown.

The adult larva feeds on the leaves of *Atraphaxis spinosa* L. (Polygonaceae).

Description of the pupa

Length 8.5 mm. Head, thorax, wings and abdomen smooth, light brown, before emergence of imago become dark brown; proboscis shorter than length of body (Figure 4). In comparison, another species of the genus *Zygaenoprocris*, viz. *Z. taftana* Alberti, 1939 (whose larva also feeds on *Atraphaxis spinosa*) has pupa with extremely long proboscis (longer than length of body and extending ca 1 mm beyond caudal end of pupa). Duration of pupal stage: 14 days.

Description of the cocoon

Length 9.5 mm. Flimsy, spindle-shaped, white (Figure 5).

Description of the male

Length of body 8.8 mm; length of forewing 8.7 mm, breadth 3.2 mm; length of hindwing 6.3 mm, breadth 3.5 mm; length of antenna 5.2 mm. Head capsule spherical, frons and occiput dark green with weak submetallic sheen (Figures 6, 7). Compound eye black; ocellus dark orange. Chaetosema black. Labial palp short (not reaching frons), black. Antenna covered with scales, black, bipectinate, strongly clubbed, number of segments 36, length of pectination in middle part of antenna 0.6 mm, antennal shaft thickened distally, ratio of breadth of 4th segment from apex to breadth of 15th segment nearly 3.0, last 9 segments of antenna with pectination reduced and forming a pronounced club, its breadth 0.7 mm.





Figures 2–3. Last instar larva of *Zygaenoprocris persepolis* (Alberti, 1938). Türkiye, Prov. Iğdır, W of Tuzluca, vic. village Akçay. 2. Lateral view. 3. Dorsolateral view. Photo: O. Başbay.





Figures 4–5. *Zygaenoprocris persepolis* (Alberti, 1938). Türkiye, Prov. Iğdır, W of Tuzluca, vic. village Akçay. 4. Pupa. 5. Cocoon. Photo: K.A. Efetov.





Figures 6–7. Male of *Zygaenoprocris persepolis* (Alberti, 1938). Türkiye, Prov. Iğdır, W of Tuzluca, vic. village Akçay. Photo: K.A. Efetov.

Proboscis yellow, well developed. Tegulae and patagia dark green with weak submetallic sheen. Thorax thickly covered with dark green scales. Forewing upperside dark green with weak submetallic sheen; underside of forewing grey; fringe grey. Hindwing upper- and underside grey, with transparent central part; fringe grey. Legs grey, thickly covered with scales, foreleg with long tibial epiphysis, mid and hind tibia with one pair of short apical spurs. Abdomen black with weak green sheen, thickly covered with scales.

Genitalia (Figure 8). Uncus heavily sclerotized, 1.5 times longer than tegumen. Valva narrow, without processes. Aedeagus nearly 3 times longer than uncus, with one straight heavily sclerotized cornutus with pointed apex, its length 3 times shorter than length of aedeagus, cornutus conical, with spoon-shaped proximal end.

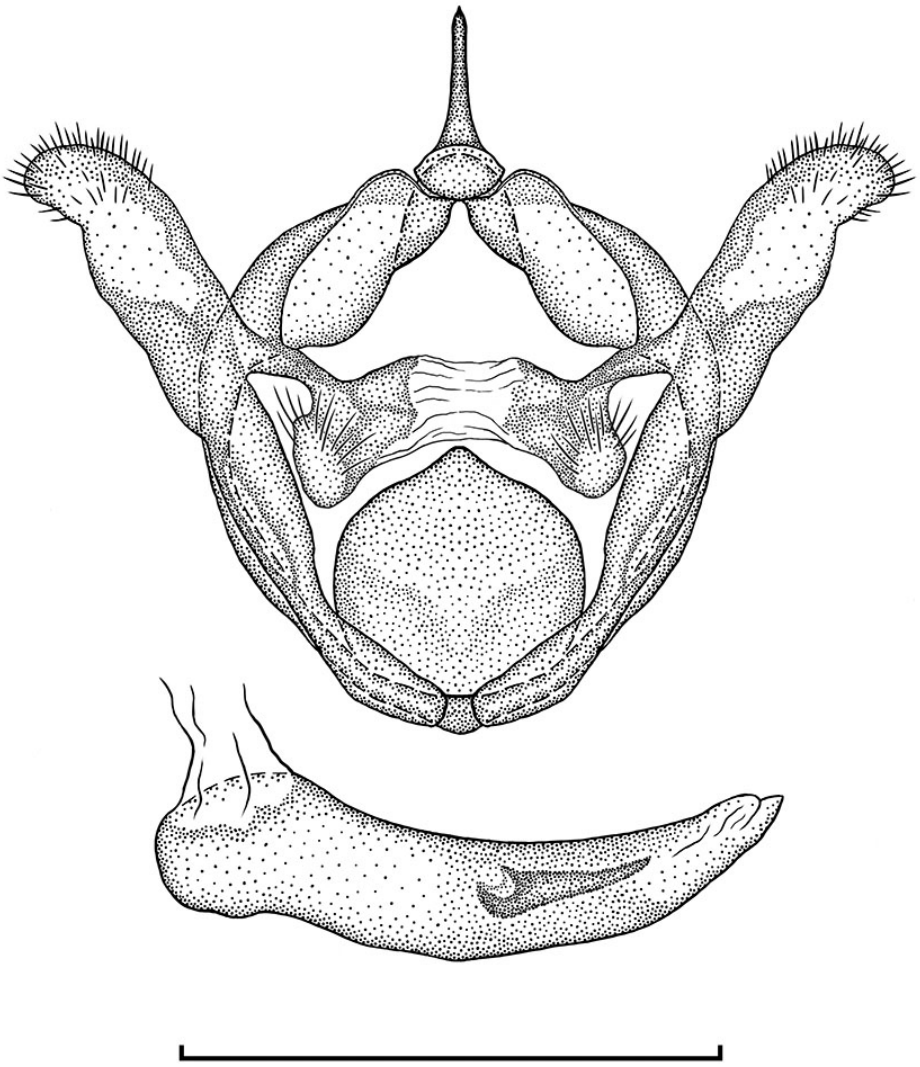


Figure 8. Male genitalia of *Zygaenoprocris persepolis* (Alberti, 1938). Türkiye, Prov. Iğdır, W of Tuzluca, vic. village Akçay. Scale: 1.0 mm.

Discussion

Keil (2014) in his book dedicated to Iranian Zygaenidae presented all populations of *Zygaenoprocris persepolis* as one species with the same genitalia structure but with variable forewing and body coloration (unicolorous from brown to dark green). This is in accord with the species concept of Alberti (1954), Efetov (2001b) and Efetov & Tarmann (1995, 2012. 2017a, 2024) in Procridinae. However, recently Keil (2020) divided *Zygaenoprocris persepolis* in four different species that have not any

genitalia differences. He based his conclusion only on vicariant distribution and variability in forewing and body coloration. Moreover, later Keil (2023) confirmed this division and in addition, *Adscita statices* (Linnaeus, 1758) and *Adscita obscura* (Zeller, 1847) were erroneously mentioned by him in the genus *Zygaenoprocris*. *A. statices* and *A. obscura* clearly belong to the genus *Adscita* Retzius, 1783, and have no characters of *Zygaenoprocris* (in *Adscita* foretibial epiphysis is absent and proboscis is dark brown). Keil's systematic decision of splitting *Z. persepolis* into four species is not accepted and discussed in Efetov and Tarmann (2024). We consider the three described taxa of Keil, viz. *Z. puschmanni*, *Z. schahdadiani* and *Z. hasarani*, to be subspecies of *Z. persepolis*. The specimens of *Zygaenoprocris* from Türkiye according to the morphology and distribution belong to *Z. persepolis puschmanni* Keil, 2020, the subspecies distributed in Iran in northern and central Zagros Mountains. As the biology and larval host-plants of this subspecies were hitherto unknown, our data in the present paper are the first information on this matter.

Range of *the genus Zygaenoprocris*

According to the current knowledge, the genus *Zygaenoprocris* is distributed in Pakistan, Afghanistan, Iran, Turkmenistan, Armenia (Efetov & Tarmann 2024), and Türkiye (this publication).

Conclusion

Zygaenoprocris persepolis (Alberti, 1938) is found in eastern Türkiye (Turkey). This is the first record of the genus *Zygaenoprocris* Hampson, 1900 (Lepidoptera: Zygaenidae) from Türkiye. A description of the preimaginal stages and imago is provided. The larval host-plant of *Z. persepolis* in Türkiye is *Atraphaxis spinosa* L. This is the first information about the preimaginal stages and larval host-plant of *Zygaenoprocris persepolis puschmanni* Keil, 2020.

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