Contribution to the identities and distribution patterns of Zygaenidae (Lepidoptera) from Romania

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Abstract: Zygaenid material collected from 25 localities in ten counties of Romania during 1967–2002 was examined. Fifteen species were found, of which Jordanita notata appears to reliably represent the only second population of the species in Romania, while the record of J. budensis seems to be the fifth locality for the country. We discuss several misidentifications of species published in previous publications and list their precise collection places and dates.

Keywords: faunistics, Procridinae, Romania, Zygaena

Introduction

Zygaenidae are a striking group of moths, whose vivid coloration, mostly diurnal habits and sometimes large population size make them very conspicuous and easily recognisable in the field. However, the complete opposite can be said when it comes to differentiating the various species, especially of subfamily Procridinae (the forester moths). Their similarity among adults has led to various confusions in different geographical distribution lists and has prompted the exclusive reliance on genital structures as specific diagnostic criteria. Such a confusion arose from two recently published papers listing forester moths and Zygaena purpuralis (Brünnich, 1763) from Southern Transylvania, Romania (Albu & Albu, 2018) and from the Vlăsia Plain, Muntenia, Romania (Albu & Albu, 2020), based on identifications made using superficial characters. One of the present authors, A. N.-B., dissected the specimens discussed in the above papers and pointed out several inexactitudes. Those data on Procridinae should be ignored as we provide here an updated list with the corrected identities of Zygaenidae in the first author’s (V.A.) collection. We, hereby, also expand the distributional list of Romanian Zygaenidae with a series of previously unpublished data.

Material and methods

The sampling was conducted in 25 distinct places, spread out in ten counties. These ranged from an elevation of 50 m above sea level (a.s.l.) at the Hagieni forest and Călugăreni, and 1265, 1105 and 1020 m a.s.l. at the Fundata Village, Domogled Mountain and Poiana Brașov, respectively. We listed these localities in Table 1, providing their elevations and organising them based on their respective counties, along with listing the various species encountered in them. We used the web site “geonames.org” to obtain the correct spelling and elevation for each locality. All material used in this research was obtained through inspecting various flowering plants in diverse habitats during the day. The habitats visited were mountain meadows (Domogled, Poiana Brașov, Tâmpa, Sâcel), pastures (Drăușeni, Drăganu and Teliu Villages, Dealu Monastery), river edges (Pe-
cinișca, Călugăreni), forest clearings and edges (Andronache, Pasărea, Hagieni and Bogata forests, Lempeș Hill), fields, gardens and roadside stretches, especially in villages (Mocod, Potoci and Brețcu Villages) and areas disturbed by anthropogenic activities (livestock grazed fields in Vlădeni, Vâlcele and Fundata Villages, vacant lots in Chitila and Brașov). Capture dates for the specimens in this study stretch from 1967 to 2002.

Preliminary identification based on habitus was done according to Naumann et al. (1999) and de Freina & Witt (2001). Re-determination was done by A. N.-B.
Contribution to the identities and distribution patterns of Zygaenidae (Lepidoptera) from Romania

Fig. 1. Map of distribution of *Jordanita notata* (Zeller, 1847) and *J. budensis* (Speyer & Speyer, 1858) in Romania. Black dot – *J. notata* published record, red dot – *J. notata* new record, white dots – *J. budensis* published records, yellow dot – *J. budensis* new record. One white dot covers two very close localities.

on the basis of habitus for several uncertain specimens of *Zygaena*, habitus and genitalia for Procridinae and exclusively by genitalia dissection for *Z. purpuralis*. Genitalia dissections were done according to Robinson (1976). Abdomina and genitalia are preserved in microvials filled with glycerol.

**Results**

List of species with the number of locality where they were recorded as presented in Table 1.

**Procridinae**

*Rhagades pruni* ([Denis & Schiffermüller], 1775): 2.
*Adscita statices statices* (Linnaeus, 1758): 1, 2, 12, 19.
*Jordanita budensis* (Speyer & Speyer, 1858): 17.
*J. notata* (Zeller, 1847): 12.
*J. chloros* (Hübner, [1813]): 5b, 15a.
*J. globulariae* (Hübner, 1793): 2, 6b, 11, 25.

**Zygaeninae**

*Zygaena purpuralis* (Brünnich, 1763): 2, 3b, 5a, 5d, 7a, 7b, 9a, 14, 18, 23a.
*Z. carniolica* (Scopoli, 1763): 10a.
*Z. viciae* ([Denis & Schiffermüller], 1775): 2, 7b, 25.
*Z. loti* ([Denis & Schiffermüller], 1775): 2, 3a, 5b, 5d, 5e, 6a, 7b, 10b, 20a, 20b, 21, 23b, 25.
*Z. osterodensis* Reiss, 1921: 15b.
*Z. ephialtes istoki* Silbernagel, 1944: 21, 22.
*Z. ephialtes reyesati* Holik, 1958: 5e.
*Z. angelicae* Ochsenheimer, 1808: 5c, 5e, 15b.
*Z. filipendulae* (Linnaeus, 1758): 4a, 4b, 6a, 6b, 7b, 8, 9b, 13, 15a, 15c, 16, 17, 24.
*Z. lonicerae* (Secheven, 1777): 18.

During this study, we recorded 111 specimens of family Zygaenidae pertaining to 15 species. Of these, 16 individuals of six species were of Procridinae and 95 specimens from ten species were of Zygaeninae. The most abundantly encountered species were *Z. fili-
**Discussion**

The last comprehensive catalogue of Romanian Lepidoptera (Rákosy et al., 2003), records 29 species of family Zygaenidae from Romania (12 species of Procridinae and 17 species of Zygaeninae). However, the authors cast doubts in their notes about the correct identities of several of the listed species, especially the ones from the older collections, which have not been dissected. Of those 29 species three should not be considered correct because they were not determined according to genitalia. Moreover, two specimens of Z. angeliaca from Tâmpa were wrongly reported as Z. loti and Z. viciae, while Z. loniceraria from the Brețcu Village was misidentifies as Z. angeliaca. All other specimens were correctly determined. In Albu & Albu (2020), several specimens of Zygaenidae were reported only for the counties of the Vlăsia Plain without mentioning the exact localities. In that paper A. statices and Z. purpuralis were determined on the basis of habitus. In the present study, we provide additional information such as precise locality and date.

**J. notata** – This species was reported from Ineu (Arad County) by Căpușe & Kovács (1987) and Bădeni (Cluj County) by Miuț (1997), but specimens were not dissected, so their identity remains in doubt (Rákosy et al., 2003). The first specimen of J. notata to be confirmed through genital dissection was collected in the Apuseni Mountains, around the village of Bășiorea (Cluj County) at an elevation of 1200 m a.s.l. in 2002 (Rákosy et al., 2003). Craioveanu & Rákosy (2011) reported a series J. notata from the same locality. Our specimen from Vlădeni (Brașov County), collected in 1978, represents the only reliable record of this species outside the Apuseni Mountains population (Fig. 1).

**J. budensis** – This is a widely distributed but local species. In Romania it has been reported from Agapia (Neamț County), Slânic-Moldova (Bacău County) and Fănațele Clujului – Copârșaie (Cluj County) by Popescu-Gorj (1964), Fănațele Clujului (Cluj County) by Popescu-Gorj (1964) and Rákosy (1987) and from Greci (Tulcea County) by Rákosy & Wieser (2000). Further reports of J. budensis from Caradja (1895–1896), Caradja (1934) and Czegelius (1934) do not contain information on determination methods; they are from the time when genitalia examination was not a common practice and the authors were not zygaenid specialists, thus we consider records of J. budensis mentioned therein as not reliable. The adult is on the wing from April to July. In that respect, the specimen from Agapia (recorded in August) seems very unusual for an elevation of about 500 m. The image of that specimen from the collection of Ostrogoovich in Bucharest shows clearly that it belongs to the genus Adscita Retzius, 1783. The specimen from Slânic-Moldova is confirmed as J. budensis. In the collection of Delvig, there is one more record of this species from Bâile Geoagiu (Hunedoara County) published by Ciochiala & Barbu (1980). However, according to the report,
this is a female and females of Procridinae (with rare exceptions) are impossible to identify without genital dissection. A search of the collection of Delvig housed in the Braşov County Museum of History showed that there is not a single specimen of Procridinae currently present in the collection. Some of the species that were difficult to identify were sent out by Alexandru Barbu for identification help, but it is not known to whom (Székely, personal communication). We do not know whether this specimen has been dissected or not. This makes our record from the Hagieni forest the fifth reliable locality for Romania and only the second for Dobrogea, along with the specimen from Greci (Fig. 1).

Z. purpuralis – Z. purpuralis complex is a very problematic group, which can be distinguished only by genitalia, larval coloration and larval host-plant (Hofmann & Tremewan, 2017; Nahirić, 2019). In many papers listing species of this complex, the determination method is not mentioned and so is the case for the majority of papers concerning Romania. In Romania, two cryptic species are reported: Z. purpuralis and Z. minos ([Denis & Schiffermüller], 1775). Zygaeana purpuralis is a common species but not all its literature records should be accepted as correct. The only sources known to us that provide appropriate evidence of Z. minos in Romania are Naumann et al. (1983), Rákosy & Lüthi (1995) and Rákosy & Wieser (2010). The expectancy of the third species, Z. diaphana Staudinger, 1887 should not be underestimated. The nearest known localities of this species are in eastern Serbia and western Bulgaria (Nahirić, 2019; Nahirić et al., 2019) and south-eastern Bulgaria (Nahirić et al., in press). It could possibly inhabit steppe or steppe-like grasslands with abundance of Eryngium campestre L., its larval host-plant.

Z. ephialtes – Z. ephialtes retyesati is a subspecies restricted to the southern and eastern Carpathian Mountains in Romania (including Apuseni Mountains). Here it has polymorphic populations, mainly red or red to orange-red five-spotted peucedanoid, but also yellow and orange ephialtoid forms, with a broad hind wing border (Hofmann & Tremewan, 2020). Illustrations of this subspecies are given in de Freina & Witt (2001) and Hofmann & Tremewan (2020). We could not find any other images in online scientific literature or in other literature sources on Zygaeanaidae of Romania; therefore, we provide the photo of our specimen from the Tâmpa Mountain (Fig. 2). From many publications for Romania (as well as for the whole range of the species), it is not clear which subspecies is concerned. We emphasise that sampling of only one or a few specimens in order to prove the presence of the species at a certain locality is not enough for the subspecific determination. On the other hand, we do not encourage the collection of large series. It can be very helpful to take photos or release specimens after the wing pattern is noted. Precise information is very important for determining the distributional patterns of this highly polymorphic species and its evolutionary history. We illustrate the coremata of our Z. ephialtes from Tâmpa Mountain (Fig. 2) as coremata images of Zygaeana species have not been found online at the time of the preparation of the manuscript.

Literature records of Procridinae and Zygaeana purpuralis complex in Romania should be taken with caution and collections should be re-examined, especially through dissection of genitalia. Reliable identifications can show different distribution patterns than those currently published in the literature for the species of Zygaeanaidae of Romania.

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Fig. 2. Zygaeana ephialtes retyesati Holik, 1948: adult and the tip of the abdomen with coremata. Scales = 1 cm and 1 mm, respectively.
Valeriu Albu, Ana Nahirnić-Beshkova

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