

Macrolepidoptera from the steppes of Dobrogea (south-eastern Romania)

Levente Székely, Vlad Dincă & István Juhász

Abstract. Based on material collected during 2007–2009, we report 225 species of macrolepidoptera from the steppes of Dobrogea (south-eastern Romania). Besides numerous rare species with particular ecological preferences, we report *Tarachidia candefacta* (Hübner, [1831]) (Noctuidae) and *Rhodostrophia discopunctata* Amsel, 1935 (Geometridae) for the first time in the Romanian entomofauna. Several taxa of high zoogeographical significance for the Romanian and European fauna are commented. The conservation status and interest of the steppe areas from Dobrogea is brought into discussion.

Samenvatting. Macrolepidoptera van de Dobrogea steppen (Zuidoost-Roemenië) Gebaseerd op materiaal verzameld tussen 2007 tot 2009, melden we 225 soorten Macrolepidoptera uit de steppen van Dobrogea (Zuidoost-Roemenië). Naast talrijke zeldzame soorten met specifieke ecologische voorkeuren, rapporteren we voor het eerst het voorkomen van *Tarachidia candefacta* (Hübner, [1831]) (Noctuidae) en *Rhodostrophia discopunctata* Amsel, 1935 (Geometridae) in de Roemeense entomologische fauna. Verscheidene taxa met belangrijke zoögeografische betekenis voor de Roemeense en Europese fauna worden besproken. De behoudsstatus en betekenis van de steppegebieden in Dobrogea wordt ter discussie gebracht.

Résumé. Macrolépidoptères des steppes de Dobrogea (Sud-Est de la Roumanie) Sur base du matériel recueilli entre 2007 et 2009, nous mentionnons 225 espèces de macrolépidoptères des steppes de la Dobroudja (Sud-Est de la Roumanie). En plus de nombreuses espèces rares avec des préférences écologiques particulières, nous rapportons pour la première fois la présence de *Tarachidia candefacta* (Hübner, [1831]) (Noctuidae) et de *Rhodostrophia discopunctata* Amsel, 1935 (Geometridae) dans l'entomofaune roumaine. Un commentaire est fait concernant plusieurs taxons d'une grande importance zoogéographique pour la faune roumaine et européenne. L'état de conservation et l'intérêt des zones steppiques de la Dobroudja sont discutés.

Key words: Romania – Dobrogea – Macrolepidoptera – distribution – faunistics – First record – steppes – conservation

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Introduction

Even since the collecting of Mann in 1865 (Mann 1866) Dobrogea has always represented a major attraction for Romanian lepidopterists. Although Dobrogea is a fairly well studied Romanian province from a lepidopterological point of view (more than 1000 species of Macrolepidoptera have been reported), recent research in the area continues to provide faunistic novelties. The geographic position of Dobrogea (south-eastern Romania, bordered to the east by the Black Sea) (Fig. 1) and its eco-climatic conditions make it a suitable place for many Lepidoptera typical for the steppes from eastern Ukraine and southern Russia, but also for Balkan or Asia Minor species. Several taxa reach in Dobrogea their western or northern distribution limit in Europe.

The foundation of the Romanian Lepidopterological Society in 1990 considerably accelerated the entomological research in Romania and, as a consequence, during the last 20 years dozens of new species for the country have been reported. A more careful look reveals that a high proportion of these species have been reported exactly from Dobrogea. Moreover, before the falling of the Romanian communist regime in 1989, due to limited investigation possibilities, most of the nocturnal collecting was restricted to areas where electricity was available (e.g. Hagieni, Canaraua Fetei). Most of these sites belong to the sylvo-steppe areas from Dobrogea (Popescu-Gorj & Drăghia 1967, Rákosy & Székely 1996). Subsequently, due to the availability of portable electricity generators and automatic light traps, the collecting has become more effective and independent of fixed electricity sources. Increased collecting performance combined with the exploration of new areas caused a considerable increase of data on the Lepidoptera of Dobrogea. As an example, during the last two years only, many new or doubtful species for the fauna of this region have been reported or confirmed (Dincă & Vila 2008, Dincă et al. 2009), while several others proved to be new for the Romanian fauna (Székely & Dincă 2008, 2009).



Fig. 1.– Map of Dobrogea indicating the investigated localities during 2007–2009. The lower right corner indicates the position of Dobrogea within Romania’s territory. Locality numbers correspond to those in table 1.

Table 1. Localities in Dobrogea investigated for this study (numbers correspond to the localities in figure 1).

Number	Locality	Alt. (m)	County	Lat. N	Long. E
1	Mahmudia - Murighiol	1	Tulcea	45° 03'	29° 07'
2	Plopu - Sarinasuf	1	Tulcea	45° 00'	29° 04'
3	Histria	1	Constanța	44° 32'	28° 45'
4	Grindul Chituc	1	Constanța	44° 27'	28° 47'
5	Năvodari	1	Constanța	44° 20'	28° 36'

Since 2007, together with József Palotai and Gábor Rácz (Hungary) we started to investigate the Lepidoptera fauna from the northern part of Dobrogea. With the exception of the Măcin Mountains where thorough research has been done (Rákósy & Wieser 2000), the northern part of Dobrogea has received little attention. The recent discovery, in typical steppe and salty steppe habitats, of some new species for the Romanian entomofauna, some of high zoogeographical importance for the European fauna (Székely & Dincă 2009), encouraged our further research the results of which are presented in this study.

Methods

Collecting

We focused our research on the areas surrounding the Razelm and Sinoe lakes (Fig. 1, Table 1), which represent the largest complex of lakes in Romania (more than 100 thousand hectares). This complex was formed through the closure of the ancient gulf Halmyris and it is now separated from the Black Sea only by a narrow sand stripe. The area has been very little studied from a lepidopterological point of view. Prior to our research, occasional collecting in the area was done by L. Rákósy, S. & Z. Kovács, M. Skolka, D. Ruști, M. Stănescu, H. Neumann and T. Hác. Most of our collecting was focused on steppe and salty steppe areas in the surroundings of Histria (Constanța county, south of Sinoe Lake) and Plopu and Sarinasuf villages (Tulcea county, north of Razelm Lake) (Fig. 1). Roughly 400 hectares in the southern and eastern surroundings of Histria consist of steppes and salty steppes, sandy areas, but also marshes and reed plots (Fig. 2). The area represents the south-western limit of the Danube Delta Biosphere Reserve. Concerning the villages Plopu and Sarinasuf, the collecting was focused on the Artemisia steppes lying between the two localities. Areas from Grindul Chituc and Năvodari were also investigated mostly because of the specific habitats within their wild sandy beaches (Fig. 3).

The diurnal collecting was done with the insect net, while the nocturnal species were captured by using a 125W mercury vapor bulb placed in front of a white sheet and powered by a portable gasoline electricity generator. In addition,

three to seven portable light traps with 8W white and black light tubes were used during each collecting event.

The data presented in this study was obtained based on 12 collecting expeditions, to some of which G. Szabó, R. Görbe and S. Stanciu also took part: 22–28.viii.2007 (Székely & Juhász), 26–27.v.2008 (Juhász), 23–24.vii.2008 (Juhász), 23–27.viii.2008 (Székely & Juhász), 17–19.x.2008 (Székely, Szabó & Görbe), 19–20.v.2009 (Juhász), 31.v.–1.vi.2009 (Juhász), 19–23.vi.2009 (Székely & Görbe), 19–22.vii.2009 (Székely, Stanciu & Görbe), 5–6.viii.2009 (Juhász), 26–30.viii.2009 (Székely), 24–27.ix.2009 (Székely & Szabó), 23–26.x.2009 (Székely & Görbe).

Genitalia examination

Genitalia were examined for species that cannot be reliably identified based exclusively on wing morphology. The genitalia were processed as follows: maceration in 10% potassium hydroxide, cleaning and examination under a stereomicroscope and storage in tubes with glycerine. Digital photos of the genitalia were obtained through a camera attached to the stereomicroscope and measurements (if necessary) were performed with the software AxioVision.

Results and discussion

The collected material consists of 225 species of macrolepidoptera (Appendix 1, online at www.phegea.org/phegea/appendices/Phegea39-3_page-88.pdf; see Plate 1 for images of several species), out of which two are new for the Romanian fauna and several others are poorly known at national or European level. Below we briefly discuss the taxa that we consider to be of special faunistic and/or biogeographical significance for the Romanian or European fauna.

***Malacosoma castrensis* (Linnaeus, 1758) (Lasiocampidae) (Plate 1-13)**

Material. 2♂, Plopu-Sarinasuf, 26.v.2008; 2♂, 1♀, Histria, 22.vi.2009.

All the recent records of this species from Romania come from Dobrogea (Rákósy *et al.* 2003). Although recorded even from the north-western part of the country (Transylvania) more than 100 years ago, its presence in Romania has been confirmed only in 1993, based on material collected in southern Dobrogea (Székely 1994, Rákósy & Székely 1996, Dincă 2005). Here we provide the first records of this species from the northern part of Dobrogea. Due to lack of records, the species has been considered as data deficient in Romania (Rákósy *et al.* 2003). The populations from Dobrogea are considered to belong to subspecies *shardaghi* Daniel, Forster & Osthelder, 1951, characteristic for the Balkan Peninsula (Rákósy & Székely 1996).

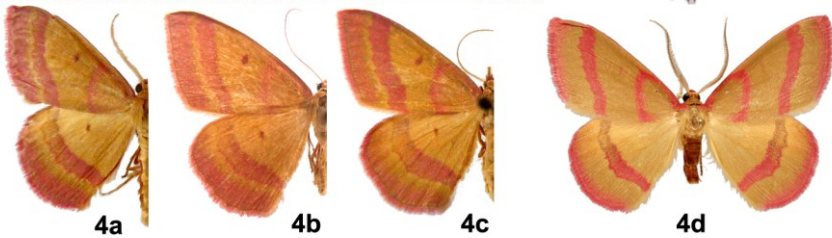
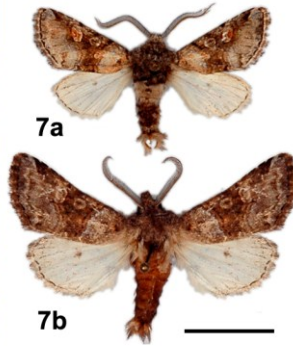
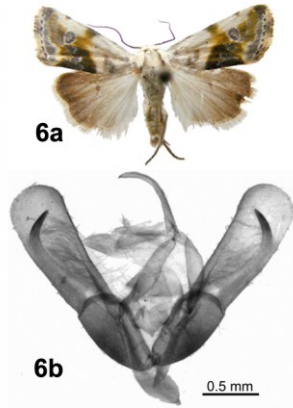


Fig. 2.– Salty steppe area at Histria, 24.x.2009 (photo L. Székely).

Fig. 3.– Wild sandy beach at Grindul Chituc, 22.vii.2009 (photo L. Székely)

Fig. 4a.– *Rhodostrophia discopunctata*, Canaraua Fetei (Constanța county, southern Dobrogea), 13.vi.1997; 4b.– *R. discopunctata*, Canaraua Fetei (Constanța county, southern Dobrogea), 14.vi.1998; 4c.– *R. discopunctata*, Histria (Constanța county), 22.vi.2009; 4d.– *Rhodostrophia calabra*, Babadag forest (Tulcea county, northern Dobrogea), 4.vi.2008.

Fig. 6a.– *Tarachidia candefacta*, Histria (Constanța county), 25.viii.2008; 6b.– Male genitalia (phallus removed) of *T. candefacta*, Histria (Constanța county), 20.vii.2009. Genit. prep. 1234/Dincă.

Fig. 7a.– *Cleoceris scoriacea*, Histria (Constanța county), 24.ix.2009; 7b.– *C. scoriacea*, Canaraua Fetei (Constanța county, southern Dobrogea), 25-29.ix.2004.

Scale bar is 10 mm for all specimens in the plate.

Lasiocampa eversmanni (Eversmann, 1843) (Lasiocampidae) (Plate 1-2)

Material. >60 specimens, Histria, 23–30.viii.2008–2009.

This taxon has been first recorded in the Romanian fauna as a form of *Lasiocampa trifolii* ([Denis & Schiffermüller], 1775) (Popescu-Gorj & Drăghia 1967, Popescu-Gorj 1985). More recently it has been reported as distinct species (Székely 2000) and has been included in the checklist of Romanian Lepidoptera (Rákosy *et al.* 2003) based on records coming exclusively from the Danube Delta. At Histria we noticed that the individuals with habitus resembling that of *L. eversmanni* were flying together with a high number of specimens corresponding in appearance to *L. trifolii*. Due to overlaps of intraspecific variability, discriminating between the two species is often difficult based on the morphology of the adult. However, they can be reliably separated during larval stage (Zolotuhin pers. comm. to V. Dincă 2009). As such data is lacking for Romania, we do not exclude that the lighter coloured specimens (resembling *L. eversmanni*) may actually represent forms of *L. trifolii*. As a matter of fact, several specimens collected in the Danube Delta and suspected to be *L. eversmanni* have been established to actually represent forms of *L. trifolii* (Zolotuhin pers. comm. to V. Dincă 2009). Under these circumstances, the status of *L. eversmanni* in Romania needs further research based on additional data such as the morphology of the larval stage.

Lemonia balcanica (Herrich-Schäffer, 1847) (Lemoniidae) (Plate 1-5)

Material. 2♂, Histria, 27.ix.2009.

It is a localized species in Romania where it is known only from the southwestern (southern Banat) and south-eastern (Dobrogea) parts. Dobrogea (especially the south of the province) hosts relatively large populations of this species that actually reaches its northernmost European distribution limit in the Danube Delta area. It was listed as critically endangered in Romania by Rákosy *et al.* (2003).

Hyles hippophaes (Esper, 1793) (Sphingidae)

Material. >20 specimens, Histria, Plopu-Sarinasuf, Mahmudia-Murighiol, v–vii.2007–2009.

The species was described by Esper from the actual territory of Romania (LT: Wallachen, Milkowfluss bei Focșani) (Fletcher & Nye 1982), but was for a long time considered as doubtful member of the Romanian entomofauna (Popescu-Gorj 1987). After having been recaptured in the Danube Delta (Székely & Szabó 1995), it seems to have rapidly spread in all Dobrogea, as well as northern Bulgaria (Beshkov 1998). It has also been recently collected in northern Muntenia (Ungureanu 2010). The subspecies *caucasica* (Denso, 1913), considered to occur in Romania too (Rákosy *et al.* 2003), has recently been synonymized with the subspecies *bienerti* (Staudinger, 1874) which is distributed east of the Anatolian plateau (Pittaway 2010). Therefore, all the populations occurring west of the Black Sea belong to the nominotypical subspecies.

Euchloe ausonia (Hübner, [1804]) (Pieridae)

Material. Common, Mahmudia-Murighiol, 27–30.iv.2009 (leg. H. Neumann).

This species is known in Romania only from Dobrogea, especially from its southern parts (Rákósy *et al.* 2003, Dincă *et al.* 2009). It was recently recaptured in northern Dobrogea after 54 years of missing data (Dincă *et al.* 2009). The records from Mahmudia-Murighiol represent the third known locality in northern Dobrogea and suggest that the butterfly may actually be more widespread in this province than previously thought. Listed as endangered by Rákósy (2003), but proposed as vulnerable by Dincă *et al.* (2009) given the increasing number of records from Dobrogea.

Cupido (Everes) alctas (Hoffmannsegg, 1804) (Lycaenidae) (Plate 1-21)

Material. 3♂. Plopu-Sarinasuf, 29.viii.2009 (1♂), Nifon, 2.viii.2007 (1♂), Smârdan, 3.viii.2007 (1♂).

It is a poorly known species in Romania with few records scattered across the country's territory. In Dobrogea it has been recorded only once from the southern part of the province (Skolka 1994). Our data confirm the presence of *C. alctas* in Dobrogea and represent the first citation from the northern part of the province. Besides Plopu-Sarinasuf, we found two more male specimens in northern Dobrogea: Nifon (Măcin Mountains, 2.viii.2007, 45°10'53"N, 28°21'12"E) and Smârdan (Tulcea county, 3.viii.2007, 45°16'02"N, 28°01'56"E) (leg. V. Dincă & S. Cuvelier). The butterfly seems to be associated to rather ruderal and temporary habitats such as abandoned agricultural fields (e.g. Nifon), disturbed river side forests (e.g. Plopu-Sarinasuf), or ditches (e.g. Smârdan). Although it does not seem to be abundant, it may also have passed unnoticed because such species-poor areas are usually paid little attention by lepidopterists.

Narraga tessularia (Metzner, 1845) (Geometridae) (Plate 1-27)

Material. very common (>150 specimens/night), Plopu-Sarinasuf, v–viii.2008–2009; common (>15 specimens/night), Histria, v–viii.2008–2009. More abundant in viii at both sites.

It is a specialist of salty steppes with *Artemisia maritima* (its larval food plant). Local populations are present in Austria, Bulgaria, Hungary, Romania, Russia, Slovakia, and Ukraine. The Romanian populations belong to subspecies *kasyi* Moucha & Povolny, 1957 (Rákósy & Schneider 1985). It is very local in Romania and always associated to salty steppes.

Charissa (Kemtroglyphos) onustaria (Herrich-Schäffer, 1852) (Geometridae) (Plate 1-25)

Material. 1♂, Histria, 26.viii.2008.

A xerothermophilous species distributed from southern Europe across the Balkans, Asia Minor, the Caucasus, Jordan, Egypt, Iran and the Arabian Peninsula. It is very poorly known in Romania, with confirmed records only from the Măcin Mountains in northern-western Dobrogea (Rákósy & Wieser 2000,

Rákósy *et al.* 2003). The record from Histria therefore represents the second confirmed locality in Romania.

Chariaspilates formosaria (Eversmann, 1837) (Geometridae) (Plate 1-30, 31)

Material. 13 specimens, Murighiol, 23.viii.2007.

Species with transpalaeartic distribution associated to humid biotopes such as marshes and flooded areas. In Romania it is known only from the extreme north-west and the south-east of the country (Rákósy *et al.* 2003). Although the species is considered to be univoltine (June-July) (Koch 1976, Vojnits 1980, Forster & Wohlfahrt 1981) the populations from Dobrogea and the Danube Delta are bivoltine: June – mid July and end of August – mid September. The two broods display pronounced differences in the size of the adults: wingspan of 35–40 mm for the first brood and 22–26 mm for the second one (Székely 2006).

Megaspilates mundataria (Stoll, 1782) (Geometridae) (Plate 1-28)

Material. 4♂, Histria, 22.vi.2009 (2♂); 20.vii.2009 (2♂).

It is another specialist of salty steppes, distributed from eastern Europe across large parts of the Palaearctic and reaching the Russian far east, Korea and Japan. Dobrogea currently represents the western limit of distribution of this species. Its presence in Romania was confirmed only in 1995, based on two females were collected on the eastern shore of the Razelm Lake (Ruști & Stănescu 1995). It was also recently collected from Histria by M. Skolka (Rákósy *et al.* 2003). Given the current data, it is clear that the species is well distributed in the surroundings of the Razelm-Sinoe lake complex. However, its presence in other parts of Dobrogea (Danube Delta) is also possible.

Microloxia herbaria (Hübner, [1813]) (Geometridae) (Plate 1-26)

Material. very common (30-50 specimens/night), Plopu-Sarinasuf, 19.vii–20.viii; relatively common (5–10 specimens/night), Histria, 19.vii–20.viii.

Distributed from southern Europe across the Balkans, Asia Minor, Middle East, Iran, Afghanistan, the Caucasus, Kazakhstan, and Mongolia. It is a steppe specialist localized in Romania where it is known only from Dobrogea (Rákósy *et al.* 2003).

Rhodostrophia discopunctata Amsel, 1935 (Geometridae)

Material. 3♂, 7♀. Canaraua Fetei, 27.vi.1993 (1♂), 13.vi.1997 (2♂, 2♀), 14.vi.1998 (1♀); Hagieni (Constanța county, southern Dobrogea), 23.vi.1979 (1♀), 7.viii.1980 (1♀), 1.vii.1982 (1♀); Histria, 22.vi.2009 (1♀).

Hausmann (2004) raised *R. discopunctata* to species rank by separating it from *Rhodostrophia tabidaria* (Zeller, 1847). As *R. tabidaria* is known in Europe only from the easternmost Greek islands, it turns out that all previous records of *R. tabidaria* from the Balkans have to be considered as belonging to *R. discopunctata* (Hausmann 2004). The latest catalogue of Romanian

Lepidoptera listed *R. tabidaria* as occurring in Dobrogea, Oltenia and Banat (Rákósy *et al.* 2003). The more recently published addenda and corrigenda to the catalogue did not comment on the status of *R. tabidaria* and *R. discopunctata* in Romania (Rákósy & Goia 2007). *Rhodostrophia discopunctata* can be readily distinguished from the relatively similar *R. calabra* (Petagna, 1787) by the presence of well developed discal spots on all wings (Fig. 4a–c). By contrast, in *R. calabra* these spots are usually absent on all wings (in very few cases they may appear on the forewings, but less developed than in *R. discopunctata*) (Fig. 4d). Moreover, the two taxa can be reliably identified through the examination of the male genitalia where the most notable differences are: the uncus dilatation is about half of the total length of the uncus in *R. discopunctata* and less than half in *R. calabra* (Fig. 5d, e); the valva ends with a rounded spinose terminal process in *R. discopunctata*, and a truncate one in *R. calabra* (Fig. 5a–c); the ventral digitiform processes are longer in *R. discopunctata* compared to *R. calabra* (Hausmann 2004) (Fig. 5a–c).

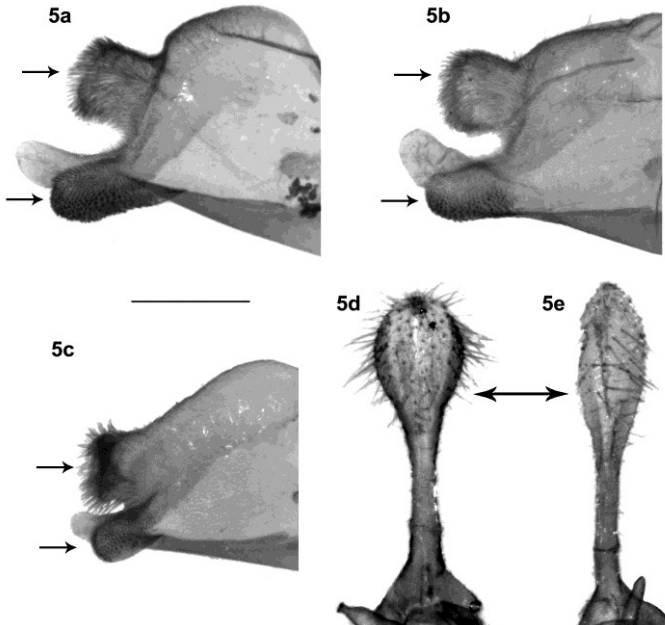


Fig. 5a.– Terminal part of the valva (lateral view) of *Rhodostrophia discopunctata*, Canaraua Fetei (Constanța county, southern Dobrogea), 13.vi.1997, genit. prep. 1297/Dincă; 5b.– Idem, 27.vi.1993, genit. prep. 1298/Dincă; 5c.– Terminal part of the valva (lateral view) of *Rhodostrophia calabra*, Babadag forest (Tulcea county, northern Dobrogea), 4.vi.2008, genit. prep. 770/Dincă; 5d.– Uncus of the male genitalia of *R. discopunctata*, Canaraua Fetei (Constanța county, southern Dobrogea), 27.vi.1993, genit. prep. 1298/Dincă; 5e.– Uncus of the male genitalia of *R. calabra*, Babadag forest (Tulcea county, northern Dobrogea), 4.vi.2008, genit. prep. 770/Dincă. Scale bar is 0.5 mm for all images.

Based on material collected in various parts of Dobrogea, we report the presence of *R. discopunctata* in Romania. Given that this species is known in Europe only from the Balkans (Hausmann 2004), the records from Histria (northern Dobrogea) represent the northern distribution limit of this species on the continent. Given the general distribution of *R. tabidaria* (Hausmann 2004), all previous records of this taxon from Romania should be considered as referring to *R. discopunctata*. A revision of museums and private collection material of *Rhodostrophia* collected in Romania is necessary in order to obtain a more complete image on the distribution of *R. discopunctata* in the country.

Eupithecia variostrigata Alphéraky, 1876 (Geometridae) (Plate 1-24)

Material. 5 specimens, Plopu-Sarinasuf, 25–28.viii.2008.

Distributed in southern and eastern Europe, Asia Minor, Crimea, the Caucasus and Central Asia (Mironov 2003). In Romania it is known only from Dobrogea and the Danube Delta (Rákosy *et al.* 2003), but can be found in relatively large numbers in salty steppe areas with *Artemisia scoparia* which possibly represents its larval foodplant (Székely 2006). Our collecting dates indicate that the species starts flying in Dobrogea slightly earlier compared to the generally reported phenology (early September to late October) (Mironov 2003).

Eupithecia extensaria (Freyer, 1845) (Geometridae)

Material. 4 specimens, Histria, 22.vi.2009, 25–28.ix.2009.

It is a transpalaeartic species with poorly known distribution in Romania where it has confirmed records only from Dobrogea (Rákosy *et al.* 2003). It is confined to steppes and sandy areas with *Artemisia*, its larval foodplant (Mironov 2003). The species has been considered to be univoltine (mid May to late June) (Mironov 2003). However, our collecting dates suggest that in Dobrogea the species might actually have two broods.

Eupithecia biornata Christoph, 1867 (Geometridae) (Plate 1-29)

Material. very common, Histria, 19.vii–30.viii; rare, Plopu-Sarinasuf, 19.vii–30.viii.

Distributed in the eastern Balkans, southern Ukraine, Caucasus, Kazakhstan, Asia Minor, southern Siberia, and Mongolia (Mironov 2003). In Romania it is rare and localized, being known only from Dobrogea and the Danube Delta (Rákosy *et al.* 2003), where it is associated to steppes and sandy areas (Székely 2006). The populations from northern Greece, north-eastern Bulgaria and Romanian Dobrogea mark the species' westernmost range in Europe.

Drasteria caucasica (Kolenati, 1846) (Erebidae) (Plate 1-8)

Material. 2♂, 1♀, Histria, 19.vi.2009 (2♂), 20.vii.2009 (1♀).

It is a western Asian species reaching its western distribution limit in the eastern Balkans. *Drasteria caucasica* is a xerothermophilous species characteristic for semi-desert and sandy biotopes. In Romania it is very local and

known mainly from the Danube Delta, but also from Dobrogea, southern Moldavia (Rákosy 1996) and northern Muntenia (Ungureanu 2010). It can be locally abundant in the Danube Delta where it is much more frequent than *Drasteria cailino* (Lefebvre 1827).

Chrysodeixis chalcites (Esper, [1789]) (Noctuidae) (Plate 1-22)

Material. >20 specimens, Histria and Plopu-Sarinasuf, vii–x.2008–2009.

Subtropical migratory species widely distributed across Eurasia, Africa, Oceania and Australia. It was accidentally introduced in many areas as a consequence of agricultural practices and it may become a pest of several cultivated plants (e.g. tomato, tobacco, pepper, cotton, etc.). In Europe it is resident only in the southern parts. Recorded for the first time in Romania two decades ago (Rákosy & Neumann 1990), the species seems to have become more and more common during the last years. Although it is currently known in Romania only from Dobrogea and Muntenia (Rákosy & Neumann 1990, Székely & Stanciu 2002, Dincă 2006), it is likely to be found in other regions of the country, especially in the south and the east.

Cornutiplusia circumflexa (Linnaeus, 1767) (Noctuidae) (Plate 1-19)

Material. 1♂, Histria, 30.viii.2009.

It is a subtropical migratory species with sporadic occurrence in southern Europe. In Romania it is a very rare migrant which has more recently been recorded only from the Danube Delta (Rákosy 1996). The specimen from Histria represents the second record in the country for a period of at least 30 years (Rákosy *et al.* 2003).

Tarachidia candefacta (Hübner, [1831]) (Noctuidae)

Material. 4 specimens, Histria, 25.viii.2008 (1♂), 20.vii.2009 (1♂); Babadag forest, 19.vii.2009 (1♂); Manolache (surroundings of Bucharest, Ilfov county), 11.v.2010 (1 spec., leg. Cristian Mihai).

It is a species of Nearctic origin described from Pennsylvania (USA). It is widely distributed in North America, ranging from southern Canada to Mexico, but is more abundant in southern areas. *Tarachidia candefacta* represents a good biological control measure of the common ragweed (*Ambrosia artemisiifolia* L., Asteraceae) because its larvae feed on the leaves of various *Ambrosia* species and its life cycle is dynamic involving two annual broods from May to September (Covell 1984). *Ambrosia artemisiifolia*, originating from North America, has been accidentally introduced to Europe around 1865 (Sanz Elorza *et al.* 2004) and it has since then rapidly spread across the old continent. It is a very competitive invasive species linked to human-disturbed habitats that often establishes populations in cultivated areas (e.g. arable fields) causing significant losses to agriculture. Moreover, because its pollen has a high allergenic potential (Rybneck & Jäger 2001), this plant is considered a serious health problem not only in North America, but also in Europe where it has colonized up to 90% of the territory of some countries (Bohren 2006) and where important eradication campaigns have been developed.



Plate1. 1.– *Rhyparioides metelkana*; 2.– *Lasiocampa eversmanni/trifolii*; 3.– *Cucullia argentina*; 4.– *Cucullia biornata*; 5.– *Lemonia balcanica*. 6.– *Chelis maculosa*; 7.– *Leucania loreyi*; 8.– *Drasteria caucasica*; 9.– *Cardepija hartigi*; 10.– *Gortyna cervago*; 11.– *Mythimna unipuncta*; 12.– *Mycteroplus puniceago*; 13.– *Malacosoma castrensis*; 14.– *Saragossa porosa*; 15.– *Leucania zaeae*; 16.– *Episema lederi*; 17.– *Episema tersa*; 18.– *Hadula stigmosa*; 19.– *Cornutiplusia circumflexa*; 20.– *Saragossa siccanorum*; 21.– *Cupido alcetas* (ventral); 22.– *Chrysodeixis chalcites*; 23.– *Ulochlaena hirta*; 24.– *Eupithecia variostrigata*; 25.– *Charissa onustaria*; 26.– *Microloxia herbaria*; 27.– *Narraga tessularia kasyi*; 28.– *Megaspilates mundataria*; 29.– *Eupithecia biornata*; 30.– *Chariaspilates formosaria* (II brood); 31.– *Chariaspilates formosaria* (I brood). 32.– *Dyscia innocentaria*. Scale bar is 10 mm.

T. candefacta has been intentionally introduced in southern Russia (the Krasnodar region) in the years 60 of the 20th century as a biological control measure against the invasive *A. artemisiifolia* (Schurov 1998, Poltavsky & Artokhin 2006, Poltavsky *et al.* 2008). Several stable populations of *T. candefacta* survived in the Krasnodar region for about 30 years, but the species did not apparently expand during this time (Schurov 1998). However, between 1999–2002 it was collected in the Lugansk and Donetsk regions of Ukraine (Kljuchko *et al.* 2004) and almost simultaneously it has been found in the northern part of the Rostov-on-Don region (Poltavsky *et al.* 2005). From there, the species continued its expansion both towards the east and the west. To the east, it currently reached the Kabardino-Balkar Republic in the north Caucasus (Poltavsky 2007), while to the west it has recently been recorded from Zaporozhye and Cherson (both sites in south-eastern Ukraine) (Lehmann 2005). The species is therefore rapidly expanding to the west through the steppes north of the Black Sea. The possible occurrence of *T. candefacta* in Romania and its continuous expansion towards the west has been anticipated recently (Hacker *et al.* 2008).

The three males collected by us in northern Dobrogea and the specimen from Manolache (surroundings of Bucharest, 44°23'46"N, 26°14'30"E) represent the first records of *T. candefacta* from Romania and confirm its expansion to the west.

T. candefacta can be reliably identified based both on wing morphology (Fig. 6a), male genitalia (Fig. 6b) and female genitalia (Lehmann 2005). Considering the Romanian fauna, *T. candefacta* is superficially similar to *Acontia lucida* (Hufnagel, 1766), *A. titania* (Esper, 1798) and *A. melanura* (Tauscher, 1809), but can be readily distinguished due to its smaller size (19–23 mm wingspan) and different wing pattern, one of the most obvious being the lack of a well defined black submarginal band on the hindwings.

It is very likely that the species is already or will become more widespread in the south of Romania (southern Moldavia, Muntenia, Oltenia). This makes sense given the fact that *T. candefacta* has already been collected in Bulgaria on the southern banks of the Danube next to the Romanian border (appreciatively south of the Romanian town Corabia) (S. Beshkov, pers. comm. to L. Székely 2009). This site is about 140 km more to the west compared to our westernmost record from Manolache. After entering Romania and Bulgaria, the species seems to continue its western expansion roughly following the Danube. However, the recent capture of a female at Balgarevo (Kaliakra, Bulgaria) (3.viii.2009, leg. I. Juhász) suggests that *T. candefacta* is also spreading towards the south by following the Black Sea coast. It is possible that, within few years, the species will reach central Europe.

Cucullia argentina (Fabricius, 1787) (Noctuidae) (Plate 1-3)

Material. 3♂, Plopu-Sarinasuf, 24–27.viii.2008.

Cucullia argentina has been recently reported from Romania, based on material collected at Plopu-Sarinasuf (Székely & Dincă 2009). It is a xerophilous species typical to steppes with *Artemisia*, its larval food plant. The population from northern Dobrogea currently represents the south-western range limit for this taxon in Europe. Moreover, only two records in Europe come from more to the west compared to Dobrogea. Both are from Slovakia, but the most recent is 29 years old (Ronkay & Ronkay 2006, Székely & Dincă 2009).

Cucullia biornata Fischer v. Waldheim, 1840 (Noctuidae) (Plate 1-4)

Material. >10 specimens, Plopu-Sarinasuf, 23–29.viii.2007–2009.

It is a very rare and local species in Romania, where it was listed as endangered (Rákosy *et al.* 2003). Only three individuals have been recorded in Romania up to present: Eforie Sud (Black Sea coast) (Popescu-Gorj 1964), Maliuc (Danube Delta) (Rákosy 1996) and Periprava (Danube Delta) (H. Neumann pers. comm. to L. Székely). Judging by the number of collected specimens, the steppe areas with *Artemisia* from Plopu-Sarinasuf seem to be the optimal habitat for this species in Romania. The populations from eastern Bulgaria and south-eastern Romania (Dobrogea) mark the western distribution limit of this species in Europe (Ronkay & Ronkay 1994).

Episema lederi Christoph, 1885 (Noctuidae) (Plate 1-16)

Material. 2♂, Histria, 23.x.2009.

Having a Ponto-Turkestanian distribution, *E. lederi* is very local in Europe where it is known only from Greece, Republic of Macedonia, Bulgaria and Romania (Ronkay *et al.* 2001). In Romania it is known only from Dobrogea (Rákosy 1996). Listed as endangered in the Romanian fauna by Rákosy *et al.* (2003).

Cleoceris scoriacea (Esper, [1789]) (Noctuidae)

Material. very common (>50 specimens/night), Histria, 24–27.ix.2009.

The abundance of *C. scoriacea* in the steppes of northern Dobrogea came as a surprise because the species has never been reported from this province and from such habitats (Rákosy *et al.* 2003). A more careful examination of the collected material revealed that all specimens are smaller and tend to have lighter wing colours compared to typical *C. scoriacea* from other parts of Romania (Fig. 7a,b). Through these features, the specimens from northern Dobrogea resemble the subspecies *subcanentis* Hacker, 1990 described from the Erzurum province (Turkey) (Hacker 1990) and distributed in Turkey, Armenia (Ronkay *et al.* 2001) and the south of Russia (H. Hacker pers. comm. to L. Székely 2009). However, Ronkay *et al.* (2001) noticed that some specimens from the Balkan and central European populations are almost inseparable from those in Anatolia and suggested that the two subspecies may be better regarded as a cline within the

species' range. As a matter of fact, when describing the subspecies *subcanentis*, Hacker (1990) also mentioned that some of the Turkish populations in the Pontus Mountains strongly resemble the nominate subspecies. Besides differences in size and wing colour, Hacker (1990) also showed that the male genitalia of specimens from the Near East has more slender valvae than the European ones. The specimens from northern Dobrogea however, do not display a clear trend towards having slender valvae and the slight differences encountered in the same population seem to reflect intraspecific variability (Fig. 8a,b). It is worth mentioning that we also examined material of *C. scoriacea* from southern Dobrogea (Fig. 7b). These specimens closely resemble the nominate subspecies in terms of size and wing colour. As Dobrogea as a whole contains no important geographic barrier, it is reasonable to accept that the specimens from northern Dobrogea represent ecological forms adapted to extreme biotopes such as the salty steppes.

The current data are in our opinion in favour of the clinal theory and, given the lack of a clear morphological and geographical separation between the two taxa, it seems more prudent to consider the specimens from northern Dobrogea as belonging to the nominate subspecies.

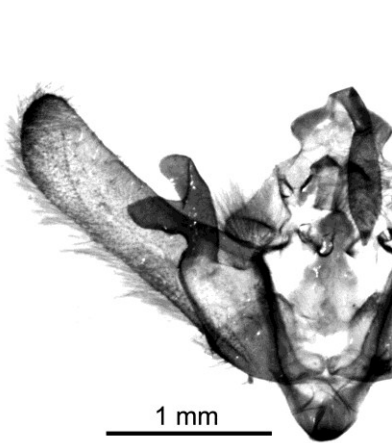


Fig. 8a.– Left valva of the male genitalia of *Cleoceris scoriacea*, Hystria (Constanța county, Romania), 24.ix.2009. Genit. prep. 1287/Dincă.

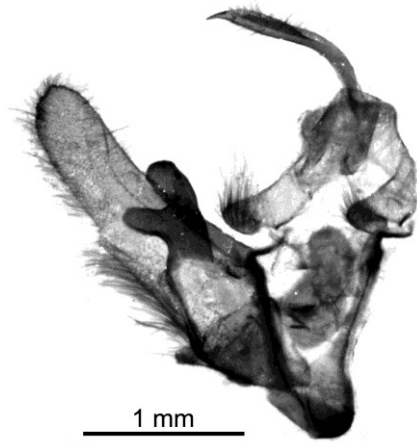


Fig. 8b.– Left valva of the male genitalia of *Cleoceris scoriacea*, Hystria (Constanța county, Romania), 27.ix.2009. Genit. prep. 1288/Dincă.

***Ulochlaena hirta* Hübner, [1813] (Noctuidae) (Plate 1-23)**

Material. very common, Hystria, 17–25.x.2008–2009; rare, Plopu-Sarinasuf, 17–25.x.2008–2009.

This is a Holo-Mediterranean-Turkestanian species which is rather local and rare in the European Mediterranean (Ronkay *et al.* 2001). In Romania it is well

represented in Dobrogea where it can locally be very abundant, with up to 100 specimens/night being attracted to artificial light. Interestingly, despite its local abundance, no female has yet been collected in northern Dobrogea.

Hadula (Calocestra) stigmosa (Christoph, 1887) (Noctuidae) (Plate 1-18)

Material. very common, Histria, 19.vi–30.viii; very common, Plopu-Sarinasuf, 19.vi–30.viii.

This halophilous steppe species has been considered as rare in the Romanian fauna where it was sporadically found in the east (Moldavia) and south-east (Dobrogea and the Danube Delta) (Rákosy 1996). Listed as endangered in Romania by Rákosy *et al.* (2003). Judging by the high number of observed specimens, the steppes from Histria and Plopu-Sarinasuf seem to represent the optimal habitat for this species in Romania.

Cardepia hartigi (Parenzan, 1981) (Noctuidae) (Plate 1-9)

Material. common, Histria, 19.vi–22.vii.

Cardepia hartigi is known in Europe only from southern Italy, Greece, Romania, Turkey, Cyprus, and Ukraine. It was reported in Romania based on two specimens collected in the Danube Delta and erroneously published as *Discestra (Cardepia) sociabilis irrisoria* (Erschov, 1874) (Rákosy 1996). Following the revision by Hacker (1998), the two specimens proved to belong to *C. hartigi* and were subsequently treated accordingly (Rákosy 2000a, Rákosy *et al.* 2003). It is a halophilous species, characteristic for the salty steppes near lakes or sea shores. According to Rákosy *et al.* (2003) in Romania flies the subspecies *additamenda* Hacker, 1998. The species is often sympatric with the similar *H. stigmosa* and *Cardepia sociabilis* (Graslin, 1850) (Hacker *et al.* 2002). Morphology alone is usually enough to separate *C. hartigi* from the other two species, but the male genitalia also offers reliable characters for identification (Fig. 9).

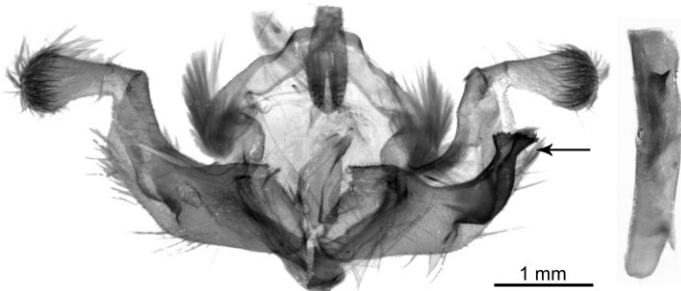


Fig. 9.– Male genitalia of *Cardepia hartigi*, Histria (Constanța county, Romania), 20.vii.2009. Genit. prep. 1237/Dincă.

Saragossa siccanorum (Staudinger, 1870) (Noctuidae) (Plate 1-20)

Material. 2♂, Plopu-Sarinasuf, 24.viii.2008.

It is a Turano-Eremic species that reaches in Dobrogea its westernmost distribution limit in Europe. *Saragossa siccanorum* is very rare in Romania, being previously known only based on two specimens collected in two localities in southern Dobrogea (Popescu-Gorj & Drăghia 1967, Rákosity 1996). We provide data for the third known locality in Romania and the first citations for northern Dobrogea.

Saragossa porosa (Eversmann, 1854) (Noctuidae) (Plate 1-14)

Material. common, Plopu-Sarinasuf, 19.v–1.vi and 6–30.viii.

Saragossa porosa is a halobiont xerothermophilous species characteristic of steppe areas with *Artemisia*. It is very local in Romania where it has populations in the west and south-east of the country. Recently recorded from Dobrogea by Székely & Dincă (2009). It has been suggested that a reconsideration of the status of the subspecies *kenderesiensis* Kovács, 1968 (considered to fly in western Romania) may be necessary given the new data from Dobrogea that considerably diminished the range disjunction between this subspecies and the nominate one (Székely & Dincă 2009).

Leucania zae (Duponchel, 1827) (Noctuidae) (Plate 1-15)

Material. 3 specimens, Histria, 26–30.viii.2009.

This is a xerothermophilous species whose European distribution follows the Mediterranean and Black Sea coasts (Hacker *et al.* 2002). In Romania it was discovered only in 1991 based on only two specimens: Vama Veche (south-eastern Dobrogea) (Rákosity 1996, Rákosity & Székely 1996) and Suatu (Cluj county, Transylvania) (Rákosity 2000b). Listed as endangered in the Romanian fauna by Rákosity *et al.* (2003). We provide the first records from northern Dobrogea and the third known locality in the country.

Leucania (Acantholeucania) loreyi (Duponchel, 1827) (Noctuidae) (Plate 1-7)

Material. 2♂, 1♀. Plopu-Sarinasuf, 24–25.viii.2007 (2♂); Histria, 26.viii.2007 (1♀).

It is a palaeotropical migrant species that can be found regularly in the Mediterranean Basin and occasionally much further to the north (Hacker *et al.* 2002). The species has very few records from Romania, most from southern Dobrogea and the Danube Delta (Rákosity 1996), but also from Transylvania (Rákosity *et al.* 2003).

Gortyna cervago Eversmann, 1844 (Noctuidae) (Plate 1-10)

Material. 5 specimens, Plopu-Sarinasuf, Histria, 24–29.viii.2008–2009.

It is a rare species distributed from the Balkans to Asia Minor, Ukraine, Armenia, Turkmenistan and southern Russia. Associated to warm steppe areas, it

is very little known in Romania where it has been found in a handful of localities in southern Moldavia and southern Dobrogea (Rákósy 1996). We provide the first records from northern Dobrogea. It was listed as critically endangered in Romania by Rákósy *et al.* (2003).

Rhyparioides metelkana (Lederer, 1861) (Arctiidae) (Plate 1-1)

Material. common, Murighiol, vii.1997, vii.2005–2006.

This species is emblematic for the Danube Delta Biosphere Reserve where the largest populations in Europe survive. It is a typical inhabitant of marshy areas and has much regressed due to habitat loss. In Romania it is present in the south-west (Banat), in southern Dobrogea (Hagieni) and the Danube Delta where it can sometimes be very abundant (e.g. on 20.vii.1987 more than 500 specimens were attracted to artificial light during one night). Listed as endangered in Romania by Rákósy *et al.* (2003).

Conservation of the steppe areas from northern Dobrogea

The areas that were investigated (excepting Năvodari), although not actually lying within the delta itself, are part of the Danube Delta Biosphere Reserve. Therefore, at least in theory, the main management and conservation measures of the Danube Delta apply to these areas too. The salty steppe biotopes are not suitable for agriculture or intensive grazing and they are relatively safe from these types of human intervention. Moreover, after the fall of the communist regime in 1989, the irrigation systems in Dobrogea have been largely destroyed and many agricultural fields were abandoned. These areas are becoming secondary steppes and may considerably increase the amount of suitable habitats for many species adapted to this type of habitat. Other types of anthropic pressure in such areas are for the moment rather superficial as the region is little populated and touristic activities are concentrated on the Black Sea coast. The *Artemisia* fields from Popu-Sarinasuf are however smaller in size compared to the large steppe areas around Histria and, besides being lightly grazed, are prone to land burning (especially during autumn) or garbage pollution. Very recently it has also been observed that the lake in the vicinity of the steppes from Popu-Sarinasuf has been partially drained. If this situation persists, the local salty steppe habitats could be affected. However, the wild beach areas next to the Black Sea are in our opinion more vulnerable than the salty steppes surrounding the large lakes in northern Dobrogea. Such areas are becoming rarer and rarer as they are transformed for touristic purposes. Given the particular flora and fauna hosted by such sites, their safeguarding should become one of the conservation priorities in Dobrogea. The value of the steppe areas of Dobrogea is also supported by the presence of several taxa protected by law in Romania or Europe (Table 2).

Table 2. Taxa protected by law at European or national level that were identified in the area investigated during this study

Taxon	Habitats Directive 92/43/EEC	Romania (national level)
<i>Hyles hippophaes</i>	x	
<i>Proserpinus proserpina</i>	x	
<i>Euchloe ausonia</i>		x
<i>Cupido alcetas</i>		x
<i>Lemonia balcanica</i>		x
<i>Cucullia biomata</i>		x
<i>Rhyparioides metelkana</i>		x

By investigating several steppe areas from northern Dobrogea, we recorded 225 species of macrolepidoptera. While not as rich in species as other types of habitats, these steppes host particular Lepidoptera assemblages of high zoogeographical significance. *Tarachidia candefacta* and *R. discopunctata* are recorded for the first time in the Romanian fauna and several other species are reported for the third-fourth time in the country. Moreover, the presence in these areas of many extremely localized species that were before considered as very rare in the Romanian and even European fauna underlines the faunistical importance of the Dobrogea steppes. The area is characterized by interferences of both the Balkanic and south Ukrainian and Russian steppes, which is reflected in the presence of many Lepidoptera taxa that reach here their westernmost distribution limit in Europe. It is worth noting that several areas similar to the ones investigated by us can still be found in Dobrogea, especially in the surroundings of the large lakes or on the Black Sea coast. Therefore, several sites are still waiting to be studied and may provide valuable data that would allow for a better knowledge and conservation of Dobrogea's particular entomofauna.

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