

***ACALYPTRIS PLATANI* (MÜLLER-RUTZ) IN THE CRIMEA, UKRAINE – THE EASTERNMOST RECORD OF THE SUB-MEDITERRANEAN SPECIES IN EUROPE (INSECTA: LEPIDOPTERA: NEPTICULIDAE)**

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Abstract. Based on the material collected by the authors in the Crimea (Karadag Nature Reserve), *Acalyptris platani* (Müller-Rutz, 1934) is recorded in Eastern Europe (Ukraine) for the first time. It represents the easternmost record of this Sub-mediterranean nepticulid species in Europe, once again confirming faunal links of southern Crimea with Mediterranean region. Adults, male and female genitalia, and leaf-mines of *A. platani* are illustrated and provided together with a distribution map.

Key words: Nepticulidae, *Acalyptris platani*, *Platanus*, Europe, Sub-mediterranean fauna

INTRODUCTION

Nepticulidae are a family of minute monotrysian moths of the microlepidopteran grade with a worldwide distribution and nearly 830 described species. Their morphology, biology, taxonomic composition and history of description have been reviewed by Puplesis and Diškus (2003). Only the North European nepticulid fauna can be considered exhaustively studied (e.g., van Nieukerken 1985, 1996; Johansson *et al.* 1990; Laštůvka & Laštůvka 1997). Particularly valuable and exhaustive for the genus *Acalyptris* is a taxonomic revision of *Acalyptris platani* and *A. staticis* groups in Europe and Mediterranean by van Nieukerken (2007). Currently, the checklist of the European fauna of *Acalyptris* includes nine species divided into two groups (van Nieukerken 2007) listed below.

The *platani* group: 1) *Acalyptris minimella* (Rebel, 1926), known from Portugal, Spain (incl. Ibiza, Mallorca), France (incl. Corsica), Italy (incl. Sicily, Sardinia), Croatia, Slovenia, Greece and North Africa (Morocco, Algeria, Tunisia); larvae on *Pistacia lentiscus*, *P. terebinthus*; 2) *A. platani* (Müller-Rutz, 1934), known from Portugal, Spain, France (incl. Corsica), Italy (incl. Sicily), Switzerland, Croatia, Greece, Cyprus, Bulgaria, Turkey and Iran (also the first record in Ukraine (the Crimea) as described in the current paper); larvae on *Platanus* spp.; 3) *A. loranthella* (Klimesch, 1937), known from Slovakia, Czech Republic, Austria, Hungary, Italy (incl. Sicily), Romania and Greece; larvae on *Loranthus europaeus*; 4) *A. pistaciae* van Nieukerken, 2007, known from Greece (Crete, Rhodes), Cyprus and Turkey; larvae on *Pistacia terebinthus* and *P. lentiscus* (van Nieukerken 2007).

The *staticis* group: 1) *A. staticis* (Walsingham, 1907), known from Spain (incl. Canary Islands: Tenerife); larvae on *Limonium pectinatum*; 2) *A. pyrenaica* Laštůvka & Laštůvka, 1993, known from Spain, Germany (host-plant unknown) (Laštůvka & Laštůvka 1993); 3) *A. maritima* Laštůvka & Laštůvka, 1997, known from Italy, Greece and Croatia; larvae on *Limonium vulgare* (Laštůvka & Laštůvka 1997); 4) *A. limonii* Laštůvka & Laštůvka, 1998, known from Greece and Croatia; larvae on *Limonium vulgare* (Laštůvka & Laštůvka 1998); 5) *A. lesbia* van Nieukerken & Hull, 2007, known from Greece; larvae on *Limonium gmelinii* van Nieukerken (2007).

A new record of *Acalyptris platani* (Müller-Rutz) in Eastern Europe (Ukraine) is based on the results of fieldwork in the Karadag Reserve (the Crimea) in 2009 by A. Remeikis and J. R. Stonis.

Adults, male and female genitalia, also leaf-mines of the species are photographed and provided together with a distribution map.

MATERIAL AND METHODS

Genitalia were prepared following the method described by Puplesis and Diškus (2003). Female genitalia and abdominal pelts of both sexes were stained with Chlorazol Black (Direct Black 38/Azo Black) and mounted in Euparal. Forewing length was measured along the costa from the wing base to the apex of the cilia. For wingspan measurement, the forewing length was doubled and thorax width added. Adults and genitalia photographs were made by A. Remeikis using a Leica DM2500 microscope and Leica DFC420

camera. Morphological terms follow Puplesis and Robinson (2000).

This study was possible thanks to the material collected by the authors during fieldwork in the Karadag Nature Reserve (the Crimea, Ukraine, 35°11'E, 44°54'N) at ca. 40 m in 2009 (Fig. 1A, B). All specimens were reared from mining larvae following a standard method described by Puplesis and Diškus (2003). Two reared specimens (female adults) were fixed in 70% alcohol and kept in a freezer for molecular studies. Currently, all specimens are deposited in the collection of VPU, with a proposed further re-deposition to the collection of ZIN (except for specimens fixed in alcohol).

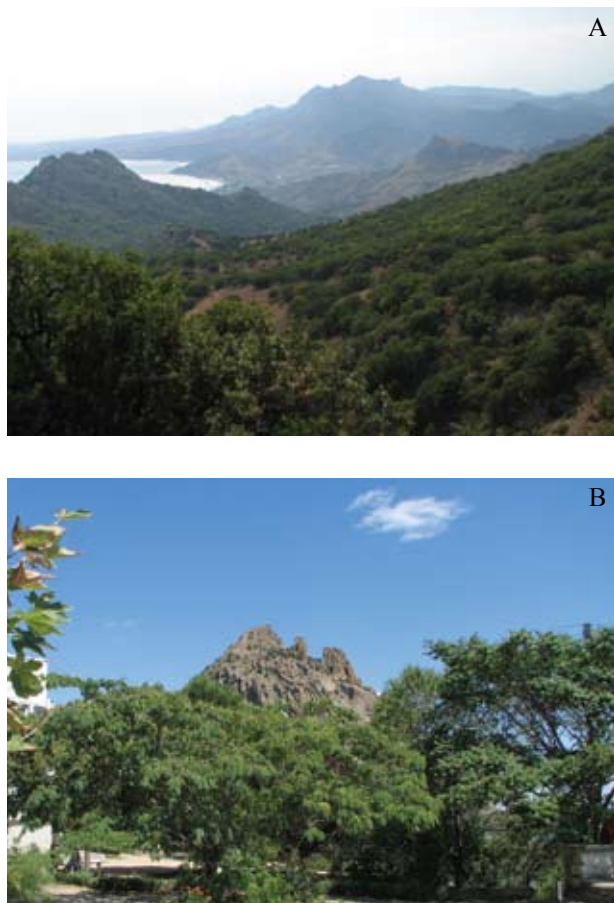


Figure 1. Collecting locality in the Crimea (Ukraine). A – Karadag Reserve (western view); B – Botanical Park of the Reserve ('Biostanciya', 35°11'E, 44°54'N at ca. 40 m) where all plane trees were infested with *Acalyptris platani* (eastern view).

Abbreviations of institutions: KBS – Karadag Biological Station, Ukrainian Academy of Sciences, Biostanciya, the Crimea, Ukraine; VPU – Biosystematics Division, Department of Zoology, Vilnius Pedagogical University, Vilnius, Lithuania; ZIN – Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

RESULTS

European *Acalyptris* as representatives of the Mediterranean and Sub-mediterranean fauna

The genus *Acalyptris* Meyrick is most diverse in tropical regions, including the Neotropics, where previous studies have shown the phenomenon of predomination of *Acalyptris* in the Neotropical fauna (Puplesis & Diškus 2003; Šimkevičiūtė *et al.* 2009). Among the recognized nepticulid species in Belize, 48% belong to the genus *Acalyptris* (Puplesis & Robinson 2000). In the western part of the Amazon basin, this genus comprises about 50% of the fauna (Puplesis *et al.* 2002a, b). A great diversity of *Acalyptris* is also known from South Africa (Scoble 1983). The genus is also abundant in desert and steppe regions of Central Asia (Puplesis 1990, 1994; Puplesis & Diškus 1995, 2003).

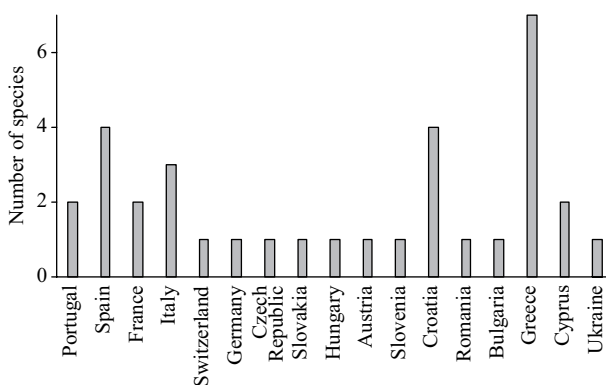


Figure 2. Number of *Acalyptris* species per European country (after data provided by van Nieuwerkerken 2007 and original).

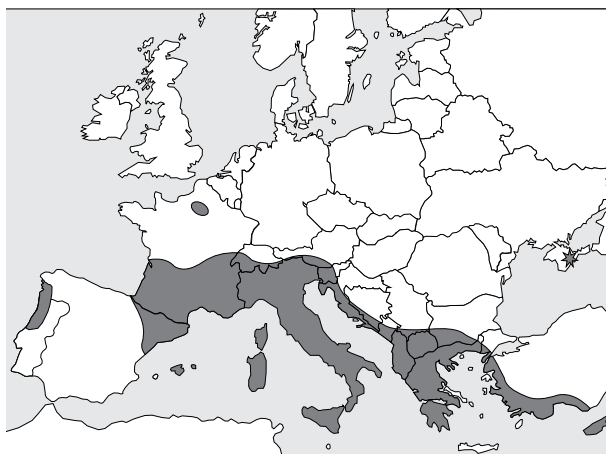


Figure 3. Approximate distribution range of *Acalyptris platani* in Europe (after data provided by van Nieuwerkerken 2007 and original). Remarks: a star indicates a new record of *A. platani*; additionally, *A. platani* was reported for western Asia (van Nieuwerkerken 2007): Turkey, Iran and Georgia; however, the latter record still needs verification.

In Europe, *Acalyptris* forms a small fraction (a total of 9 species) of the nepticulid fauna. Most of *Acalyptris* species occur in Greece (7), also Spain (4) and Croatia (4) (Fig. 2).

All European *Acalyptris* species mainly occur within Mediterranean or Sub-mediterranean regions. The latter region represents a large ecoregion in the temperate mixed forest biome (with hot dry summer and mild, rainy winter).

Documentation of the specimens of *Acalyptris platani* collected in the Karadag Reserve

Males (Fig. 4B). Forewing length 1.9–2.3 mm, wingspan 4.2–5.0 mm. Head: palpi cream; frontal tuft brown-cream, on vertex brown to fuscous (differently coloured tufts distinctly separated); collar inconspicuous, comprised of dark cream piliform scales; scape and pedicel yellowish cream (not white, as usual in the species); flagellum pale grey-brown in proximal half, dark cream in distal half; antenna with 28–29 segments (not 34, as usual in the species). Thorax yellowish cream (not brown, as common in the species). Forewing basal 1/4 yellowish cream densely irrorated with pale brown scales, followed by broad yellowish cream fascia to 1/2; distal part of wing fuscous to brown apically, with yellowish cream tornal and costal spots united in a second fascia; cilia shiny cream; cilia line, in contrast to the general description of the species (van Nieukerken 2007), indistinct or absent. Underside of forewing cream. Hindwing very broad at basal 2/3, distinctly and abruptly cuspidate towards tip; costal bristles present (brown); upper surface of the whole broadened basal part (2/3 of hindwing), except anal margin, covered with a thick indumentum of white raised androconial scales, interrupted along midline by a distinct, straight, longitudinal furrow, without scales; costal margin of hindwing with a row of short pale brown broadened (not piliform) scales instead of cilia. Underside cream.

Abdomen brown, with yellow inconspicuous anal tufts. Legs yellow-cream.

Females (Fig. 4A). Forewing length 2.2–2.3 mm, wingspan 4.7–4.9 mm. Antenna with ca. 26 segments. Hindwing lanceolate, without white androconial scales. Otherwise similar to male.

Male genitalia (Fig. 5A–F). Vinculum anteriorly and posteriorly concave, but in the specimens from Karadag anterior incision tends to be shallower than usual. Otherwise as in the species descriptions given by Johansson *et al.* (1990), Laštůvka and Laštůvka (1997) and van Nieukerken (2007). Tegumen narrowly rounded, forming specific pseuduncus; uncus band-shaped, with short central process (indistinct in ventral view). Gnathos with long and almost pointed central element (caudal tip usually weakly sclerotized in the specimens from Karadag) and with a prominent inner lobe at the base. The shape of the inner lobe may vary, usually right and left lobes slightly asymmetrical. Transtilla without transverse bar but, in contrast to the descriptions by Johansson *et al.* (1990), Laštůvka and Laštůvka (1997) and van Nieukerken (2007), sublateral process of valva less developed, almost invisible and right valva joined with left one via sclerotized juxta. Carinae of aedeagus ending in tiny forked lobes, tightly fused to ventral process; pair of lateral carinae straight and pointed. Vesica with numerous very small triangular cornuti and one large cornutus.

Female genitalia (Fig. 6A, B). Anal papillae separated by a shallow square-like excavation. Vestibulum with vaginal sclerotization comprising three plates. The main, ‘nose’-shaped, broad and tends to be dentate on proximal margin. Otherwise as in the species descriptions given by van Nieukerken (2007). Corpus bursae elongate, without pectinations, with very narrow and long reticulate signa, margins crenate. Ductus spermathecae with 2 convolutions and long and conspicuous vesicle (as in the description by van Nieukerken (2007)



Figure 4. *Acalyptris platani* specimens collected in Karadag. A – female; B – right side of male.



Figure 5. Male genitalia of *Acalyptris platani*. A – capsule, genitalia slide No RA241; B – aedeagus, genitalia slide No RA241; C – the same, genitalia slide No RA239; D – capsule, genitalia slide No RA239; E – the same, genitalia slide No RA238; F – general view (capsule with aedeagus), genitalia slide No RA240 (scale 10 μ m).

(broken in slides No RA243 and RA243; therefore, not shown in Fig. 6).

Bionomics. Host-plants: *Platanus* spp. (including

P. orientalis, *P. hybrida* and also *P. x acerifolia* Willd., *P. digitifolia* Palib., *P. occidentalis* L. planted in the Karadag Reserve). Eggs on leaf underside, usually against a

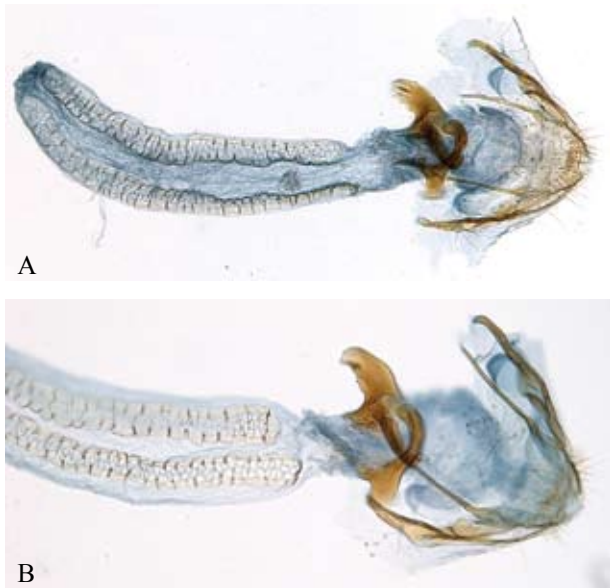


Figure 6. Female genitalia of *Acalyptris platani* (ductus spermathecae is broken, therefore, not shown). A – genitalia slide No RA242; B – genitalia slide No RA243 (scale 10 µm).

vein. Leaf-mine (Fig. 7A–D) as a long gallery with contorted green or brown (when dried) frass. Larva (while feeding) yellowish with green or dark green central line and brown head; before pupation larva turns brownish yellow. Cocoon yellowish brown (Fig. 8). Mortality rate of the larvae collected in the Karadag Reserve in 2009 was 26%; of the cocoons reared indoors, 29%. In total, mortality rate for the whole sample collected in the Karadag Reserve was 55%. The species is most likely bivoltine; in Karadag, fresh mines were found in August together with old mines from the previous season.

Distribution (Fig. 3). *A. platani* exhibits Mediterranean or typical Sub-mediterranean distribution: until now it has been known from Portugal, Spain (incl. Menorca), France (incl. Corsica), Italy (incl. Sicilia), Switzerland, Slovenia, Croatia, Greece, Bulgaria and Cyprus (Laštůvka & Laštůvka 1997; van Nieukerken 2007). Following van Nieukerken (2007), a supposed record from the Netherlands was based on misidentification, and the northernmost locality for *A. platani* has for more than 70 years been the region of Paris. In the

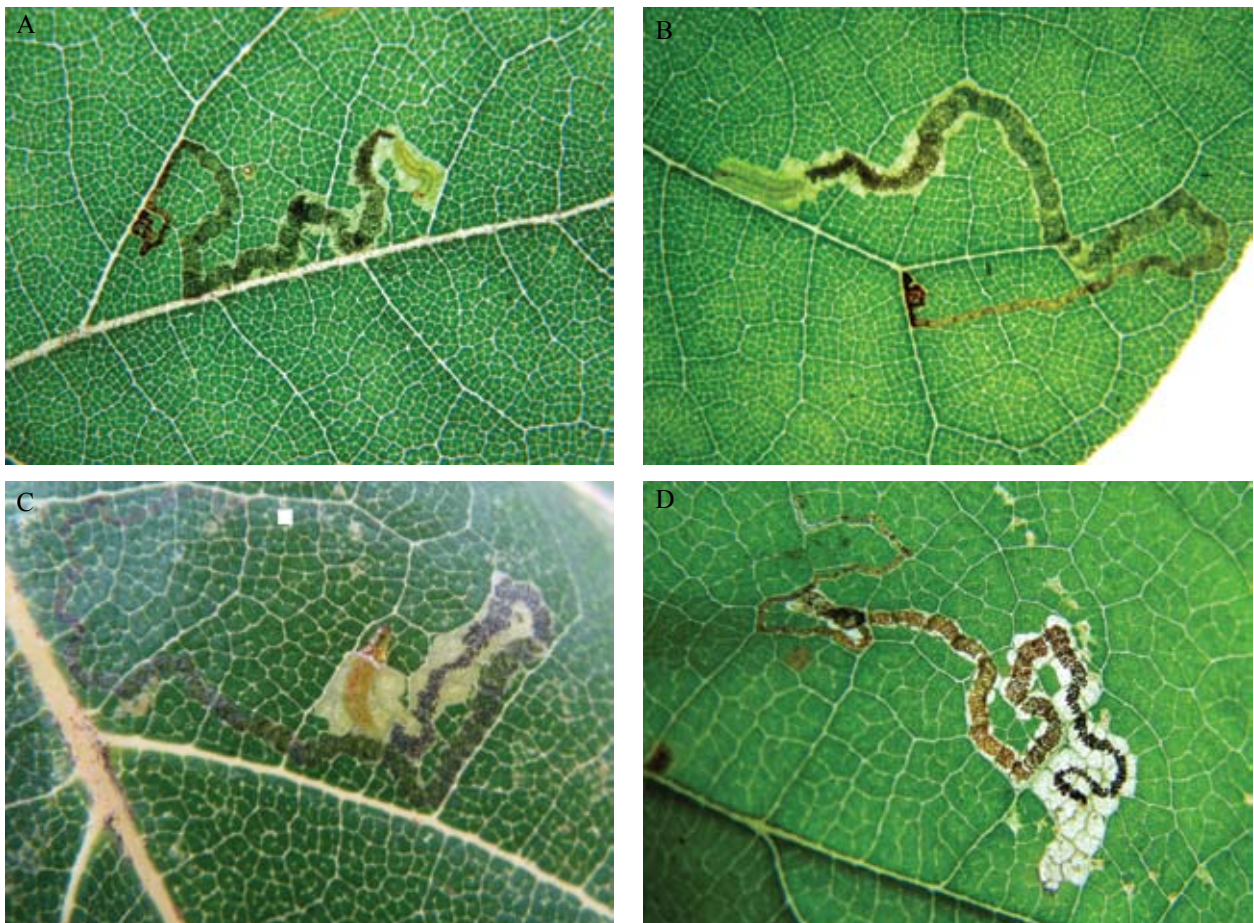


Figure 7. Leaf-mines of *Acalyptris platani*. A–B – with feeding larva; C – larva leaving the mine; D – empty mine without larva.



Figure 8. Cocoon of *Acalyptris platani* on litter.

current paper, the record from the Crimea (Ukraine) represents the easternmost locality within Europe. However, *A. platani* is also reported in western Asia (van Nieukerken 2007): Turkey, Iran and Georgia. We suppose that the record of *A. platani* in Georgia still needs verification.

Material examined. 4♂ 3♀, Ukraine: Crimea, 20 km SW Feodosiya, Karadag Nature Reserve (Botanical Park of the Reserve, i.e. 'Biostanciya'), on *Platanus* spp. (incl. *P. x acerifolia* Willd., *P. digitifolia* Palib., *P. occidentalis* L.), 12–26 August 2009, sample/field card No 4965, genitalia slide No RA238, RA239, RA240, RA241 (males), RA242, RA243 (females), leg. A. Remeikis, J. R. Stonis. Other 2 ♀ specimens are preserved in 70% ethanol and kept in a freezer for molecular studies. For the material deposition see Material and Methods.

DISCUSSION

Acalyptris platani collected in the Karadag Nature Reserve represents an isolated population of the species with generally Sub-mediterranean distribution and slightly differs from the general description of *A. platani* given in the taxonomic revision by Erik van Nieukerken (2007). In contrast to the description, the males from Karadag are smaller, antennae have less flagellomeres, the cilia-line of forewing is absent, the costal margin of the hindwing is with a row of short broadened (not piliform) scales, the forewing pattern and colouration of antennae are paler. However, differences in colouration could possibly be caused by the climate of Karadag: hot dry summer, cool rainy winter. The discovery of *Acalyptris platani* in the Crimea supports the concept of the South Crimean Nepticulidae fauna as mostly Sub-mediterranean (or Mediterranean).

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REFERENCES

- * – Stonis, J. R. formerly – Puplesis
 Johansson, R., Nielsen, E. S., Nieukerken, E. J. van and Gustafsson, B. 1990. The Nepticulidae and Opostegidae (Lepidoptera) of north west Europe. *Fauna Entomologica Scandinavica* 23 (1/2): 1–739.
 Laštůvka, A. and Laštůvka, Z. 1993. *Acalyptris pyrenai-ca* sp. n. aus Spanien (Lepidoptera: Nepticulidae). *SHI-LAP Revista de Lepidopterologia* 21 (83): 157–160.
 Laštůvka, A. and Laštůvka, Z. 1997. *Nepticulidae Mitteleuropas. Ein illustrierter Begleiter (Lepidoptera)*. Brno: Konvoj Publishers.
 Laštůvka, Z. and Laštůvka, A. 1998. Beitrag zur Kenntnis der Nepticulidenfauna Griechenlands (Lepidoptera, Nepticulidae). *Stapfia* 55: 313–326.
 Nieukerken, E. J. van. 1985. A taxonomic revision of the Western Palaearctic species of the subgenera *Zimmermannia* Hering and *Ectoedemia* Busck s. str. (Lepidoptera, Nepticulidae), with notes on their phylogeny. *Tijdschrift voor Entomologie* 128 (1): 1–164.
 Nieukerken, E. J. van. 1996. Nepticulidae. In: O. Karsholt and J. Razowski (eds) *The Lepidoptera of Europe. A Distributional Checklist*, pp. 21–27. Stenstrup: Apollo Books.
 Nieukerken, E. J. van. 2007. *Acalyptris* Meyrick: revision of the *platani* and *staticis* groups in Europe and the Mediterranean (Lepidoptera: Nepticulidae). *Zootaxa* 1436: 1–48.
 Puplesis*, R. 1990. The genus *Acalyptris* Meyrick (Lepidoptera, Nepticulidae) in the USSR: distribution and taxonomy. *Nota lepidopterologica* 13 (1): 62–88.
 Puplesis*, R. 1994. *The Nepticulidae of Eastern Europe and Asia: western, central and eastern parts*. Leiden: Backhuys Publishers.
 Puplesis*, R. and Diškus, A. 1995. *Acalyptris argyraspis* sp. n., a remarkable species from Tadzhikistan (Lepidoptera: Nepticulidae). *Phegea* 23 (1): 51–54.
 Puplesis*, R. and Diškus, A. 2003. *The Nepticuloidea & Tischerioidea (Lepidoptera) – a global review, with strategic regional revisions*. Kaunas: Lututė Publishers.

- Puplesis*, R. and Robinson, G. S. 2000. A review of the Central and South American Nepticulidae (Lepidoptera) with special reference to Belize. *Bulletin of the Natural History Museum, London (Entomology)* 69 (1): 1–114.
- Puplesis*, R., Diškus, A. and Robinson, G. S. 2002a. New Neotropical Nepticulidae (Lepidoptera) from the western Amazonian rainforest and the Andes of Ecuador. *Bulletin of the Natural History Museum, London (Entomology)* 71 (1): 19–58.
- Puplesis*, R., Diškus, A., Robinson, G. S. and Onore, G. 2002b. A review and checklist of the Neotropical Nepticulidae (Lepidoptera). *Bulletin of the Natural History Museum, London (Entomology)* 71 (1): 59–76.
- Scoble, M. J. 1983. A revised cladistic classification of the Nepticulidae (Lepidoptera) with descriptions of new taxa mainly from South Africa. *Transvaal Museum Monograph* 2: i–xi + 1–105.
- Šimkevičiūtė, A., Stonis, J. R. and Diškus, A. 2009. Taxonomic checklist of Nepticulidae of Mexico, with the description of three new species from the Pacific Coast (Insecta, Lepidoptera). *Acta Zoologica Lituanica* 19 (4): 268–277.

**NAUJA SUBMEDITERANINĖS GAUBTAGALVIŲ RŪŠIES
ACALYPTRIS PLATANI (MÜLLER-RUTZ) (INSECTA:
LEPIDOPTERA: NEPTICULIDAE) RADVIETĖ RYTŲ
EUROPOJE, KARADAGO REZERVATE (UKRAINA)**

J. R. Stonis, A. Remeikis

SANTRAUKA

Karadago rezervate (Krymas, Ukraina) aptikta nauja Rytų Europos faunai mažųjų gaubtagalvių (Lepidoptera: Nepticulidae) rūšis – *Acalyptris platani* (Müller-Rutz), kuri iki šiol buvo žinoma iš Mediteraninio ir ypač Submediteraninio regionų. Straipsnyje išvardinamos visos šiuo metu Europoje žinomos *Acalyptris* genties rūšys, pateikiamas Karadago rezervate aptiktą *A. platani* individų aprašas, publikuojamos *A. platani* suaugėlių (imagu) patinų ir patelių, genitalinių struktūrų bei minų (vikšrų padarytų vidinių išgraužų) platano lapuose nuotraukos.

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