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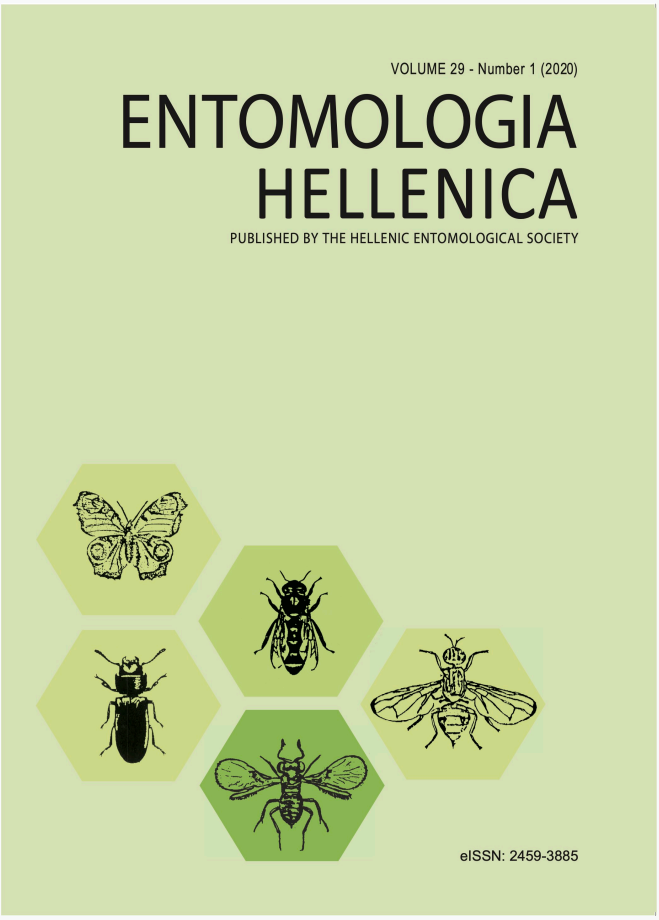

A new tropical invader in Greece: The lantana plume moth Lantanophaga pusillidactylus (Lepidoptera: Pterophoridae)

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SHORT COMMUNICATION

A new tropical invader in Greece: The lantana plume moth *Lantanophaga pusillidactylus* (Lepidoptera: Pterophoridae)

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ABSTRACT

This study documents the first known record of the lantana plume moth *Lantanophaga pusillidactylus* (Walker, 1864) in Greece. The moth was observed in four localities from April 2018 to November 2019, and four individuals were collected and deposited in the Zoological Museum of the University of Athens (ZMUA). All specimens were identified as *L. pusillidactylus*, an alien species in Europe, which has been recently introduced in Spain, Italy (Sicily), Portugal, and Malta. The possible pathways of its introduction, as well as notes on its distribution are discussed.

KEY WORDS: Lepidoptera, Pterophoridae, *Lantanophaga*, alien species, first record, Greece.

Introduction

Alien insects represent one of the most numerous groups of introduced organisms in Europe (Roques et al. 2009). Several non-native insects have been reported from Greece over the last decades, as a result of climatic change and intensified international movement of horticultural plants and products, e.g. box tree moth, *Cydalima perspectalis* (Walker, 1859), exotic sap beetle, *Phenolia (Lasiodites) picta* (Macleay, 1825), and feather-legged fly, *Trichopoda pennipes* (Fabricius, 1781) (Strachinis et al. 2015, Kalaentzis et al. 2019, Kazilas et al. in press).

The lantana plume moth, *Lantanophaga pusillidactylus* (Walker, 1864) is a tropical moth species of the family Pterophoridae. The main host plant is *Lantana camara* L., a neotropical aromatic shrub, which has been introduced in several parts of the world as an ornamental plant (Verdeguer et al. 2009). Additionally, the larvae have been reported feeding on many other plants of Verbenaceae (*Lantana* spp., *Lippia alba*, *Phyla lanceolata*), Euphorbiaceae (*Caperonia palustris*), Lamiaceae (*Mentha spicata*), and Lentibulariaceae (*Utricularia* spp.) families (Bella and Marchese 2007, Bella 2013).

The natural distribution of *L. pusillidactylus* includes countries of the neotropical zoogeographical realm, namely Brazil, Dominica, Ecuador, Jamaica, Mexico, Paraguay, Peru, Puerto Rico, and the Virgin Islands (Gielis 2006). It has been established in South Africa, although it is

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not certain if it was inadvertently introduced along with *Lantana* L. plants or it was already present (Baars and Neser 1999, Day and Neser 2000). *L. pusillidactylus* has also been introduced in several parts of the world (e.g. Australia, Hawaii, Hong Kong, and Palau) for biological control of *L. camara* (Day and Neser 2000, Thomas and Ellison 2000), leading to an almost cosmopolitan distribution of the species. In Europe, it has been introduced in Malta (Agius 2017), Portugal (Corley et al. 2009, Bella 2013), Sicily (Bella and Marchese 2007), and Spain (King 2000). It has also been reported from Israel, Macaronesia (Canary Islands, Madeira), and Morocco (Bella 2013).

In this study, photographic records and collected specimens of *L. pusillidactylus* from Attiki, Kriti, and Rodos confirm the presence of the new tropical invader in Greece (Fig. 1).

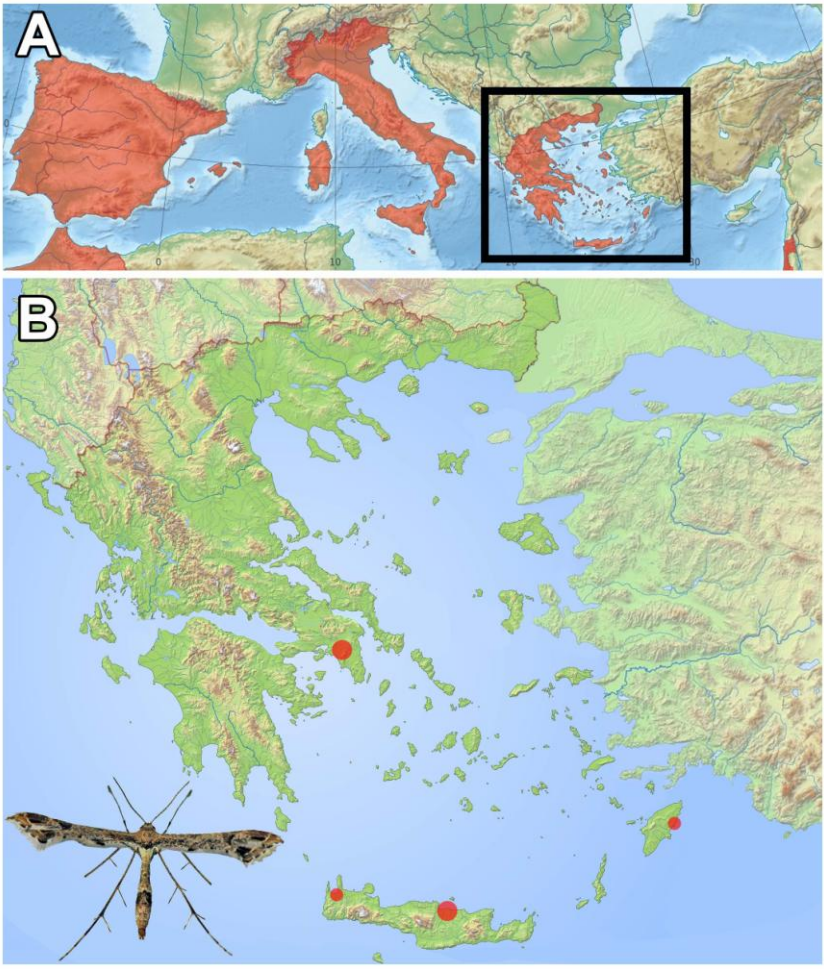

FIG. 1. Records of *Lantanophaga pusillidactylus* in the Mediterranean region. (A) Mediterranean countries where *L. pusillidactylus* has been introduced based on literature data and our records. (B) Physical map of Greece, where the records of the species are indicated with red circles (radius in correspondence to the number of records). Inset: *L. pusillidactylus* (Rodos, Greece); photo by H.W. Graf.

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Materials and Methods

On November 7th, 2019, a specimen of *L. pusillidactylus* was collected from Zografou, Athens, Attiki (37.9672°, 23.7819°). The specimen was found on a wall, below a *Lantana camara* plant, with its hind legs still attached to the cocoon it had recently emerged from. On November 11th, 2019, another individual was collected from *L. camara,* in proximity to the first sighting area (37.9665°, 23.7840°). Both specimens were deposited in the Zoological Museum of the University of Athens (ZMUA), Greece.

The personal observations of the authors, as well as citizen sightings from Rodos, Dodekanisa (H.W. Graf, pers. comm.), Irakleio, Kriti (P. Bormpoudaki, pers. comm.), and Chania, Kriti (S. Zafeiriou, pers. comm.), were pooled in a total of 6 sightings from Attiki, Kriti, and Rodos. Examined material originating from Kriti and Rodos was collected through online platforms (Insects of Greece & Cyprus Facebook Group; lepiforum.de). The data for such records were requested via email and consent was given for their use in the present article. Ms. Bormpoudaki was kind enough to collect specimens which were sent to the ZMUA for further examination. Photographic data, from both *in situ* sightings and collected specimens under a stereoscope (Fig. 2), were sent to Dr. Cees Gielis (Naturalis Biodiversity Center, Leiden), who confirmed the species' identification.

Results

Individuals of *L. pusillidactylus* were observed in four localities throughout Greece (Fig. 1). The moth was generally found in urban areas, usually near parks and public gardens, where plants of *Lantana* sp. are present. All the sightings took place from September to November, apart from a single record from Rodos, which occurred in mid-April. The highest activity was reported from the city of Irakleio, where more than 10 individuals were counted in each sighting.

Overall, we collected the following data:

1. Dodekanisa, Rodos, Stegna (36.2100°, 28.1401°), 14.IV.2018, H. W. Graf, 1 individual, lepiforum.de (pers. comm.)
2. Kriti, Irakleio (35.3080°, 25.1539°), 3.X.2019, P. Bormpoudaki, 10-20 individuals, Insects of Greece & Cyprus Facebook Group (pers. comm.)
3. Kriti, Chania, Koleni (35.4951°, 23.7130°), 23.X.2019, S. Zafeiriou, 1 individual, Facebook (pers. comm.)
4. Kriti, Irakleio (35.3079°, 25.1538°), 6.XI.2019, P. Bormpoudaki, 10-11 individuals observed, 2 individuals collected and deposited in the ZMUA (ZMUA LEP: 00000788), pers. comm.
5. Attiki, Athens, Zografou (37.9672°, 23.7819°), 7.XI.2019, J. Demetriou, 1 individual collected and deposited in the ZMUA (ZMUA LEP 00000786), direct sighting
6. Attiki, Athens, Zografou (37.9665°, 23.7840°), 11.XI.2019, A. Boziki & J. Demetriou, 1 individual collected and deposited in the ZMUA (ZMUA LEP 00000787), direct sighting

Discussion

The presented data constitute the first published records of the Lantana plume-moth for the Greek entomofauna. The collection of a recently emerged adult from Attica might suggest the existence of an established population in the area. The repeated observation of several individuals on *Lantana* sp., within a time period of two months (October - November), suggests the successful breeding of the species in Crete. The adults can typically be found in July and again between September and December (Gielis 1996). Most encounters with the species took place between October and November, although the individual from Rhodes was spotted in April. The latter may

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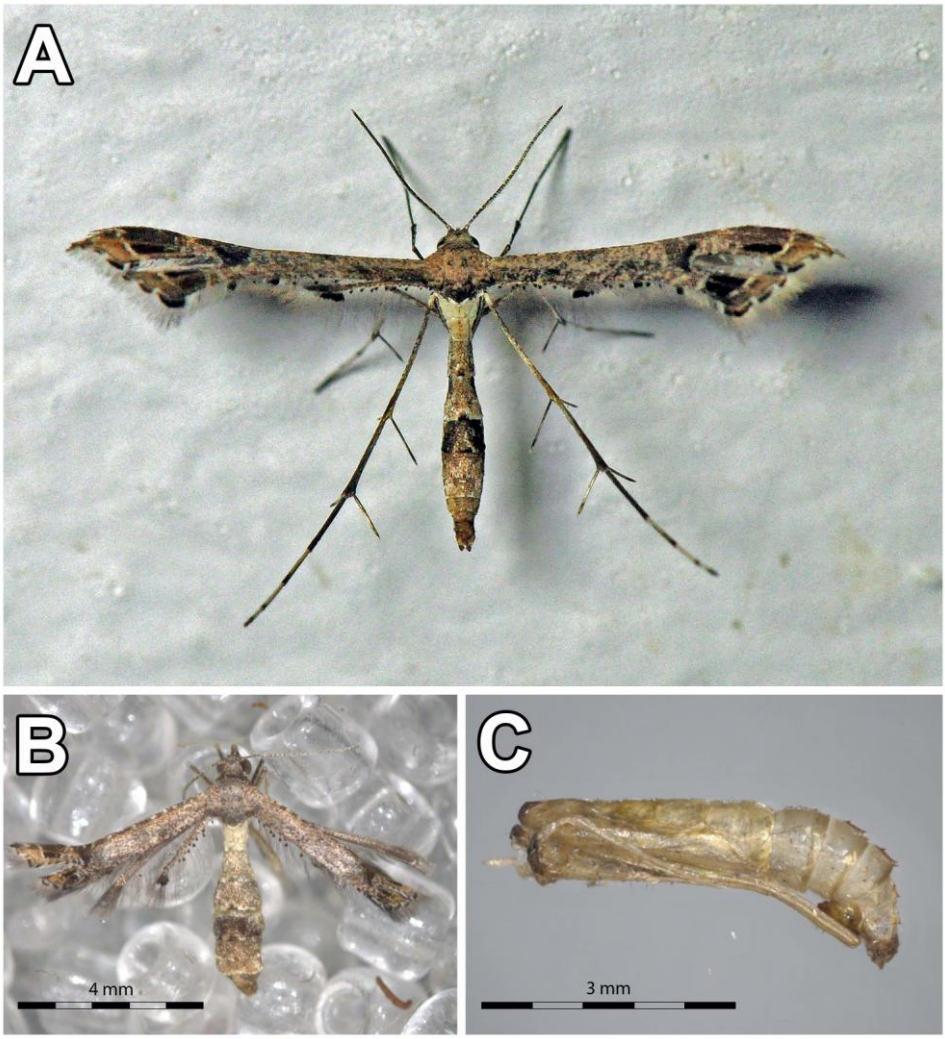

FIG. 2. Specimens of *Lantanophaga pusillidactylus*. (A) Individual photographed *in situ* (Rodos, Greece). (B) Freshly emerged individual from Attiki, under stereoscope (C) Cocoon of freshly emerged individual, under stereoscope. Photos by H.W. Graf (A) and J. Demetriou (B, C).

suggest the possibility of multiple broods throughout the year.

Lantanophaga pusillidactylus was first reported for the Mediterranean from Morocco (Amsel 1951). Since then, it has been recorded for the European continent from Spain (King 2000), Sicily (Bella and Marchese 2007), Portugal (Corley et al. 2009, Bella 2013), and Malta (Agius 2017). For the moment, it seems to inhabit Southern European countries according to its tropical and subtropical ecological preferences.

It remains uncertain how the species reached Greece. Its presence might be attributed to the importation of its principal

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host plants in the country, i.e. *Lantana* spp., which are widely used as ornamental plants in house gardens, parks, and other urban areas. It is possible that the species may have been introduced in various countries as larvae, in infected *Lantana* spp. plants, as independent introduction events. According to the DAISIE-data, the ornamental and horticultural plant material pathway (flowers, vegetables, and fruit) is responsible for the 29% of introduced arthropod species (Rabitsch 2010). Alternatively, the species may have gradually expanded its distribution through other European countries. The geographical isolation of Malta and Crete in the Mediterranean Sea would suggest the scenario of accidental introduction through *Lantana* spp. plants, although the latter scenario cannot be rejected.

The species' strong association and dependence on its host plants suggest the possible expansion of its distribution to areas where its main host plant can be found. *L. pusillidactylus* is expected to be found in more Mediterranean countries in the near future.

Four out of six sightings of *L. pusillidactylus* were made in proximity to its main host plant, *Lantana*, in urban areas. This doesn't come as a surprise as 52.6% of invasive species can be found in parks and gardens, alongside their native host plants (Lopez-Vaamonde et al. 2010). According to Bella and Marchese (2007) the species has been reported reproducing and feeding on various plants (Verbenaceae, Euphorbiaceae, Lamiaceae, Lentibulariaceae), including *Mentha spicata*, an indigenous aromatic plant. Other native members of the Pterophoridae family, namely *Merrifieldia tridactyla* (Linnaeus, 1758) and *Amblyptilia acanthadactyla* (Hübner, 1813) use among other plants *M. spicata* as a food source and a host plant (Gielis 1996). The latter species has also been observed by V. Koutsoukos and H.W. Graf in Attica and Crete respectively, showing the overlap of its distribution with the newly introduced *L. pusillidactylus*. The interaction between the invading species and native Pterophoridae has not been researched yet. The effects of the introduction of *L. pusillidactylus* on the native flora is yet to be investigated, as in the case of many invasive herbivore insects (Kenis et al. 2009). More research is needed in order to fully unravel the distribution pattern of the species in Europe, as well as the possible effects of *L. pusillidactylus* on native biodiversity.

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We thank H.W. Graf and S. Zafeiriou for allowing us to include their records in our study, but also for providing us with photographic material. We would like to wholeheartedly thank P. Bormpoudaki for providing valuable data and specimens for our study. Furthermore, we thank A. Boziki for her assistance in the collection of the specimens and Dr. Ioannis D. Adamakis (Section of Botany, Department of Biology, NKUA, Greece) for lending us the department's equipment in order to photograph the collected specimens. Finally, we would like to express our great appreciation to Dr. Cees Gielis (Naturalis Biodiversity Center, Leiden) for his useful advice and constructive comments for this study, as well as for his valuable assistance on the species identification.

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Ένας νέος τροπικός εισβολέας στην Ελλάδα: Το λεπιδόπτερο *Lantanophaga pusillidactylus* (Lepidoptera: Pterophoridae)

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ΠΕΡΙΛΗΨΗ

Η παρούσα εργασία τεκμηριώνει την πρώτη καταγραφή του λεπιδόπτερου *Lantanophaga pusillidactylus* (Walker, 1864) στην Ελλάδα. Το λεπιδόπτερο παρατηρήθηκε σε τέσσερις τοποθεσίες από τον Απρίλιο του 2018 μέχρι το Νοέμβριο του 2019 και τέσσερα άτομα συλλέχθηκαν και κατατέθηκαν στο Μουσείο Ζωολογίας του Εθνικού Καποδιστριακού Πανεπιστημίου Αθηνών. Όλα τα δείγματα αναγνωρίστηκαν ως *L. pusillidactylus*, ένα ξενικό είδος στην Ευρώπη που έχει ήδη αναφερθεί από την Ισπανία, την Ιταλία (Σικελία), την Πορτογαλία και τη Μάλτα. Αναλύονται οι πιθανές οδοί της εισαγωγής του, καθώς και στοιχεία της κατανομής του.

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