PASQUALE TREMATERRA^a

DESCRIPTION OF *CYDIA ALDOCATANIAE* SP. N. AND REPORT OF *CYDIA RYMARCZKI* VARENNE & NEL, 2013 FROM MALTA (LEPIDOPTERA TORTRICIDAE)

^a Department of Agriculture, Environmental and Food Sciences, University of Molise, Campobasso, Italy.
Corresponding Author: Pasquale Trematerra; trema@unimol.it

Trematerra P. – Description of *Cydia aldocataniae* sp. n. and report of *Cydia rymarczki* Varenne & Nel, 2013 from Malta (Lepidoptera Tortricidae).

Cydia aldocataniae sp. n. is described as new. Adults and genitalia are very similar to *C. fagiglandana* (Z.) but DNA barcodes are different. Moreover, the presence of *Cydia rymarczyki* Varenne & Nel, 2013 is reported for the first time in the Maltese fauna.

KEY WORDS: *Cydia aldocataniae*, new species, *Cydia rymarczki*, Lepidoptera Tortricidae, Malta.

INTRODUCTION

In the past the Tortricidae from the Maltese Islands have received only sporadic attention by both local and foreign lepidopterists (T.B. FLETCHER 1904-05; 1905), ALFREDO CARUANA GATTO (1905). More recently VALLETTA (1973) listed 33 species of tortricids out of a list of 413 species. SAMMUT (1984) and RAZOWSKI (1996) mentioned 41 and 50 species respectively. SAMMUT (2000) in a catalogue of over 600 species brought the number of known tortricids from Malta to 59. In the latest checklist of lepidoptera, the electronic version of the Fauna Europaea, the number of Tortricidae reported from Malta is 51 (AARVIK, 2013). The species listed by TREMATERRA and SAMMUT (2007) amount to 68. SEGUNA in 2008 added *Cydia blackmoreana* (Walsingham) from Naxxar.

In the present paper a new species collected by Aldo Catania from Buskett Garden in 2017 is described and the presence of *Cydia rymarczki* Varenne & Nel, 2013 is cited for the first time. With these two new records the genus *Cydia* in Malta is represented by 12 species.

Cydia aldocataniae sp. n.

MATERIAL EXAMINED – Holotype, 1♂, Malta, Buskett, 35°51'21.13"N – 14°23'49.66"E, Alt. 190 mt, 28.VI.2017, Leg. A. Catania (Sample ID: LEP-SS-00826) (in collection Pasquale Trematerra, Campobasso, Italy).

Paratypes, 1♀, Malta, Buskett, 35°51'21.13"N – 14°23'49.66"E, Alt. 190 mt, 15.VI.2017, Leg. A. Catania (in collection P. Trematerra, Italy); 1♀, Malta, Buskett, 35°51'21.13"N – 14°23'49.66"E, Alt. 190 mt, 2.VI.2017, Leg. A. Catania (in collection Aldo Catania, Malta).

Additional material (Paratypes) from Malta, Buskett, 35°51'21.13"N – 14°23'49.66"E, Alt. 190 mt, Leg. A. Catania: 1♀, 25.V.2017; 1♂ and 1♀, 30.V.2017; 1♂, 2.VI.2017; 1♂, 10.VI.2017; 1♂, 11.VI.2017; 1♂, 20.VI.2017; 1♂, 25.VI.2017; 1♀, 28.VI.2017; 2♀, 30.VI.2017; 4♂, 3.VII.2018 (in collection Aldo Catania,

Malta). 1♀, 30.V.2017 (in collection Paul Sammut, Malta). 1♀, 2.VI.2017 (in collection Antony Seguna, Malta).

ADULT (Fig. I) – Wingspan 14-16 mm. Head brownish sprinkled with cream scales, palps light brown-cream; antennae brownish-cream. Thorax brownish, abdomen cream colour with brownish stripes. Forewing grey-brownish, sprinkled whitish-cream with creamish strigulae; costal strigulae delicate, whitish or white-cream, dividings dark brown; post-apical strigula white-cream; speculum olive grey, with refractive lines and blackish inner spots; outer lines of speculum silvery. Dorsal patch white-creamish, diffused distally and extending towards middle of wing, marked by brownish lines. Basal blotch brown-creamish, slightly convex medially; subternal blotch dark brown. Cilia brownish grey; basal line creamish. Hindwing brownish with cilia brownish-cream, darker at base, basal line cream. Males with creamish-white blotch in basal and anal areas with similarly coloured cilia.

MALE GENITALIA (Fig. II, 1-2) – Tegumen developed with enlarged base; small prominence at top of tegumen proximally and scales on lateral surfaces; valvae large, elongate bean shaped with costa convex in the median part; cucullus elongate, convex caudally covered with group of spines; ventral incision quite pronounced; basal cavity rather rounded; neck of valva broad; caudal angle of sacculus little pronounced; aedeagus very slender long and curved, basally enlarged and at the terminal part pointed.

FEMALE GENITALIA (Fig. II, 3-4) – Sub-genital sternite trapezoidal, cut laterally; postostial part of sterigma small, slightly expanding posteriorly; ostium bursae wide, sterigma funnel shaped; colliculum membranous; cingulum rather elongated; ductus seminalis sub-median; bursa copulatrix sculptured, developed and broad; signum developed.

DISTRIBUTION – Known only from the type locality: Buskett Garden, Rabatt (Malta).

Fig. I – *Cydia aldocataniae* sp.n.: adult male (1); *Cydia fagiglandana* adult male (2).

BIOLOGY – Probably univoltine. The specimens of *C. aldocataniae* sp. n. came out from acorns of *Quercus ilex* L. collected at Buskett Garden (Malta), in October/November, and adults emerged from end of May to the first week of July (Fig. III, 1-4).

DIAGNOSIS – Externally *Cydia aldocataniae* sp. n. looks like *Cydia fagiglandana* (Z.) but differs by wing-patterns (DANILEVSKI & KUZNETSOV, 1968; RAZOWSKI, 2003) (Fig. I, 1-2). From the latter species, in male genitalia it differs by the conformation of tegumen and of valvae, the caudal angle of the sacculus, by cucullus being larger and by aedeagus slender, longer and pointed (Fig. II, 1-2; Fig. IV, 1-2). The female genitalia differ by subgenital sternite being trapezoidal, cut laterally, ostium bursae wider, cingulum being elongated, bursa copulatrix smaller and sculptured (Fig. II, 3-4; Fig. IV, 3-4).

BARCODING ANALYSES – A small piece of a leg was transferred to a lysis plate under ca. 0.3 ml 100% alcohol. Tissue samples were submitted to the standard procedures of the Canadian Centre for DNA Barcoding (CCDB) for sequencing the mitochondrial 5' cytochrome oxidase gene, subunit 1 (COI), the standard marker for the identification of most animals. LepF1 and LepR1 were the primers used for PCR and sequencing (HAJIBABAEI *et al.*, 2006). Sequences were blasted against the complete sequence database of BOLD data systems (RATNASINGHAM and HEBERT, 2007) in order to investigate the closest matches using the BOLD Identification Engine (http://www.boldsystems.org/index.php/IDS_OpenIdEngine). Sequences having no matches on BOLD were blasted against the complete sequence database of Gen Bank (HAJIBABAEI *et al.*, 2006; RATNASINGHAM and HEBERT, 2007). Genetic distances between sequences were measured using minimum pairwise distance and Neighbour joining tree was built using Kimura 2-parameter distance model for COI-5P marker. The distance of the *C. aldocataniae* (ID: BCLEP376-18) from the nearest neighbour (NN) is equal to 2,99%. The NN is *C. fagiglandana* (BIN: BOLD AAC5023).

A target 658-bp fragment of COI was amplified only from LEP-SS-831, as follow:

```
AACATTATATTTTATTTTGGTATTTGAGCTGGCATA
GTAGGAACCTCCCTAAGTTTATTAATTCGTGCAGA
ATTAGGAAATCCTGGATCTCTAATTGGAGATGATCA
AATTTATAATACTATTGTAAGTGCATGCTTTTATTA
TAATTTCTTTATAGTAATACCTATTATAATCGGTGGA
TTTGGTAACTGATTAGTACCATTAATACTAGGAGCC
CAGATATGGCATTTCCTCGAATAAATAATATAAGATT
TTGATTATTACCTCCCTCTATTATACTTTAATTTCAA
GTAGAATTGTAGAAAATGGAGCAGGTACAGGATGA
ACAGTATACCCCCCTCTGTCATCTAATATTGCCATA
GTGGAAGATCTGTAGACTTAGCTATTTCTCCCTTAT
TTAGCTGGAATTTCTTCTATTTTAGGAGCTGTTAATT
TTATTACAACATTATTATTAATATACGACCTAATAATATA
TCATTAGACCAAATACCCCTATTTGTATGAGCTGTG
GTATTACCGCTCTTCTCTTACTTCTATCATTACCAGT
ATTAGCAGGTGCCATTACTATACTTCTCACAGACCG
AAATCTCAATACTTCATTTTTTGATCCTGCTGGTGG
AGGTGATCCAATTCTCTACCAACATCTATTT
```

ETYMOLOGY – The new *Cydia* is dedicated to my colleague Mr. Aldo Catania (Żebbuġ, Malta) who has contributed to collections of the material studied.

Cydia rymarczyki Varenne & Nel, 2013

MATERIAL EXAMINED – 1 ♀, Malta, Buskett, Bred ex-larva on *Quercus ilex* 30.V.2014, leg. A. Catania. 1 ♂ Malta, Buskett, Bred ex-larva on *Quercus ilex* Alt. 190mt., 1.VI.2014, leg. A. Catania. 1 ♀, Malta, Buskett, 35°51'21.13"N – 14°23'49.66"E, Alt. 190mt., 30.V.2017, Leg. A. Catania.

Cydia rymarczyki Varenne & Nel, which is closely related to *Cydia amplana* (Hübner), and *Cydia molybdana* (Constant), was described from southern France (VARENNE & NEL, 2013). *C. rymarczyki* presents a habitus rather similar to that of *C. amplana* but more contrasted and browner, especially in the males (Fig. V, 1). The male genitalia are closely related to those of *C. molybdana* and the female genitalia are related to those of *C. amplana* (VARENNE & NEL, 2013) (Fig. V, 2-5).

BIOLOGY – Probably bivoltine. According to VARENNE & NEL (2013), in France *C. rymarczyki* coexists with *C.*

Fig. II – *Cydia aldocataniae* sp. n.: male genitalia (1); tegumen, aedeagus and valva (2); Female genitalia (3); antrum and colliculum (4).

amplana and *C. molybdana*. As with these two species, hatching occurs mostly in September. From 2013 to 2017, in Malta adults of *C. rymarczyki* were obtained from late May to early June from larvae in acorns of *Quercus ilex*.

DISTRIBUTION – France (coastal plain of Alpes-Maritimes) and Malta (Buskett), also in Greece (Crete) published as *Cydia amplana* (Huemer in litt.). Before this new distribution record, *C. rymarczyki* was known only from the Var and the Alpes-Maritimes, on the coastal plains (altitude around 100 m), from le Destet, Mouriès, 95 m, Bouches-du-Rhone;

le Brûlat, Grand Vallat, Sainte-Anne-du-Castellet, 115 m; Tamarin, Biot, 100 m, Alpes-Maritimes.

ACKNOWLEDGEMENTS

I thank Mr. Aldo Catania and Mr. Paul Sammut (Malta), Dr. Marco Colacci and Lorenzo Goglia (Italy) for information, comments and helpful suggestions. I am grateful to Dr. Paul Hebert and his team (Canadian Centre for DNA Barcoding Guelph, Canada) for DNA sequencing work.

Fig. III – Plant of *Quercus ilex* in Buskett Garden (Malta) (1); acorns of *Quercus ilex* (2); larva of *Cydia aldocataniae* in an acorn of *Quercus ilex* (3); cocoon of *C. aldocataniae* (4).

REFERENCES

- AARVIK L.E., 2013 – *Tortricidae*. In: O. Karsholt & E.J. Van Nieukerken. *Fauna Europaea version 2.6.2*. Available from <http://www.faunaeur.org>.
- CARUANA GATTO A., 1905 – *Seconda Contribuzione alla Fauna Lepidopterologica dell'Isola di Malta – Eteroceri*. - Tipografia del "Malta": 1-32.
- DANILEVSKY A.S., KUZNETSOV V.I., 1968 – *Listovertki (Tortricidae). Triba plodozhorki (Laspeyresii)* – *Fauna SSSR*, 5 (1). - Nasekomye Cheshuekrylye, Leningrad: 636 pp.
- FLETCHER T.B., 1904-05 – *A Preliminary list of the Lepidoptera of Malta*. - *Entomologist*, 37: 273- 276, 315-319; 38: 18-20.
- FLETCHER T.B., 1905 – *A Preliminary list of the Lepidoptera of Malta*. - *Dialy Malta Chronicle*. March 10 and March 14, 1905.
- HAJIBABAEI M., JANZEN D.H., BURNS J.M., HALLWACHS W., HEBERT, P.D.N., 2006 – *DNA barcodes distinguish species of tropical Lepidoptera*. - *PNAS* 2006, 103: 968-971.
- RATNASINGHAM S., HEBERT, P.D.N., 2007 – *BOLD: The Barcode of Life Data System* (www.barcodinglife.org). - *Molecular Ecology Notes*, 7: 355-364.
- RAZOWSKI J., 1996 – *Tortricoidea*. In: Karsholt O. & J. Razowski. *The Lepidoptera of Europe. A Distributional Checklist*. - Apollo Books, Stenstrup: 380 pp.
- RAZOWSKI J., 2003 – *Tortricidae of Europe. Olethreutinae*, 2. - Frantisek Slamka, Bratislava: 301 pp.
- SAMMUT P., 1984 – *The present Status of the Endemic Lepidoptera of the Maltese Islands*. - *Potamon*, 13: 65-70.
- SAMMUT P., 2000 – *Kullana Kulturali 12. – Il-Lepidoptera*. - *Pubblikazzjonijiet Indipendenza, Malta*: 1-246.
- SEGUNA A., 2008 – *Cydia blackmoreana (Walsingham, 1903), a tortricid moth new for the Maltese fauna (Lepidoptera: Tortricidae)*. - *SHILAP Revta. Lepid.*, 36 (141): 77-78.
- TREMATERRA P., SAMMUT P., 2007 – *Lepidoptera Tortricidae of the Maltese fauna*. - *Boll. Zool. agr. Bachic.*, Ser. II, 39 (1): 1-34.
- VALLETTA A., 1973 – *The Moths of the Maltese Islands*. - Progress Press, Valletta: 120 pp.
- VARENNE TH., NEL J., 2013 – *Cydia molybdana (Constant, 1884), bona species, stat. Restaur. Et description de Cydia rymarczki sp. nov. du sud de la France (Lep. Tortricidae, Olethreutinae)*. - *Oreina*, 21: 9-11.

Fig. IV – *Cydia fagiglandana* (Zeller, 1841): male genitalia (1); tegumen, aedeagus and valva (2); Female genitalia (3); antrum and colliculum (4).

Fig. V – *Cydia rymarczki* Varenne & Nel, 2013: adult male (1); male genitalia (2); aedeagus (3); female genitalia (4); sterigma and antrum (5).