

SHORT COMMUNICATION

## First record of parasitoids associated with insects inhabiting capsules of *Papaver rhoeas* in Greece

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**Summary** A faunistic complex of chalcidoid parasitoids (Hymenoptera: Chalcidoidea) associated with cynipids and cecidomyiids (Hymenoptera: Cynipidae; Diptera: Cecidomyiidae) inhabiting capsules of the annual weed *Papaver rhoeas* L. (corn poppy) was recorded in Amynteo, Northern Greece (2012) and Orchomenos, Voeotia, Central Greece (2013). The parasitoids are *Idiomacromerus papaveris* (Forster, 1856), *Idiomacromerus* sp., *Pseudotorymus papaveris* (Thomson, 1876) (Torymidae), *Aprostocetus epicharmus* Walker, 1839 (Eulophidae), and *Cyrtoptyx* sp. (Pteromalidae). *Aprostocetus epicharmus* was recorded only in Amynteo while *Idiomacromerus* spp. and *Cyrtoptyx* sp. only in Voeotia. This is the first record of these parasitoid species in corn poppy capsules in Greece. All parasitoids except the eulophid, which probably parasitizes Cecidomyiidae, are most likely parasitoids of *Aylax papaveris* (Perris, 1840) (Cynipidae).

**Additional keywords:** *Aprostocetus epicharmus*, *Aylax papaveris*, *Cyrtoptyx* sp., gall, *Idiomacromerus papaveris*, *Pseudotorymus papaveris*

A complex of chalcidoids (Hymenoptera: Chalcidoidea) was recovered from mature, dry capsules of the winter annual weed *Papaver rhoeas* L. (corn poppy, common poppy) (Papaveraceae), which were collected from Amynteo, Florina, Northern Greece in 2012, and Orchomenos, Voeotia, Southern Greece in 2013. The parasitoids are *Idiomacromerus papaveris* (Förster, 1856), *Idiomacromerus* sp., *Pseudotorymus papaveris* (Thomson, 1875) (Torymidae), *Aprostocetus epicharmus* Walker, 1839 (Eulophidae), and *Cyrtoptyx* sp. (Pteromalidae). *Aprostocetus epicharmus* was recorded only in Amynteo while *Idiomacromerus* spp. and *Cyrtoptyx* sp. only in Voeotia. Identifications of the parasitoids have been made based on Bouček and Rasplus (1991) and Medvedev (1978). To our knowledge, this is the first record in Greece of these parasitoids occurring in corn poppy capsules. *Chalcimerus borceai* Steffan and

Andriescu, 1962 (Hym.: Torymidae) is the only parasitoid species associated with corn poppy capsules that has been previously reported in Greece (Askew *et al.*, 2006).

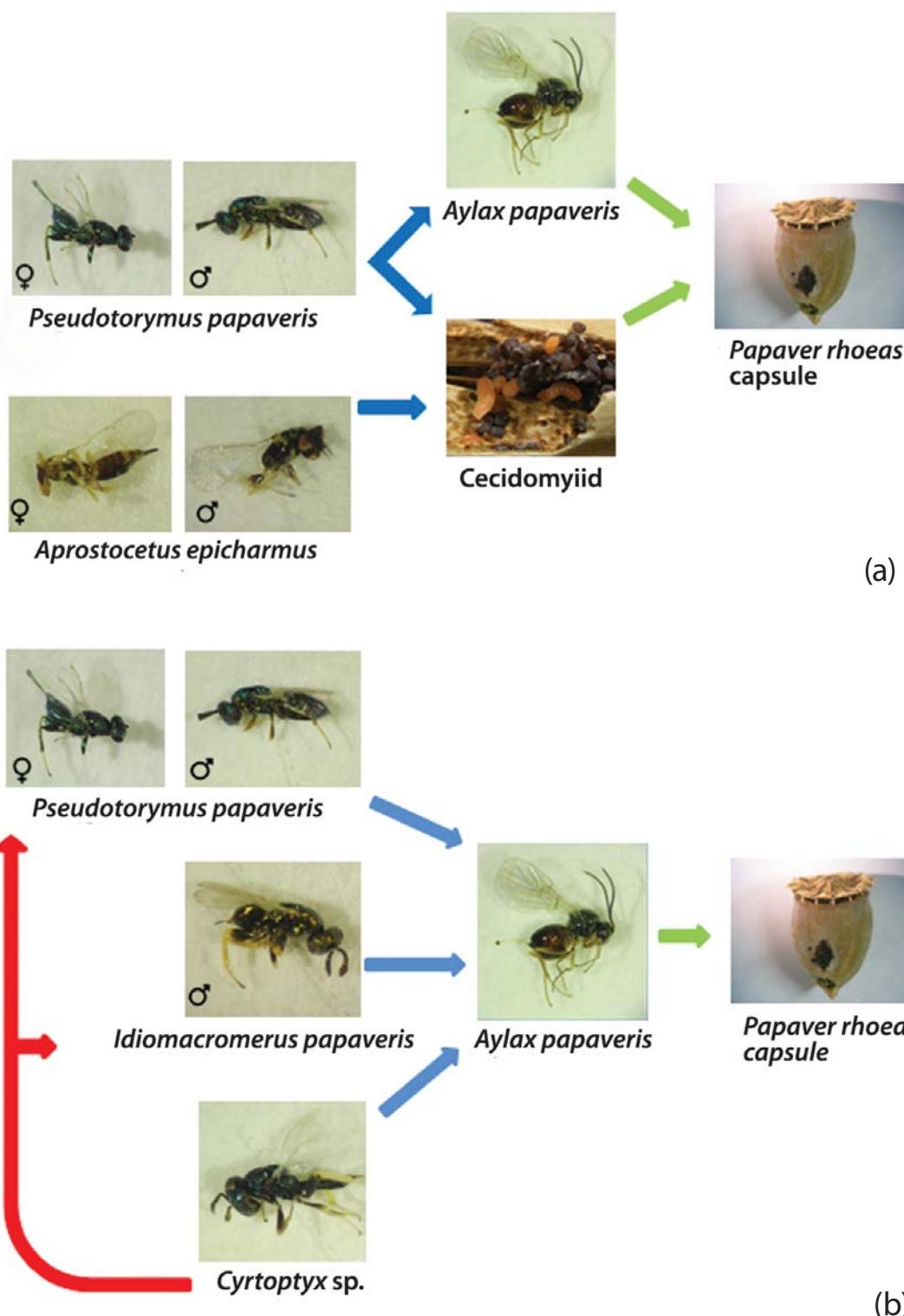
Adult females and males of *P. papaveris* were recorded upon emergence from the *P. rhoeas* capsules in both regions. In the capsules from Amynteo, together with the parasitoid specimens, we obtained an adult female of *Aylax papaveris* (Perris) (Hym.: Cynipidae) and found infestation by Cecidomyiidae larvae (Diptera), most likely *Dasineura papaveris* Winnertz.

*Pseudotorymus papaveris* is probably a parasitoid of *A. papaveris* and the cecidomyiid while *A. epicharmus* is a parasitoid of the cecidomyiid (Figure 1). *Pseudotorymus papaveris* has a Palaearctic geographical distribution (Nikol'skaya and Zerova, 1978; Grissell, 1995; Noyes, 2017). Popescu (2002) reported the emergence of *P. papaveris* from *A. papaveris* and *D. papaveris*, infesting *P. rhoeas* and *P. dubium* L. capsules, and from their predator *Lestodiplosis callida* Winnertz (Diptera: Cecidomyiidae). *Aprostocetus epicharmus* has been reported (as *Tetrastichus epicharmus* (Walker)) parasitising the bras-

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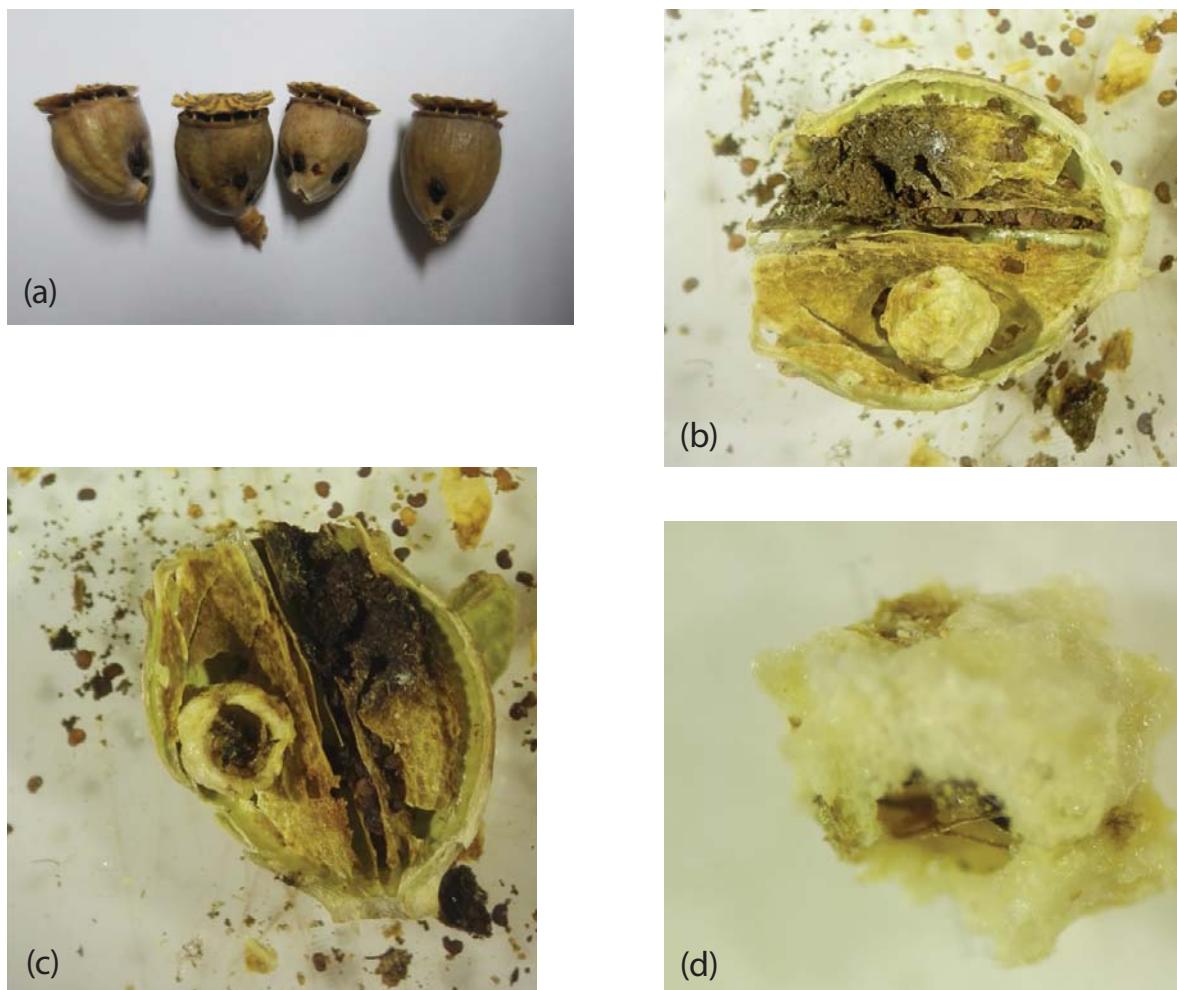
**Figure 1.** Suggested interrelations a) between the parasitoids *Pseudotorymus papaveris* and *Aprostocetus epicharmus*, and the herbivores *Aylax papaveris* and a cecidomyiid (samples from Northern Greece) and b) between the parasitoids *Pseudotorymus papaveris*, *Idiomacromerus papaveris* and *Cyrtoptyx sp.*, and the host *A. papaveris* (samples from central Greece), in *Papaver rhoeas* capsules. Colored arrows indicate the various associations (green for herbivory, blue for parasitism, red for hyper-parasitism) (Images by M. Samara, V. Kati).

sica pod midge, *Dasineura brassicae* (Winnertz) (Diptera: Cecidomyiidae), in Poland (Czajkowska, 1978) and the raspberry cane midge, *Resseliella theobaldi* (Barnes) (Diptera: Cecidomyiidae), in Hungary (Vétek et al., 2006).

*Aylax papaveris* is one of the three Cynipidae species inducing capsule galls in *P. rhoeas*, *P. dubium*, *P. argemone* L. and *P. somniferum* L., the other two species being *Barbotinia oraniensis* (Barbotin) and *Aylax minor* Hartig, 1840 (Pujade-Villar, 2015; Gómez et al., 2017). *Aylax papaveris* forms light yellow fused galls, irregular oval or globular in shape, highly variable in size, including a few dozen larval chambers arranged perpendicularly to the vertical capsule axis. The

individual gall chambers originate from the transformation of the septum and seeds, usually causing deformation and enlargement of the capsules (mainly in *P. rhoeas* and *P. dubium*). Internal septa and seeds disappear (Pujade-Villar, 2015). *Dasineura papaveris* is a monophagous bivoltine gall midge of *Papaver* spp. capsules, which have a normal appearance after infestation and only when opened the clearly swollen septa are visible (Skuhravá and Skuhravý 1997; Popescu 2002).

In the capsules from Voeotia, we encountered galls by the cynipid gall wasp *A. papaveris* (Figure 2) and the parasitoids *Idiogrammacromerus* spp. (three male specimens, probably *I. papaveris*, although it is difficult



**Figure 2.** *Papaver rhoeas* capsules a) infested by cynipid gall wasp, b) capsule with the gall (10x), c) gall with the cynipid gall wasp (10x) and d) *Aylax papaveris* (Hym.: Cynipidae) before emergence (40x) (Images by M. Samara).

to be certain without any females, *Idiomacromerus* sp. (1 male) (different from *I. papaveris* in the coloration of tibiae), and *Cyrtoptyx* sp. (1 male).

A possible scenario is that *P. papaveris*, *I. papaveris* and *Cyrtoptyx* sp. are parasitoids of *A. papaveris*, although no *Cyrtoptyx* sp. has ever been reared from *Aylax* (Figure 1). *Cyrtoptyx* sp. might as well be a hyperparasitoid of the torymids. *Idiomacromerus papaveris* has been reported to parasitise *A. papaveris* (in Croatia, France, Hungary, Romania, Spain) and *A. minor* (in Andora, France, Romania, Spain) in *Papaver* galls (Askew *et al.*, 2006). *Idiomacromerus papaveris* is widely distributed from Iran to U.K. (Noyes, 2017). Some *Cyrtoptyx* species have been reported to parasitise cynipid gall wasps e.g. *Cyrtoptyx robustus* (Masi, 1907) on *Cynips disticha* Hartig, 1840 on *Quercus* (Nieves Aldrey, 1982; Bellido and Pujado-Villar, 1999) in Spain; others are parasitoids of fruit flies, e.g. *Cyrtoptyx latipes* (Rond.) on the olive fruit fly, *Bactrocera oleae* (Rossi) (Diptera: Tephritidae) (Baratella, 2008).

The sampled parasitoid species and their hosts are associated with the natural vegetation in agricultural systems of different intensity in terms of cultivation and pesticide use, affecting the abundance and species diversity of spontaneous plants: *P. rhoeas* plants were located in uncultivated land around the grape-producing area of Amynteo and in the intensively cultivated arable crop area of Voeotia. Our findings highlight the importance of natural or semi-natural areas for the maintenance of these species. Further studies are necessary to clarify the exact trophic relations among the Hymenoptera pararasitoids and the hosts found in the *P. rhoeas* capsules, as well as their potential role in ecosystem services through the biological control of the corn poppy.

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## ΣΥΝΤΟΜΗ ΑΝΑΚΟΙΝΩΣΗ

### Πρώτη καταγραφή παρασιτοειδών σε έντομα Cynipidae και Cecidomyidae σε κάψες παπαρούνας, *Papaver rhoeas*, στην Ελλάδα

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**Περίληψη** Στην εργασία παρουσιάζεται ένα σύμπλεγμα παρασιτοειδών σε έντομα Cynipidae και Cecidomyiidae που προσβάλλουν τις κάψες του ετήσιου ζιζανίου *Papaver rhoeas* (κν. παπαρούνα), όπως καταγράφηκε στις περιοχές του Αμύνταιου Φλώρινας (2012) και του Ορχομενού Βοιωτίας (2013). Τα παρασιτοειδή ανήκουν στα είδη *Idiomacromerus papaveris* (Forster, 1856), *Idiomacromerus* sp., *Pseudotorymus papaveris* (Thomson, 1876) (Torymidae), *Aprostocetus epicharmus* Walker, 1839 (Eulophidae), και *Cyrtoptyx* sp. (Pteromalidae). Το *A. epicharmus* καταγράφηκε μόνο στο Αμύνταιο ενώ τα *Idiomacromerus* spp. και *Cyrtoptyx* sp. στη Βοιωτία. Πρόκειται για την πρώτη καταγραφή των παρασιτοειδών αυτών σε κάψες παπαρούνας στην Ελλάδα. Όλα τα παρασιτοειδή, εκτός από το Eulophidae, το οποίο πιθανόν παρασιτεί δίπτερα της οικογένειας Cecidomyiidae, φαίνεται να είναι παρασιτοειδή του υμενόπτερου *Aylax papaveris* (Perris, 1840) (Cynipidae).

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