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The Blackcap *Sylvia atricapilla* and the Garden Warbler *Sylvia borin* as pollinators of *Rhamnus alaternus* (Rhamnaceae)

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In Europe few cases are know of birds spreading pollen (Ash et al. 1961, Campbell 1963) or feeding on nectar (Simms 1985, Swynnerton 1916, Thake 1980, Visick 1977). The pollination of *Salix* spp. by the Blue Tit *Parus caeruleus* is the only example which relates to autochthonous plants in Europe (Kay 1985). In this short communication we describe the case of some Blackcaps *Sylvia atricapilla* and Garden Warblers *Sylvia borin* which apparently played the role of pollinators feeding on the nectar produced by *Rhamnus alaternus* (Rhamnaceae).

STUDY AREA AND METHODS - The observations were made in the World Wildlife Fund Nature Reserve "Bosco di Palo" at Ladispoli (Rome) and near Anacapri in the Isle of Capri (Naples). The birds were trapped by mist-nets. The pollen found on the bills of the birds was identified with a microscope to compare it with pollen taken from the flowers of the woody plants flowering during the observation periods. The number of insects present on the flowers was estimated by sweeping an entomological net among the leaves and flowers for periods of one minute.

RESULTS - On 11 April 1987 we trapped three Blackcaps in the Palo Reserve which had the upper mandible, from the tip up to the forehead, covered with a layer of 1 mm of pollen of *Rhamnus alaternus* mingled with nectar. On 10 and 13 May 1987 we trapped two Garden Warblers near Anacapri whose bill and surrounding feathers carried considerable quantities of pollen and nectar of *Rhamnus alaternus*. In Tab. I we report the average numbers of insects found on 12 April 1987 at Palo in the course of five sampling periods of 1 minute each, sweeping an entomological net among the flowering wood plants with pollination by insects. We also report the percentages of presence of the predominantly insect-pollinated woody species that were flowering during the observation period along two transects 1000 m long, the first inside the Palo wood and the second in an ecotone.

DISCUSSION - We consider that the Blackcaps and the Garden Warblers we trapped carried large amounts of the pollen of *Rhamnus alaternus* on their bills and

TABLE I. The average number (+/- S.D.) of insects found in 5 samples of insect-pollinated woody plants and the percentage of presence of these plants in full bloom on 12 April 1987 inside the wood and in an ecotone of the Palo Reserve.

	Average number of insects	Percentage of insect-pollinated woody plants	
		wood (no. 81)	ecotone (no. 262)
Rhamnus alaternus	36.2+/-5.5	4.9	16.4
Prunus spinosa	68.6+/-5.0	4.9	80.5
Viburnum tinus	57.0+/-6.6	87.7	0.8
Pyrus amygdaliformis	79.8+/-9.6	2.5	2.3

surrounding feathers not by chance but because they feed on its nectar.This conclusion is supported by the following observations:
- there were no more insects on *Rhamnus alaternus* than on other insect-pollinated woody plants in flower at the same period, so there was no justification for a preference for this species by birds feeding on insects (Tab. I);
- *Rhamnus alaternus* was not the prevailing species in full bloom at the sites where the observations were made (Tab. I);
- the flowers of *Rhamnus alaternus* have so much nectar that it is visible to the naked eye in form of small drops on the nectar organ;
- the quantity of pollen mingled with nectar present on the bills and feathers of the birds was so great that it could not be the result of casual contamination.
This is the second case in Europe, and the first in the Mediterranean basin, in which birds have been observed to play the role of pollinators on an autochthonous plant.

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RIASSUNTO - La Capinera *Sylvia atricapilla* ed il Beccafico *Sylvia borin* sono degli impollinatori dell'Alaterno *Rhamnus alaternus* (Rhamnaceae).
- Durante le attività di inanellamento sono state catturate alcune Capinere a Palo Laziale (Roma) ed alcuni Beccafichi presso Anacapri (Napoli) che presentavano il becco e le piume circostanti sporchi di polline impastato a nettare di Alaterno.
- Si ritiene che le Capinere ed i Beccafichi si siano sporcati di polline mentre si alimentavano del nettare e non per catturare insetti sui fiori, per i seguenti motivi: sull'Alaterno non erano presenti più insetti che su altri arbusti fioriti in quel momento, l'Alaterno non era la specie numericamente dominante, nell'Alaterno il nettare è talmente abbondante da vedersi ad occhio nudo sotto forma di goccioline sul nettario, la quantità di polline presente sul becco degli uccelli era tale da escludere la possibilità che essi si fossero sporcati casualmente. Questo è il secondo caso in Europa ed il primo nel Mediterraneo di uccelli che svolgono ruolo di impollinatori nei confronti di una pianta autoctona.
TAB. I. Numero medio (+/- d.s.) di insetti rinvenuti in cinque campionamenti su piante legnose ad impollinazione entomofila in fioritura il 12 aprile 1987 nell'Oasi di Palo e percentuali di presenza di queste piante all'interno del bosco ed in un ambiente ecotonale.

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