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Foraging by Great Spotted Cuckoo (*Clamator glandarius*) on the caterpillars of *Ocnogyna boeticum*

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Abstract

The Great Spotted Cuckoo is primarily known as a specialist predator of lepidopteran larvae, particularly the urticating caterpillars of the Pine Processionary Moth *Thaumetopoea pityocampa*. This report documents a novel observation of a single Great Spotted Cuckoo individual foraging extensively on larvae of the moth *Ocnogyna boeticum* in a dehesa ecosystem. Over a ten-hour observation period, the cuckoo completed six distinct foraging sessions, consuming a minimum of 768 caterpillars. The bird demonstrated a clear ability to locate and exploit dense aggregations of the larvae, showing marked plasticity in its foraging behaviour.

Keywords: Arctiinae, dehesa, dietary plasticity, gregarious larvae, Iberian Peninsula, lepidopteran prey, phenological synchrony

INTRODUCTION

The Great Spotted Cuckoo *Clamator glandarius* (L.) is a migratory, medium-sized brood parasitic bird common in Mediterranean ecosystems. Main food ingested in African grounds: insects, mainly large hairy caterpillars; also termites, locusts, grasshoppers, moths, and small lizards (Irwin 1988). In Europe, its diet is known to be highly specialised, consisting almost exclusively of defoliating lepidopteran larvae. In the Iberian Peninsula, the primary prey is widely documented to be the Pine Processionary Moth *Thaumetopoea pityocampa* (Denis & Schiffermüller, 1775) (Valverde 1953), a species with urticating hairs that few other predators

can exploit (Soler 2003, Barbaro & Battisti 2011). The cuckoo's gizzard structure allows it to consume these caterpillars safely, reducing competition for this food resource (Barbaro & Battisti 2011). Recent studies have highlighted the species' foraging plasticity, with observations of it exploiting new, abundant food sources such as the invasive Box-tree Moth *Cydalima perspectalis* (Walker, 1859) (Garcia Espluga & Àngel 2020) and nest-forming moths such as as Brown tailed Moth *Euproctis chrysorrhoea* (Linnaeus, 1758) and Glanville Fritillarys *Melitaea cinxia* (Linnaeus, 1758) as shown by studies conducted in the UK (Urquhart 2019, Wright 2019), where the species is a rare vagrant.

Ocnogyna boeticum (Rambur, 1836) is a lepidopteran species belonging to the family Erebidae, subfamily Arctiinae. Endemic to the western Mediterranean regions (North Africa, Iberia, Sicily, central Italy), this species is common in SE Spain and univoltine, with adults typically emerging in late winter or early spring. The larvae are polyphagous, feeding on a wide variety of herbaceous plants and low-growing shrubs, which makes them a common component of Mediterranean grassland and Dehesa ecosystems. They are characterized by a dense covering of long, dark setae (hairs), which provide insulation and likely serve as a mechanical defence against potential predators and parasitoids. The species is known not to be urticant. A key behavioral trait of *O. boeticum* larvae is their gregarious nature during the early and middle instars. Larvae aggregate in large numbers within conspicuous silken nests or webs constructed at the base of vegetation or directly on the soil surface. These communal webs provide protection from desiccation and predators, creating localized patches of extremely high density.

This report contributes to this understanding by documenting the first detailed foraging interaction between *C. glandarius* and *Ocnogyna boeticum*, a common arctiid moth in the Iberian Peninsula whose larvae are also covered in dense setae.

STUDY AREA AND METHODS

The study was conducted within a 2-hectare pasture plot located in a dehesa ecosystem in Sierra Morena (Baños de La Encina, southern Spain), 38° 11' N, 3° 50' W. The habitat is characterized by open woodland with scattered holm oaks (*Quercus ilex* L.) and shrubs such as *Retama sphaerocarpa* (L.) Boiss., a typical Mediterranean savannah-like landscape. Notably, no pine trees (*Pinus* spp.) were observed within the study area.

Observations were carried out continuously from 08:00 to 18:00 (local time) on February 16th, 2026, following an exceptionally wet period with one month of intense rain. The observation day itself was characterized by 100% cloud cover and an absence of direct sunlight, succeeding two previous sunny days. It is hypothesized that the silken webs of the prey caterpillars became conspicuous during those preceding sunny days.

A single adult Great Spotted Cuckoo

was detected at midday and subsequently observed throughout the afternoon. Foraging and resting behaviours were recorded using a terrestrial telescope from distances varying between 40 and 120 meters. Prey identification was confirmed based on the distinctive morphology of *O. boeticum* larvae and their association with the species' characteristic large, silken webs constructed on the ground.

For each discrete foraging session, the start time, duration, and number of caterpillars consumed were recorded, for which data marginal data loss cannot be ruled out due to an expected margin of uncertainty in detectability. Additionally, the behaviour of sympatric corvid species —a flock of Iberian Magpies *Cyanopica cooki* (Bonaparte, 1850) and a group of Common Magpies *Pica pica* (Linnaeus, 1758)—was observed in relation to the available caterpillar resource to assess potential competition or interspecific interactions.

To contextualize the field observation within the broader temporal availability of both species, phenological data were retrieved from citizen science platforms. For the Great Spotted Cuckoo, occurrence data from Spain were downloaded from ebird.org (2026). For *O. boeticum*, occurrence records (N = 1.750) were obtained from observation.org (2026) and iNaturalist.org (2026). All available records up to February 2026 were considered.

RESULTS

The single Great Spotted Cuckoo was observed throughout the day, with a total of 204 minutes of direct observations (Tab. 1), alternating between foraging sessions (N=71 minutes) and periods of observed rest (N=51), at times disappearing from direct sight (N=68) and finally flying by the pasture at the end of the afternoon, being constantly chased by Common magpies, (N=14). A total of six discrete foraging sessions were recorded, where a session was defined as a continuous period of foraging interspersed with only minimal pauses, excluding any prolonged resting intervals.

The bird was observed exploiting *O. boeticum* caterpillars, employing a distinctive foraging technique of picking individual larvae with its rather long and curved beak. Notably, the bird did not probe or explore the ground substrate but only picked exposed prey from vegetation or the surface of the silken webs.

The bird was first detected moving through the area, picking at scattered caterpillars at a low initial rate of 0.03 prey/second (Fig. 1). The cuckoo's foraging strategy shifted markedly after the discovery of a dense aggregation of *O. boeticum* larvae on the ground during Session 2. For the remainder of the observation period, all subsequent foraging sessions (3-6) were focused on exploiting these high-density patches.

The consumption rate increased substantially in Sessions 2 through 5, reaching a mean of 0.23 prey/second, with observed bursts of intense foraging activity. During Session 3, the bird flew directly to a web patch upon returning from a resting

period, suggesting spatial memory of the resource location. After Sessions 4 and 5, the cuckoo rested on the ground in immediate proximity to a web, further indicating its reliance on these concentrated food sources. With no apparent shortage of prey, the bird's motivation appeared to diminish by Session 6, where it was notably observed to be less eager to consume prey, resulting in a slightly decreased consumption rate of 0.15 prey/second. In total, 768 caterpillars were observed to be consumed by the Great Spotted Cuckoo over the course of the day.

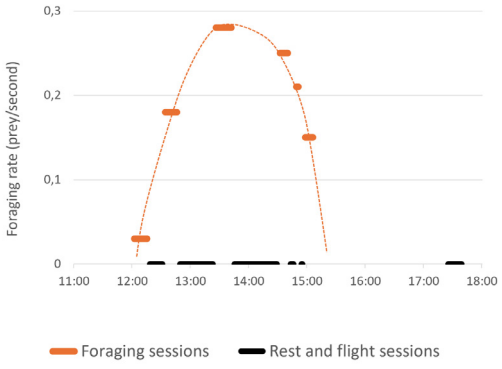
Observations of other bird species in the vicinity revealed no competition for this resource, indicating a clear avoidance, particularly notable for generalist species of the crow family capable of wide-ranging foraging and behavioral adaptation. A flock of approximately 30 Iberian Magpies showed no interest in the *O.*

Table 1: Summary of a single Great Spotted Cuckoo (*Clamator glandarius*) foraging activity on *Ocnogyna boeticum* (February 16th, 2026, in Baños de la Encina). Duration in bracket, when the bird was not directly observed.

Session	**Local time**	**Behaviour**	**Duration (minutes)**	**Ingested caterpillars (N)**	**Prey/ second**	**Comment**
1	12:02	Foraging	*c.* 15'	25	0.03	First detection
2	12:17	Resting	16'	-	-	Rest in *Retama sphaerica* bush
3	12:33	Foraging	15'	162	0.18	Discovered one web with plenty of caterpillars
4	12:48	Resting	23'+(13')	-	-	Rest in *Quercus ilex* tree
5	13:25	Foraging	18'	298	0.28	
6	13:43	Resting?	(48')	-	-	Rest probably in *Quercus ilex* hedge
7	14:31	Foraging	10'	151	0.25	
8	14:41	Resting	7'	-	-	Rest on ground close to caterpillar nest
9	14:48	Foraging	4'	52	0.21	
10	14:52	Resting	5'	-	-	Rest on ground close to caterpillar nest
11	14:57	Foraging	9'	80	0.15	Feed with intermittent pauses
12	17:25	Flight	14'	-	-	Constantly chased by Common Magpies. Disappearance.

boeticum caterpillars. A group of about 5 to 15 Common Magpies was observed foraging constantly on the ground in the same area, lifting soil and dung to capture other invertebrates, such as coprophagous beetles, and did not exploit the available caterpillars, despite moving in their immediate vicinity.

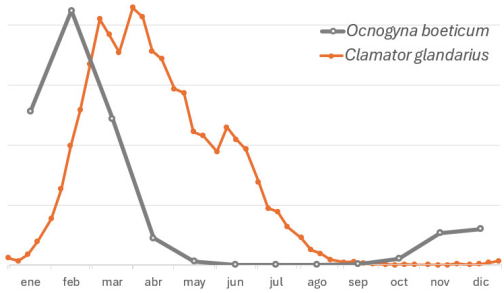
Figure 1. Observation sessions of Great Spotted Cuckoo recorded on February 16th, 2026, in Baños de la Encina, Spain. Temporal variation in foraging rate (prey/second).



The phenology data (Fig. 2) reveals a synchronicity between the arrival of Great Spotted Cuckoos and the peak availability of *O. boeticum*. The observation on February 16th represents a snapshot of this predator exploiting its prey at the optimal moment within their shared annual cycle.

Great Spotted Cuckoo detection rates in Spain, while low in winter, begin a sharp increase in mid-February, rising from 1.0% on February 15th to peak levels throughout March and early April (reaching 2.1% in early April). This upward trajectory coincides exactly with the species' return migration from sub-Saharan Africa to their Mediterranean breeding grounds.

Figure 2. Phenology of Great Spotted Cuckoo and *Ocnogyna boeticum* in Spain. Data sets: eBird, iNaturalist, observation.org.



Satellite tracking of eight individual Great Spotted Cuckoos revealed a pre-breeding migration period of variable length, determined primarily by stopover duration (2–5 weeks), with individuals reaching their breeding grounds in Spain between February and March (Ibáñez-Álamo et al. 2019), a temporal pattern consistent with observational records from Italy (Giovacchini et al. 2004).

O. boeticum exhibits a highly seasonal phenology, reaching its maximum observation frequency in February (N= 676 records). This period corresponds to the active larval stage of the moth, when the caterpillars are feeding intensively and are most conspicuous and aggregate in large numbers within their characteristic communal silken webs constructed on the ground.

DISCUSSION

Dietary plasticity and novel prey

The observation strongly supports the notion of the Great Spotted Cuckoo as a flexible forager capable of exploiting abundant lepidopteran larvae, as suggested by Garcia Espluga & Àngel (2020). While *T. pityocampa* is widely considered the dietary staple in the Iberian Peninsula, this report confirms that other similarly defended species, like *O. boeticum*, can constitute a major food item. The presence of dense setae, although not urticant, on *O. boeticum* caterpillars aligns precisely with the cuckoo's known morphological and physiological adaptations for consuming such prey (Barbaro & Battisti 2011), reinforcing the concept of a specialised diet that nonetheless allows for prey switching within a narrow niche of hairy, nest-forming larvae, of different Lepidoptera families: Notodontidae (*T. pityocampa*), Erebidae (*E. chrysorrhoea, O. boeticum*), Crambidae (*C. perspectalis*) and Nymphalidae (*M. cinxia*) (Barbaro & Battisti 2011, Urquhart 2019, Wright 2019, Garcia Espluga & Àngel, 2020).

Foraging strategy and reduced competition

The cuckoo's foraging behaviour evolved markedly over the observation period, shifting from searching for scattered prey to repeatedly exploiting dense, localized patches. This strategy denoted a choice by the bird minimizing search effort. Critically, the observed corvids, which are potential competitors, completely ignored *O. boeticum*, suggesting that the caterpillars' defences render them inaccessible or unpalatable to generalist foragers like magpies, creating a low-competition niche for specialised predators like the Great Spotted Cuckoo. This ecological release mirrors the situation well-documented for *T. pityocampa* (Barbaro & Battisti 2011) and confirms that such defences can effectively exclude most potential competitors, concentrating this abundant resource in the hands of a few adapted specialists.

Phenological synchrony and prey availability

This low-competition niche coincides with a critical phenological window. The peak larval abundance of *O. boeticum* aligns precisely with the arrival of Great Spotted Cuckoos from their African wintering grounds and their increased metabolic demands as they enter the breeding season. It was noted that breeding phenology of cuckoos is finely tuned to the breeding phenology of their magpie host (Avilés et al. 2014). This timing synchronizes prey availability with the energetic needs of migratory insectivorous birds, ensuring access to high-protein food resources when they are most needed. We hypothesise this phenological match likely represents a strategic adaptation, allowing cuckoos to rebuild energy reserves after migration.

Ecological context: the dehesa ecosystem

Sierra Morena's pasture woodlands support high densities of corvids which serve as the primary hosts for Great Spotted Cuckoo brood parasitism. The abundance of both magpies and cuckoos creates an ecological scenario where alternative prey resources, such as *O. boeticum* caterpillars, may play a crucial role in sustaining cuckoo populations in areas where Pine Processionary Moths are less accessible due to the absence of extensive pine forests. In this context, *O. boeticum* represents an exceptionally abundant and localized food resource that may effectively replace or complement *T. pityocampa* as the primary prey in dehesa habitats.

CONCLUSION

Several *Ocnogyna* species form dense, conspicuous communal webs and can become locally abundant in Mediterranean-type habitats, especially in late winter and spring. This behavioural and ecological trait makes them potentially important prey for specialised avian predators across the Mediterranean Basin and adjacent regions. The biogeographical context is particularly suggestive: both *Ocnogyna* (including species such as *O. loewii* in Asia Minor and Cyprus, and *O. clathrata* in the eastern Mediterranean) and *Clamator glandarius* are notably abundant on the island of Cyprus, as well as in parts of the Near East and Asia Minor (EBCC 2022). This coincidence raises the possibility that the relationship documented here for *O. boeticum* in Spain may represent a broader, pan-Mediterranean ecological association between *Clamator* and *Ocnogyna* species—one that has remained largely overlooked until now.

A critical factor linking both prey species—*Ocnogyna* spp. and *T. pityocampa*—is their restricted seasonal availability. Both moths exhibit larval development periods that span the winter and early spring, creating a narrow but predictable phenological window of high-protein food availability. This window coincides precisely with the arrival of Great Spotted Cuckoos in their Mediterranean breeding grounds, raising the hypothesis that the timing of *Ocnogyna* larval peaks may influence the species' migratory schedule.

The importance of these Lepidoptera in the diet of the Great Spotted Cuckoo should be examined more systematically across the species' range to determine whether *Ocnogyna* spp. constitute a key resource and can trigger the early migration of Great Spotted Cuckoos from their African wintering grounds.

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