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New provincial records of *Megachile sculpturalis* Smith, 1853 (Hymenoptera, Megachilidae) from Bizkaia and Gipuzkoa (Basque Country, Spain).

Nuevos registros provinciales de *Megachile sculpturalis* Smith, 1853 (Hymenoptera, Megachilidae) en Bizkaia y Gipuzkoa (País Vasco, España).

Jennifer Rose[1*], Jon Zubieta Rodríguez [1]

Abstract

We report new provincial records for the invasive giant resin bee, *Megachile sculpturalis* Smith, 1853, from Bizkaia and Gipuzkoa, confirming its establishment in the Basque Country and ongoing expansion across the Iberian Peninsula. Observations from July to August 2025 provide the first evidence of nesting in the region, including a documented case of a female repurposing nest material from the native bee *Anthidium septemspinosum* Lepeletier, 1841. These findings highlight the urgent need for monitoring programs and public involvement to track the species' spread and assess potential impacts on native pollinator communities.

Key words: distribution, sculptured resin bee, invasive pollinators, non-native bees, exotic species.

Resumen

Se informa de nuevos registros a nivel provincial de la abeja gigante de la resina, *Megachile sculpturalis* Smith, 1853, en Bizkaia y Gipuzkoa, confirmando su establecimiento en la Comunidad Autónoma del País Vasco y su propagación continuada en la Península Ibérica.

[1] **Basque Centre for Climate Change,** Leioa, Spain.
Jennifer Rose, https://orcid.org/0000-0002-7207-6886;
Jon Zubieta Rodríguez, https://orcid.org/0009-0000-6503-0057

[*] corresponding author: jennifer.rose@bc3research.org

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Observaciones realizadas entre julio y agosto de 2025 proporcionan las primeras evidencias de nidificación en la región, incluyendo una observación documentada de una hembra reutilizando para ello material de un nido de la especie de abeja autóctona *Anthidium septemspinosum* Lepeletier, 1841. Estos resultados subrayan la necesidad urgente de programas de seguimiento y participación ciudadana para documentar la expansión de la especie y evaluar su posible impacto sobre las comunidades de polinizadores autóctonos.

Palabras clave: distribución, abeja gigante de la resina, polinizadores invasores, abejas alóctonas, especies alóctonas.

Laburpena

Megachile sculpturalis Smith, 1853 espeziearen probintzia mailako behaketen berri ematen da Bizkaian eta Gipuzkoan. Egiaztatzen da Euskal Autonomia Erkidegoan finkatu egin dela eta Iberiar Penintsulan zehar modu jarraituan hedatzen ari dela. 2025eko uztailetik abuztura bitartean egindako behaketek erakutsi dituzte habiak egin izanaren lehenengo aztarnak eta horien artean eme baten behaketa dokumentatua, berrerabiltzen ari zena *Anthidium septemspinosum* Lepeletier, 1841, erle espezie autoktonoaren habia bateko materiala. Emaitza horiek agerian uzten dute monitorizazio programen eta herritarren parte-hartzearen premia larria espeziearen hedapena dokumentatzeko eta polinizatzaile autoktonoen komunitateetan izan dezakeen eragina ebaluatzeko.

Gako hitzak: banaketa, erretxina-erle erraldoia, polinizatzaile inbaditzaileak, erle aloktonoak, espezie aloktonoak.

Introduction

The giant resin bee, *Megachile (Callomegachile) sculpturalis* Smith, 1853 (Hymenoptera: Megachilidae), is a leafcutter bee native to East Asia, including Japan, China, and Korea (Batra, 1998; Sasaki & Maeta, 1994; Wu, 2006). Recognized as the first non-native bee species to establish in Europe, *M. sculpturalis* has attracted scientific attention due to its invasive potential, distinctive morphology, and strong association with human-modified habitats (Lanner *et al*., 2020).

Following its initial introduction to the United States in 1994 (Mangum & Brooks, 1997), *M. sculpturalis* has demonstrated a remarkable capacity for rapid range expansion (Le Féon *et al.,* 2018; Lanner *et al.,* 2020). In Europe, it was first detected near Marseille, France, in 2008, with maritime timber trade suspected as a likely introduction pathway (Vereecken & Barbier, 2009; Le Féon *et al.,* 2018). Subsequent records have documented its expansion across the continent, including Switzerland (Amiet, 2012), Italy (Quaranta *et al.,* 2014), Germany (Westrich *et al.,* 2015), Hungary

(Kovács, 2015), Serbia (Ćetković & Plećaš, 2017), Austria (Westrich, 2017), Slovenia (Gogala & Zadravec, 2018), and Liechtenstein (Lanner *et al.,* 2020), Ukraine (Ivanov & Fateryga, 2019), Bosnia and Herzegovina (Bila Dubai *et al.,* 2021), and most recently Slovakia (Purkart *et al.,* 2024). Genetic evidence suggests that multiple, independent introductions have contributed to this rapid colonization success (Lanner *et al.,* 2021).

In Spain, *M. sculpturalis* was first documented in Catalonia in 2018 (Aguado *et al.,* 2018; Ortiz-Sánchez *et al.,* 2018), with subsequent records from Mallorca (Ribas Marquès & Díaz Calafat, 2021) and Navarra (Ortiz-Sánchez & Baquero, 2021). The species was first reported in the Basque Country from a male specimen collected in Álava (Saez de Zerain *et al.,* 2022). However, despite this early detection and the continued expansion of the species in the Iberian Peninsula, no further observations have been published in the Basque Country, highlighting a potential gap in detection efforts and distribution monitoring.

Megachile sculpturalis is notable for its large size (males: 12-22 mm; females: 20-28 mm), dark wings, and bright orange thoracic hairs (Mangum & Brooks, 1997; Hinojosa-Díaz *et al.,* 2005), which easily distinguish it from native European bees (Quaranta *et al.,* 2014). Females construct nests using resin, wood fibers, and plant material (Michener, 2007), frequently utilizing anthropogenic structures such as bee hotels (Bogo *et al.,* 2024), building fixtures (Aguado *et al.,* 2018; Ortiz-Sánchez & Baquero, 2021), and other artificial cavities.

The species is generally regarded as polylectic (Quaranta *et al.,* 2014); however, its floral associations have been documented more extensively in its non-native range than in its native range (Bila Dubai *et al.,* 2022). In Europe, larval provisions have been found to contain high proportions of pollen from exotic ornamentals, such as *Styphnolobium japonicum* (Westrich *et al.,* 2015) and *Ligustrum* spp. (Aguado *et al.,* 2018; Bogo *et al.,* 2024). At the same time, adults have also been observed foraging on native European flora, with some species likely visited primarily for nectar (e.g., *Lavandula* spp. and *Origanum vulgare*) and others for pollen (e.g., *Vitex agnus-castus)* (Le Féon *et al.,* 2018; Ortiz-Sánchez & Baquero, 2021). Its nesting behavior is highly opportunistic, incorporating diverse materials primarily of natural origin (Fornoff *et al.,* 2024). This includes resins (e.g., from *Prunus persica*; Aguado *et al*., 2018), but also anthropogenic debris and material stolen from nests of other bee species (Bogo *et al*., 2024). This generalist and opportunistic strategy in both foraging and nesting is considered a key facilitator of its dispersal (Quaranta *et al.,* 2014; Le Féon *et al.,* 2018).

Here, we report the first records of *M. sculpturalis* from the provinces of Bizkaia and Gipuzkoa, confirming the establishment of the species in the Basque Country since its initial detection in 2022. These findings represent the westernmost records of the species for the Iberian Peninsula to date.

Material and methods

Gipuzkoa

On August 21st, 2024, a male *M. sculpturalis* was photographed (Fig. 1) in Ametzagaina Parkea (43.305611°N, -1.947944°W; 59 m a.s.l.), an urban park in Donostia-San Sebastián. The specimen appeared to be an older individual, with weathered wings and missing hairs on the thorax. No foraging activity or territorial behavior was noted.

Fig. 1.- *Megachile sculpturalis* male photographed in Ametzagaina Parkea (Donostia-San Sebastián, Gipuzkoa) on August 21st, 2024. Photo: Jennifer Rose.

Fig. 1.- Macho de *Megachile sculpturalis* fotografiado en el Parque Ametzagaina (Donostia-San Sebastián, Gipuzkoa) el 21 de agosto de 2024. Foto: Jennifer Rose.

On July 13th, 2025, two female *M. sculpturalis* were observed at a drilled-log bee hotel in the first author's garden in Donostia-San Sebastián (43.31°N, -1.95°W; 73 m a.s.l.). The first individual was collected upon detection. The second female was monitored over a two-week period, during which it excavated and removed old nest material from recently emerged *Anthidium septemspinosum* (Fig. 2a), repurposing it to cap two nests (Fig. 2b). This female subsequently completed two additional nests, which were capped with collected clay soil. The individual was collected on July 27th after completing the fourth nest. Both specimens were deposited in the private collection of the first author. The drilled-log bee hotel was brought to a controlled indoor facility to monitor adult emergence and prevent further spread.

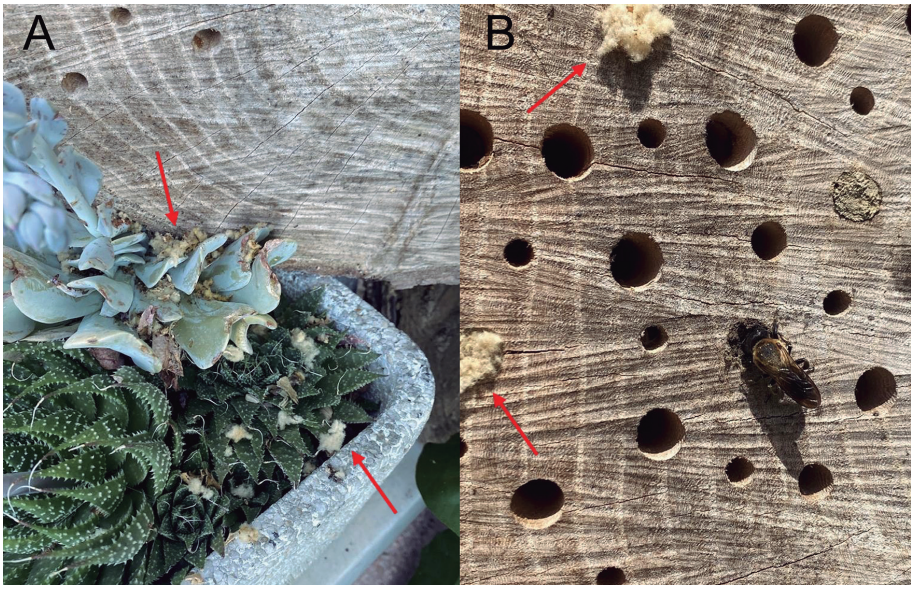

Fig. 2(a).- Removed, used nesting material of *Anthidium septemspinosum* (red arrows), excavated from drilled wood cavities by *Megachile sculpturalis*. (b). Four nests of *M. sculpturalis* exhibit two nesting strategies for capping the nests: reuse of *A. septemspinosum* nesting material (red arrows) and use of clay soil. One nest is actively being sealed by a female using clay. Photos: Jennifer Rose.

Fig. 2(a).- Material usado desechado de un nido de *Anthidium septemspinosum* (marcado con flechas rojas) extraído de las cavidades del tronco por *Megachile sculpturalis*. (b). Cuatro nidos de *M. sculpturalis* mostrando dos estrategias de sellado de los nidos: reutilización del material de un nido de *A. septemspinosum* (marcado con flechas rojas) y uso de sustrato arcilloso. Se puede apreciar a una hembra sellando uno de los nidos usando arcilla. Fotos: Jennifer Rose.

Bizkaia

On July 5th, 2025, a female *M. sculpturalis* was observed (Fig. 3a) by the second author inspecting and repeatedly entering cavities in a bee hotel on Monte Cabras (43.285922°N, -2.961175°W; 95 m a.s.l.), on the boundary between Bilbao and Erandio, suggesting active nesting behavior. The observation was subsequently brought to the attention of the first author.

During a follow-up visit on August 2nd, a single female was collected from the same bee hotel, and three completed nests, capped with clay in 10-mm diameter cavities, were documented (Fig. 3b). Although it remains unclear whether more than one individual was ever present at the site or if the collected specimen was the same individual previously observed, the presence of multiple nests confirms reproductive activity. The specimen has been deposited in the SARE Lab entomological collection at the Basque Centre for Climate Change (Leioa, ES). As of December 2025, the three nests remained intact at the study site.

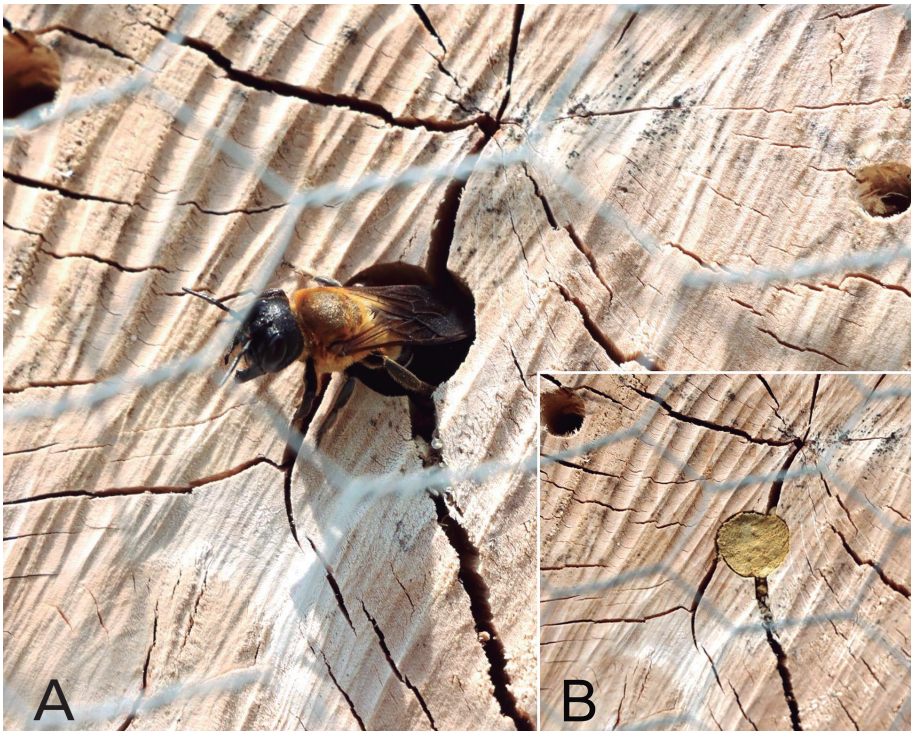

Fig. 3(a).- A female *Megachile sculpturalis* investigating nesting cavities in a drilled-log bee hotel at Monte Cabras (Bizkaia) on July 5th, 2025. (b). One of three resulting nests observed on August 2nd, 2025, located in the specific cavity from which the female was observed investigating. Photos: Jon Zubieta Rodríguez.

Fig. 3(a).- Hembra de *Megachile sculpturalis* explorando cavidades para la construcción del nido en un hotel de insectos en el Monte Cabras (Bizkaia) el 5 de julio de 2025. (b). Uno de los tres nidos resultantes observados el 2 de agosto de 2025, ubicado en la misma cavidad previamente explorada por la hembra. Fotos: Jon Zubieta Rodríguez.

Additional occurrence records

To assess the current distribution of M. sculpturalis more comprehensively in the Basque Country, we searched for additional occurrence records to supplement our direct observations. These were obtained through: (1) searches of two citizen science platforms (iNaturalist.org and Observation.org) and the Facebook group "Abejas y avispas de España y Portugal / Bees and Wasps of Spain & Portugal", including observations dated up to February 2026; (2) consultation of the research database Observatorio Entomológico de Gipuzkoa (heteropterus.org); and (3) direct communication with two regional institutions (NEIKER and the Sociedad de Ciencias Aranzadi).

Results

We report the first confirmed records of *M. sculpturalis* for the provinces of Bizkaia and Gipuzkoa, documenting a significant range expansion within the Basque Country and northwestern Spain. A total of six new occurrences are presented, comprising two photographic observations, three collected specimens, and one citizen science record from Observation.org. Together with the initial detection from 2022, these findings bring the total number of known regional occurrences to seven (Fig. 4).

Collectors and identifiers are indicated in the data using the following acronyms: JR (Jennifer Rose) and JZR (Jon Zubieta Rodríguez). Specimen repositories are abbreviated as follows: BC3 (Basque Centre for Climate Change) and PJR (private collection of Jennifer Rose). New records examined in this study are as follows:

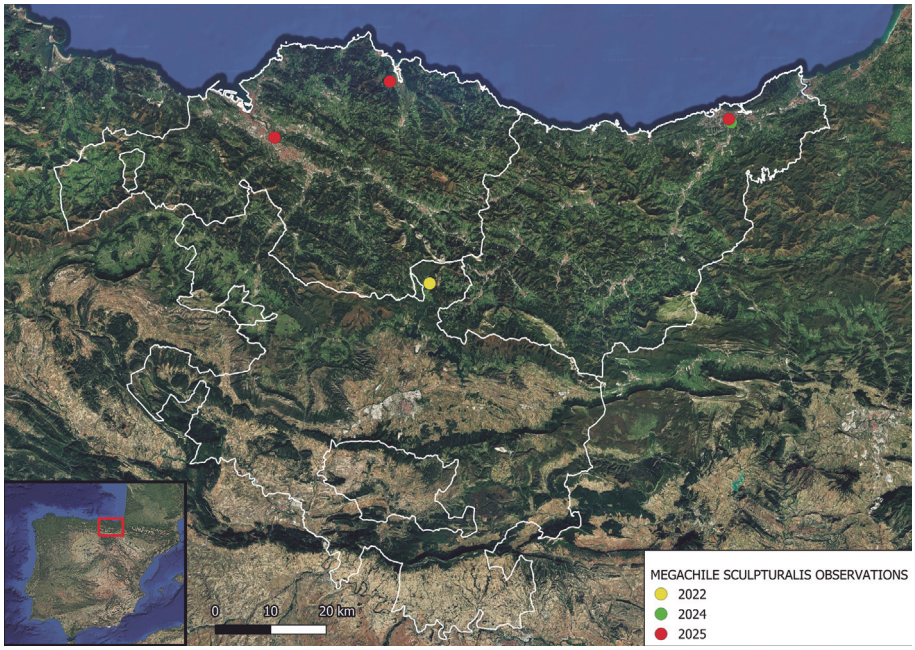

Fig. 4.- Distribution map of *Megachile sculpturalis* occurrences across the three provinces of the Basque Country: Bizkaia, Gipuzkoa and Álava. Observations are categorised by year, from the first detection (Saez de Zerain et al., 2022) to those newly reported by the authors. Note: observations from areas adjacent to the Basque Country are not included.

Fig. 4.- Mapa de distribución de *Megachile sculpturalis* en las tres provincias de la Comunidad Autónoma Vasca: Bizkaia, Gipuzkoa y Álava. Las observaciones están clasificadas por año, desde la primera cita (Saez de Zerain et al., 2022) hasta las nuevas reportadas por los autores. Nota: las observaciones de zonas adyacentes a la CAV no se incluyen.

Bizkaia

Bilbao, Monte Cabras, in bee hotel [43.285922°N, -2.961175°W, 95 m a.s.l.], 5.vii.2025, 1♀, *fot.* & *det.* JZR, *conf.* JR; *ibid.*, 2.viii.2025, 1♀, *leg.* & *det.* JZR (coll. BC3); Busturia, foraging on *Wisteria* sp. (Fabaceae) [43.37639°N, -2.70490°W, 55 m a.s.l.], 7.vii.2025, 1♀, *obs.* username 'Jeroen R.' (Observation.org 363812877), *conf.* JR.

Gipuzkoa

Donostia-San Sebastián, Ametzagaina parkea, open vegetation [43.305611°N, -1.947944°W, 59 m a.s.l.], 21.vii.2024, 1♂, *fot.* & *det.* JR; Donostia-San Sebastián, Intxaurrondo, in bee hotel [43.31°N, -1.95°W, 73 m a.s.l.], 13.vii.2025, 1♀, *leg.* & *det.* JR (coll. PJR); *ibid.,* 27.vii.2025, 1♀, *leg.* & *det.* JR (coll. PJR).

Discussion

Our findings confirm the establishment of *M. sculpturalis* in the Basque Country, with new provincial records for Bizkaia and Gipuzkoa representing a significant northwestern expansion of its Iberian range. The two- to three-year interval between the initial record in Álava and these subsequent findings likely reflects limited awareness and a lack of targeted monitoring, rather than a genuine absence of the species.

These individuals likely originated from southwestern France, consistent with the expansion pattern proposed by Ortiz-Sánchez & Baquero (2021). This hypothesis is supported by citizen science records from within 100 km of Donostia-San Sebastián dating back to 2019 (e.g., Bayonne, Saint-Jean-de-Luz, Ondres; iNaturalist records #168641187, #298654677, #29237191, respectively), suggesting possible established presence in Gipuzkoa prior to our 2024 detection. Given that the initial Álava record occurred within 5 km of the Bizkaia provincial boundary and considering the one-month interval between the Busturia and Bilbao observations, it is likely that the species was also present in Bizkaia earlier than our first confirmed record.

It is uncertain at what rate *M. sculpturalis* will spread along the Cantabrian coast in northern Spain. Expansion rates vary across Europe, with slower momentum in southwestern France, the plausible source of the Basque populations, compared to other European regions (Rohrbach *et al.,* 2025); however, as noted by these authors, variation in monitoring effort and reporting may have created observational bias in areas of more rapid expansion. Considering its current distribution in the Basque Country, its arrival in adjacent provinces such as Cantabria and Burgos is likely imminent, if not already ongoing. The bordering areas of these provinces are

predominantly natural reserves and rural communities with lower human population densities, potentially delaying detection without targeted surveying efforts. Systematic monitoring of established bee hotels could be an efficient, feasible strategy for confirming the species' presence further west in the near future.

Bee hotels are increasingly installed in public parks and private gardens to promote the conservation of wild bee populations, but concern exists as to whether this practice may also facilitate the spread of *M. sculpturalis.* In Marseille, France, where the species was first detected in Europe in 2008, *M. sculpturalis* comprised approximately 40% of bee species using bee hotels surveyed after a decade of establishment (Geslin *et al*., 2020). Conversely, these structures have provided invaluable opportunities for detecting new populations and monitoring distribution and behavior (e.g., Bogo *et al*., 2024), as demonstrated by our initial observations in Bizkaia and Gipuzkoa. In addition to bee hotels, the timber trade is also considered a pathway that facilitates its spread. Considering that the first regional record of *M. sculpturalis* occurred in a *Pinus radiata* plantation in a rural, forested area, the removal of bee hotels in the Basque Country as a precautionary measure would likely only address a minor pathway of its ongoing dispersal.

The potential ecological impacts of *M. sculpturalis* in the Basque Country warrant future investigation. Whether our observation of the species reusing the nest material of *A. septemspinosum* reflects competition for nesting resources or simply opportunistic behavior remains unclear, particularly given that no other species occupied the remaining cavities in 2025 compared to the previous year (Rose, pers. obs.). As *A. septemspinosum* was recently reassessed as 'Near Threatened' by the IUCN Red List (Kasparek *et al.,* 2025), future research directions could include monitoring local occupancy of bee hotels to detect potential competitive interactions with *M. sculpturalis*.

Competitive behavior by *M. sculpturalis* against other cavity-nesting bees with similar requirements has been documented elsewhere in Europe. For instance, the species has been observed displacing *Osmia* and *Xylocopa* from nests in France (Le Féon *et al.,* 2018) and is associated with reduced native bee abundance near its nesting sites (Geslin *et al.,* 2020). In northern Italy, Straffon-Díaz *et al.* (2021) reported *M. sculpturalis* cohabiting nest cells of *Osmia cornuta,* potentially blocking the emergence of the native species. However, population-level impacts on these species remain poorly understood and merit further investigation (Fornoff *et al.,* 2024).

To assess potential threats related to floral resource competition, future research in the Basque Country and northern Spain should investigate local floral preferences, building on the *Wisteria* spp. record reported here via Observation.org. Given its large size and conspicuous presence, *M. sculpturalis* is well-suited for study through citizen science. Such an approach not only offers a feasible means of addressing these

ecological questions but also helps raise local awareness, as demonstrated elsewhere in Europe (Bila Dubai *et al.,* 2022).

In conclusion, our findings confirm the establishment of *M. sculpturalis* in the Basque Country, including two new provincial records contributing to its continued northward expansion across the Iberian Peninsula. Given its potential to disrupt local native bee communities, we advocate for the initiation of local monitoring efforts, which can be feasible due to the species' distinctive morphology and its close association with human-modified habitats. Future research should prioritize quantifying its foraging preferences, nest-site competition dynamics, and long-term impact on native bees. Public engagement will be crucial for tracking its range expansion and assessing potential ecological impacts throughout the northern Iberian Peninsula.

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