

Crested porcupine in the Island of Elba, Italy: native or alien?

The crested porcupine (*Hystrix cristata* L., 1758) is the largest rodent among the Italian fauna¹. It is nocturnal, monogamous², herbivorous^{3,4} and lives in burrows that could be self made as well as made by other mammals such as fox (*Vulpes vulpes*) and badger (*Meles meles*)⁵. It exhibits moonlight avoidance⁶ and male performs parental care². In Europe, distribution of the species is limited to Italy⁷⁻⁹, although the presence of porcupine in Balkans is still debated¹⁰⁻¹².

Outside Europe crested porcupine distribution includes parts of northwestern Africa from Morocco to Libya and Sub-Saharan Africa from Gambia to Tanzania¹³.

The crested porcupine is common in mainland Italy, although not evenly distributed. Its presence has been reported throughout Veneto¹⁴, Emilia Romagna¹⁵, Liguria¹⁶, Umbria and Marche¹, Molise and Abruzzi¹⁷, Tuscany, Latium, Campania, Basilicata, Calabria and Apulia¹⁸⁻²⁰. In the Veneto region after the early 1800s¹⁴, presence of porcupine was recorded only from the early 2000s²¹. Since 1980s, the distribution of crested porcupine has undergone rapid expansion northward and eastward, extending its range to Lombardy²², Piedmont²³ and Trentino Alto Adige⁹.

In the Italian islands porcupines are historically well documented in Sicily¹⁸⁻²⁰. In Sardinia, recently, Angelici *et al.*²⁴ reported that porcupines were illegally introduced in 2001 in Ogliastra Province. Furthermore, between 2005 and 2008 the discovery of dead porcupines and other signs (scats, quills, sightings by hunters, etc.) confirmed the presence of this rodent in the island²⁴.

There are no porcupines in the other Italian islands. In Elba, a large island of Tuscan Archipelago (223.5 km²), the presence of porcupines is debated since 1808. Thiebaut de Bernaud²⁵, for the first time reported the presence of porcupine in the Island of Elba in 1808, as a result of sightings by hunters. Since then, there has been an ongoing debate about including the Island of Elba in the porcupine distribution range (Table 1).

Since 2000, one of the present authors (F.G.) has actively searched for porcupines in the Island of Elba following a specimen sighting by a hunter in the locality of 'Pedalta' in Marciana during a

Table 1. List of the authors from 1808 to 2017 that include the Island of Elba in porcupine distribution range (column Yes) and of those that not include it (column No) with specific evidences to support what has been reported for each author

Authors	Presence of porcupine (<i>Hystrix cristata</i>) in the Island of Elba		Literature source and notes
	Yes	No	
Thiebaut de Berneaud ²⁵	X		Observation by hunters
Ghigi ¹⁸		X	
Damiani ²⁹		X	
Toschi ¹⁹		X	
Orsomando and Pedrotti ¹		X	Refs 18 and 19
Santini ³		X	Ref. 19
Scaramella ²⁰		X	
Amori and Angelici ⁷		X	Ref. 20
Lovari ²⁷	X		Introduced nucleus undocumented
Agnelli ²⁶	X		Reported dead porcupine
Amori and Capizzi ⁸	X		No evidences
Spada <i>et al.</i> ²¹	X		No evidences
Angelici <i>et al.</i> ³⁰	X		No evidences
Angelici <i>et al.</i> ²⁴	X		Ref. 30
Mori <i>et al.</i> ⁹		X	F. Giannini, <i>Pers. Commun.</i> , 2011
F. Giannini, <i>Pers. Commun.</i> , 2016		X	Did not find any evidence of the presence

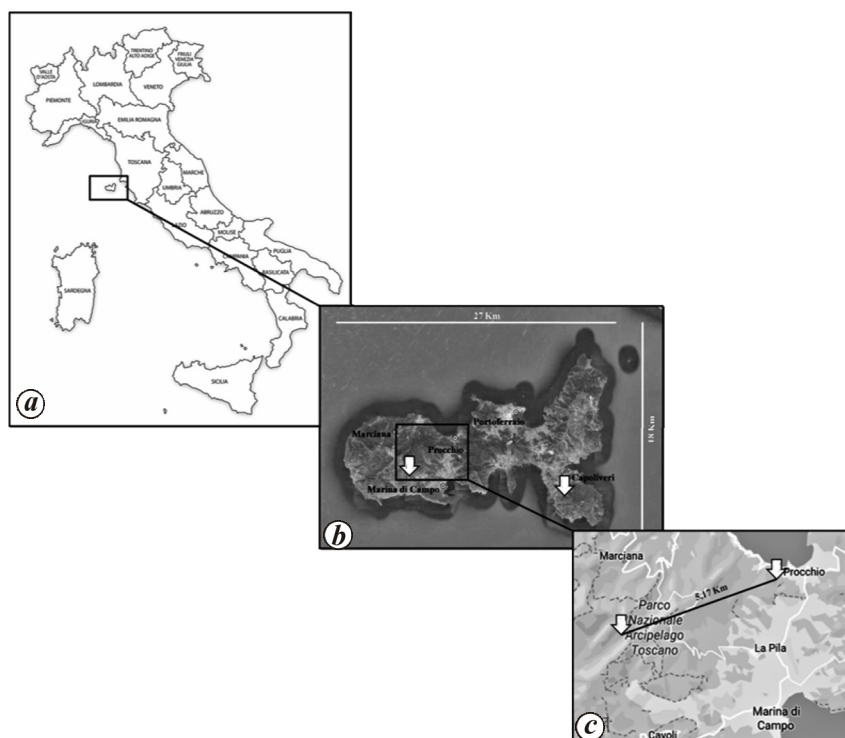


Figure 1. a, Map of Italy showing the Island of Elba. b, Enlarged view of the Island of Elba. Arrows indicate the areas where wildlife monitoring was performed: Monte Perone and Monte Calamita. The squared portion is the Monte Perone area where the porcupine was detected. c, Details of the Monte Perone area where the porcupine was caught on camera in 2016 and distance (km) from Procchio where a porcupine killed by a car was reported in 1996 (ref. 26).

day census of mouflon (*Ovis aries musimon*), without finding any evidence of its presence.

Agnelli²⁶ reported the killing of a specimen of porcupine by a car in the locality of 'Procchio'. Lovari²⁷ and also Agnelli²⁶ refer an intentional introduction of crested porcupine to the island around the second half of the 1980s by unknown. However both reports lack documentation and there is no scientific evidence about this event in the literature.

On 22 October 2016 at 1.51 p.m., an adult porcupine was caught on camera during a wildlife monitoring project on 'Monte Perone' (42°45'28.56"N; 10°11'27.72"E). This event provides the only scientific evidence of porcupine in the Island of Elba (Figure 1).

Three possible conclusions can be drawn from this finding:

- The porcupine caught on camera may be of those reported to be introduced in the 1980s^{26,27} or an offspring;
- This porcupine was introduced more recently;
- Porcupines have always inhabited the Island of Elba at least since 1808 with a low population density.

Further genetic investigation and comparison with the results obtained by Trucchi *et al.*²⁸ are desirable, which may offer interesting facts on the origin of this rodent in the Island of Elba in order to understand if porcupines are a native, alien and/or long-time alien species. Assessing the origin of the presence of porcupines in the Island of Elba remains a key factor in the management of the Tuscan Archipelago National Park, Italy.

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