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Short Note

First record of a possibly overlooked impact by alien parrots on a bat (*Nyctalus leisleri*)

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Abstract

Although its interferences on native biodiversity are still poorly known, the rose-ringed parakeet *Psittacula krameri* is currently recorded as one of the 100 worst alien species. The impacts on native fauna by this parrot are mainly represented by the displacement of native birds from nesting sites, with direct lethal attacks observed only against little owls and red squirrels.

To date, competition with bats for tree cavities has been hypothesized but not documented yet. We recorded a fatal attack of a parakeet towards a Leisler's bat (*Nyctalus leisleri*), roosting or possibly hibernating in a trunk cavity. Although this is the only report available, the fact that both parrots and many bat species use tree cavities suggests that similar cases may be relatively frequent although sporadically observed. This observation puts emphasis on the need to supporting active monitoring and management of introduced species populations to preserve threatened native fauna.

Despite being the second most important cause of the Sixth global extinction (Wonham, 2006), the impacts of alien species on biodiversity is often neglected or overlooked, in particular those exerted by attractive and/or synanthropic species (Gurevitch and Padilla, 2004; Menchetti and Mori, 2014). Among the latter, Psittaciformes are most attractive to the general public, because of their often bright, colourful plumages, and their ability to copycat sounds and human voices, feature making them very popular as pets (Gismondi, 1991; Luescher and Luescher, 2006). Thus, a number of species have established breeding populations outside their natural range throughout the world (Carrete and Talia, 2008; DAISIE, 2008; BirdLife International, 2012). Among the over 60 Psittaciformes species recorded outside their natural ranges, the rose-ringed parakeet *Psittacula krameri* is currently the most widely distributed species outside its natural distribution range (cf. Menchetti and Mori 2014). Despite this wide extent of occurrence, data about interferences with native species are scarce, with many anecdotal observations and only few experimental studies (e.g. Strubbe et al. 2010; Orchan et al. 2013). This is probably a consequence of the fact that most breeding colonies of this species are currently located within or in the immediate surroundings of human settlements, e.g. cities and urban parks, with few populations in rural areas (Angelici et al., 1988; Butler, 2003). In Italy, the number of breeding colonies of *Psittacula krameri* has increased since the first observations (Angelici, 1984), being recorded in at least 14 Italian regions (Mori et al., 2013a).

The main interactions between alien *Psittacula krameri* and native species are chiefly represented by the harassment and displacement of native birds from their nesting sites (e.g. Strubbe and Matthysen 2007; Czajka et al. 2011; Menchetti and Mori 2014). This species has also been reported to attack and kill little owls *Athene noctua* and Eurasian red squirrels *Sciurus vulgaris* (Mori et al., 2013a; Menchetti and Mori, 2014).

In this note we describe the first fatal attack to a bat by a group of RRPs, observed along the southern shore of the Accesa Lake, a karstic lake (14 ha) in the municipality of Massa Marittima (Southern Tuscany: 42.966380° N, 10.895908° E). The lake is bordered by riparian vegetation (*Phragmites australis*, *Cladium mariscus*, *Populus alba*, *Salix babilonica* and *Fraxinus oxycarpa*); some *Pinus pinea* are also present in the surroundings of the lake. No breeding population of this parakeet is known for this area, the nearest being about 15 km from it (Follonica, Province of Grosseto: Mori et al. 2013a). Parrots were observed in this area for the first time in June 2013, albeit sporadically and with small numbers. No interference with native species was observed, with the exception of occasional harassments of kestrels *Falco tinnunculus* and Eurasian tree sparrows *Passer montanus* (E. Mori, *pers. obs.*).

On 8th March 2014 we observed a parakeet entering a trunk cavity where an adult male individual of Leisler's bat *Nyctalus leisleri* was roosting.

The parakeet attacked the bat and extruded it from the cavity. Once on the ground, the bat died after a few minutes, showing wounds in the head and abdomen (Fig. 1). Gebhardt (1996) first stated that *Psittacula krameri* may displace *Myotis* bats from tree holes, but provided no details. A dead Gould's wattled bat *Chalinolobus gouldii* was detected in a Perth suburb (Australia), beneath the nest of a rainbow lorikeet *Trichoglossus haematodus*, but its death was thought not to be caused by the parrot, which simply removed it from the cavity when preparing for nesting (Start, 1998). Overall, our observation represents the first direct interaction between a bat and an alien parrot.

The behaviour of the parakeet here reported is similar to the one observed against European red squirrels (Mori et al., 2013a). Harassments and attacks by alien Psittaciformes on native birds within or near cavities were only observed during the breeding period, mostly where

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trunk cavities represent a limiting resources (cf. Menchetti and Mori 2014). Competition between birds and bats for cavities may occur, and this phenomenon has been described in the scientific literature (e.g. Goldingay and Stevens 2009; Estòk et al. 2011; Meddings et al. 2011. The great tit *Parus major* may search for, kill and eat hibernating bats in winter, when food is scarce (Estòk et al., 2011). Although only one observation is available, given the common use of cavities by both parrots and bats, similar cases may be relatively frequent albeit difficult to observe and so overlooked. Bats are particularly vulnerable to predation especially while hibernating (Sommer et al., 2009; Estòk et al., 2011). When active, the interaction with parrots may be limited to the bat's displacement from roost (Gebhardt, 1996), but during cold periods, when bats are torpid and not promptly reactive, the risk is far greater.

All European bats are protected according to the 92/43/EC Habitats Directive, and tree-roosting species are at risk. *Nyctalus leisleri*, featuring in Annex IV of the above mentioned Directive, is typical of coniferous and deciduous forests, but it is also well adapted to parks and urban areas, where it may roost in trunk cavities. Nocturnal raptors (*Bubo bubo*, *Strix aluco*, *Athene noctua* and *Tyto alba*) are the main predators of this species (Lanza, 2012), although a recent work has shown that this bat may also fall prey to domestic cats (Ancillotto et al., 2013). Further research must be encouraged to assess the real impact of alien species on these mammals and develop strategies to mitigate it (cf. Genovesi and Shine 2004).

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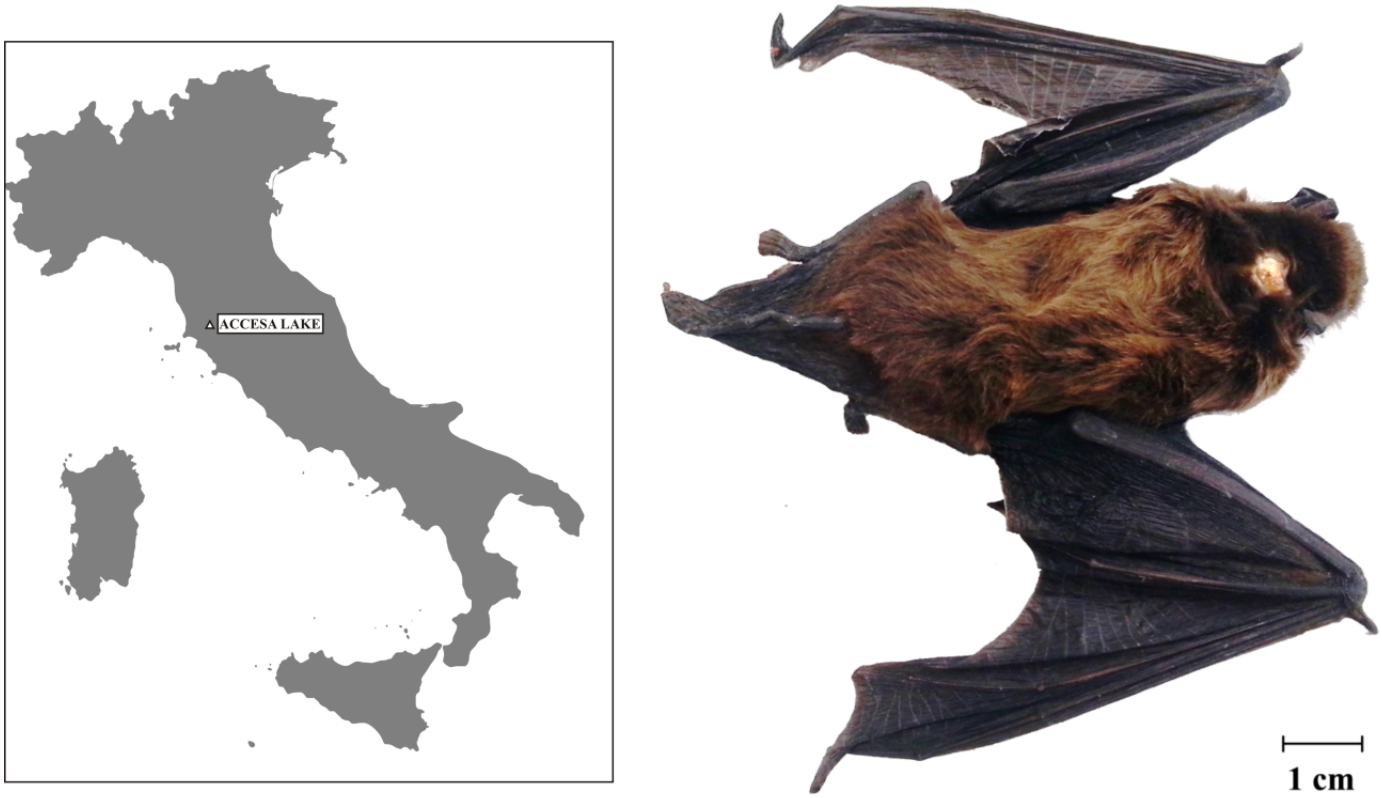

Figure 1 – The individual of *Nyctalus leisleri* injured and killed by a rose-ringed parakeet. Localization of the study site in the inset..