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Mobbing to death of a Japanese Long-eared Bat *Plecotus sacrimontis* by two species of tit

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Introduction

Mobbing is a widespread antipredator behaviour that occurs when individuals approach and cooperatively drive off a potential predator (Wilson 1975, Curio 1978). Birds use mobbing against a variety of predators (e.g., hawks, owls and snakes). This behaviour includes distinctive calls that attract additional mobbers from the same and different species (Curio 1978, Hurd 1996). Some species of bird have evolved the ability to adjust their mobbing response according to the predator species (Griesser 2009, Suzuki 2011, 2012). On the other hand, there are several reports of birds occasionally mistaking harmless animals as targets for mobbing. For example, tits have been documented mobbing Common Cuckoo *Cuculus canorus* mounts at winter feeders because the

plumage coloration and patterns of cuckoos mimic those of Sparrowhawks *Accipiter nisus* (Davies & Welbergen 2008). Nighthawks (Caprimulgidae) are similar to owls of the family Strigidae in their cryptic plumage, and occasionally induce mobbing by forest birds (Marks *et al.* 2011).

I describe an instance in which a Willow Tit *Poecile montanus* and a Great Tit *Parus major minor* simultaneously mobbed a flying Japanese Long-eared Bat *Plecotus sacrimontis*, a small nocturnal mammal that measures approximately 50 mm in size, including the head and body (Ohdachi *et al.* 2009). This bat preys exclusively on arthropods (Ohdachi *et al.* 2009) and poses no threat to birds, although some other bat species in other geographic regions have been reported to prey on birds (reviewed in Ibáñez *et al.* 2001).

There are several reports of predation by birds on bats (Lee & Kuo 2001, Chacón-Madrigo & Barrantes 2004, Hernández *et al.* 2007, Estók *et al.* 2010), but mobbing of flying bats by small passerines has been rarely reported (e.g. Tugendhat 1966).

Observations

A Japanese Long-eared Bat was observed on 25 April 2008, at 11h45 (Japan Standard Time), flying about 4 m above a stream in a mixed deciduous–coniferous forest in Karuizawa, Nagano, Japan (36°22'N 138°36'E). I then saw a Willow Tit and a Great Tit fly towards the bat. The Willow Tit flew at an angle as if it was trying to intercept the bat's flight path and came within 1 m of the bat, repeatedly producing mobbing calls (*zi-tää* calls: Haftorn 2000). The Great Tit also flew at the bat in this manner and came within 2 m of the bat. The two birds sometimes perched on trees beside the stream but immediately resumed flying towards, approaching closely, and mobbing the bat. The tits chased the bat for at least 20 m, although they did not make direct attacks on it. Although it was unclear if the mobbing had started before I started my observation, I observed the mobbing for more than 20 seconds. During the mobbing, the bat seemed to be exhausted since it flew up and down with a quite low speed and its flying height gradually decreased. Finally, the bat fell into the stream. After this, both tits stopped mobbing and left the vicinity. The bat moved its wings for c. 10 seconds but could not escape from the water. I went down the stream and confirmed that the bat was dead. No signs of injury or attack were observed on the bat's body.

Discussion

Mobbing of bats by small passerines has rarely been reported. Another account described an observation of Barn Swallows *Hirundo rustica* chasing and mobbing a flying Pipistrelle Bat *Pipistrellus pipistrellus* during the day in England (Tugendhat 1966). My report provides the first observation in which Willow and Great Tits simultaneously mobbed a Japanese Long-eared Bat, which may have contributed to its death.

I do not know how the two tits started to mob the bat. Japanese Long-eared Bats are nocturnal mammals and normally roost in cavities during the day (Ohdachi *et al.* 2009), so diurnal birds are unlikely to encounter bats. However, Great Tits are secondary cavity-nesters and from March to May often enter tree-cavities to assess potential nesting sites (*pers. obs.*). Since the incident in question took place in the last week of April, it is possible that the bat was disturbed in its roost by the Great Tit, which then proceeded to mob it.

It remains unclear why the Willow and Great Tits mobbed the bat. It seems unlikely they mistook it for a potential predator, since bats are morphologically very different from small-bird predators such as shrikes, owls and hawks. Moreover, it is unlikely that this was an attempted predation, although several previous reports have shown that raptors, owls, crows and motmots consume flying

bats (Lee & Kuo 2001, Chacón-Madrigo & Barrantes 2004, Hernández *et al.* 2007). In Hungary, Great Tits have been observed to kill and prey on bats, but only when the bats were inactive and hibernating in caves (Estók *et al.* 2010). Further observations of bat mobbing by birds might provide insight into predator recognition and the feeding ecology of birds, as well as the evolution of nocturnal behaviour in bats (Rydell & Speakman 1995).

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