Invasion history and control of a Pallas squirrel *Callosciurus erythraeus* population in Dadizele, Belgium

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The escape of exotic animals bred in zoos or kept as pets has been identified an important pathway of introduction of alien invasive terrestrial vertebrates in Europe. We provide data on invasion history and eradication attempts of an invasive squirrel population possibly resulting from a zoo or pet shop escape in Dadizele, Belgium.

In August 2005, bark stripping and cable gnawing was observed in a 5 hectare suburban park in Dadizele, Belgium. The damage was immediately linked to the occurrence of strange greyish squirrels, initially suspected Chinese rock squirrels, *Sciurotamias davidianus*. The exact date of introduction of this population is unclear. At start, nobody was alarmed by their presence. Considering the damage, trapping efforts started in October 2005. An unexpected number of 45 squirrels were removed from the site during the first three months.

Despite maintained trapping efforts in 2006 sightings of squirrels in the park, surrounding gardens and the nearby abandoned fun-fair Dadipark were still numerous.

Largely based on the morphology of the male reproductive system and the skull we identified the squirrel as Pallas's Squirrel *Callosciurus erythraeus*, a species of Indochinese origin.

Based on major dissimilarities of the reproductive apparatus (left) and the baculum (right) with the description of the Chinese rock squirrel, *Sciurotamias davidianus* (Callahan & Davis, 1982) we immediately rejected this hypothesis.

Distinguishing characteristics of the skull led us to the subtribe Callosciurina (Moore, 1959). Combining skull features and pelage colour patterns we came to *Callosciurus erythaeus* (Moore & Tate, 1965).

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Although the colour of the belly is often thought to be a diagnostic feature, individual variation in coat colour was considerable.

To validate the species determination, sequence analysis of two nuclear genes (c-myc and RAG1) was performed (Steppan et al, 2004). Homology searches against other known sequences showed an almost perfect match with *C. erythraeus*.

Studies have shown Pallas squirrels to disperse easily and achieve relatively high population densities (5-10 ind/ha) which was consistent with the high number of animals caught. The species is supposed to be a food competitor of the native red squirrel *Sciurus vulgaris* and may outcompete it (densities of red squirrel in Flanders are around 0.1-2.2 ind/ha depending on size, isolation and quality of the forest. Furthermore it damages trees by bark stripping and may cause substantial economic loss in tree plantations. The species was introduced to Japan (Setoguchi, 1990) and Argentina (Guichon & Doncaster, 2008) where it is considered invasive. In France a viable population is present in Cap d'Antibes (Alpes-Maritime) since the early 1970s (Jouanin, 1986).

In Dadizele, the squirrel population was still increasing and more damage was to be expected if the species would further expand its range to other urban areas or forest ecosystems. Following the IUCN guidelines on AIS we applied the precautionary principle and decided on systematic eradication and monitoring of the whole Dadizele population. We advised to increase trapping efforts before the next reproductive season. Intensified trapping from February till April 2008 yielded another 76 animals. Recent sightings have not been reported since.

This case illustrates that even in a densely urbanized area it is not at all obvious that the settlement of an alien species is readily observed and recognized as problematic. Every report on alien squirrels should receive proper attention. We recommend prompt actions in case of suspected invasiveness and associated impact. Meanwhile, the species has been classified A1 on the BFIS list and received the highest ISEIA score of 11 (Branquart et al, 2009).

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