

A new invasive species risk: first record of Alexandrine Parakeet *Psittacula eupatria* × Rose-ringed Parakeet *P. krameri* hybrids on Reunion

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Un nouveau risque d'espèce envahissante : première mention d'hybrides de la Perruche Alexandre *Psittacula eupatria* × Perruche à collier *P. krameri* à La Réunion. En août 2022, un couple mixte de Perruche Alexandre *Psittacula eupatria* et de Perruche à collier *P. krameri* a été détecté à Saint-Denis, La Réunion. En octobre 2022 la femelle Perruche à collier nourrissait trois jeunes hybrides. Pour l'île, il s'agit de la première mention hors captivité de la reproduction de la Perruche Alexandre et de la première mention d'hybrides de ces deux espèces. Les perruches envahissantes représentent une menace pour la biodiversité réunionnaise, à travers une éventuelle compétition avec les espèces indigènes pour les sites de nidification et des risques sanitaires liés à la transmission d'agents pathogènes aux espèces endémiques. De plus, les hybrides Perruche Alexandre × Perruche à collier peuvent être de meilleurs envahisseurs que les espèces parentales.

On 18 August 2022, a pair comprising a male Alexandrine Parakeet *Psittacula eupatria* and a female Rose-ringed Parakeet *P. krameri* was discovered in Jardin de l'État, at Saint-Denis, Reunion Island (20°53'14.05"S 55°27'02.06"E). The pair and their progeny were monitored weekly with 10 × 42 binoculars until 2 October for a total of 6.15 hrs.

Between 18 and 28 August, the pair engaged in beak locking near the cavity in an *Enterolobium cyclocarpum* tree c.15 m above ground (Fig. 1). The male Alexandrine Parakeet was larger than the female Rose-ringed Parakeet, with a black-pink collar, reddish shoulder patch, green-blue upperside to the tail, yellow-tipped red bill and pale yellow iris (Fig. 2). The female had a faint

yellow-green collar, blue uppertail, a dark red black-tipped upper mandible and black lower mandible, and a yellowish-white iris (Fig. 3). These features are diagnostic for the species, except for the male tail which lacked a yellowish tip (Collar & Boesman 2020, Collar *et al.* 2020). The male was not seen near the cavity after 28 August. From 11 to 18 September, the female was observed feeding three chicks in the nest (Figs. 4–5). On 25 September, two young were in a tree near the nest cavity and on 2 October all had fledged. The juveniles were larger than the adult female and had a larger, all-red bill, a shorter tail with a blue upperside, and a black iris. None of them had a shoulder patch (Figs. 6–7). These features are intermediate between those expected



Figures 1–3. Mixed pair of Alexandrine Parakeet *Psittacula eupatria* and Rose-ringed Parakeet *P. krameri* near a tree cavity (left); male Alexandrine Parakeet (middle) and female Rose-ringed Parakeet (right), Saint-Denis, Reunion, August 2022 (Sarah Caceres and Jean-Noël Jasmin)

Couple mixte de Perruche Alexandre *Psittacula eupatria* et Perruche à collier *P. krameri* près d'une cavité de nidification (à gauche) ; mâle de Perruche Alexandre (au milieu) ; femelle de Perruche à collier (à droite), Saint-Denis, La Réunion, août 2022 (Sarah Caceres et Jean-Noël Jasmin)



Figures 4–5. Female Rose-ringed Parakeet *Psittacula krameri* feeding chicks in the nest, Saint-Denis, Reunion, September 2022 (Sarah Caceres and Jean-Noël Jasmin)

Femelle de Perruche à collier *Psittacula krameri* nourrissant des jeunes au nid, Saint-Denis, La Réunion, septembre 2022 (Sarah Caceres et Jean-Noël Jasmin)

for juveniles of Alexandrine and Rose-ringed Parakeets (Collar & Boesman 2020, Collar *et al.* 2020; E. Mori *in litt.* 2022). Extrapolating from the dates on which the young fledged (Braun & Wink 2013, Khaing *et al.* 2019), eggs must have been laid between mid July and early August, during the austral winter. To our knowledge, this is the first documented record of hybrid Alexandrine × Rose-ringed Parakeets in the wild on Reunion.

On 3 October, five parakeets were shot as part of the invasive parakeet control programme conducted under French regulations (Préfecture de La Réunion 2020). One of them was a hybrid Alexandrine × Rose-ringed Parakeet, thought to be a female, with the following measurements: wing 191 mm, tail 191 mm, bill 28 mm, tarsus 20.6 mm, mass 200 g (a stopped wing rule was used to measure wing and tail length, vernier callipers for tarsus and bill, and a Pesola spring scale 1,000 g to assess mass). The specimen was mounted and is held at the Reunion Island Museum of Natural History (reference 2022.E.15.1.1). Samples (muscle tissue and stomach in 70% ethanol; small feathers) are also preserved at the museum.

Escaped Rose-ringed Parakeets were first reported on Reunion in 1972 (Barré *et al.* 1996) and there were scattered records until 2010 (Safford & Hawkins 2013). Since then, sightings have increased and breeding has occurred at least since 2019 (Caceres *et al.* 2022). A few reports of Alexandrine

Parakeets outside captivity have been made since 2016 (DEAL Réunion & OFB 2021) but the lack of observations could be due to confusion with Rose-ringed Parakeet (Caceres *et al.* 2022). Breeding in the wild has never been reported.

Hybridisation among parrots is quite common (Mori & Menchetti 2021, Hingston 2022). Hybrid Rose-ringed × Alexandrine Parakeets have been reported both in captivity and in the wild (Weiserbs *et al.* 2000, Butler 2002, Groombridge *et al.* 2004, Lever 2005, McCarthy 2006, Ancillotto *et al.* 2016, Postigo 2016, Viviano & Mori 2021, Mori *et al.* 2022). They can produce fertile progeny (Groombridge *et al.* 2004). Hybrids usually exhibit intermediate morphological features, being midway in size between the parental species, having a massive bill with red upper and lower mandibles, and an orange to pale brown shoulder patch that may be absent in some individuals (Butler 2002, Ancillotto *et al.* 2016, Postigo 2016). Hybridisation may create colour mutations (Butler 2002, Ancillotto *et al.* 2016) and the lack of shoulder patches in the hybrids on Reunion might indicate breeding between a hybrid Alexandrine and pure Rose-ringed Parakeet (Postigo 2016). Only genetic analysis could reveal the identity of the Reunion hybrid.

Invasive parakeets represent a threat to Reunion biodiversity, through possible competition for nesting sites with native species and sanitary risks associated with pathogen transmission to endemic



Figures 6–7. Hybrid juveniles of Alexandrine Parakeet *Psittacula eupatria* × Rose-ringed Parakeet *P. krameri*, Saint-Denis, Reunion, September and October 2022 (Sarah Caceres and Jean-Noël Jasmin)

Jeunes hybrides de Perruche Alexandre *Psittacula eupatria* × Perruche à collier *P. krameri*, Saint-Denis, La Réunion, septembre et octobre 2022 (Sarah Caceres et Jean-Noël Jasmin)

species (e.g., Fogell *et al.* 2018, Caceres *et al.* 2022, Giuntini *et al.* 2022). Control of the population has therefore been taking place since 2020.

A recent study highlighted that the presence of introduced Rose-ringed Parakeets may aid the successful invasion and establishment of Alexandrine Parakeets, by interspecific facilitation (the positive interaction between species in the same trophic guild) (Ancillotto *et al.* 2016, Viviano & Mori 2021). Hybrids between these two species may also be better invaders than the parental species (Ancillotto *et al.* 2016, Postigo 2016, Mori & Menchetti 2021). Invasive species are a major cause of biodiversity loss on islands (Bellard *et al.* 2017, Spatz *et al.* 2017, Leclerc *et al.* 2018) and eradication should be performed while individuals are still few, by early detection and rapid response (e.g., Westbrooks & Eplee 2011, Simberloff *et al.* 2013).

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