The extinction of the ocellated lizard *Timon lepidus lepidus* (Daudin, 1802) on the island of Porquerolles (Provence, France)

Marc Cheylan

CEFE UMR 5175, CNRS – EPHE, équipe Biogéographie et Ecologie des vertébrés. 1919 route de Mende. 34293 Montpellier. France.
C.e.: Marc.CHEYLAN@cefe.cnrs.fr

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Resumen: Se documenta el proceso de extinción del lagarto ocelado *Timon lepidus* en la isla de Porquerolles (Provenza, Francia). Las prospecciones realizadas en 2001 y 2002 con el objetivo de volver a encontrar la especie fueron negativas. A partir de esto se infiere que la especie se extinguió en la década de 2000. Las causas de la desaparición de la especie son controvertidas y parecen deberse a una evolución desfavorable de los hábitats y a la depredación que ejerce el faisán vulgar, introducido en los años 1970.

The range of the ocellated lizard (*Timon lepidus*) is most of the Iberian Peninsula, the south of France and the extreme northwest of Italy (Mateo & Cheylan, 1997). Historically, it was known to occupy 18 islands in this area (Doré *et al.*, 2015). In recent years, signs of its decline have been reported in several regions, including Portugal (Paulo, 2008), Spain (Mateo, 2015), France (Cheylan & Grillet, 2005) and Italy (Salvidio *et al.*, 2004). Its island populations have not escaped this trend; today the species is near extinction on Portugal's Berlenga Island (Paulo, 2008), where several individuals were last seen in 2009 (M.A. Carretero & A.C. Luz, personal communication), its numbers have dropped dramatically on the island of Oléron in France (Doré *et al.*, 2015), and it has disappeared from France's Ratonneau Island in the gulf of Marseille (Mourgue, 1930). There are multiple reasons for its decline (Doré *et al.*, 2015). These include habitat loss (Cheylan & Grillet, 2005), the decline of the European rabbit (*Oryctolagus cuniculus*) with which this species is closely linked (Grillet *et al.*, 2010), the use of antihelmintics to treat livestock herds for parasites (Cheylan *et al.*, 2011), as well as more complex causes (Paulo, 2008). As a result, this species is classified as Near Threatened on the IUCN Red List for the Mediterranean basin (Cox *et al.*, 2006) and as Vulnerable on the IUCN Red List for France (UICN, MNHN, SHF, 2015). In France, *T. lepidus* has been the subject of a national action plan since 2012 (Thirion & Doré, 2012) as this species is in decline over most of its range, and particularly in France. Until recently, the island of Porquerolles was home to one of the last remaining island populations of this lizard species, whose range was already restricted to only three French islands.

Porquerolles (42.997° N, 6.207° E, WGS 84) is located 8.5 km off the coast of Provence in the south of France, just opposite the city of Hyères. The island has a surface area of 12,54 km^2 and reaches an altitude of 142 masl. Acquired by the French Government in 1985, it has been part of the Port-Cros National Park since 1971. The island has a population of 130 permanent residents and receives up to 20 000 visitors per day in the summer. The natural habitat consists of woods of pine (*Pinus halepensis*) and oaks (*Quercus ilex* and *Quercus suber*), dense Mediterranean scrub, and a small surface area of cultivated land (grapevines and orchards).

Timon lepidus presence on Porquerolles was first mentioned by Jahandiez (1929), who remarked that they were abundant in this period (end of the 19th century). In April 1931, Lantz (1931) captured a specimen during a brief foray on the island. Leila Fournier (*in litt.*), the owner of a large part of the island before it was sold to the French Government, frequently saw these large lizards when she was young (circa 1940s). Between 1979 and 1982, I observed four individuals on five visits to the island. The species was rare and difficult to observe by the beginning of the 1980s (Cheylan, 1983). Between 1982 and 2001, only eight observations were recorded on the island (see Table 1). The last sighting was in May 2000 (by G. Farny), on the backshore of Courtade beach. Since then there have been no observations that confirm the presence of the species on the island.

At the request of the Port-Cros National Park, a survey was carried out in 2001–2002 with the aim of locating the species on Porquerolles (Cheylan & Cluchier, 2004). To this end, 23 survey days were conducted during the most favourable periods of activity for this species. In addition to visual surveys, 58 fibre-cement boards measuring 60x60 cm were put in place around the island six months before the start of the study. The top of each board was covered with a pile of stones, to make it more attractive to *T. lepidus*. Underneath the board, a hollow space and an access corridor were made to facilitate the animal's entry into the shelter. These artificial shelters were positioned all over the island in the most favourable areas for this species, i.e. where the edges of cultivated plots meet woodland, open grassy areas, cleared woodland areas, shoreland exposed to the sun, and at the base of talus slopes exposed to the sun. These sites were visited six times between May 28th 2001 and September 23th 2002, twice in the spring and once at the end of the summer. The inspections were carried out early in the morning or at the end of the day, when this species shelters.

At the end of the 2-year study, no observation of this species had been made, either by visual survey or in the constructed shelters. The attractiveness of the shelters was confirmed by the observation of several other reptile species: eight common wall lizards (*Podarcis muralis*), seven Montpellier snakes (*Malpolon monspessulanus*), five ladder snakes (*Rhinechis scalaris*) and two southern smooth snakes (*Coronella girondica*). This leads us to assume that the species would have been sighted by this technique even if direct observation in the habitat failed. Given that there were no sightings, it can be considered that *T. lepidus* became extinct on Porquerolles around the year 2000.

The majority of Porquerolles is public property that has been classified as a National Park since 1971. As such, the island is subject to strict protection measures that prohibit any damage of the natural environment. In addition, the island is monitored daily by National Park wardens and eco-rangers in the summer period. Off-leash dogs as well as the collection of any animal or vegetation specimens are prohibited. The disappearance of *T. lepidus* thus has complex causes that are not linked to a lack of protection of the site. The principal cause is landscape changes over the last 60 years. Until around the 1950s, the island had a relatively large human population, who exploited the island's natural resources and woodlands, cultivated diverse crops, and kept cattle, sheep, goats, donkeys and horses (Jahandiez, 1929; Fournier-Le Ber, 1998; Borel, 1997). Gradually, these rural activities declined as tourist and offshore activities increased. As a result, the woodlands became much denser, making the natural areas completely unfavourable

Table 1: Dates and locations (WGS 84 coordinates in decimal degrees) of the last sightings of *T. lepidus* on the island of Porquerolles.
Tabla 1: Fechas y localidades (coordenadas WGS 84 en grados decimales) de los últimos avistamientos de *T. lepidus* en la isla de Porquerolles.

Sighting	Date	Location (Lat./Long.)	Observer	Observations
1	06/24/82	Path to the Calanque de l'Indienne 42.986882° N/6.204833° E	M. Cheylan	1 adult female
2	06/27/82	Cemetery path 42.994563° N/6.201054° E	M. Cheylan	1 adult male seen
3	06/20/83	Fournier football pitch 43.001881° N/6.212598° E	M. Cheylan	1 adult male seen
4	06/21/83	Cemetery 42.994494° N/6.198930° E	M. Cheylan	1 individual seen
5	1984	Agricultural hamlet 42.996490° N/6.195827° E	P. Vandenbrouck	1 individual seen several times
6	05/90	Repentance crossroads 43.002688° N/6.225047° E	?	1 individual seen
7	05/05/95	Cliff path between lighthouse and the Calanque de l'Indienne 42.984937° N/6.208344° E	?	1 individual seen
8	05/30/00	Backshore of Courtade beach 43.005102° N/6.215197° E	G. Farny	1 individual seen

to *T. lepidus*. Agricultural cultivation was largely abandoned. Beginning in the 1980s, these fallow fields were replanted with grapevines and orchards cultivated by mechanical means, making them unfavourable habitats for *T. lepidus*. These changes mean that since the 1990s the island no longer has many favourable biotopes for this species, apart from a few limited areas on the periphery of the village and along the shoreline. The second factor in the decline of this species is the introduction of the pheasant (*Phasianus colchicus*) in 1970-1975 for hunting purposes. This bird was first introduced on Porquerolles in the 18th century, but had disappeared in the 1950s (Puchala, 2009). In the early 1970s, pheasants became very abundant on the island, causing serious damage to crops from 1970 to 1980 (Puchala, 2009). During this period, 300-500 pheasants were shot by hunters each year. This overabundance of pheasants may have had a considerable impact on the *T. lepidus* population, through the direct predation of juvenile lizards. Pheasants essentially occupy cultivated plots, particularly the edges, which are also the preferred habitats of *T. lepidus*. It is known that pheasants eat prey animals, particularly lizards (Cramp & Simmons 1980). It is likely that the combination of these two main factors may have led to the disappearance of *T. lepidus* on Porquerolles.

This means that today, Oléron is the last island in France with a remaining population of *T. lepidus*. Because of the relatively threatened status of this population, a number of conservation measures have recently been adopted to protect it (Doré *et al.*, 2015).

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References

Borel, V. 1997. *Porquerolles et les îles d'Hyères vers 1900*. La Rosalba. Giens.

Cheylan, M. 1983. Statut actuel des Reptiles et Amphibiens de l'archipel des Iles d'Hyères (Var, Sud-est de la France). *Travaux scientifiques du parc national de Port-cros, France*, 9: 35-51.

Cheylan, M. & Cluchier, A. 2004. *Statut actuel et passé du lézard ocellé (*Lacerta lepida lepida*) sur l'île de Porquerolles*. Rapport interne Parc national de Port-Cros.

Cheylan, M. & Grillet, P. 2005. Statut passé et actuel du Lézard ocellé (*Lacerta lepida*, Saurien, Lacertidae) en France. Implications en termes de conservation. *Vie et Milieu*, 55: 15-30.

Cheylan, M., Grillet, P. & Doré, F. 2011. Dynamique populationnelle du lézard ocellé. 25-26. *In*: Thompson, J. & Gauthier, P. (eds.), *Activités humaines et dynamique de la biodiversité en région méditerranéenne*. CEFE. Montpellier.

Cox, N., Chanson, J. & Stuart, S. 2006. *The Status and Distribution of Reptiles and Amphibians of the Mediterranean Basin*. IUCN. Gland, Switzerland and Cambridge, UK.

Cramp, S. & Simmons, K.E.L. (eds.). 1980. *The birds of the Western Palearctic*, vol. II. Oxford University Press, Oxford. New York.

Doré, F. Cheylan, M. & Grillet, P. 2015. *Le lézard ocellé. Un géant sur le continent européen*. Biotope. Mèze.

Fournier-Le Ber, L. 1998. *Porquerolles, une île en cadeaux de mariage*. La Plage d'Argent. Porquerolles.

Grillet, P., Cheylan, M., Thirion, J.M., Doré, F., Bonnet, X., Dauge, C., Chollet, S. & Marchand, M.A. 2010. Rabbit burrows or artificial refuges are a critical habitat component for the threatened lizard *Timon lepidus* (Sauria, Lacertidae). *Biodiversity and Conservation*, 19: 2039-2051.

Jahandiez, E. 1929. *Les Iles d'Hyères* (3e édition). Rebufa et Rouard. Toulon.

Lantz, L.A. 1931. Note sur la faune herpétologique des Iles d'Hyères. *Bulletin Société Zoologique de France*, 56: 420-422.

Mateo, J.A. 2015. Lagarto ocelado - *Timon Lepidus*. *In*: Salvador, A. & Marco, A. (eds.), *Enciclopedia Virtual de los Vertebrados Españoles*. Museo Nacional de Ciencias Naturales. Madrid. <http://www.vertebradosibericos.org> [Accessed: November 18, 2016].

Mateo, J.A. & Cheylan, M. 1997. *Lacerta lepida*. 246-247. *In*: GASC & coll. (eds.), *Atlas of Reptiles and Amphibians of Europe*. Societas Europaea Herpetologica & Museum National d'Histoire Naturelle (IEGB/SPN). Paris.

Mourgue, M. 1930. Présence de reptiles non signalés dans les îles de Pomègue et Ratonneau. *Bulletin de la Société Linnéenne de Lyon*, 9, 11: 75-76.

Paulo, O.S. 2008. *Lacerta lepida* Daudin, 1802. 144-145. *In*: Loureiro, A., Ferrand de Almeida, N., Carretero, M.A. & Paulo, O.S. (eds.), *Atlas dos Anfíbios e Répteis de Portugal*. Instituto da Conservação da Natureza e da Biodiversidade. Lisboa.

Puchala, J.B. 2009. Gestion du faisan commun: enseignements de 30 ans de suivi en milieu insulaire. *Faune sauvage*, 283: 52-58.

Salvidio, S., Lamagni, L., Bombi, P. & Bologna, M.A. 2004. Distribution, ecology and conservation status of the ocellated lizard (*Timon lepidus*) in Italy (Reptilia, Lacertidae), *Italian Journal of Zoology*, 71: 125-134.

Thirion, J.M. & Doré, F. 2012. *Plan national d'actions Lézard ocellé Timon lepidus 2012-2016*. Ministère de l'Ecologie, du développement durable et de l'Energie. Paris. [http://www.developpement-durable.gouv.fr/IMG/pdf/DGALN_PNA_Lezard_ocelle.pdf]

UICN, MNHN, SHF. 2015. *La liste rouge des espèces menacées en France. Reptiles et Amphibiens de France métropolitaine*. Paris.