Predation on *Psammodromus algirus* by purple heron *Ardea purpurea* in a salt-water lagoon in southern Spain: first record and some thoughts about the abundance of the lizard in a coastal habitat

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Resumen: Se reporta el primer registro conocido de depredación por parte de un ejemplar de garza imperial (*Ardea purpurea*) sobre ejemplares adultos de lagartija colilarga (*Psammodromus algirus*), en el Paraje Natural Desembocadura del río Guadalhorce (Sur de España). Además, se compara la abundancia conocida para la lagartija en diferentes hábitats forestales con la abundancia estimada en un hábitat costero asociado a un humedal salobre.

The Algerian psammodromus, *Psammodromus algirus* (Linnaeus, 1758), is a medium-sized lacertid lizard whose length may reach up to 325 mm, including the head, body and tail (Salvador, 2015). It is widely distributed in a wide range of Mediterranean environments of the Iberian Peninsula, southern France and north-western Africa, including forested and shrubby habitats (Carretero *et al.*, 2004; Sindaco & Jeremcenko, 2008). In the Iberian Peninsula the Algerian psammodromus is found in all regions except those with a clearly Atlantic or Eurosiberian influence, as the Pyrenees, the Cantabrian region and a coastal strip in north-western Portugal (Pérez-Mellado, 1997; Ferrand de Almeida *et al.*, 2001). This species is present in a wide diversity of habitats, ranging from dense bushes and shrubland, in open or degraded woodland areas, pine forests and eucalyptus plantations, coastal dunes and beaches, to rural gardens and even agricultural areas (Mateo *et al.*, 2009). Although this lizard is a common prey for many visually-hunting predators, as larger lizards and snakes (Civantos & Forsman, 2000), mammals (Amores, 1980; Moleón & Gil-Sánchez, 2003), and also birds (Martín & López, 1990), the references of predation are scarce, and mostly mentioned in the ornithological literature.

The diet of the purple heron (*Ardea purpurea* Linnaeus, 1766) has been studied along its distribution range, including a detailed study in the Guadalquivir marshes (Amat & Herrera, 1977). It is mostly based on fish and insects, to a lesser extent in small mammals and amphibians, and only occasionally reptiles, birds and invertebrates, as crustaceans, molluscs and spiders (Snow & Perrins, 1998).

On the 24th of April 2020, in the protected area 'Paraje Natural Desembocadura del Río Guadalhorce', a coastal wetland separated from Malaga city by the eastern branch of the Guadalhorce river, we observed an adult purple heron feeding alone. It was in a small island of 0.1 ha, in the lagoon called La Casilla (36°40'31.58"N / 4°27'28.10"W; 6 masl; Figure 1). The island is separated from the mainland by 1-1.5 meter-wide channels, easily accessible for lizards, and fully covered by vegetation, mostly sedge (*Juncus maritimus* and

Figure 1: General view of the small island in La Casilla Lagoon (Paraje Natural Desembocadura del Río Guadalhorce). The yellow circle shows the purple heron.
Figura 1: Vista general de la pequeña isla en la laguna de La Casilla (Paraje Natural Desembocadura del Río Guadalhorce). El círculo amarillo muestra la garza imperial.

Bolboschoenus maritimus), with some scattered reed beds (*Phragmites australis*), and a small patch of salworts (*Sarcocornia perennis*) in one edge of the lagoon (Figure 2). Water salinity levels in this lagoon varies greatly during the year, ranging from 15 000 to 40 000 ppm, depending on the season and rainfall, with higher values in summer.

In two observation periods of approximately 40 minutes each, one in the morning and one in the afternoon, we saw the heron standing on the vegetation and walking slowly in a typical foraging behaviour. The purple heron normally feeds in wetlands, and even can swim when searching for fishes, although in this case it was in emerged vegetation. We had the chance to see five successful attempts in which the heron could trap 25-30 cm long Algerian psammodromus (Figure 3). Although there are some old records of spiny-footed lizard *Acanthodactylus erythrurus* (Schinz, 1833) in this protected area, the most common lizard is the Algerian psammodromus. The size of the specimens, including a very long tail, the pale line along the body, as well as the occupied habitat, helped us to identify the predated lizard as Algerian psammodromus. The heron was a migratory individual, temporarily stopping-over in this wetland, because the species does not breed in the area. Six, four and two days earlier one purple heron was observed in the same lagoon; it was probably the same bird.

Different authors have estimated the abundance of the Algerian psammodromus in different habitats. Cano (1984) and Delibes & Salvador (1986) found densities of 13-18 and 25 lizards/ha, in hoalm oaks forests in Madrid and León, respectively, while Salvador & Veiga (2001) found up to 130 lizards/ha in a Pyrenean oak forest in Guadarrama. We could not find information about the density of this lizard in coastal habitats, and particularly in areas surrounding salt-water lagoons. On the basis of our observations, and pro-

Figure 2: View of the habitat inhabited by this population of Algerian psammodromus. The small island is completely covered by sedges (*Juncus maritimus*), with some scattered reed beds (*Phragmites australis*), and a small patch of salworts (*Sarcocornia perennis*).
Figura 2: Vista del hábitat donde vive la población de lagartija colilarga. La isla está completamente cubierta por juncos (*Juncus maritimus*), con algunos carrizos sueltos (*Phragmites australis*) y un pequeño parche de plantas halófitas en un extremo (*Sarcocornia perennis*).

viding a very conservative estimate based on the number of predated lizards we could detect and the surface of the island where the purple heron was hunting, the density of Algerian psammodromus in the small patch where we saw the heron was, at least, of 55 lizards/ha: a value within the estimates of previously cited authors. Most likely this guess falls short, since the heron continued in the same patch the whole day. The relatively high density might be due to the isolation of the small island, or to a temporary concentration of lizards on it. Apparently, the density found in this patch cannot be extrapolated to the rest of the area; we visited this place regularly and never found such an abundance of lizards. As far as we know this is the first record for this lizard being part of the diet of the purple heron.

Figure 3: Purple heron with a just hunted Algerian psammodromus.
Figura 3: La garza imperial con un ejemplar de lagartija colilarga recién capturado.

References

Amat, J.A. & Herrera, C.M. 1977. Alimentación de la garza imperial (*Ardea purpurea*) en las marismas del Guadalquivir durante el periodo de nidificación. *Ardeola*, 24: 95-104.

Amores, F. 1980. Feeding habits of the stone marten, *Martes foina* (Erxleben, 1777) in south western Spain. *Saugetierkundliche Mitteilungen*, 28: 316-322.

Cano, J. 1984. *La comunidad de lacértidos (Lacertidae: Squamata) de un encinar continental. Ciclo anual de actividad*. Tesis de licenciatura. Universidad Complutense. Madrid.

Carretero, M.A., Montori, A., Llorente, G.A. & Santos, X. 2004. *Psammodromus algirus*. 260-262. *In*: Pleguezuelos, J.M., Márquez, R. & Lizana, M. (eds.). *Atlas y Libro Rojo de los Anfibios y Reptiles de España*. Dirección General de Conservación de la Naturaleza-Asociación Herpetológica Española. Madrid.

Civantos, E. & Forsman, A. 2000. Determinants of survival in juvenile *Psammodromus algirus* lizards. *Oecologia*, 124: 64-72.

Delibes, A. & Salvador, A. 1986. Censos de lacértidos en la Cordillera Cantábrica. *Revista Española de Herpetología*, 1: 335-361.

Ferrand de Almeida, N., Ferrand de Almeida, P., Gonçalves, H., Sequeira, F., Teixeira, J. & Ferrand de Almeida, F. 2001. *Guia FAPAS Anfibios e Répteis de Portugal*. FAPAS-Cámara Municipal de Porto. Porto.

Martín, J. & López, P. 1990. Amphibians and reptiles as prey of birds in southwestern Europe. *Smithsonian Herpetological Information Service*, 82: 1–43.

Mateo, J.A., Cheylan, M., Nouira, M.S., Joger, U., Sá-Sousa, P., Pérez Mellado, V., Martinez Solano, I. & Sindaco, R. 2009. *Psammodromus algirus*. *The IUCN Red List of Threatened Species 2009: e.T61558A86629654*. <https: https://www.iucnredlist.org/species/61558/86629654> [Accessed: 25 April 2020].

Moleón, M. & Gil-Sánchez, J.M. 2003. Food habits of the wildcat (*Felis silvestris*) in a peculiar habitat: the Mediterranean high mountain. *Journal of Zoology*, 260: 17-22.

Pérez-Mellado, V. 1997. *Psammodromus algirus* (Linnaeus, 1758). 307-318. *In*: Salvador, A. (coord.). *Reptiles*. Ramos, M.A. *et al*. (eds.). *Fauna Ibérica*, vol. 10. Museo Nacional de Ciencias Naturales-CSIC. Madrid.

Salvador, A. 2015. Lagartija colilarga - *Psammodromus algirus*. *In*: Salvador, A. & Marco, A. (eds.). *Enciclopedia Virtual de los Vertebrados Españoles*. Museo Nacional de Ciencias Naturales. Madrid. <http://www.vertebradosibericos.org/> [Accessed: 25 April 2020].

Salvador, A. & Veiga, J.P. 2001. Male traits and pairing success in the lizard *Psammodromus algirus*. *Herpetologica*, 57: 77-86.

Sindaco, R. & Jeremcenko, V.K. 2008. *The Reptiles of the Western Palearctic. 1. Annotated checklist and distributional atlas of the turtles, crocodiles, amphisbaenians and lizards of Europe, North Africa, Middle East and Central Asia*. Edizioni Belvedere. Latina.

Snow, D.W. & Perrins, C.M. 1998. *The Birds of the Western Palearctic, Concise Edition Vol. 1. Non-Passerines*. Oxford University Press. Oxford.