Gallotia caesaris feeding on ectoparasite flies from *Pandion haliaetus*

Pedro F. Acosta[1] & Miguel Molina-Borja[2]

[1] *Alas Cinematografía S.L.* Cl. Los Afligidos, 43. 38410 Los Realejos. Tenerife. Islas Canarias. Spain. C.e.: pedrofelipeacosta@gmail.com
[2] *Asociación Bienestar Ambiental.* Cl. Henry Dunnant, s/n. 38203 La Laguna. Tenerife. Spain.

Fecha de aceptación: 21 de octubre de 2016.
Key words: feeding, ectoparasites, *Gallotia caesaris*, *Pandion haliaetus*.

Resumen: Se describe un comportamiento previamente no observado en el lagarto de Boettger (*Gallotia caesaris*). Varios ejemplares de la subespecie *G. caesaris caesaris* se subieron al dorso de un águila pescadora (*Pandion haliaetus*) y comieron allí moscas parásitas (Diptera, Hippoboscidae) que estaban sobre las plumas; el águila pescadora se hallaba en un nido situado en la costa del mar de las Calmas en la isla de El Hierro. Este comportamiento es otro caso de mutualismo (simbiosis de limpieza) ya que puede contribuir a mejorar la salud de las águilas pescadoras y, por otra parte, es un suplemento alimenticio para los lagartos.

Canarian lizards (genus *Gallotia*, Arnold, 1973) are in general omnivorous, eating several plant species and some insects (Molina-Borja, 1991; Rodríguez *et al.*, 2008). Juveniles may consume more insects, but adults are mainly vegetarians (Valido & Nogales, 1994). Among the consumed plants are "salado" (*Schizogine cericea*), "guaidil" (*Convolvulus floridus*), "lavanda" (*Lavandula* sp.), and petals, flowers and fruits of "tunera" (*Opuntia dillenii*) (Molina-Borja, 1991; Rodríguez *et al.*, 2008). Among the consumed invertebrates are coleopteran, aracnids, formicids and hymenopterans (Rodríguez *et al.*, 2008).

We describe here, for the first time, the feeding of *Gallotia caesaris* specimens on feather parasites of *Pandion haliaetus* nesting in El Hierro (Canary Islands). In that island, *P. haliaetus* reproduction has been reinforced by adding previously built nests on several cliff sites (Trujillo & Rodríguez, 2007). During several periods in which *P. haliaetus* individuals were filmed (by the first author) while they were in the nest (located at the shore of Mar de las Calmas), an undescribed behavior by *G. caesaris caesaris* lizards could be observed. It consisted of several lizards climbing to dorsal feathers of *P. haliaetus* (adult and chick, Figures 1a and b) and performing there typical feeding movements directing their snouts to the feathers (Pedro F. Acosta, unpublished video film). When observed with more detail, the insects eaten by the lizards on *P. haliaetus* back feathers were identified as louse flies (Diptera, Hippoboscidae). These flies are ectoparasites of mammals and birds (Tella *et al.*, 2000) and different species like *Ornithomya avicularia*, *Pseudolynchia canariensis*, *Icosta americana* and *Ornithomya anchineuria* have been described as parasites of raptors (Samour, 2016); another species, *Olfersia fumipennis*, Sahlberg, 1886, has been cited on *P. haliaetus* (Pospischil, 2015). It was impossible to capture any of the louse flies from *P. haliaetus* (not allowed) so we do not know the species.

Commensalism on rests from prey brought by Eleonora's falcon has been cited in lacertids from Mediterranean islands (Delaugerre *et al.*, 2012) and from gull's prey in *Gallotia simonyi* on Roque Chico de Salmor (Siverio & Felipe, 2009). On the other hand, several reports have been published on lizards eating bird ectoparasites, including flies

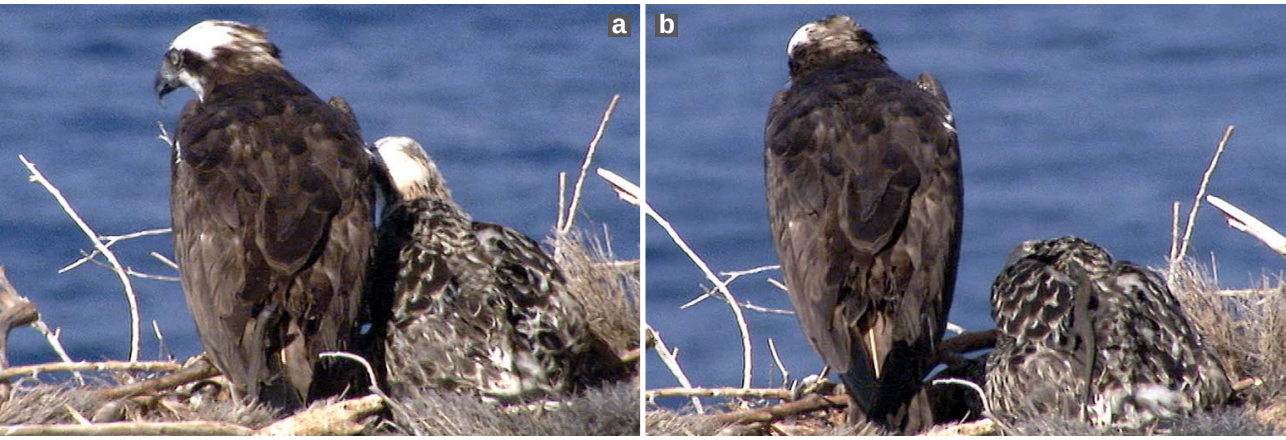

Figure 1: Individuals of *G. caesaris caesaris* on the back of *P. haliaetus* while in nest. (a) Adult. (b) Chick. Pictures obtained from a film recorded by Pedro F. Acosta.
Figura 1: Individuos de *G. caesaris caesaris* sobre la espalda de *P. haliaetus* en el nido. (a) Adulto. (b) Pollo. Fotografías obtenidas de una película grabada por Pedro F. Acosta.

from different families (Kammerer, 1925; Duffy, 1991; Polis & Hurd, 1995). Our observation pose some interesting questions: first of all, this behaviour can be present only in local populations of *G. caesaris caesaris* living close to *P. haliaetus* nests. Secondly, it must contribute to *P. haliaetus* (adults and new-borns) health eliminating or reducing louse flies parasites; these parasites have been shown to affect body condition in other bird species (Senar *et al.*, 1994; Clayton *et al.*, 2010). Moreover, lizards on their part obtain, at least temporarily while birds are on nests, an additional food item supplying animal proteins; therefore, this relationship could be considered an example of mutualism, sometimes named as cleaning symbiosis (McFarland & Reeder, 1974). Nevertheless, this relationship could be more complicated if louse flies endoparasites (Baker, 1967) could also infect lizards (see Johnson *et al.*, 2010 for a revision of the ecological importance of parasites as preys).

References

Baker, J.R. 1967. A review of the role played by the Hippoboscidae (Diptera) as vectors of endoparasites. *Journal of Parasitology*, 53: 412-418.

Clayton, D.H. Koop1, J.A.H., Harbison, C.W., Moyer, B.R. & Bush, S.E. 2010. How birds combat ectoparasites. *The Open Ornithology Journal*, 3: 41-71.

Delaugerre, M., Grita, F., Lo Cascio, P. & Oun, R. 2012. Lizards and Eleonora's Falcon (*Falco eleonorae* Gené, 1839), a Mediterranean micro-insular commensalism. *Biodiversity Journal*, 3: 3-12.

Duffy, D.C. 1991. Ants, ticks and nesting seabirds: dynamic interactions? 242-257. *In*: Loye, J.E. & Zuk, M. (eds), *Bird-parasite interactions: ecology, evolution and behaviour*. Oxford University Press. Oxford.

Johnson, P.T.J., Dobson, A., Lafferty, K.D., Marcogliese, D.J., Memmott, J., Orlofske, S.A., Poulin, R. & Thieltges, D.W. 2010. When parasites become prey: ecological and epidemiological significance of eating parasites. *Trends in Ecology and Evolution*, 25: 362-371.

Kammerer, P. 1925. Lebensweise der Eidechsen auf Kleinsten Inseln. *Blätter für Aquarien- und Terrarienkunde*, 36: 483-496, 513-524.

McFarland, C.G. & Reeder, W.G. 1974. Cleaning symbiosis involving Galápagos Tortoises and two species of Darwin's Finches. *Zeitschrift für Tierpsychologie*, 34: 464-483.

Molina Borja, M. 1991. Notes on alimentary habits and spatial temporal distribution of eating behaviour patterns in a natural population of lizards (*Gallotia galloti*). *Vieraea*, 20: 1-9.

Polis, G.A. & Hurd, S.D. 1995. Extraordinarily high spider densities on islands: Flow of energy from the marine to terrestrial food webs and the absence of predation. *Proceedings of the National Academy of Sciences USA*, 92: 4382-4386.

Pospischil, R. 2015. *Hippoboscidae, Louse Flied/Keds. Encyclopedia of Parasitology*. Springer-Verlag. Heidelberg.

Rodríguez, A., Nogales, M., Rumeu, B. & Rodríguez, B. 2008. Temporal and spatial variation in the diet of the endemic lizards *Gallotia galloti* in an insular Mediterranean scrubland. *Journal of Herpetology*, 42: 213-222.

Samour, J. 2016. Management of raptors. 915-934. *In*: Harrison, G. & Lightfoot, T. (eds.), *Clinical Avian Medicine*, vol 11, cap. 40. Harrisons's Bird Foods. Brenthwood. Tennesse. <http://avianmedicine.net/publication_cat/clinical-avian-medicine> [Accessed: October 18, 2016].

Senar, J.C., Copete, J.L., Domenech, J. & Von Walter, G. 1994. Prevalence of louse-flies (Diptera, Hippoboscidae) parasiting a cardueline finch and its effect on body condition. *Ardea*, 82: 157–160.

Siverio, F. & Felipe, P. 2009. Comensalismo entre lagarto gigante de El Hierro (*Gallotia simonyi*) y gaviota patiamarilla (*Larus michahellis*) en el roque Chico de Salmor. *Boletín de la Asociación Herpetológica Española*, 20: 40-44.

Tella, J.L., Rodríguez-Estrella, R. & Blanco, G. 2000. Louse flies on birds of Baja California. *Journal of Wildlife Diseases*, 36: 154-156.

Trujillo, D. & Rodríguez, M.A. 2007. El águila pescadora consigue criar en un nido artificial de El Hierro. *Quercus*, 261: 10.

Valido, A. & Nogales, M. 1994. Frugivory and seed dispersal by the lizard *Gallotia galloti* (Lacertidae) in a xeric habitat of the Canary Islands. *Oikos*, 70: 403–411.

Analysis of the loggerhead (*Caretta caretta*) bycatch in mediterranean surface longlines from depth sensors data

Juan A. Camiñas[1], Natalia Rivetti[1], Josetxu Ortiz de Urbina[1], Salvador Garcia-Barcelona[1], Pilar Rioja[1], María José Gómez-Vives[1], José Carlos Báez[1] & David Macías[1]

[1] Instituto Español de Occeanografía. Centro Oceanográfico de Málaga. Puerto pesquero. 29640 Fuengirola. Málaga. Spain. C.e.: juanantonio.caminas@ma.ieo.es

Fecha de aceptación: 24 de octubre de 2016.
Key words: fishery depth, loggerhead, longline, Mediterranean Sea.

Resumen: En este trabajo se analiza la relación entre las características del hábitat pelágico explotado por los palangreros españoles dirigidos al atún blanco (*Thunnus alalunga*), en el Mediterráneo occidental, y las capturas ocasionales de tortuga boba (*Caretta caretta*). Entre julio y octubre de 2008 (93 días) el Instituto Español de Oceanografía (IEO) realizó una campaña científica de pesca experimental en colaboración con la flota de palangre de superficie, con el objetivo de analizar los efectos de este aparejo en las especies objetivo y de captura ocasional. Nuestros resultados indican que la temperatura es una variable clave en relación a la captura ocasional de tortugas marinas.

The Spanish surface longline fleet in the western Mediterranean is monitored on board and at landing ports by the IEO from more than 20 years ago due to the commercial importance of the target species: swordfish (*Xiphias gladius*), bluefin tuna (*Thunnus thynnus*), and albacore (*Thunnus alalunga*). Marine turtles species caught as bycatch include loggerhead (*Caretta caretta*) as the most frequent one, although leatherback (*Dermochelys coriacea*) and sometimes green turtle (*Chelonia mydas*) are also present (Camiñas *et al.*, 2006; Báez *et al.*, 2013).

The Spanish surface longline fleet operates with six different gear/target species (called "métier", as referred to in the EU Commission). One of the main distinctive technical features among métiers is the depth range in which the baited hooks are setting (Báez *et al.*, 2013). Depth of setting hooks varies from surface waters (average depth of 30 m, with a maximum of 50 m) to over 400 m deep. Each métier exploits a different part of the pelagic habitat, changing the species of both components of the capture, the target and bycatch. For more detail see Camiñas *et al.* (2006),