Absence of Blood Parasites in Nestlings of the Eleonora's Falcon (*Falco eleonorae*)

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Parasites are an important factor influencing the dynamics of populations and the structure of animal communities (Sheldon and Verhulst 1996). In birds, haematozoan parasites have been found in more than 2500 of 4000 species examined (Bennett et al. 1992, Bishop and Bennett 1992). The order Falconiformes includes ca. 285 species (Peirce et al. 1990). No haemoproteids have been described for the families Cathartidae (75 species), Pandionidae (15 species), and Sagittaridae (15 species), but four species of haemoproteids have been described from the family Falconidae (59 species). The Eleonora's Falcon (*Falco eleonorae*) is a migratory falcon that nests on islands of the Mediterranean region and winters in southeast Africa, mainly in Madagascar and the Mascarene islands (Walter 1979).

In this study, we examined blood smears of 42 nestlings of the Eleonora's Falcon (18 in 1999 and 24 in 2000) to detect the presence of blood parasites. The only published works on the prevalence of blood parasites in Eleonora's Falcon are those by Wink et al. (1979) and Ristow and Wink (1985), who reported a low prevalence (13%) of *Leucocytozoon toddi* in adult birds (2 of 16 birds infected), but no information for nestlings was provided. To our knowledge, our work is the first to report on blood parasites in nestlings of the Eleonora's Falcon.

Nestlings sampled came from the Columbretes archipielago, a small (19 ha) volcanic outcrop located 63 km off the coast of Castellón (39°54'N, 0°41'E) where about 30 pairs of Eleonora's Falcon breed (A. Martínez-Abraín unpubl. data). Vegetation is typical of a Mediterranean island with small shrubs and annual plants. The only sources of fresh water are two cisterns which collect water from the scarce rainfall (annual mean ca. 250 mm). All 1999 samples came from the main group of islands (Columbrete Gran and Mancolibre), but in 2000 we included samples from Foradada and Ferrera islands. Nestlings sampled came from eight different nests in 1999 and from 16 in 2000. Blood samples were collected by venipuncture of the ulnar vein of 20—25-d old chicks from 17–22 September 1999 and from 21–23 September 2000. Smears were air-dried and fixed in methanol on the day of sampling. In the laboratory, slides were stained with Giemsa and examined under a microscope with oil at 1000×, using the techniques of Korpimäki et al. (1995). Prevalence was established through the inspection of 100 fields, containing about 100 erythrocytes each. All smears were inspected twice by the same person (A. Martínez-Abraín.) and once by a second observer (B. Esparza) at lower power (400×). We sampled haematophagous night-dwelling insects in September 2000, with a Center for Disease Control (Kimsey and Chaniotis 1984) mosquito trap placed for three consecutive nights on the main island but no haematophagous insect was trapped.

No blood parasites were found in the 42 blood samples

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taken from Eleonora's Falcon nestlings. Because the Eleonora's Falcon is an island species and marine habitats seem to represent an unsuitable environment for potential vectors of haematozoan parasites (Little and Earlé 1994, Piersma 1997) it is very likely that the absence of blood parasites in the nestlings sampled is due to the absence of appropriate vectors in the Columbretes Islands, located far from the mainland. The lack of appropriate vectors is one of the reasons commonly used to explain the absence of blood parasites in birds linked to saline or marine habitats (Greiner et al. 1975, Figuerola et al. 1996) and in Spain birds associated with cliffs, like the Griffon Vulture (*Gyps fulvus*) (Blanco et al. 1998). Tella et al. (1996) attributes the low prevalence of *H. tinnunculi* in adults of the Lesser Kestrel (*Falco naumanni*), breeding in open, arid areas of the northern Iberian plateau, to the scarcity of suitable vectors. In contrast, adult falconids breeding in forested areas may have higher prevalences of infection, as is the case of the American Kestrel (*Falco sparverius*), with a prevalence of 85% (Apanius 1991), 74% for females and 53% for males (Wiehn et al. 1997), and 75% (Castellucci et al. 1998). However, neither Korpimäki et al. (1995) studying Eurasian Kestrels (*Falco tinnunculus*) or Apanius and Kirkpatrick (1988) studying American Kestrels, were able to detect blood parasites in most nestlings, although 69% of juvenile American Kestrels were infected with *H. tinnunculi* during the autumn migration. Thus, parasite transmission by *Culicoides* vectors, for forest-dwelling falconids, may happen mainly after fledging and before the first autumn migration. This seems not to be the case for chicks of the Eurasian Sparrowhawk (*Accipiter nisus*) which showed very high *Leucocytozoon toddi* parasitemias as early as 12–14 d of age (Peirce and Marquiss 1983, Ashford et al. 1991) as well as for chicks of the Northern Goshawk (*Accipiter gentilis*) (Toyne and Ashford 1997). Tella et al. (1999) found that macrohabitat constraints are important in the dynamics of hematozoan transmission. They suggested that the overall low prevalence of blood parasites in Spanish diurnal birds of prey may be due to an overall scarcity of hemoparasite vectors, because Iberian habitats are commonly drier and less-forested than temperate or boreal areas. Sol et al. (2000) have shown that the prevalence of *Haemoproteus columbae*, among near-by populations of the Rock Dove (*Columba livia*), unequivocally paralleled variation in abundance of its main vector, which represents strong support for the hypothesis linking prevalence and vector abundance.

A more comprehensive insect survey and the sampling of adult birds in their breeding colonies would be required to strengthen our conclusions.

RESÚMEN.—Se examinaron 42 frotis sanguíneos de pollos volantones de talcón de Eleonor (Falco eleonorae) de la colonia de las islas Columbretes (NE, España). No se hallaron hemoparásitos en ninguna de las muestras. Se sugiere que la ausencia de vectores apropiados en las islas podría explicar la ausencia de parásitos sanguíneos, aunque se deberá realizar un mayor esfuerzo de muestreo de vectores así como obtener frotis de aves adultas para confirmar nuestras conclusiones.

[Traducción de los autores]

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