

AZOREAN BIRDS – A NATURAL HERITAGE

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ABSTRACT

The Azores Archipelago has small species diversity within the broader Macaronesian context, and its birds are no exception to this generalisation. This fact is explained by the location of the archipelago, in the heart of the North Atlantic, 1,500 km from Europe and 1,900 km from the Americas. In these volcanic islands, the avifauna comprises 41 breeding species and, though not numerous, they are of great importance at the species and population levels. Among these birds, there are two endemic species with the status of most endangered in the world, that is, the Azores bullfinch and Monteiro's storm-petrel. There are also eleven endemic subspecies from five orders and several of Europe's most important populations of marine bird species, such as Cory's and Macaronesian Shearwaters and the Madeiran Storm-petrel. The importance of the Azores for the migration of Nearctic and Western Palaearctic birds is poorly recognized, but it is known that every year dozens of individuals from more than 100 different species pass through the Azores on their flight routes. This paper is about the richness of the Azorean avifauna and its ornithological history. It also addresses topics for further research.

RESUMO

O arquipélago dos Açores apresenta uma menor diversidade específica em comparação com os restantes arquipélagos da Macaronésia, e as aves não são excepção. Esse facto é explicado pela localização geográfica do arquipélago, no coração do Atlântico Norte, a 1.500 km da Europa e 1.900 km do continente Americano. Nestas ilhas de origem vulcânica recente, nidificam de forma regular 40 espécies de aves, e embora não seja um número muito elevado de espécies, estas são de grande importância a nível específico e populacional. Entre essas aves, existem duas espécies endémicas, o Priolo e o Painho-das-tempestade-

de-Monteiro. Nidificam também onze subespécies endémicas de cinco ordens, e várias das populações mais importantes da Europa de espécies de aves marinhas, como o cagarro, o frulho e o painho-da-madeira. Desconhece-se a importância dos Açores para a migração de aves de origem Neártica e Paleártica, mas todos os anos é possível observar dezenas de indivíduos de mais de 100 diferentes espécies. Este artigo descreve a riqueza da avifauna dos Açores e a sua história ornitológica, e aponta tópicos relevantes para futuras investigações ornitológicas.

THE AZORES BEFORE HUMAN SETTLEMENT

The Azores archipelago is located in the heart of the North Atlantic Ocean, between latitudes 36° 55' and 39° 43' N and longitudes 24° 46' and 31° 16' W, 1,500 km from Europe and 1,900 km from the Americas. The nine oceanic and volcanic islands that constitute the archipelago are situated along a NW-SE oriented, 600 km long, line and can be divided into three different geographical groups, that is, the Occidental (Flores and Corvo), Central (Faial, Pico, São Jorge, Graciosa and Terceira) and Oriental (São Miguel and Santa Maria) (França, 2003).

Due to its isolation, the Azores was only discovered in the beginning of the XV century, being described by the first settlers as islands covered by dense native vegetation with thousands of birds, especially seabirds

(Frutuoso, 1591). At that time, the Azores was a bird paradise, not only for seabirds that could use the sea cliffs of the islands and islets to breed, but also for the land birds that had rapidly expanded their populations in the lush Azorean forests.

THE SETTLERS AND THE AZOREAN AVIFAUNA

Santa Maria and São Miguel were first settled by the Portuguese in 1439, followed by Terceira in 1450, Pico and Faial in 1466, Flores, Corvo and São Jorge in 1470 and, finally, Graciosa in 1510 (Albuquerque, 1989). In 1591, Gaspar Frutuoso (Figure 1) described in his chronicles *Saudades da Terra*, the early years of the settlers in the Azores (Books III, IV and VI), and gave valuable information about the fauna and the flora of the islands at that time. Frutuoso was the first person to write about the

Azorean avifauna, reporting the existence of several native bird species, some of which had populations comprising thousands of individuals. The Manx shearwater (*Puffinus puffinus*) population alone, the most abundant bird at that time, comprised hundreds of thousands of breeding individuals. Frutuoso also reported the existence of a small woodpecker and a black pigeon that subsequently became extinct. He also recorded the killing of thousands of birds for food, feathers and meat. Some stories involve one man, a stick and more than one thousand bird killings in one day. This was probably due to the fact that Azorean birds had never seen people and, as a consequence, were unable to associate man with predation. Consequently, birds were not afraid of them, with disastrous consequences. The Priolo (*Pyrrhula murina*) was also hunted to the point of near extinction (Le Grand, 1982; Ramos, 1996a).

The vegetation of the islands was also cut for wood and, with settlers, predators and invasive species also having arrived; it was the beginning of 500 years of habitat destruction in the Azores.

Although Gaspar Frutuoso was not a scientific naturalist, the list of Azorean birds provided in his books (Table 1) is of great value. It constitutes the first authentic list of species known to inhabit the Azorean islands four hundred years ago.

THE BEGINNINGS OF AZOREAN ORNITHOLOGY

Almost three hundred years after the Frutuoso chronicles, two works were published on the fauna of the Azores, in particular its birds. These were



FIGURE 1. Gaspar Frutuoso (Centro de Estudos Gaspar Frutuoso, 2010).

TABLE 1. List of bird species reported by Gaspar Frutuoso (1591) from the Azores at the time of human settlement.

Species common name	Some notes about Frutuoso's observations
Woodpigeon	
Rock dove	
Buzzard	
Partridge	Probably referring to the introduced Red-legged partridge
Quail	
Azorean bullfinch	Records this species only from São Miguel island
Canary	
Chaffinch	
Blackbird	
Wagtail	
Blackcap	
Goldcrest	
Little woodpecker	A doubtful record
Black pigeon	This is the unique record of a bird extinction in the Azores
Shearwater	Refers to the Manx shearwater as the most abundant species
Migrants	Refers to species that do not breed in the Azores

Notice sur l'Histoire Naturelle des Açores published by A. Morelet in 1860 and *Éléments de la Fauna Açoréenne* published by H. Drouët in 1861. Both naturalists visited the Azores during a scientific expedition in 1857 and reported the existence of thirty to forty bird species. Eight years later, in 1865, Frederick du Cane Godman (Figure 2) collected hundreds of Azorean bird specimens for identification purposes. In 1866, Godman published *On the Birds of the Azores*, the first paper on Azorean birds, wherein the endemic Priolo (Azores bullfinch) was described. Godman also published *The Natural*

History of the Azores or Western Islands in 1870. This is one of the most important books about the natural history of the archipelago and wherein was contained a list of species known from the Azores. Godman's work can be considered as the modern foundation for the study of Azorean ornithology.

In the following ninety years, several local and overseas naturalists collected specimens of and eggs from all bird species in the Azores (Bannerman & Bannerman, 1966). During this time, some naturalists stand out. For example, W.R. Ogilvie-Grant who visited the

Azores on a British Museum expedition in 1903, and was assisted by Colonel Francisco Afonso Chaves, director of the Carlos Machado Museum in Ponta Delgada. The report of this expedition, *On the Birds of the Azores*, written by Ogilvie-Grant and the taxonomist Ernst Hartert, was published in 1905 and became the most important work on Azorean ornithology for the next sixty years.

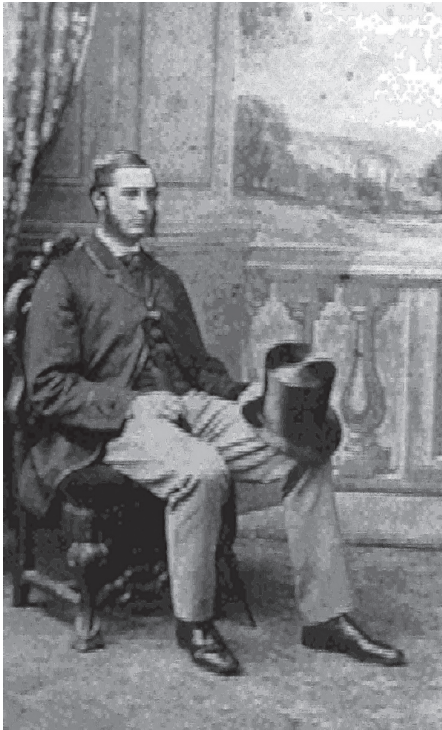


FIGURE 2. Frederick du Cane Godman (Wikipedia, 2010).

AZOREAN ORNITHOLOGY: THE PRESENT AND THE FUTURE

In 1966 David and Mary Bannerman published the third volume of *Birds of the Atlantic Islands: A History of the Birds of the Azores*. This was a great advance in the understanding of the Azorean avifauna. This book has become the most comprehensive work on the archipelago's avifauna, providing comprehensive descriptions of and details about all the breeding birds of the Azores, their distributions and behaviours, including migrant and vagrant birds.

In the last thirty years, the University of the Azores has become the research centre for studies of Azorean birds, with some leading researchers publishing several works about different aspects of the biology, ecology and behaviour of local species. Gérard Le Grand published several papers on the general ornithology of the Azores (Le Grand, 1977, 1980, 1983, 1987; Le Grand & Furtado, 1982). Fátima Medeiros studied the detailed ecology of sparrows (*Passer domesticus*) in the Azores (Medeiros, 1995, 1997, 1998).

Luís R. Monteiro dedicated his life to the study of Azorean seabirds. He and his team studied their ecology and developed bio-indicators of environmental quality based on seabird characteristics (Monteiro & Furness, 1995, 1996, 1997, 1998; Monteiro *et al.*, 1995, 1996, 1998, 1999). Following his untimely death in 1999, Monteiro's team and others, continued to develop studies on seabirds (Ramos & del Nevo, 1995; Ramos *et al.*, 1997; 1998a, 1998b; Bolton, 2007; Bolton *et al.*, 2004; Bried & Bolton, 2005; Bried & Bourgeois, 2005; Bried *et al.*, 2008, 2009; Magalhães *et al.*, 2008; Paiva *et al.*, 2010a, 2010b), culminating in the description of a new endemic species, Monteiro's storm-petrel (*Oceanodroma monteiroi*) from the Azores (Bolton *et al.*, 2008).

Jaime A. Ramos studied the ecology of the Azores bullfinch and developed conservation measures for this endangered species (Ramos, 1994, 1995, 1996b, 1996c; Monticelli *et al.*, 2010; Ceia *et al.*, 2011), and most recently some genetic and phylogeographic studies with passerines have been developed (Packert & Martens, 2004; Packert *et al.*, 2006, Dietzen *et al.*, 2006; Neves *et al.*, 2010).

All the above researchers have helped to reveal the importance of the Azorean avifauna in the global context. At least 40 species breed in the Azores (Table 2). Of these, thirteen are endemic species and subspecies, and the colonies of several seabird species are of great importance in a European context. In addition, every year, dozens of individuals belonging to more than 100 different species cross the Azores on their flight routes and it is also known that these islands are a harbour for vagrants. Nevertheless, the importance of these islands with regard to the migration of Nearctic and Western Palaearctic birds is poorly understood even with the existence of records about the occurrence of more than 300 different species of migratory or vagrant birds that have landed in the Azores over the past years (Birding Azores, 2010; Rodrigues *et al.*, 2010).

The breeding birds of the Azores and the recognized importance of the archipelago's islands for migratory birds are a natural heritage not just locally but also within a global context. Because of their uniqueness, there is an important need to protect and conserve the

TABLE 2. List of birds known to breed in the Azores. EA, Endemic to the Azores; EM, Endemic to Macaronesia; I, Introduced; N, native (from Rodrigues *et al.*, 2010)

Species	Colonization status
<i>Anas platyrhynchos</i>	N
<i>Alectoris rufa</i>	I
<i>Coturnix coturnix</i>	N
<i>Puffinus puffinus</i>	N
<i>Puffinus baroli</i>	EM
<i>Calonectris diomedea borealis</i>	N
<i>Bulweria bulwerii</i>	N
<i>Oceanodroma castro</i>	N
<i>Oceanodroma monteiroi</i>	EA
<i>Buteo buteo rothschildi</i>	EA
<i>Gallinula chloropus</i>	N
<i>Fulica atra</i>	N
<i>Charadrius alexandrinus</i>	N
<i>Gallinago gallinago</i>	N
<i>Scolopax rusticola</i>	N
<i>Larus michahellis atlantis</i>	EA
<i>Sterna dougallii</i>	N
<i>Sterna hirundo</i>	N
<i>Onychoprion anaethetus</i>	N
<i>Columba livia</i>	N
<i>Columba palumbus azorica</i>	EA
<i>Streptopelia decaocto</i>	N
<i>Psittacula krameri</i>	I
<i>Asio otus</i>	N
<i>Motacilla cinerea patriciae</i>	EA
<i>Erithacus rubecula</i>	N
<i>Oenanthe oenanthe</i>	N
<i>Turdus merula azorensis</i>	EA
<i>Sylvia atricapilla gularis</i>	EA
<i>Regulus regulus azoricus</i>	EA
<i>Regulus r. sanctae-mariae</i>	EA
<i>Regulus r. inermis</i>	EA
<i>Sturnus vulgaris granti</i>	EA
<i>Passer domesticus</i>	I
<i>Estrilda astrild</i>	I
<i>Fringilla coelebs moreletti</i>	EA
<i>Serinus canaria</i>	EM
<i>Carduelis chloris</i>	I
<i>Carduelis carduelis</i>	I
<i>Pyrrhula murina</i>	EA

Azorean birds and their habitats, especially the very important colonies of seabirds and several endemic species.

For the future, it is necessary to continue scientific studies on the ecology, biology and genetics of Azorean birds. Truly integrative approaches are still uncommon and there is an urgent need to implement a holistic understanding of the mechanisms that regulate bird populations on islands, particularly oceanic ones, and thereby achieve their protection and conservation.

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