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THE FOSSIL LAND BIRDS OF MADEIRA AND PORTO SANTO

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SUMMARY. A first survey of the fossil land birds of the Madeira group is given, dealing with rails, pigeons, quails and some passerines. Problems of the colonization and extinction of the endemic species are discussed taking into consideration faunal age and human influence on these islands.

ZUSAMMENFASSUNG. Ein erster Überblick über die Landvögel der Madeira-Gruppe behandelt u.a. Rallen, Tauben, Wachteln und diverse Singvögel. Diskutiert werden Probleme der Kolonisation und des Aussterbens der endemischen Arten, unter Berücksichtigung der Altersstellung und der Rolle der menschlichen Besiedlung dieser Inseln.

RESUMO. Neste trabalho é feito um estudo preliminar das aves terrestres fósseis do Arquipélago da Madeira, entre outras Ralídeos, Columbídeos, Codornizes e alguns Passeriformes. São discutidos problemas de colonização e extinção das espécies de aves endémicas, tendo em consideração a idade da fauna e a colonização humana destas ilhas.

When in September 1979 I first visited Madeira and Porto Santo, I did this with the object of studying the helicids, and especially the subfamily Geomitrinae, of these islands. Shortly after starting collecting material in the famous Quaternary sands containing snails in the São Lourenço Peninsula of Madeira, and later also in Porto Santo, I came

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across bones of birds and also the remains of lizards and mice (PIEPER 1981). This caused me to postpone my research on Geomitrinae and to dedicate myself to investigate the fossil birds of these islands. Since 1979 I have paid Madeira and Porto Santo four further visits in the course of which I have managed to collect several thousand bird bones.

By far the greatest part of these bones are from various species of shearwaters (Procellariidae) and storm petrels (Hydrobatidae). Altogether we are concerned with the remains of over 40 species, of which the land birds are of special interest. However, we must not ignore the fact that several noteworthy discoveries have been made also among the seabirds, for example, the finding of the sternum of a Great Auk *(Pinguinus impennis)* on Porto Santo, making this the southernmost record in the Palaearctic region.

The following account must be regarded as a preliminary communication and the detailed treatment I shall be giving to the individual bird groups will be published in several parts.

Already DARWIN (1859) had wondered why there were hardly any endemic bird species in Madeira. In his time, the Madeiran Firecrest *(Regulus ignicapillus madeirensis)* was considered to be the only endemic species. Today the long-toed Pigeon *(Columba trocaz)* is assumed by some authors (LÖHRL 1981, CRAMP 1985) to be distinct from *C. bollii* of the Canary Islands on species level, an opinion with which I fully agree. This latter bird was, therefore, in fact, the only truly endemic species of Madeira at the time. As an explanation of this above mentioned phenomenon DARWIN (and in this respect apparently all authors to this day have followed his view) stated that since every year a relatively large number of birds reached Madeira and Porto Santo from the continent, the continuous interbreeding with those birds, which already existed on these islands, hindered the development of any new species.

What apparently DARWIN did not know, was that LOWE, the well-known explorer of the fauna and flora of the Madeira Islands, had already in 1853 (mostly cited as 1851) recorded the presence of lizard and bird bones on the São Lourenço Peninsula. Originally, I too was ignorant of this fact. LOWE's material was examined by the famous palaeontologist Richard OWEN, who, however, was not able to identify the species of that material but only classified them as bones of thrush-size etc. My enquiries in London showed that these bones were apparently destroyed during World War II and that, in any case, they must be considered lost.

As on very many oceanic islands, in Madeira and Porto Santo there also existed endemic, flightless rails. Unfortunately, we have at this moment only 10 bones of this family which, however, clearly belong to three different species. What is remarkable is that by far the largest number of these bones are of the hind limb. Furthermore, from the comparison of the morphology of the tarsometatarsi with that of other island rails it was possible to conclude that these animals must have been flightless.

There are many remains of pigeons of the genus *Columba,* most of them stemming from *C. trocaz* which still exists in the forests of northern Madeira. Special attention must be drawn to the former presence of this species in Porto Santo. Because of the topographical conditions and the consequent climate on Porto Santo and the São Lourenço Peninsula these geographical localities probably did not have a vegetation which could be compared with that of the laurel forests in the northern part of Madeira, both as regards species composition and general structure. It therefore appears to me that these palaeontological discoveries tend to show that *C. trocaz* is not so strictly adapted to and dependent on the laurel forest as is generally believed. Moreover, it is possible, that before the colonization of the islands by man, several other types of forest could have been inhabited by this bird and the relatively inacessible forests of northern Madeira represent a refuge after 1420.

Quail remains of several species are often to be found on both islands, as can be seen from size and proportions of the limb bones. In contrast to the rails, the genus *Coturnix* is very well represented, i.e. we have more than 250 bones. These birds are of especially great interest since they are the first flightless phasianids found on any island in the world. Among Non-Passeriformes we found, among others, birds of prey, that is the two recent species, Kestrel *(Falco tinnunculus)* and Buzzard *(Buteo buteo),* the latter on Porto Santo, where it only became a breeding bird after the reforestation of the island, also owls: the Barn Owl *(Tyto alba)* and a new species related to the Scops Owl *(Otus scops).*

Naturally, there is some difficulty in identifying the species of songbirds (Passeriformes) and it is, therefore, at this stage impossible to say how many species are present in my material. Above all, we often found the remains of a large species of the genus *Turdus,* with greatly lengthened hind limbs, which are in no way identical with the bones of the only recent species of this genus in Madeira, *T. merula.* Further, we were able to identify various species of Fringillidae, among which, the endemic Chaffinch *(Fringilla coelebs maderensis),* so that the questions of speciation and distributional history of the genus *Fringilla* on the Mid-Atlantic islands, which have been studied chiefly by GRANT (1979), can now be discussed in the light of new data.

We also found the rostrum of a Hawfinch *(Coccothraustes coccothraustes),* which has been recorded only as a vagrant in recent times and, above all, we have proof of other thick-billed finches of at least one new species related to the genus *Acanthis.*

In this connection we should draw attention to the opinion that *Goniaphea leucocephala* described by BOWDICH (1825) could belong to *Passerina,* a New World genus, and not to the Fringillidae (s.str.), does not appear to be plausible. Unfortunately, a large part of the material collected by BOWDICH was lost on its way to Europe and cannot, therefore, be re-examined. From the figure of the head of *Goniaphea* it is conceivable

that BOWDICH had hit upon a finch species in Madeira which is now extinct.

So much for a short survey of the most important discoveries. In my material there is a striking lack of several of the species now living in Madeira and Porto Santo whose fossilized remains we could certainly have expected to find. Thus we are obliged to assume that the arrival of the Portuguese in the beginning of the 15th century and the resulting rapid changes in the environment, especially in the lower altitudes, led to a considerable change in the composition of the avifauna. On the one hand, a number of endemic species died out and on the other hand several birds were introduced. We have only limited knowledge of what these actually were. In the case of peacocks, turkeys and the *Alectoris* species, the situation is quite clear, but this is not the case with the songbirds. One cannot completely put aside the possibility that popular cage birds such as the Linnet (*Acanthis cannabina*) and Goldfinch (*Carduelis carduelis*) were not originally part of the avifauna of the Madeira Archipelago.

OLSON & JAMES (1982) published the comparable case of the Hawaiian Islands. Also there, the species which were described after James COOK's re-discovery of the islands, were only a shadow of the rich avifauna, which, through the discovery of bones we now know used to exist. From this we can assume that this amazing avifauna was greatly reduced after the arrival of the Polynesians.

This obliges us to go into the question of the age of the bones now found in Madeira. The dating of charcoal from the São Lourenço Peninsula resulted in an age of 2070 ± 180 years B. P. and KREJCI-GRAF (1964) gave 5130 ± 70 years for a sample of snails (Regarding the problems of dating gastropods see OLSON & JAMES 1982). Further radiocarbon dates from Porto Santo can be found in the important publication of LIETZ & SCHWARZBACH (1971). At any rate it can be said that the individual places where bones were collected are of varying ages and that the oldest bones are from the Late Pleistocene, while the most recent ones extend to the present day, as is born out by the remains of turkeys both in Madeira and Porto Santo. In this respect, it can also be assumed that human influence alone cannot be held totally responsible for the extinction of the endemic species, for the postglacial climatic changes and the accompanying shift of vegetation zones have also contributed their share.

How the bird bone deposits actually came into being, is a matter which entails a large range of open questions not pursued in this paper. As LIETZ & SCHWARZBACH (1971) have shown, at the time when the dunes, in which a large part of the bones are to be found, were being formed, the prevailing wind direction was from the northwest. This makes us assume that in those days fewer vagrants reached Madeira and, consequently, DARWIN's argument for the general lack of endemic land bird species, mentioned earlier, is understandable if only the present day

knowledge of wind conditions (predominantly from the northeast) is taken into consideration.

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