

## THE HERPETOFAUNA OF GIBRALTAR—STATUS, RECENT HISTORY AND CURRENT RESEARCH

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### INTRODUCTION

The acceptance of the International Strategy for the Conservation of European Herpetofauna in 1980 has served to highlight two major problems: (a) the increasing pressure on all species of European herpetofauna; (b) the lack of information available on the herpetofauna of some European regions.

The south of Iberia is rich in amphibians and reptiles, is little studied, and is an area where species are threatened by man's activities and ignorance. Gibraltar (36° 7' N, 5° 21' W), although politically distinct from the rest of the Iberian Peninsula, is an example of a site in which man has greatly altered habitats causing generally detrimental changes in the fauna. Being limited in extent and having a considerable recorded history, Gibraltar is a conveniently delimited area of southern Iberia in which a study of recent changes in vegetation and fauna has been possible.

The history of the herpetofauna of Gibraltar can be extrapolated from a knowledge of the present distribution and preferred habitats of the species and from the known history of the development of the vegetation of the area. A similar study of the history of the avifauna of Gibraltar has recently been attempted. (Cortés, Finlayson, Garcia & Mosquera, 1980).

### GIBRALTAR

Gibraltar is situated at the eastern end of the Strait of Gibraltar, and together with the southern coast of the Spanish Province of Cadiz forms the northern shore of the Strait. The Rock is a mass of Lower Jurassic limestone running approximately north-to-south along the greater part of a peninsula about 6.0 km long and 1.2 km across at its widest point. The northern end of the peninsula is a flat, sandy isthmus by which the Rock is connected to the Spanish mainland.

The northern and eastern faces of the Rock consist of steep cliffs rising to 426 m. The eastern cliffs are ascended to 290 m along the northern half by accumulated sand slopes. The western slopes of the Rock are less steep and largely vegetated, although the Town lies on the lower parts. On the south of the peninsula a series of flat, stony terraces descend from the highest point to the sea.

The terms "Gibraltar" and "the Rock" are locally synonymous, but in this paper "the Rock" will refer specifically to the limestone mass, in order to distinguish this from "the isthmus", which is of different geology and vegetation.

### CLIMATE

The climate of Gibraltar is Mediterranean. Mean temperatures of the coldest and warmest months are 13°C and 24°C for January and August. Mean annual rainfall is 797 mm although there are considerable yearly variations. Most rain falls between October and April. Due to its geographical positions, Gibraltar experiences less extreme temperatures and more rainfall than much of the surrounding area.

Predominating winds are from the east and west sectors (88% of the days per year). About 40% of days have winds from the east sector. The easterlies, forced up the sheer cliff, cause condensation and produce the "Levanter" cloud. Usually—particularly during the summer—the cloud covers the Rock while the isthmus and the extreme south remain clear. At other times the cloud will stretch several kilometres north and west from Gibraltar.

### THE HERPETOFAUNA

#### METHODS

Current herpetological research concerns the ecology of *Psammodromus algirus* and *Podarcis hispanica*. Numerous other incidental observations have been made during the course of field work, particularly in relation to the habitats of the species observed. In addition, colleagues resident in various areas of the Rock have been invaluable in passing on to me records of their own observations of herpetofauna. Older residents of Gibraltar with an interest in natural history have been interviewed. By extrapolation from the present situation it has been possible to speculate broadly and qualitatively on the changes the herpetofauna of Gibraltar have undergone.

#### HISTORICAL

The first known reference to the herpetofauna of Gibraltar is by Ayala (1782). Only a passing reference is made to snakes. There are somewhat confusing descriptions of lizards, although a fair one of *Acanthodactylus erythrurus* which is mentioned as occurring on the "white soils" (either the east sand slopes on, more likely, the isthmus) and of *Podarcis* and *Tarentola* on roofs. A vivid description is given of *Lacerta lepida*, which is considered "abundant on this hill".

## PRESENT STATUS AND RECENT HISTORY

The Western Spadefoot Toad *Pelobates cultripes* was formerly common and widespread on the isthmus and was frequently heard and observed up to the winter of 1979/80. Breeding must be doubtful since no pools persisted either in that year or in 1980/81. It is not known whether there is any breeding in two artificial duck ponds in the garden on the Spanish side. In past years individuals have been known to cross the airfield to the south (where there is no suitable habitat), but recolonization from further north must be virtually ruled out considering the urban belt of La Linea. The Natterjack *Bufo calamita* has been recorded (J. Bensusan, personal communication), but there are no recent records.

Busack (1977) uses old records in giving Gibraltar as a location for a number of reptiles. Caution is necessary when considering the records of Chameleon *Chamaeleo chamaeleon* and Spanish Psammodromus *Psammodromus hispanicus* in particular. Experience of old botanical and ornithological collections and records has shown that in most cases the locality "Gibraltar" does not refer specifically to the Rock, but to an indistinct area comprising the Rock, its hinterland in Spain (the "Campo de Gibraltar"), and even Cadiz Province as a whole (Wolley-Dodd 1914; Cortés *et al.*, 1980). There are no other records of *P. hispanicus* at Gibraltar, although it may have occurred on the isthmus. Observations of *C. chamaeleon* have occasionally been claimed (often due to confusion with *Tarentola!*) and one was captured in June 1979. Proximity to human habitation suggests captive origin and a subsequent thorough search of adjacent vegetated areas yielded none. If it did occur formerly it is likely to have disappeared at a time when the vegetation of the Rock was cleared.

The Moorish Gecko *Tarentola mauritanica* occurs on walls, buildings, cliffs and rocky clearings in vegetation.

The Spiny-footed Lizard *Acanthodactylus erythrurus* is common around La Linea on sandy ground and on the east end of the remaining vegetated strip of isthmus where plant cover is more open. It is likely to have been more widespread there and on the east sand slopes where it does not now occur. The species is not observed south of the airfield. It would appear that the airfields, roads and housing of the area impede colonization of suitable areas of the Rock.

The Three-toed and Bedriaga's Skinks (*Chalcides chalcides* and *C. bedriagai*) are present on the isthmus (including the Cemetery) and *C. bedriagai* has been confirmed on the sand slopes.

*Psammodromus algirus* is common in the Maquis, especially high Maquis with leaf litter, and on the edges of the Maquis. It is regularly encountered in firebreaks and open areas with scattered bushes, but avoids entirely open areas. It is not found in the Steppe vegetation of Windmill Hill Flats, the sand slopes or the isthmus. The present habitat of the Cemetery is similar in structure to areas on the Upper Rock where this species occurs. However *P. algirus* is not found there. The open vegetation present there until recently was probably unsuitable (and perhaps occupied by *A. erythrurus*) and recent colonization by *P. algirus*

impeded by the roads and urbanization that has isolated the Cemetery.

The Iberian Wall Lizard *Podarcis hispanica* is more widespread, but is not found over most of the Town and is rare in the scrub away from stony clearings. It forages in low ground vegetation and in leaf litter, and spends longer than the last species basking. Both species climb in vegetation (*Psammodromus* more than *Podarcis*), but only *Podarcis* regularly scales walls and cliffs. The Wall Lizard is never encountered far from cover, and is rare in large flat areas of low continuous vegetation, probably due to lack of basking sites. It was hence probably rare over most of the isthmus, although it is now extremely abundant in the parts of the Cemetery where the vegetation has been broken up by tombstones which provide cover and basking sites. Colonization by this species has therefore not been impeded.

The Ocellated Lizard *Lacerta lepida* still occurs as an isolated population on the Cemetery. It is now rare, although older gravediggers recall times when it was regularly encountered (about 30 years ago). Increased human activity, allowing little undisturbed basking could be a contributory factor to the decrease. It is still found on the Spanish side of the isthmus. On the Rock itself there have been no confirmed records for about ten years. Disturbance and seral succession may have been causes for a decrease in numbers. The species is certainly no longer "abundant on the hill" (Ayala, 1782) and may well be absent from much of the western slopes.

Snakes on Gibraltar are known from relatively few observations, so that the state of their populations are even harder to determine. The Horseshoe Whip Snake *Coluber hippocrepis* is the most frequently observed. It occurs in dense and open scrub, firebreaks, the isthmus (including the Cemetery) and gardens, often venturing into households. The Southern Smooth Snake *Coronella girondica* is also widespread but not encountered as frequently. The Ladder Snake *Elaphe scalaris* and Montpellier Snake *Malpolon monspessulanus* have only been recorded from the Maquis, the latter a single dead individual. The Grass Snake *Natrix natrix* has been recorded on the Upper Rock and isthmus, while the Viperine Snake *Natrix maura*, formerly found on the isthmus (J. Bensusan, personal communication) has not recently been found.

## DISCUSSION

By simple consideration of the reduction in areas available to the herpetofauna their corresponding decrease becomes evident. Populations of most species have been reduced, some have disappeared from certain areas, and others are in danger of doing so. On the Upper Rock the herpetofauna has also been subjected to changes in habitat type. The habitat changes have caused changes in breeding species of birds (Cortés *et al.*, 1980). Colonization by reptile species is obviously much more difficult and necessarily a long term process. The result of habitat change will often be a drop in numbers and ultimate local extinction. This appears to be happening in the case of

*Lacerta lepida* on the Upper Rock. *Podarcis hispanica* will have been more common when the vegetation was more open, while *Psammodromus algirus* was possibly less so. The position as regards snakes is more difficult to determine.

### CONCLUSIONS

The problems faced by the herpetofauna of Gibraltar over the last few centuries, and today, are similar to those in other parts of Europe: fragmentation of habitats; seral successions; lack of breeding sites (especially for amphibians); predation by feral cats and children; disturbance; inadequate habitat protection and lack of law enforcement. (All wildlife is protected in Gibraltar under the 1964 Animals and Birds Ordinance. Enforcement is however difficult, especially in the case of reptiles which are generally viewed with disgust and contempt.) The measures needed to combat these threats are similarly common to other countries. Public education in particular is essential, particularly in those Mediterranean countries where herpetofauna is held in low public esteem. Some of this is now being carried out by the Gibraltar Ornithological Society on the Rock itself. The I.S.C.E.H. has been given wide coverage in the local media, and a Television programme on the loss of the isthmus has been produced and screened.

There is no protection in law against habitat loss, a matter which is now being reviewed by the legal authorities in relation to birds. There will however be a consequent benefit to reptiles. The difficulty lies in that there can only ever be small amounts of habitat available in a place of such a high density of population (30 000 inhabitants). Nevertheless, because of the political separation from the mainland, species of "local" importance have "national" status. In this way species that are common elsewhere in the region could receive protection and public support if a deliberate campaign is organized. This could reverse the situation and make the Rock an important refuge for some species.

Threats similar to those experienced in Gibraltar are currently increasing in the surrounding area of neighbouring Spain. Species which may not yet be in danger in the region may suffer local reductions as they have done in Gibraltar. More specifically, the "Campo de Gibraltar", already largely industrialized around the Bay of Gibraltar at the expense of coastal habitats, is earmarked for further development once the Spanish frontier is opened. In this case the herpetofauna of the whole area would be even more seriously threatened.

The problems of local extinction and difficulty of recolonization of isolated patches of habitat have been

made clear in the case of Gibraltar (whose history is better documented than that of most equivalent areas in the region), and worsens the outlook for the future. Short term solutions—such as the digging of breeding ponds for amphibians—can only meet with limited success, especially when viewed against this background. The virtually total loss of the sensitive and rich coastal habitat on the isthmus occurred at a time when conservationists in the area were few. It need not have happened at all had political expediency not transcended environmental planning. Both these dangers remain.

The Province of Cadiz and the Rock of Gibraltar form the southernmost extreme of southwestern Europe. As such, the region's importance in determining the origins of the European herpetofauna have been recognized (e.g. Bons, 1974; Busack, 1977). However, even though Spain is one of the Mediterranean countries whose herpetofauna is best known (Lambert, 1981) there is scant knowledge of the distribution of most species in the region, away from Gibraltar. Busack's maps (Busack, 1977), although contributing much to a knowledge of the distributions, are incomplete and, in the case of the Rock, outdated. The distribution even of those well-studied vertebrates, the birds, is little known in the Province.

There is therefore a need to ensure full protection of species and habitats such as on the Rock itself: to achieve regional co-operation between Gibraltar and the local Spanish administrations once the frontier opens to prevent economic development being at the expense of conservation; to foster the mapping of the herpetofauna of this area—the part of Europe nearest Africa and with such a rich diversity of amphibians and reptiles; and to ensure, by education, the co-operation of the public in their protection.

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