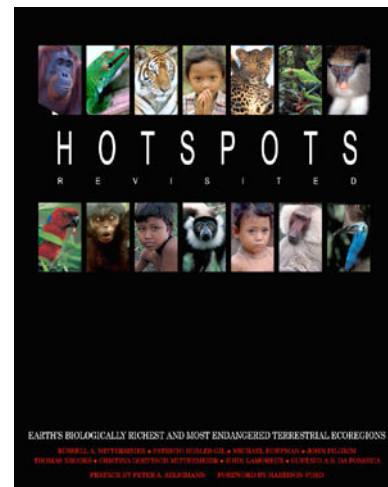


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## ***Mediterranean Basin***

The Mediterranean-Macaronesian Hotspot covers some 2,085,292 km<sup>2</sup> and stretches from Portugal to Jordan and from Morocco to Mediterranean Italy. It encompasses over 90% of Greece, Lebanon, and Portugal, though less than 10% of France, Algeria, and Libya. In Spain, 6,000 of the country's 7,500 plant species occur within the Mediterranean-climate zone, in Israel 1,500 out of 2,200, and in Morocco 3,800 out of 4,200 (Quézel, 1985; Greuter, 1991). The hotspot includes also the Canary Islands, Madeira and the Selvages Islands, and, in contrast to the former definition of this hotspot (Médail and Quézel, 1997; Myers et al., 2000), the region is here considered to include also the remaining Macaronesian Islands (Azores and Cape Verde Islands), even though the floristic affinities of these latter island groups lie more closely with Europe and Africa, respectively.

Of overwhelming importance in understanding the origins and diversity of the Mediterranean Basin biota is the region's location at the intersection of two major landmasses, Eurasia and Africa. Indeed, the collision between these two continental plates during the mid-Tertiary is responsible for the Basin's spectacular scenery. The Basin's violent geological history has produced an unusual geographical and topographical diversity, with high mountain ranges (more than 4,500 m in elevation), peninsulas, and one of the largest archipelagos in the world (the Mediterranean Sea includes several hundred islands and islets). The physiographic diversity of the region has resulted in a wide range of local climates, with mean annual rainfall ranging from 100 mm up to 3,000 mm (Blondel and Aronson, 1999).

The typical and most widespread vegetation type is *maquis* or *matorral*, a hard-leaved shrubland dominated by *Cistus*, *Erica*, *Genista*, *Juniperus*, *Myrtus*, *Phillyrea*, *Pistacia*, and other evergreens, and similar in appearance to the chaparral of California and the

*matorral* of Chile (Di Castri and Mooney, 1973). Although *maquis* now covers more than half of the region, much of it has been derived from forest formations by human-induced disturbances. Frequent burning of *maquis* results in depauperate vegetation dominated by Kermes oak (*Quercus coccifera*), *Cistus* spp. or *Sarcopoterium spinosum*, all of which regenerate rapidly after fire by sprouting or mass germination.

Shrublands, including *maquis* and the aromatic, soft-leaved and drought phrygana of *Rosmarinus*, *Salvia*, and *Thymus*, persist in the semiarid, lowland, and coastal regions of the Basin. However, prior to the onset of significant human impact, which started some 8,000 years ago, most of the Mediterranean Basin was covered by some form of forests (Quézel and Médail, 2003), including: evergreen oak forests (*Q. ilex*, *Q. suber*, and *Q. coccifera* ssp. *calliprinos*); deciduous forests (*Quercus canariensis*, *Q. faginea*, *Q. frainetto*, *Q. ithaburensis*, *Q. petraea*, *Q. pubescens*, *Q. pyrenaica*, and *Fagus sylvatica*); and conifer forests (*Abies* spp., *Cedrus* spp., *Juniperus* spp., and *Pinus* spp.).

The flora of the Mediterranean Basin includes around 25,000 species of vascular plants, 13,000 of which are endemic (Quézel, 1985; Greuter, 1991). These figures include taxonomically doubtful taxa (6 to 9%) and naturalized exotics (< 3 %). As we are considering here only confirmed native species, we subtract 10% for a figure of 22,500 (and 11,700 endemics). The plant species endemic to the Mediterranean Basin are not a random assemblage in terms of their taxonomic affinities, biology, habitat requirements, and geographical distribution. Rather, the flora comprises a complex admixture of Mediterranean woody plants belonging to pre-Mediterranean lineages (start of the Tertiary) (Verdú et al., 2003), and of localized neo-endemics composed predominantly of herbs and sub-shrubs in the families Asteraceae, Brassicaceae, Caryophyllaceae, Cistaceae, Fabaceae, Lamiaceae, Poaceae, Ranunculaceae, and so on. Endemics are mainly concentrated on some Tertiary and Pleistocene refugia on islands, peninsulas, rocky cliffs, and mountain peaks (Médail and Verlaque, 1997). Nevertheless, higher level of endemism is very reduced, with only one endemic family (Aphyllanthaceae) in the hotspot. The Mediterranean region also harbors a high degree of tree richness and endemism (290 indigenous tree species with 201 endemics) (Quézel and Médail, 2003). A number of trees are important flagships, including the cedars (such as the famous Lebanon cedar, *Cedrus libani*), the argan tree (*Argania spinosa*), a species in the Souss region of SW Morocco, and *Phoenix theophrasti* in Greece and western Turkey.

The principal foci in the Mediterranean are 10 regional mini-hotspots within the larger hotspot, characterized by regions of high plant richness and narrow endemism of more than 10% (Médail and Quézel, 1997, 1999): the Atlas Mountains in North Africa; the Rif-Bétique range in southern Spain and two coastal strips of Morocco and Algeria; the Maritime and Ligurian Alps of the French-Italian border; Tyrrhenian Islands; southern and central Greece; Crete; southern Turkey/Cyprus; Israel and Lebanon; Cyrenaica in Libya; and the Canaries/Madeira Islands. These 10 areas cover about 22% of the Basin's total area, yet account for almost 5,500 narrow endemic plants i.e. 44% of total Mediterranean endemics (Médail and Quézel, 1999). Considering the redefinition of the hotspot boundary, the inclusion of the Cape Verde Islands (4,071km<sup>2</sup>) and the Azores

(2,407km<sup>2</sup>) with the Canaries/Madeira Islands to form an expanded Macaronesian mini-hotspot appears warranted. Clearly, these are priority sites for conservation of these plant components of Mediterranean-Macaronesian biodiversity.

As with the other Mediterranean-climate hotspots, diversity and endemism among vertebrates is much lower than for plants (Blondel and Aronson, 1999). The mammal and bird faunas are largely derived from extra-Mediterranean biogeographical zones, with Eurasian and African elements dominating the mammal fauna, whereas Eurasian and the semiarid southern elements dominate the avifauna. The North African mammal fauna has closer affinities with tropical Africa than the Mediterranean Basin. On the other hand, the reptile and amphibian faunas comprise mainly Mediterranean species, and have higher levels of endemism. Many endemic species and genera are archaic lineages, which have probably remained unchanged since their differentiation before the late Tertiary onset of Mediterranean-climate conditions.

The present number of land mammals in the region is about 229, of which 26 (11%) are endemic, including several standouts like the Barbary deer (*Cervus elaphus barbarus*), Barbary macaque (*Macaca sylvanus*), and the Mediterranean monk seal (*Monachus monachus*), now thought to number fewer than 400 individuals. The region's avifauna includes about 498 breeding species of which only 33 (7%) are endemic (I have the figure of 343 breeding birds and 48 endemics i.e. 14%!). A few small portions of the hotspot also appear as priorities in BirdLife International's recent global analysis of Endemic Bird Areas (EBAs) (Stattersfield et al., 1998), among them Cyprus, Madeira and the Canary Islands (with eight species confined to this EBA), and Cape Verde.

Endemism is much better developed in reptiles, with 229 species, 77 (34%) of which are endemic; there are also four endemic genera, namely *Algyroides*, *Trogonophis*, *Macroscincus*, and *Gallotia* (the latter being a genus of lizard unique to the Canary Islands). Of the 62 species of amphibians in the hotspot, 32 (52%) are endemic. Reptile diversity is highest in the drier, eastern and North African parts of the Basin, whereas the opposite is true of amphibians. For both groups, the Mediterranean Basin is an important center of diversity and endemism for some families. These include, for amphibians, Discoglossidae (10 species, or 71.4% of the world total) and Salamandridae (19 species, or 35.8% of the world total), and for reptiles, Lacertidae (64 species, 23% of the world total), Testudinidae (five species of Mediterranean tortoises which are all important flagship species, 16%), and Viperidae (19 species, 8%).

The inland fishes of this hotspot represent small subsets of the rich Eurasian and African fish faunas from which they are isolated. Consequently, the fauna is species-poor (216 native species), although it includes 63 endemic species, six endemic genera, and even an endemic family, Valenciidae, the toothcarps of the Iberian and Greek peninsulas. These two peninsulas provide the primary centers of fish endemism in the hotspot, together containing 86% of its endemic fishes.

The present human population of the Mediterranean Basin is some 300 millions and increasing, and the impact of a long history of human assault on Mediterranean

ecosystems has been huge. Perhaps the most severe transformation has been the conversion of forests, especially primeval deciduous forests, to agricultural lands, evergreen woodlands, and maquis. Tourism, too, has had a serious impact on semi-natural areas in western and southern Turkey, and in Cyprus, Tunisia, and Morocco, a list that may shortly be joined by Greece among several other countries, particularly as concerns the Mediterranean islands such as the Balearics, Corsica, Sardinia, Sicily, Crete, and the Canary and Madeira Islands. Although reforestation is occurring in some of the more developed areas of the Basin, e.g., southern France and parts of northern Spain, Italy and Croatia, the pace of land degradation is accelerating in North Africa, where human populations are still increasing at a rapid rate.

Much of the Basin's current vegetation reflects the influence of regular burning of grass and shrub, imposed by humans for several millennia. To this profound extent, many, if not most, present-day landscapes are an example of co-evolution between nature and humans. It would be erroneous in the case of the Mediterranean to regard only purely pristine vegetation as "worthwhile" primary vegetation in the sense of undisturbed original vegetation, when, even by the year 1000, much of the Mediterranean Basin was bearing widespread marks of human activity. Thus, it is scientifically correct to divide today's environments into pristine (extremely rare 1-2%), semi-natural (fairly frequent, albeit in small patches, for the most part uncultivated, but somewhat managed 20-25%), and sub-natural (the predominant form, with limited natural vegetation and of contrasted relevance to the conservation of biodiversity 73-79%) (Naveh and Kutiel, 1990; Greuter, 1994; Médail and Quézel, 1997).

The Mediterranean-Macaronesian hotspot, therefore, emerges as one of the hottest, having exceptionally high plant endemism, and the lowest percentage of natural vegetation remaining considered in "pristine condition". Furthermore, the hotspot has a surprisingly low protected area coverage, with only 4% (or 90,242 km<sup>2</sup>) under some form of protection, and the 762 protected areas in IUCN categories I to IV make up a pitiful 1% of the surface area of the hotspot.

Protected areas have had a long history in the Mediterranean. As much as 2,000 years ago, several societies set aside areas for protective purposes, or, rather, as "resource reserves", some of them surviving to the present time. They were 'developed as an ancient acknowledgment of the scarcity of renewable resources and a need to conserve and use them widely in support of sustainable rural economic development' (Sulayem, 1994). Today, most countries of the Basin are planning substantial increases in their protected area systems. This applies especially to the Levant countries of Turkey, Syria, and Lebanon. Because of the demands of agriculture and other activities that absorb large tracts of natural environment, many protected areas are small, but a good deal is being accomplished through more flexible arrangements of Biosphere Reserves, especially in those areas where state authorities recognize their value. Biosphere Reserves seek to safeguard natural environments in areas where there is a moderate degree of intrusion by humans.

There is also a host of conservation efforts underway, such as the European Union's Habitats Directive, popularly known as Natura 2000, which requires the Mediterranean countries of the European Union to identify the more important natural sites and to formulate conservation responses. Furthermore, with the predictions of land-use experts that rural populations in the Mediterranean will increase by no more than one million by 2025, thereby reducing the continuing encroachment upon natural environments, there is still much to be hopeful about in this hotspot with so much biodiversity at stake.

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