

## **Distribution and habitat of the Barbary macaque (*Macaca sylvana*) in North Morocco**

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The Barbary macaque (*Macaca sylvana*) is found throughout Morocco, Algeria and Gibraltar in discontinuous populations (Joleaud, 1930-31; Cabrera, 1932; Heim de Balsac, 1936; Panouse, 1957), which recently, and apparently due to human influence, seem to divide themselves up into even more small, isolated centres.

The interest of this species of macaque, the only Western Palearctic primate, and the danger it faces in its competition with man, require that most elementary steps towards its conservation, that is, the knowledge of its ecological requirements and of the characteristics of its habitat, must be taken urgently.

The present report is centred at the region of Djebala, to the North of Jbel Lakraa, an area for which Whiten & Rumsey (1973) already supplied an approximate geographical distribution, based on Moroccan forestry officials' reports.

In our study, contact with the macaques was established by means of information from the natives of the country, so that, subsequently, and with the aid of guides familiar with the mountains we managed to observe the animals at first-hand.

### **Distribution**

A map of the inhabited areas is shown in Fig. 1.

In spite of the fact that Cabrera (1932) mentions its existence in Buhasen, this locality does not appear in recent reports, although in these mountains the macaque is still relatively frequent.

The areas occupied on the heights of Len-Dar, Tisi, Kelti, Ahfa-Timesh and Derti-Na to the North of Ued Lau are new, as well as those of Sidi-

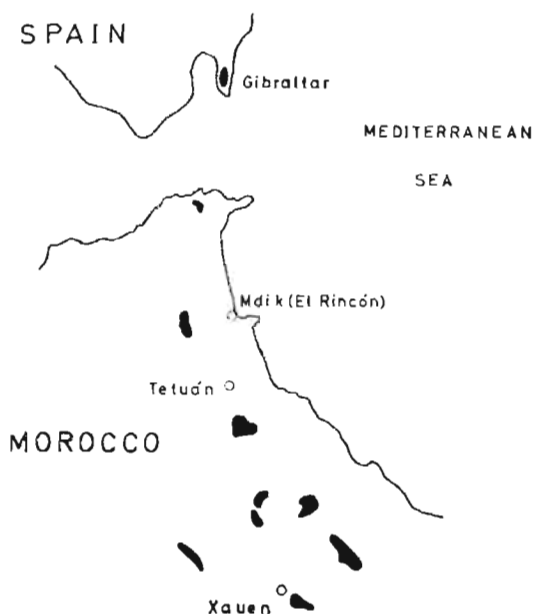


Fig. 1. Distribution of *M. sylvana* in Djebala and Gibraltar.

Slah and Kaiat in the conflux of the Lau and Talambot, and the heights of Buseitun and Sidichmim in Beni Hosmar.

### Habitat

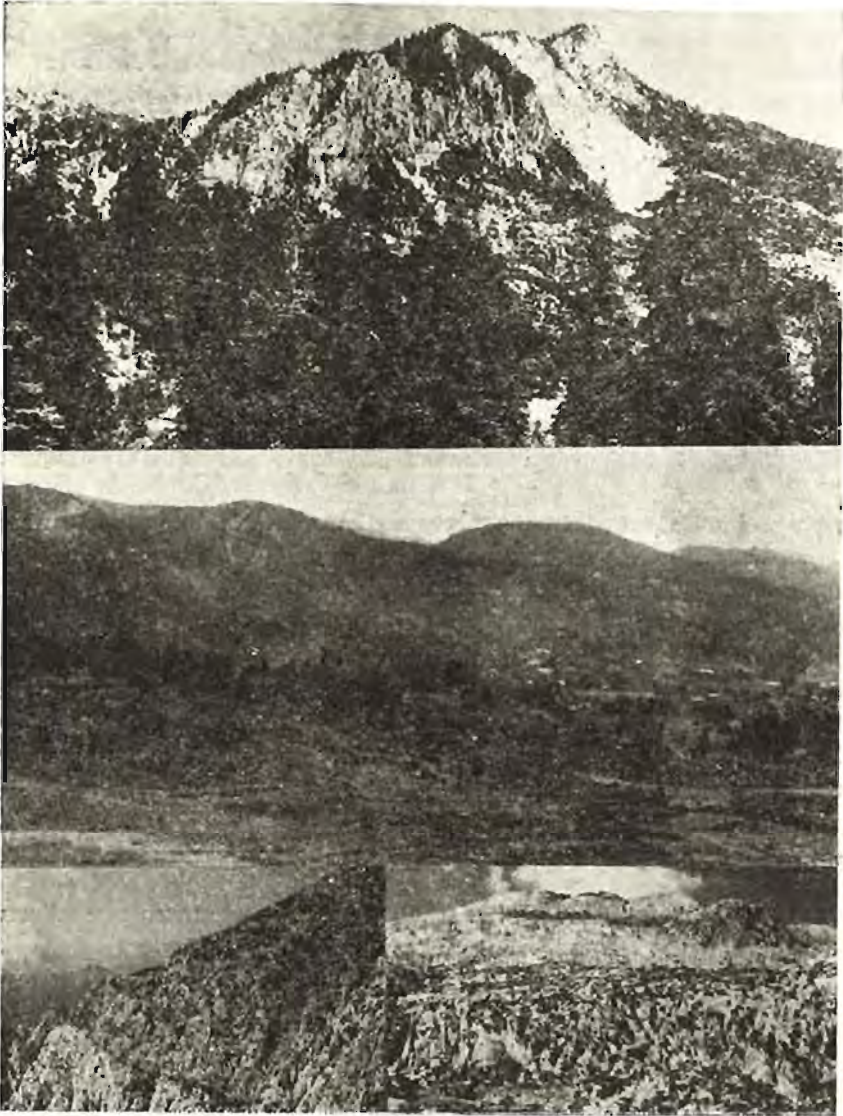
The monkey dwells in a variety of habitats in North Morocco, which we classify as follows:

#### *Fir and cedar forests*

In forests of Spanish fir (*Abies pinsapo*) such as Jbel Tazaot, or of *A. pinsapo* plus cedars (*Cedrus libanotica*) and cluster pines (*Pinus pinaster*), as in Jbel Lakraa, we were able to observe the monkeys at a considerable altitude (up to 2,000 m).

Gall oaks (*Quercus faginea*), holm oaks (*Quercus ilex*), yews (*Taxus baccata*) and sycamores (*Acer pseudoplatanus*) are also abundant in these forests.

On descending the slopes the conifers diminish and woods of holm



**Fig. 2.** Habitats used by the Barbary macaque in the Djebala region of North Morocco. Above: fir and cedar forests (Jbel Lakraa), middle: mixed forests (Buhasen), below: rocky slopes, right: Beni Hosmar; left: Jbel Musa, the coast of Spain (Gibraltar and Sierra Carbonera) can be seen in the background.

oak (*Q. ilex*) and gall oaks (*Q. faginea*) appear, and lower down, of cork oak (*Quercus suber*) and holm oak (*Q. ilex*).

The shrub layer is made up of holm oaks (*Q. ilex*) bushes, holly (*Ilex aquifolium*), prickly juniper (*Juniperus oxycedrus*), broom (*Erinacea anthyllis*) and, in smaller proportion, hawthorn (*Crataegus monogyna*) and dog roses (*Rosa canina*).

With no woods at medium altitude, strawberry-trees (*Arbutus unedo*) are in greater abundance, as well as scattered brush of rock-roses (*Cistus ladaniferus* and *C. salvifolius*). On the lower slopes we find mastich-trees (*Pistacia lentiscus*) and dwarf palms (*Chamaerops humilis*) near or between areas cultivated with cereals (wheat, rey, barley, sorghum).

The herbaceous layer is relatively varied although subjected to much grazing by goats and cattle.

The monkeys seek refuge from danger and sleep in vertical cliffs of calcareous rocks, some of which reach a height of 100 m.

The climate is cool even in summer and heavy snowfalls are frequent in winter.

Other animals found in the area, and of possible interest regarding their relationships with *M. sylvana* are the leopard (*Panthera pardus*), apparently almost extinct, jackal (*Canis aureus*), fox (*Vulpes vulpes*), imperial eagle (*Aquila heliaca*) and viper (*Vipera latasti*).

In the case of the monkeys eating birds' eggs or chicks, the rock dove (*Columba livia*) and wood pigeon (*C. palumbus*) would be of interest, as well as abundant passerines.

In winter the monkeys come down the slopes of these mountains, perhaps in response to the extent of the snow.

#### *Mixed forests*

The most characteristic are those of Buhasen with groves of scattered cork oaks (*Q. suber*), holm oaks (*Q. ilex*), gall oaks (*Q. faginea*) and wild olive trees (*Olea europaea*), and undergrowth of heather (*Erica sp.*), strawberry-trees (*A. unedo*) and rock roses (*C. ladaniferus*). Where the rock roses are predominant there is little herbaceous layer; in other areas it is denser, to the extent of being grazing ground.

In the foothills there are ferns (*Pteridium sp.*) which form large patches with some green gramineous grasses intermingled and extensive growths of rock roses which limit human movement. In the vicinity of streams, alders (*Alnus glutinosa*) are in abundance and near the kitchen-gardens halfway up the hillsides (with vegetables, mint, dogbane, etc.) fruit

trees (cherry, fig, apricot), walnut trees and brambles (*Rubus sp.*) are in abundance.

The fauna in these mountains seems more impoverished than in the coniferous forests previously described.

### Rocky slopes

In many areas of Djebala the monkey is found in abundance on limestone slopes with sparse or no trees.

The most impoverished area gives onto Jbel Musa, at a height of 800 m, in which the animals live most of the time in cliffs with many hollows and little terraces and vegetation of fig trees (*Ficus carica*) and arbor-vitae (*Tetraclinis articulata*) among the rocks, as well as mastich-trees (*P. lentiscus*), dwarf palms (*C. humilis*), bay laurels (*Laurus nobilis*), myrtles (*Ruscus aculeatus*) and greenweed (*Genista sp.*) and a grass layer predominantly in small flat areas and steps.

The slopes of El Haus (800 m) and Beni Hosmar (500 m) are richer in vegetation, the arboreal layer is more important in them and made up of arbor-vitae (*T. articulata*), wild olive trees (*O. europaea*), cork oaks (*Q. suber*) and fig trees (*F. carica*), although the dominant vegetation is a brushwood of mastich-trees (*P. lentiscus*) or box-trees (*Buxus sempervirens*) and, in a smaller proportion, dwarf palms (*C. humilis*), which form hanging palms in cliffs inaccessible to goats and wild boar, and common hawthorn (*Crataegus monogyna*).

Grass forms sometimes extensive meadows in high areas and is found on steep slopes only if trees and shrubs are not present.

The cultivation of cereals is frequent on the slopes and in the valley or skirting the mountain there are fruit trees, carob trees (*Ceratonia siliqua*) and kitchen gardens.

The arboreal layer appears to have been greatly reduced lately, judging by the large stumps of trees cut on the slopes or by the big wild olive trees in inaccessible areas or on the high meadows, where they have been preserved in order to provide shelter to live stock.

The fauna of possible interest include the jackal (*C. aureus*), fox (*V. vulpes*), brown hare (*Lepus capensis*), rabbit (*Oryctolagus cuniculus*), golden eagle (*Aquila chrysaetos*), barbary partridge (*Alectoris barbata*), rock dove (*C. livia*), as well as lizards (*Lacerta sp.*, *Psammotromus sp.*, *Agama sp.*) and many grasshoppers, beetles and some scorpions.

## Conclusions

The presence of *M. sylvana* in Djebala appears to depend on two factors: The existence of a constant source of food in its habitat and the inaccessibility of these areas to human beings.

In accordance with the list of food items provided by Deag (1974) for the Middle Atlas, in all the regions of Djebala where the monkey is found, it has an ample supply of seeds during Autumn and Winter, as well as plentiful fruit, seeds and insects in Spring and Summer.

Without doubt, the arboreal pre-adaptation has prevented the extinction of the monkey in many areas, as it is capable of climbing up even the most vertical calcareous cliffs, sometimes with no vegetation, where they seek refuge when pursued by people or dogs. Likewise, they use the many hollows and caves in the cliffs as safe sleeping places. No other animal in the area can do likewise.

The reduction of the geographical range and the progressive isolation of the populations seems to be a result of competition with man. The tendency shown by the monkeys to descend to eat in cultivated fields results in their pursuit by farmers and is probably the reason for their disappearance in some areas such as Jbel Xauen, where Valverde (personal communication) saw the macaques less than 20 years ago.

The ecological relationships of *M. sylvana* to agriculture and pasturing in Djebala should then be analyzed in detail as these activities stand as the major obstacle to the conservation of the species. The reduction of the coniferous forests due to fire and the effect on the fauna should also receive attention.

Finally, from the habitats occupied by the Barbary macaque today we should not conclude that they are its preferred optimum, as deforestation and competition are perhaps forcing it to retreat to marginal habitats in inaccessible areas.

## Summary

The geographical distribution of the Barbary macaque (*Macaca sylvana*) in the Djebala region of North Morocco is given, three new populations are mapped and the three kinds of habitat occupied by the monkeys (conifer forests, mixed forests and rocky slopes) are described.

## Resumen

Se proporciona la distribución geográfica de la Mona de Gibraltar (*Macaca sylvana*) en la Yebala marroquí y se localizan tres nuevas poblaciones, también se describen los tres tipos de hábitat utilizados por los macacos en la zona (bosque de coníferas, bosques mixtos y taludes rocosos).

## Acknowledgements

We should like to thank Mohamed Henda and Salvador Vargas for their hospitality and help in the region of Ued Lau, and also to our companions José Ayarzagüena and Jacobo Pérez for their assistance.

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