

## BUTTERFLIES OF THE TOUBKAL NATIONAL PARK AND ITS ENVIRONS, MOROCCO

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North-west Africa is a particularly interesting area zoologically. Effectively isolated from Europe and from the rest of Africa by natural ocean and desert barriers, it forms the southern and western-most limits of the Palaearctic zoogeographic region. The Atlas mountains of Morocco and Algeria, in reality structural extensions of the Alpine systems of Europe, rise to more than 4000 metres and provide conditions for species diversification. A significant number of the butterfly species in Morocco, particularly in the mountains, are restricted in distribution and some are endemic to that country.

The high rugged peaks and deep valleys of the Moroccan High Atlas form an almost impenetrable barrier between the Mediterranean flora, fauna and climate to the north and the arid Anti-Atlas Mountains on the edge of the desert to the south. The few areas of abundant vegetation are largely confined to creeks, deep river valleys and cultivated areas. The Toubkal Park lies at the western end of the High Atlas (Fig. 1).

Since the early part of this century, effort has been made to afford some measure of protection to ecologically important areas and cultural heritage in Morocco. Legal provisions supporting and regulating the rights of common pasture in Moroccan state

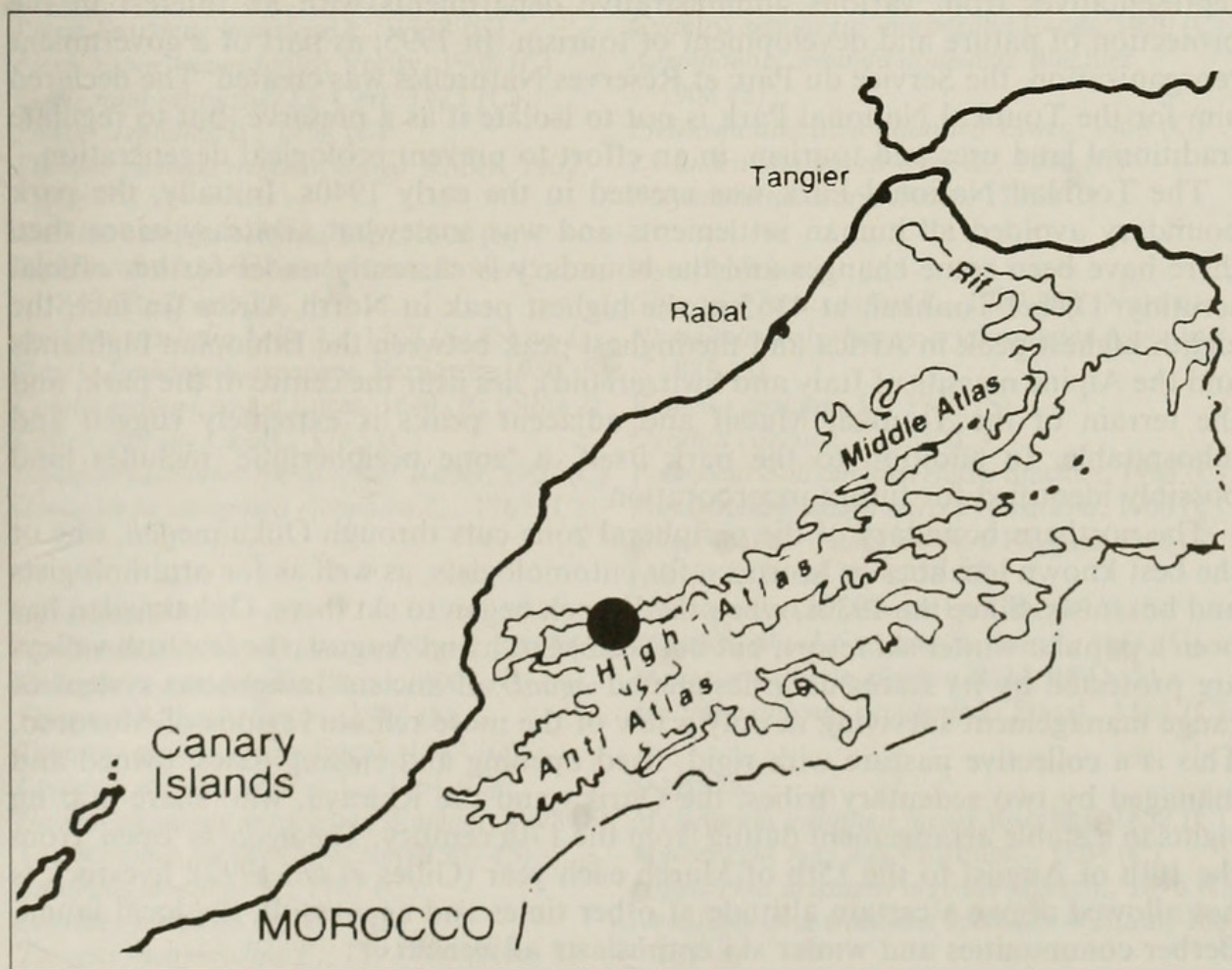


Fig. 1. Morocco, showing the position of the Toubkal National Park.

Table 1. Butterfly species (numbers) recorded from the Toubkal Park and its environs, compared with total species in Morocco and in the Maghreb States of Morocco, Algeria and Tunisia combined.

	Butterfly species recorded from		
	Toubkal	Morocco	Maghreb States
Papilionidae	3	4 (75%)	4 (75%)
Pieridae	14	23 (60.8%)	23 (60.8%)
Lycaenidae	23	39 (58.9%)	45 (51.1%)
Nymphalidae	12	17 (70.5%)	19 (63%)
Satyridae	17	30 (56.7%)	33 (51.5%)
Danaidae	—	1	1
Libytheidae	—	1	1
Hesperiidae	8	19 (42.1%)	20 (40%)
Total	77	133 (57.9%)	146 (52.7%)

forests (including protected areas) were incorporated in a ministerial order of May 1921 and the first national parks were formally established in 1934. The Royal Edicts Dahir of 11 September 1934 directed that park regulations must contain protective provisions and that potentially damaging activities such as hunting or building must be controlled by the Direction Regionale des Eaux et Forêts du Haut Atlas.

A consultant committee of the national parks, formed in 1946, is comprised of representatives from various administrative departments with an interest in the protection of nature and development of tourism. In 1995, as part of a government reorganization, the Service du Parc et Réserves Naturelles was created. The declared aim for the Toubkal National Park is not to isolate it as a preserve, but to regulate traditional land uses and tourism, in an effort to prevent ecological degeneration.

The Toubkal National Park was created in the early 1940s. Initially, the park boundary avoided all human settlements and was somewhat arbitrary; since then there have been some changes and the boundary is currently under further official scrutiny. Djebel Toubkal, at 4165 m the highest peak in North Africa (in fact, the eighth highest peak in Africa and the highest peak between the Ethiopian highlands and the Alpine massifs of Italy and Switzerland), lies near the centre of the park, and the terrain of the Toubkal Massif and adjacent peaks is extremely rugged and inhospitable. In addition to the park itself, a 'zone périphérique' includes land possibly identified for future incorporation.

The northern boundary of the peripheral zone cuts through Oukaïmeden, one of the best known localities in Morocco for entomologists, as well as for ornithologists and botanists. Since the 1930s, when the French began to ski there, Oukaïmeden has been a popular winter ski resort, but between March and August, the few lush valleys are protected by its status as a designated *agdal*, an ancient indigenous system of range management surviving in only a few of the more remote regions of Morocco. This is a collective pasture with rigid, fixed opening and closing dates, owned and managed by two sedentary tribes, the Ourika and the Rhiraya, who share grazing rights in a stable arrangement dating from the 17th century. The *agdal* is 'open' from the 10th of August to the 15th of March each year (Gilles *et al.*, 1992); livestock is not allowed above a certain altitude at other times and as a result, the local fauna, Berber communities and winter ski enthusiasts all benefit.

The High Atlas mountains, despite their parched appearance in summer, support a significant fauna and 32 species of butterfly were observed hill-topping at 2788 m on the

Adrar-n-Guinous, south-west of the Toubkal park, on one day in June 1994 (Tennent, 1995). At species level, the park and its immediate environs (including Oukaimeden) support an unexpectedly high proportion of the total Moroccan butterfly fauna and overall, more than half of the butterfly species known from the Maghreb States of Morocco, Algeria and Tunisia have been reported from the park (Table 1).

### TOUBKAL PARK BUTTERFLY SPECIES

There follows a list of the butterfly species recorded from the Toubkal Park and its environs, including Oukaimeden. The status of each species is indicated. (C)=common (widespread and common in most years; may be abundant). (S)=scarce (resident in smaller numbers; may be local or very local). (R)=rare (irregular visitor; not seen every year; includes those species recorded singly).

#### Papilionidae

*Papilio machaon mauritanica* Verity, 1905 (S)  
*Iphiclides feisthamelii* Dup., 1832 (S)  
*Zerynthia rumina africana* Stichel, 1907  
 (S) (Note 1)

#### Pieridae

*Aporia crataegi mauretanica* Oberth., 1909  
 (S)  
*Pieris brassicae brassicae* L., 1758 (C)  
*Pieris rapae mauretanica* Verity, 1908 (C)  
*Pieris napi segonzaci* Le Cerf, 1923 (C)  
*Pontia daplidice* L., 1758 (C)  
*Euchloe ausonia melanochloros* Rober, 1907  
 (C)  
*Euchloe belemia belemia* Esp., 1800 (S)  
*Elphinstonia charlonia charlonia* Donzel,  
 1842 (R) (Note 2)  
*Anthocharis belia belia* L., 1767 (S) (Note 1)  
*Zegris eupheme maroccana* Bernardi, 1950 (S)  
*Colotis evagore nouna* Lucas, 1849 (R) (Note 2)  
*Colias croceus* Geoff., 1785 (C)  
*Gonepteryx rhamni meridionalis* Rober, 1907 (C)  
*Gonepteryx cleopatra cleopatra* L., 1767 (C)

#### Lycaenidae

*Nordmannia esculi mauretanica* Staud., 1892 (C)  
*Callophrys rubi fervida* Staud., 1901 (C)  
*Tomares ballus ballus* F., 1787 (S)  
*Tomares mauretanicus* Lucas, 1849 (C)  
*Lycaena phlaeas phlaeas* L., 1761 (C)  
*Heodes alciphron heracleana* Blachier, 1908 (S)  
*Thersamonia phoebus* Blachier, 1905 (S)  
*Lampides boeticus* L., 1767 (C)  
*Leptotes pirithous* L., 1767 (S)  
*Tarucus theophrastus* F., 1793 (R) (Note 3)  
*Azanus jesous* Guér.-Mene., 1849 (R) (Note 4)  
*Cupido lorquini* H.-S., 1851 (C)

#### *Celastrina argiolus mauretanica*

Rothschild, 1925 (S)  
*Glaucopsyche melanops alluaudi* Oberth., 1922  
 (S) (Note 5)  
*Pseudophilotes abencerragus abencerragus*  
 Pierret, 1837 (C)  
*Plebejus martini ungemachi* Rothschild, 1926  
 (S)  
*Aricia agestis cramera* Esch., 1821 (C)  
*Aricia artaxerxes montensis* Verity, 1928 (C)  
*Cyaniris semiargus maroccana* Lucas, 1920 (C)  
*Agrodiaetus amanda abdelaziz* Blachier,  
 1908 (S)  
*Plebicula atlantica atlantica* Elwes, 1905 (C)  
*Lysandra punctifera* Oberth., 1876 (C)  
*Polyommatus icarus* Rott., 1775 (C)

#### Nymphalidae

*Charaxes jasius jasius* L., 1767 (R) (Note 6)  
*Nymphalis polychloros erythromelas* Austaut,  
 1885 (S)  
*Vanessa atalanta* L., 1758 (S)  
*Cynthia cardui* L., 1758 (C)  
*Polygonia c-album imperfecta* Blachier, 1908 (C)  
*Pandoriana pandora seitzii* Fruhstorfer, 1908 (C)  
*Fabriciana auresiana astrifera* Higgins, 1965 (S)  
*Issoria lathonia* L., 1758 (C)  
*Melitaea cinxia atlantis* Le Cerf, 1923 (S)  
*Melitaea phoebe occitanica* Staud., 1861 (C)  
*Melitaea aetherie algerica* Rühl, 1892 (S)  
*Melitaea didyma occidentalis* Staud., 1861 (C)

#### Satyridae

*Melanargia galathea lucasi* Rambur, 1858 (C)  
*Melanargia ines ines* Hoffman., 1804 (C)  
*Hipparchia aristaeus algerica* Oberth., 1876 (C)  
*Neohipparchia statilinus sylvicola* Austaut, 1880  
 (S)  
*Chazara briseis* L., 1764 (C)  
*Pseudochazara atlantis* Austaut, 1905 (S)

- Satyrus ferula atlantea* Verity, 1927 (C)  
*Berberia lambessanus* Staud., 1901 (C)  
*Arethusana arethusana aksouali* Wyatt, 1952 (S) (Note 5)  
*Maniola jurtina jurtina* L., 1758 (C)  
*Hyponephele maroccana maroccana* Blachier, 1908 (C)  
*Pyronia cecilia* Vallantin, 1894 (C) (Note 1)  
*Coenonympha pamphilus lyllus* Esp., 1806 (C)  
*Coenonympha fettigii inframaculata* Oberth., 1922 (S)  
*Coenonympha vaucheri vaucheri* Blachier, 1905 (C)  
*Pararge aegeria aegeria* L., 1758 (C)
- Lasiommata megera megera* L., 1767 (C)  
*Lasiommata meadewaldoi* Rothschild, 1917 (S) (Note 5)  
 Hesperidae  
*Pyrgus alveus numida* Oberth., 1910 (C)  
*Spialia sertorius ali* Oberth., 1881 (C)  
*Carcharodus tripolina* Verity, 1925 (S)  
*Carcharodus stauderi stauderi* Reverdin, 1913 (S)  
*Thymelicus acteon orana* Evans, 1949 (S)  
*Thymelicus lineola semicolon* Staud., 1892 (C)  
*Thymelicus sylvestris iberica* Tutt, 1905 (C)  
*Hesperia comma benuncas* Oberth., 1912 (C)

Note 1. *Z. rumina*, *A. belia* and *P. cecilia* are usually found only at low to moderate levels within the park.

Note 2. *E. charltonia* is not found in the park every year. In favourable years it extends its range by migration and in some years, 1994 for example, it may be locally quite common. *C. evagore* is resident in the park wherever the host-plant, *Capparis* sp. (Capparidaceae) occurs, but also extends its range under favourable conditions and may be found singly at high altitudes.

Note 3. The occurrence of *T. theophrastus* at 2400 m near Oukaimeden (Tennent, 1996b: 165, 174) is remarkable. It is unlikely to be resident at such high altitudes, where known host-plants, *Zizyphus* and *Paliurus* spp. (Rhamnaceae) are absent.

Note 4. *A. jesous* is common south of the park in hot areas where *Acacia* (Fabaceae) is common; occasional specimens have been reported from the lower slopes of the Toubkal Massif.

Note 5. So far as is known, *G. melanops alluaudi*, *A. arethusana aksouali* and *L. meadewaldoi* are taxa endemic to the Toubkal Massif and its environs.

Note 6. *C. jasius* is a butterfly of low to moderate altitudes in Mediterranean coastal regions. The only record from the park the author is aware of was in 1992, when an individual was observed by the author over a 3-day period near Oukaimeden at 2400 m.

This list results from numerous visits to the Toubkal Massif by the author between 1979 and 1994. It may not be complete and the following species may also be present in the park:

*Maurus vogelii insperatus* Tennent, 1996—for 74 years after its discovery in the Middle Atlas mountains of Morocco, it was known only from a few localities close to the Taghzeft Pass, making it one of the most local butterflies in the world. The discovery of the species in 1994 in the western High Atlas, south-west of the park, was remarkable and it may well fly within the boundaries of the park. This unobtrusive and distinctive butterfly is the only representative of the genus *Maurus*; the host-plant, *Erodium cheilanthifolium* (Geraniaceae) is probably more conspicuous than the butterfly.

*Eurodryas desfontainii* Godart, 1819—It was only recently that this butterfly was discovered flying at high altitude in the mountains north of the Dades Gorge, in a habitat similar to that predominant in the Park.

*Neohipparchia hansii* Austaut, 1879—The author has not seen this butterfly in the park, although it is quite likely to fly there. It is usually a local butterfly where it occurs.

*Gegenes nostradamus* F., 1794—Seen singly up to 1400 m not far from the park boundary on the slopes of the Tizi-n-Test. It may fly in the park.

#### ERRONEOUS RECORDS

*Pseudaricia nicias* Meig., 1830—reported to be abundant at Oukaïmeden by de Toulgoet (1966 : 200). The species does not fly in North Africa; this was presumably a mis-identification of one of the other park lycaenids.

*Pieris mannii* Mayer, 1851—mistakenly reported from the High Atlas mountains by de Toulgoet (1966 : 201), and by de Friena (1975 : 39), who mis-identified the species (de Friena 1995, pers. comm.).

*Carcharodus alceae* Esp., 1780—the status of *C. alceae* and *C. tripolina* has been the subject of much confusion over the years and it is not possible to separate the two from external characters. It is believed that only the latter species flies in North Africa (de Jong, 1978; Tennent, 1996a) and that the numerous published records of the occurrence of *C. alceae* refer to *C. tripolina*.

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