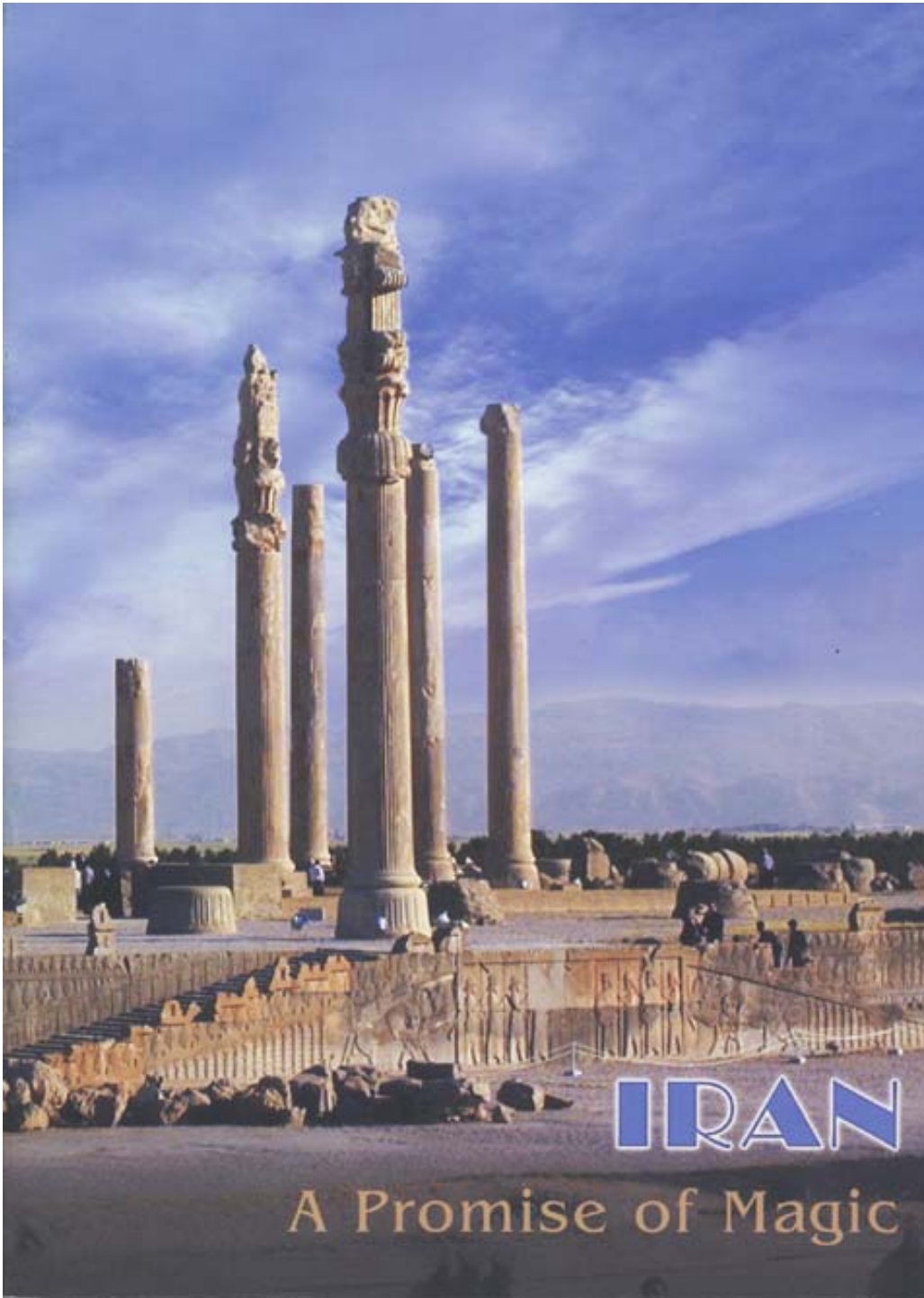


**A Botanical Paradise in the  
Zagros Mountains of Iran –  
*Tulipa, Fritillaria, and Dionysia***

John and Hilary Birks







Why go to Iran?

Why go to the Zagros Mountains in April 2006?

What is the modern environment of Iran?

Geology

Climate

Vegetation zonation

Iran's flora

How did we identify plants from the Zagros Mountains?

Mesopotamian lowland vegetation

Forest-steppe and Zagros oak forest

Alpine areas and interior plateau steppe

Dionysia – THE botanical gem of Iran

Iranian culture

Acknowledgements

# Why go to Iran?

1. Remarkable flora – 6417 species, 1810 endemic
2. Spectacular scenery – major mountain ranges, highest point 5671 m with permanent snow. Also massive limestone cliffs and ravines
3. Amazing culture – complex history, various Persian Empires, superb Islamic buildings
4. Step back in time (ideal for palaeoecologists!) –  
2006 AD = 1385 Iranian Solar Years = 1446 Arabian Lunar Years
5. Sadly may not be able to go there much longer

# Why go to the Zagros Mountains in April 2006



Major mountain range extending from SW Turkey to Afghanistan as part of the Alpine-Himalayan Mountain System

Series of long ridges and valleys controlled by unfaulted folds of Cretaceous and Tertiary limestone

Highest mountain (Gash Mastan) 4460 m

## Flora

- rich in spring bulbs (*Fritillaria*, *Tulipa*, *Gagea*, *Muscari*, *Ornithogalum*)
- one of the world's two strongholds for *Dionysia*, magnificent cushion plant growing in crevices of limestone cliffs. Spring-flowering
- many endemic taxa confined to Zagros Mountains, particularly of *Dionysia*

*Dionysia michauxii*



# What is the Modern Environment of Iran?

Three main physiogeographic provinces in western Iran



- Mesopotamian Lowland
- Zagros Mountains
- Interior Plateaux

1. Mesopotamian Lowland – area of tectonic subsidence since early Tertiary, 200-600 m

Mainly late-Tertiary redbeds and gravels

Large alluvial fans including huge composite fan of Khuzestan

2. Zagros Mountains – SE-NW running series of long ridges and deep intermontane valleys controlled by folds in Cretaceous and Tertiary limestone and marl, 700-4460 m

Ridges increase in height towards the interior

Some metamorphic rocks in the highest mountains

3. Interior plateaux – Inner side of Zagros ridges are high Iranian and Anatolian plateaux. Very dry, many saline soils, 1400-2500 m



## Climate:

Typically Mediterranean, with almost all precipitation in autumn, winter, and spring

Summers are dry and hot, up to 35°C in Esfahan

Zagros Mountains are major barrier to moisture-bearing storm tracks from Mediterranean, creating the very dry Interior plateaux in their rain-shadow

Mesopotomian lowlands - 300-400 mm yr<sup>-1</sup>

Zagros Mountains - 400-1000 mm yr<sup>-1</sup>

Interior plateaux - 200-300 mm yr<sup>-1</sup>

## Vegetation zonation:

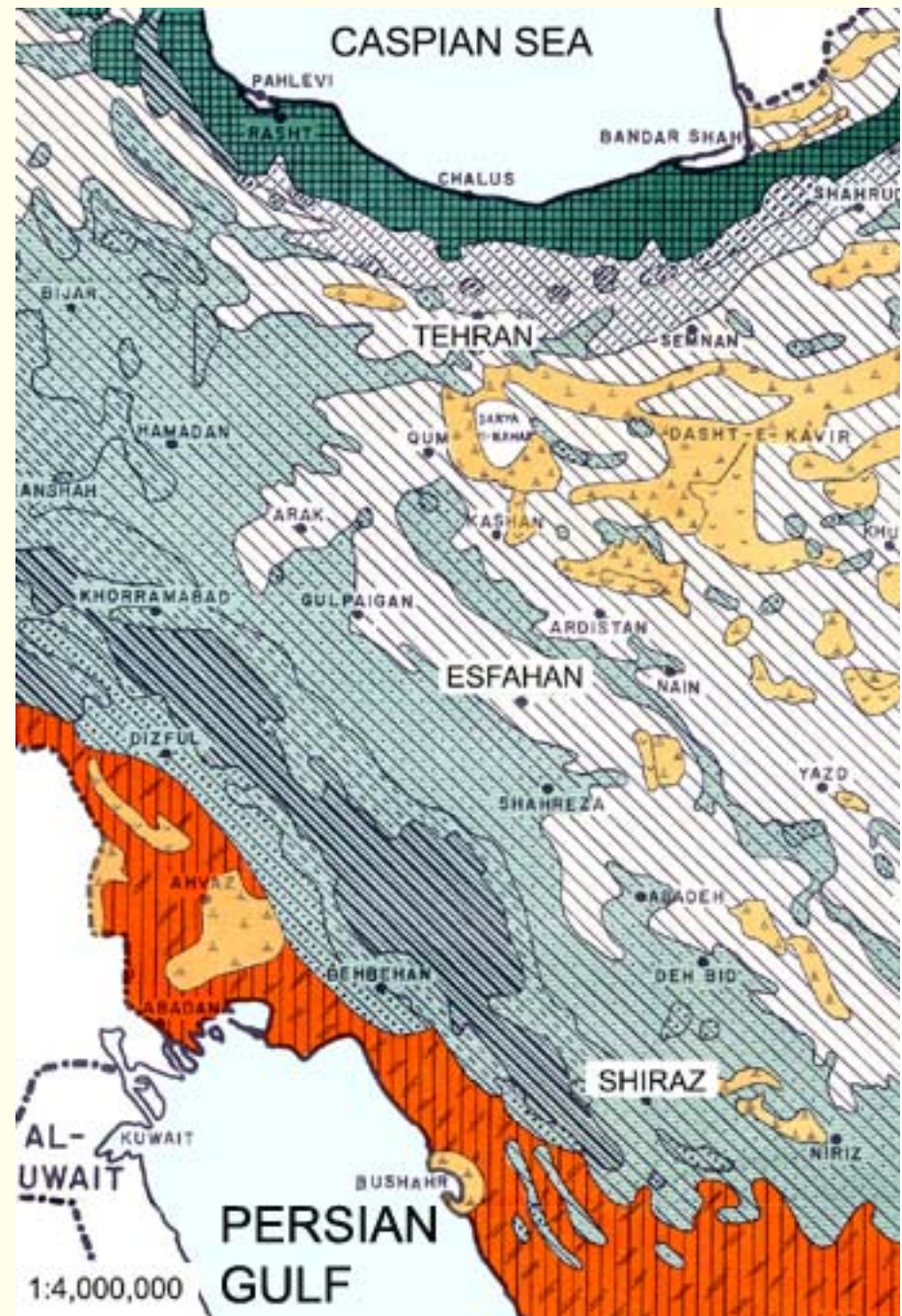
1. Mesopotamian lowland steppe, 200-600 m – 300-400 mm yr<sup>-1</sup>

Desert steppe with shrubs such as *Paliurus spina-christi* and abundant *Artemisia*

2. Forest steppe ('savanna') of Zagros foothills and mountains of the interior plateaux, 500-700 m – 400-500 mm yr<sup>-1</sup>

Trees and shrubs such as *Amygdalus scoparia*, *Pistacia atlantica*, and *Ziziphus spina-christi*

Virtually disappeared as a result of human activity, mainly clearance for cereal cultivation



3. Zagros oak forest of *Quercus brantii*, 700-800 m up to 2500 m – 500 mm yr<sup>-1</sup> or more

*Quercus brantii*, *Q. infectoria*, *Pyrus syriaca*, *Acer cinerascens*, *Pistachia atlantica*, *Fraxinus rotundifolia*, etc

Open forest, heavily disturbed or destroyed by human activity. Charcoal burning, goat grazing, clearance for cereal cultivation

4. Alpine areas and interior plateau steppe, above about 2000 m in Zagros Mountains. Alpine zone of extensive snow beds (in April!) and very open turf and wind-exposed areas – at least 600 mm yr<sup>-1</sup>

In areas farther east and with 300 mm yr<sup>-1</sup> or less rainfall, very dry interior plateau of *Artemisia* steppe between 1400 and 2500 m

# Iran's Flora

As of 1999, Iran's flora consists of

6417 species

1215 genera

167 families

1810 endemic taxa

Families with more than 20 endemic taxa:

Fabaceae	471	Rosaceae	58
Asteraceae	406	Brassicaceae	55
Lamiaceae	127	Liliaceae	53
Caryophyllaceae	98	Scrophulariaceae	46
Boraginaceae	89	Ranunculaceae	34
Apiaceae	89	Primulaceae	21

## Number of endemics in relation to geographical area

	Endemics	Area/Endemics	% Endemics
Iran	<b>1,812</b>	<b>909</b>	<b>24</b>
Afghanistan	900	848	30
Pakistan	300	2,679	5
Iraq	190	2,307	6
Turkey	2,400	324	30
Greece	763	17,298	14
Norway	2	161,948	0.1
Sweden	4	112,447	0.2
UK	16	15,297	0.9
Bhutan	750	<b>93</b>	15
Nepal	315	449	5
Argentina	2,700	1,234	26
Chile	2,750	273	<b>50</b>
South Africa	18,560	1,184,827	<b>80</b>
Madagascar	9,600	74	<b>80</b>
Australia	14,400	533	<b>80</b>

## Current status of Iranian flora

1812 endemic species

1420 rare species \*

98 extinct species since 1850 AD

\* includes *Orthilia secunda*, *Frangula alnus*,  
*Goodyera repens*, *Gymnadenia conopsea*, *Luzula*  
*spicata*, and *Festuca altissima*

# How Do We Identify Plants from the Zagros Mountains?

Morinaceae

auctore M. IRANSHAR, Tehran

Lfg. No. 135 / Februar 1978  
Conf.



FLORA DES IRANISCHEN HOCHLANDES  
UND DER UMRÄHMENDEN GEBIRGE

PERSIEN, AFGHANISTAN, TEILE VON WEST-PAKISTAN,  
NORD-IRAQ, AZERBAIDJAN, TURKMENISTAN

von

Univ.-Prof. Dr.

KARL HEINZ RECHINGER

Erster Direktor des Naturhistorischen Museums in Wien (emeritus)



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GRAZ-AUSTRIA

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قیمت : ۸۰۰۰۰ ریال

# Biodiversity of Plant Species in Iran

Vol. I

*The vegetation of Iran*

*Plant species*

*Red Data of Iran*

*Endemic species*

*Rare species*

*Species threatened by extinction*

by  
A. Ghahreman  
&  
F. Attar



*Rhizophora mucronata*, Persian Gulf (Sirkh Coast)

1999



Check-list of all  
species, endemic  
species, rare species,  
and threatened  
species (1999)



TULIPS AND IRISES OF IRAN  
AND THEIR RELATIVES



BOTANICAL INSTITUTE OF IRAN  
ARIAMEHR BOTANICAL GARDEN  
TEHRAN, IRAN

Per Wendelbo 1977

Bulbous plants of   
Turkey  
and Iran



Peter Sheasby 2007

Various taxonomic experts, mainly at Herbarium,  
Royal Botanic Garden, Edinburgh

<i>Astragalus</i> , other Fabaceae	- Douglas McKean
Lamiaceae, <i>Convolvulus</i> , Boraginaceae, Brassicaceae	- Ian Hedge
Apiaceae	- Mark Watson
Crassulaceae	- Lawrie Springate
Also <i>Dionysia</i>	- Magnus Lidén (Uppsala)

Monographs on *Fritillaria*, *Gagea*, *Dionysia*, *Tulipa*, and  
*Geranium*

Identified 320 species

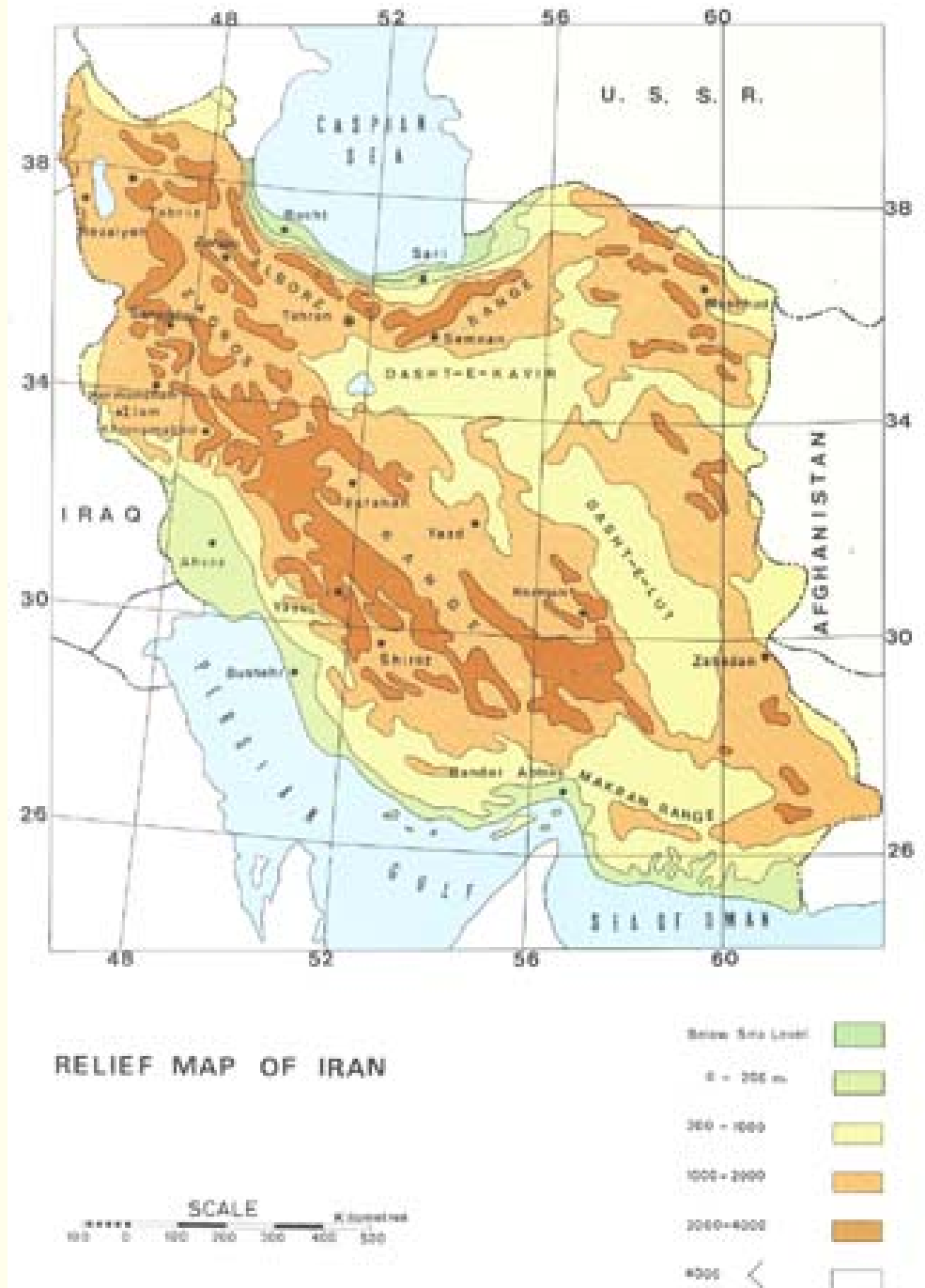
Many plants were not yet in flower or were  
underground in April 2006

Some plants, especially 'weeds', overlooked.  
Much time spent travelling

Flew to Tehran and then to Shiraz. Drove 2700 km in 11 days from Shiraz to Esfahan

South-nourth transect through the Zagros Mountains – mainly above 1000 m

Look at different vegetation types and associated flora from lowlands to alpine and inner plateaux areas

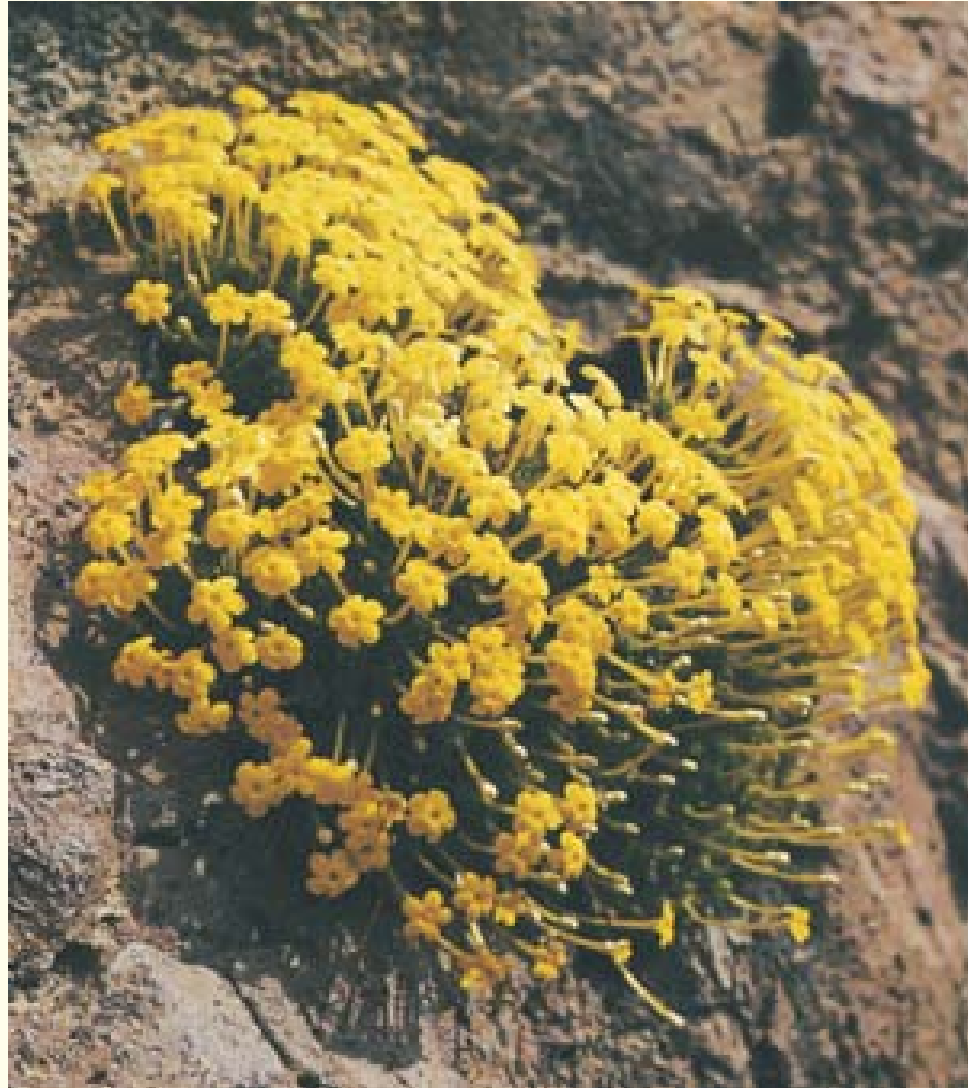


# Mesopotamian Lowland Vegetation

**Forest-Steppe of *Pistacia-*  
*Amygdalus* and Zagros Oak Forest  
of *Quercus brantii***

# Alpine Areas and Interior Plateau Steppe

# *Dionysia* – THE Botanical Gem of Iran



*Dionysia diapensiifolia*

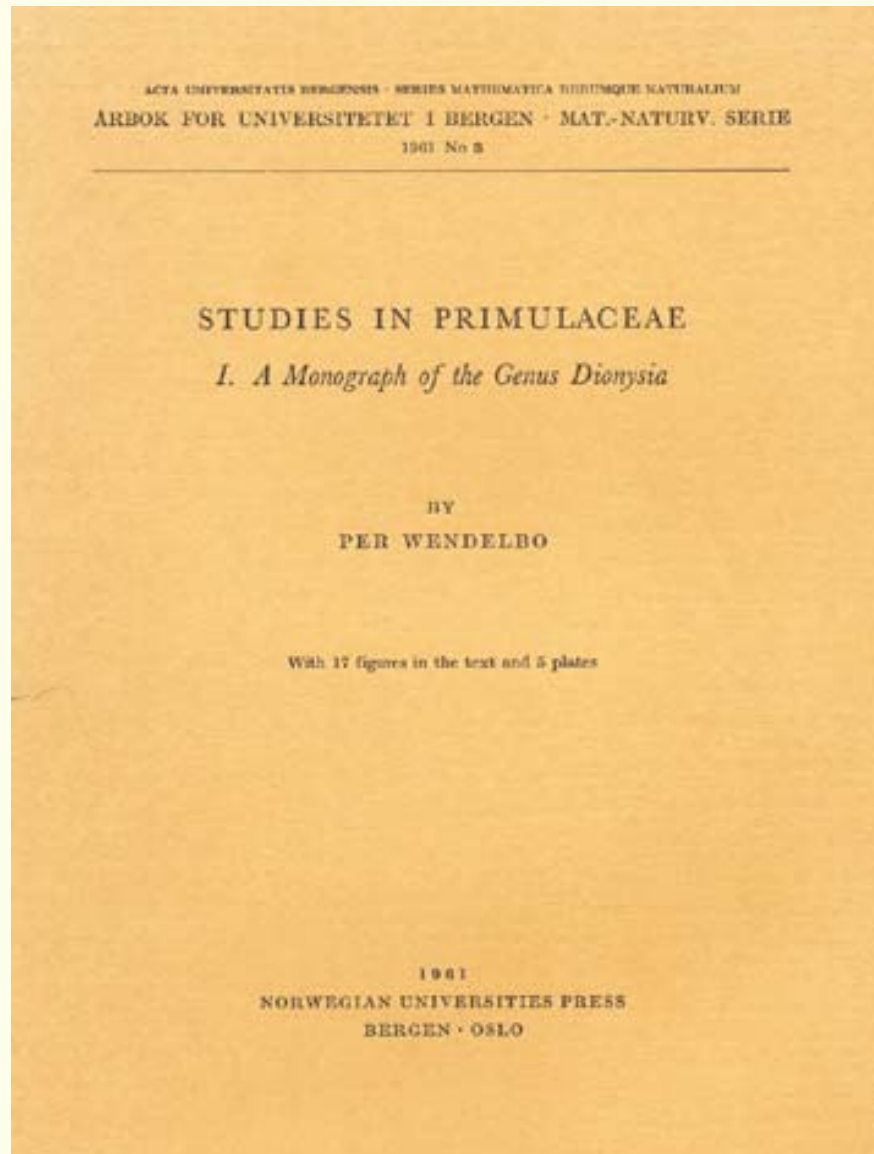
Spectacular cushion chasmophyte plants in Primulaceae growing in rock crevices on vertical limestone cliffs at a range of altitudes from about 1500 m to over 3500 m.

Almost an obsession for some – especially those from UK, Holland and Czech Republic

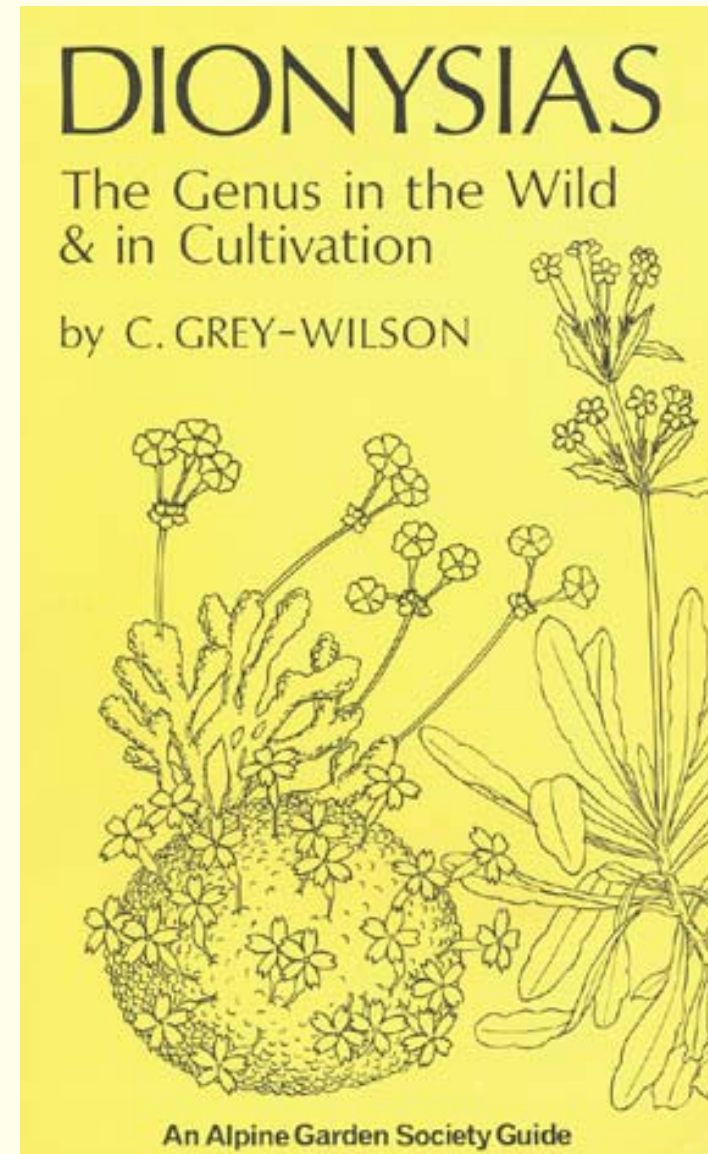
*Dionysia* habitats







Wendelbo (1961) – 28  
species



Grey-Wilson (1970) – 36  
species

# The Genus *Dionysia*

CHRISTOPHER GREY-WILSON

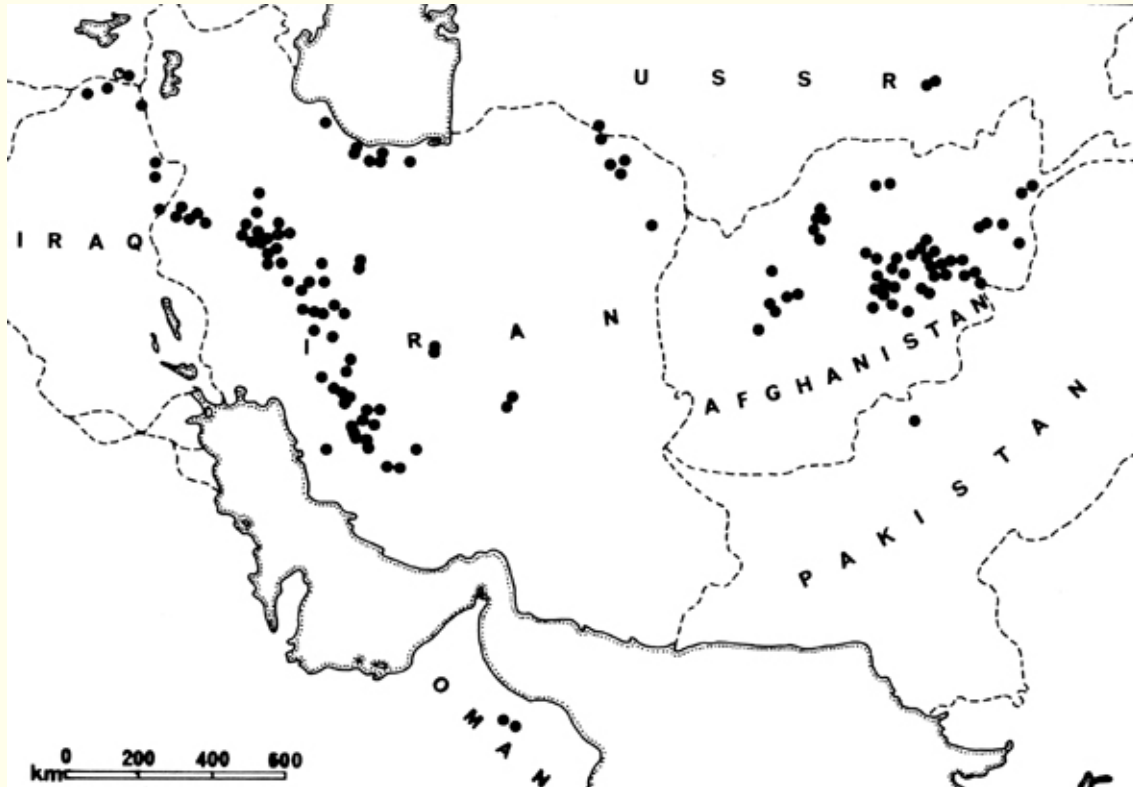


1989 – 41 species



*Dionysia diapensiifolia*

Currently 49 species of *Dionysia* (Lidén 2007)



Iraq, Iran,  
Afghanistan,  
Pakistan, Turkey,  
Tadzhikistan,  
Turkmenistan,  
Oman

Mainly centred  
on Afghanistan  
and Iran,  
especially the  
Zagros Mtns

*Dionysia* distribution

We saw 14 species of *Dionysia* in the Zagros Mountains

All grew in crevices in vertical limestone or conglomerate cliffs, often under a small overhang where there is presumably some protection from rain (rather limited!)

All endemic to Iran and all seem to occur in relatively small geographical areas within the Zagros Mountains

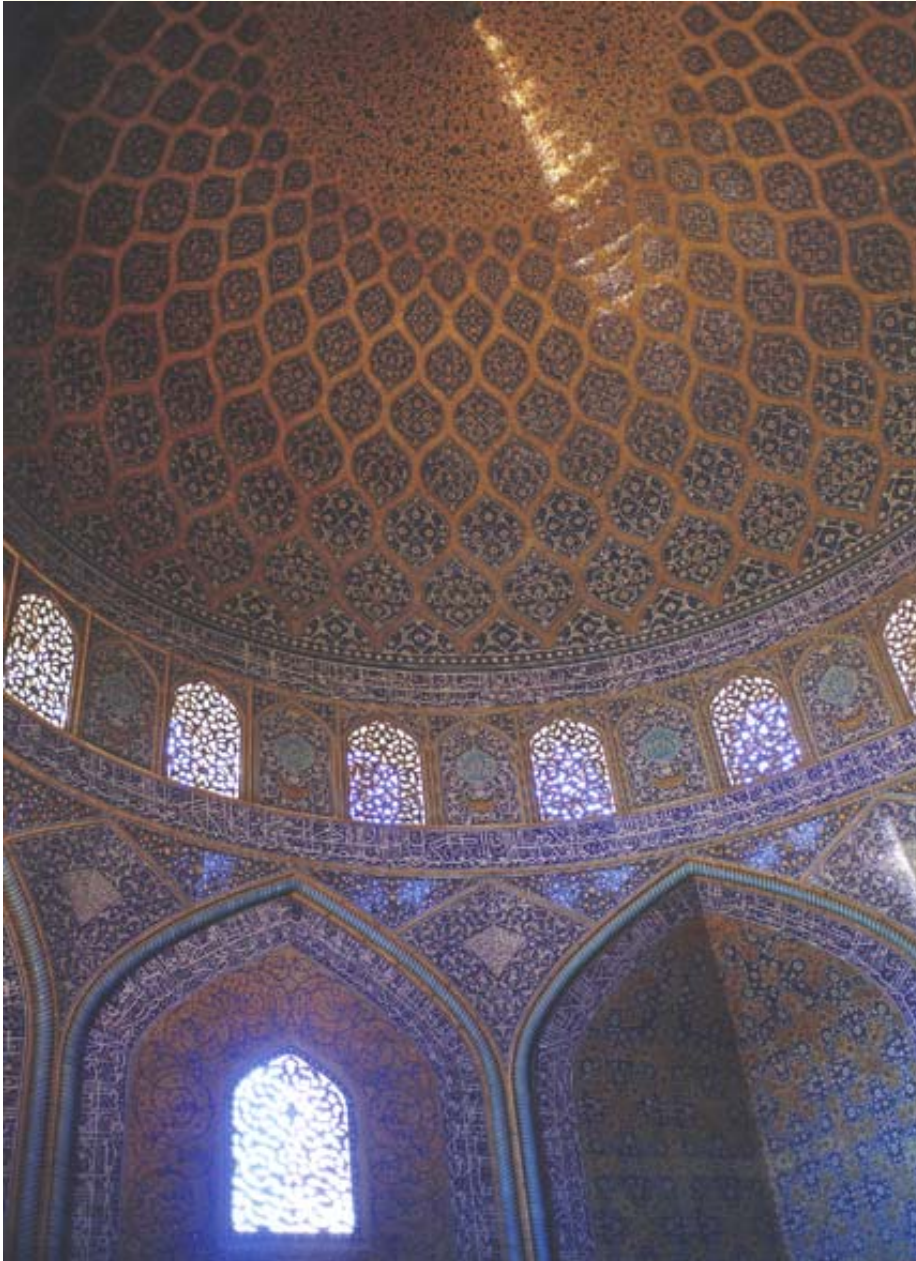
Amazing diversification. Very rare to see two species on same cliff

A real botanical delight – one of the greats of the alpine world!

*Dionysia michauxii*



# Iranian Culture



Islamic buildings, mosques,  
bridges, bazaars, ruins

Persepolis - one of the capitals of the first Persian empire, Achaemenid Empire, 559-330 BC

- best preserved Persian ruined city.  
Started to be built in 518 BC. Burned to ground during visit by Alexander the Great in 330 BC

Esfahan - one of the finest cities in Islamic world

- 'Esfahan nesf-é jahan' = Esfahan is half the world

- some buildings date from late 10<sup>th</sup> century, some from 17<sup>th</sup> and 18<sup>th</sup> centuries

- Imam Khomeini Square built in 1612, 500 x 160 m

# Acknowledgements

Ian Green – Greentours Ltd

Ian Hedge – RBGE

Douglas McKean – RBGE

Mark Watson – RBGE

Lawrie Springate – RBGE

Magnus Lidén – Uppsala

Cathy Jenks – Bergen

and



## The late Per Wendelbo



who did so much for Iranian botany, for donating his library to Bergen, and for ensuring that all the relevant floras are in Bergen