THE FLORAS OF GIBRALTAR

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Abstract

The spectacular appearance of the Rock of Gibraltar, as well as the consequences of its military and political history have meant that it has attracted more attention in many fields than similar sized mountains in the region and than most in Iberia. This extends to the flora. Apart from a good number of species lists produced by collectors from the 18th Century, there exist a number of more or less complete Floras of the Rock.

Five of these have been produced, viz. Kelaart (1846), Debeaux & Dautez (1888), Frere (1910), and Wolley Dod (1914) and then, after a break of eighty years, Linares (1990 & 1993). This paper discusses the different approaches and relative merits of these floras as historical and botanical documents, and, taking Wolley Dod contribution as a starting point, compares it with the present flora of Gibraltar reaching conclusions on the changes and making predictions for the future.

Resumen

Quizás por su aspecto conocido y impresionante, o tal vez por los accidentes de su historia militar y política, el Peñón de Gibraltar ha recibido más atención botánica desde el siglo pasado que ninguna otra sierra de la zona y que de muchas en la Península Ibérica.

Aparte de numerosas referencias botánicas de coleccionistas durante más de un siglo, se han publicado cinco "listas completas" de la flora de Gibraltar, las floras de Kelaart (1846), Debeaux & Dautez (1888), Frere (1910), Wolley Dod (1914), y, tras más de medio siglo, Linares (1990 y 1993).

Esta contribución compara las obras de estos botánicos y, partiendo del trabajo histórico de Wolley Dod, compara la flora que encontró él en Gibraltar en 1914 con la del presente, llegando a conclusiones sobre las cambios que han habido en ocho décadas y las lecciones para el futuro.

Introduction

Probably due to a combination of factors, including Gibraltar's spectacular appearance, its uniqueness in the region and the consequences of its military and political history, the plants of the Rock have historically attracted more attention than those of any other hill or sierra in the region, and than most on the Iberian Peninsula.

Numerous botanists have collected or explored the plants of Gibraltar since the eighteenth century, and earlier historians have sometimes made reference, albeit in layman's terms, to the plants of the Rock. In his introduction to A *flora of Gibraltar and the neighbourhood*, Wolley Dod (1914) summarises botanical records for Gibraltar since Clusius (1576). As has been the case in the past, Wolley Dod found it difficult to distinguish from other authors' works those plants which were found in the territory now politically known as Gibraltar and those found in the immediate -and not so immediate- surroundings (in his own work he made certain he left no doubt). The botanists and other authors mentioned in Wolley Dod's introduction are listed in Table 1. In addition, Portillo (ca 1620) reports that in 1566, on instructions from King Philip II, a royal herbalist visited Gibraltar and was amazed at the diversity of plants that grew in so small a place.

It is difficult to make many conclusions from most of these early species lists, mainly because of the doubts as to the origins of the plants, as in most cases no clear distinction was made by collectors between Gibraltar and the hinterland. But also in many cases there is a lack of absolute confidence in their identification.

The aim of this paper is not to repeat the thorough summary provided by Wolley Dod, but to briefly review those few works, including Wolley Dod's own, that have specifically set out to cover all Gibraltar's flora and, using Wolley Dod as a starting point, comment on floristic contributions since that date and compare the flora of Gibraltar as described in 1914 with the current checklist of the flora given in the thorough treatise by Linares (1993).

The floras

Five works purport to be full floras of Gibraltar. These are:

FLORA CALPENSIS: BOTANY & TOPOGRAPHY OF GIBRALTAR (1846), by Dr E. F.Kelaart.

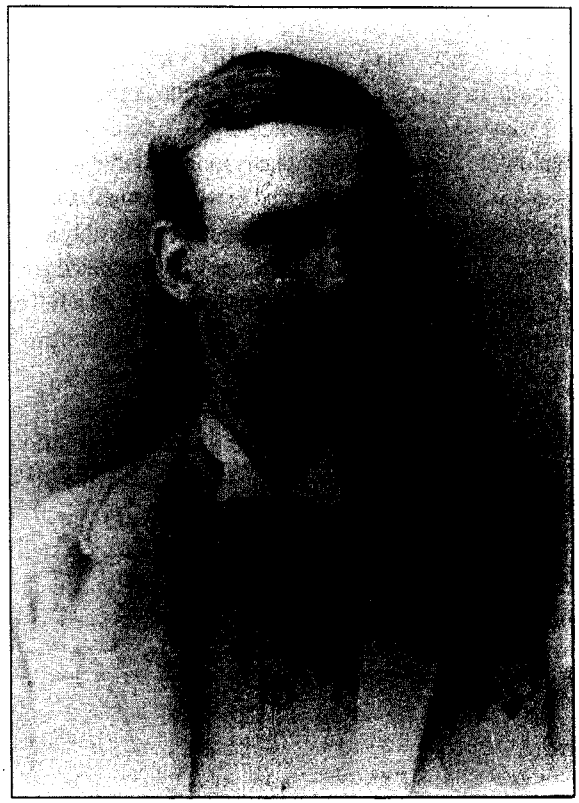
SYNOPSIS DE LA FLORE DE GIBRALTAR (1888) by O. Debeaux & G. Dautez.

A GUIDE TO THE FLORA OF GIBRALTAR AND THE NEIGHBOURHOOD (1910) by B.H.T. Frere.

A FLORA OF GIBRALTAR AND THE NEIGHBOURHOOD (1914) by A.H. Wolley Dod.

A CHECKLIST OF THE GIBRALTAR FLORA (1983, updated 1991 and 1993) by L. Linares

Kelaart (1846) doubtless provided the starting point in the serious study of Gibraltar's flora. *Flora Calpensis* also provided a historical statement of Gibraltar, giving much valuable detail on the social and medical situation on the Rock, not surprising from the author who was medical officer to the Garrison and lived in Gibraltar for two years (1844-1845). He also provided a surprising, almost ecological approach, giving details of topography, geology and climate, although evidently not linking these to the flora as closely as might have been the case if he had been writing in the 20th Century. However, his work was a flora and certainly not an approach that considered habitats and vegetation, and it is not easy to gain an insight into the organisation and composition of plant communities from his work (Cortes 1979 & 1994). Kelaart also provides a useful translation of Boissier's (1837) references to Gibraltar.

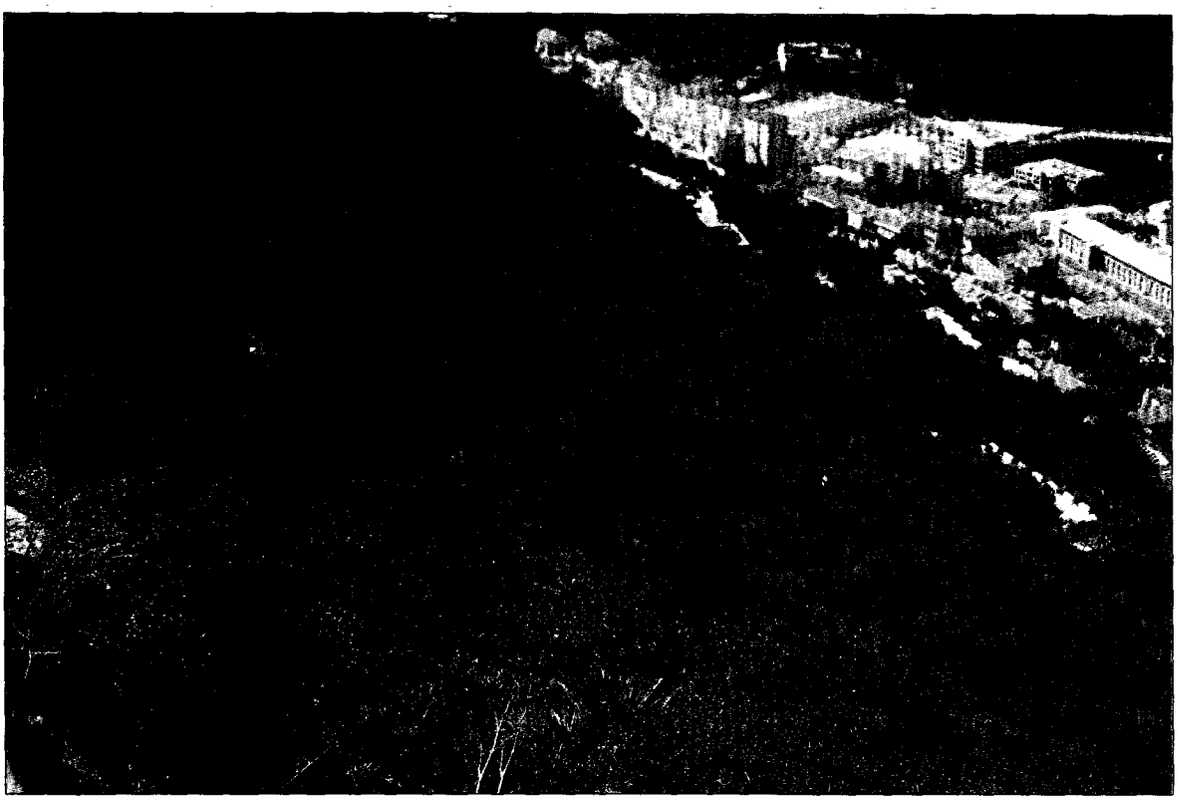


Lt.- Col. A. H. Wolley-Dodd
b. 17/11/1861 – d. 29/10/1917

Wolley Dod (1914) attributes to Kelaart a total of 512 species for the Rock, which he reduces to 396 by excluding cultivated or casual species, naturalised aliens, probable errors, and plants confined to the Neutral Ground north of the Gibraltar border.

J.M. Perez Lara began the publication of his *Florula Gaditana* in 1886, eventually completed in 1903 by an appendix published in the Mem. Soc. Esp. Hist. Nat. vol. ii. Wolley Dod once again extracted those species he felt were recorded for Gibraltar and arrived at a total of 462 for Gibraltar only. Perez Lara, however, did not provide much useful information on the flora of Gibraltar itself and extensively quoted earlier authors (including Kelaart). Not considering Gibraltar other than as a part of Spain, no effort was made to distinguish the station from the hinterland. This work, although impressive and a great contribution to the knowledge of the flora of the region, was therefore of limited interest for Gibraltar itself.

Synopsis de la Flore de Gibraltar was published by 0. Debeaux and G. Dautez in 1888. Dautez, who lived in Gibraltar, collected the specimens, and the identification was done by Debeaux whose direct knowledge of Gibraltar was very limited. This was unfortunate as Debeaux tried hard to be specific and factual. However, misidentification of sites and assumptions as to collecting points limits the value of the work. It is a pity that Dautez, a naturalist who had lived in Gibraltar for 44 years (since 1844) and worked on the molluscs of the area, could not have dedicated more of his time to a development of botanical knowledge. Topographical and other details are much fewer than those given by Kelaart. Although the work should not be dismissed as useless, its usefulness in the study of the historical botany of Gibraltar is undoubtedly limited. Wolley Dod's analysis of Debeaux & Dautez attributes 367 "accepted" species for the Rock, 29 less than Kelaart, after making similar deductions as he made to the latter's work.



Scrub vegetation on the Upper Rock

Flowers and Wildlife of Gibraltar (1988) by J.E. Cortes and J.C. Finlayson;
Flora Vascular de Andalucia Occidental (1987) by B. Valdes *et al.*

Stocken (1969) does not purport to be a flora and indeed it is not. Like Cortes & Finlayson (1988) it is a general guide for visitors and residents and not a scientific work.

Hamilton's (1969) *Walks and Flowers* is also a guide for tourists, but contains a species list in the appendix which lists the plants according to the main month of flowering. This is somewhat confusing as species with a long flowering period can only occur under one month. The species list is limited too in that the name of only one species is given per genus with the number of species in the genus occurring given in brackets. A total of 373 species are listed (it does not claim to be an exhaustive list), largely based on Wolley Dod (1914) and therefore out of date.

Valdes *et al., (1987)* in their formidable work, include all records for Gibraltar known to them. But it is necessarily a regional approach which, like Perez Lara a century before does not generally make separate reference to Gibraltar, but considers it part of the area refered to as "Algeciras". In addition, there are a number of inaccuracies in relation to plant distributions as they affect Gibraltar. Despite the fact that their work is a major one and a valuable reference to botanists

in the region, including Gibraltar, it cannot be used for direct comparison in this study.

In 1983, the Gibraltar Ornithological & Natural History Society published Linares' Checklist of the Gibraltar Flora (Linares 1983), updated in 1990 (Linares 1990) and fully revised in 1993 (Linares 1993). These works are the result of fieldwork by Gibraltar residents L. Linares and A. Harper spanning about 25 years of painstaking observations in all habitats. Despite this new species are being added annually. Linares (1993) contains a total of 519 currently growing wild in Gibraltar, 474 if 45 introduced species are excluded. Linares (1993) is purely a checklist and does not provide details of location, flowering periods, etc., but it makes up the most accurate list of Gibraltar flora ever produced.

Although neither Wolley Dod's 1914 list nor Linares's 1993 list can be considered absolute, they provide the best starting points for comparison This comparison has not been easy, due especially to changes in nomenclature, some doubtful identification (even by Wolley Dod) and some confusion as to Wolley Dod's methodology of excluding certain species he did not consider native.

The purpose has been to compare the species found by Wolley Dod in 1911-1913 with those currently growing in Gibraltar, so that excluded also have been species seen by previous workers but not confirmed by Wolley Dod himself. This has been done with difficulty due to the possibility of confusion, as Wolley Dod's total of native flora is a cumulative one. He assumed that if the species had been genuinely recorded in Gibraltar then it should be on the list. He did not make allowance for local extinction. This is a phenomenon that was not as impending in 1914 as it has been subsequently, when it is borne in mind that there had in fact been little change in the size of the builtup parts of Gibraltar for over one hundred years (Cortes 1994) Wolley Dod claims a cumulative total of 587 native species for Gibraltar proper, south of the present frontier fence. Correcting this figure to allow for changes in classification and nomenclature leaves a total of 585. Lists of species found by Wolley Dod (1914) but not by Linares (1993) and of others given in Linares (1993) but not recorded by Wolley Dod (1914) are given in Appendices I, Ia and II. Within the above limitations there is a total of 98 native species given by Wolley Dod (1914) and not by Linares (1993). Of these, three are not recorded by Valdes *et al.* (1987) for western Andalucia. These are *Spergularia rupicola, Fedia langei and Scilla verna.* A species regarded by Wolley Dod as introduced, and not recorded by Valdes *et al.*, but recorded by Linares is *Senecio bicolor cinerea.*

A total of 88 species are given by Linares (1993) but not by Wolley Dod (1914). Of these 22 are introduced, making 66 the total number of native species given by Linares (1993) but not by Wolley Dod (1914). Some species which Wolley Dod did not personally confirm but which had been seen by earlier authors were recorded again by Linares (1993) (including *Anchusa azurea, Orobanche minor, Allium pallens and Vulpia ciliata*), but were included in Wolley Dod' s cumulative total of 585 species. Sixty-six species in Linares (1993) had not been recorded earlier in Gibraltar. Linares (1993) gives a total of 519 species including 45 introduced, leaving a current species list of 474, which is 27 less than Wolley Dod's.

Table 2 summarises the totals from the various authors under consideration.

Discussion

The preparation of lists such as those in Appendices I, Ia and II is of limited value only, especially as small errors in totals can creep in due to the difficulty in analysing historical data which cannot be confirmed in the field. It is important

therefore to study the species lists closely in order to be able to suggest some conclusions that can be arrived at regarding the historical changes that have taken place. One aspect that needs to be borne in mind is the possible misidentification of species, especially the transposing of names in species pairs. Thus the possibility of doubtful identification springs to mind in considering the fact that Wolley Dod recorded, for example *Setaria verticillata* and not *S. adhaerens, Stipa capensis* and not *S. tenacissíma, Ruta chalepensis* and not *R. angustifolia, Cichorium intybus* and not *C. endivia.* It must be noted, however, that herbarium specimens were not examined in this study. Regardless of this, and of the small alterations in various of the totals given above and in Table 2 that could occur as a result, it cannot be doubted that there have been changes in the floral composition of Gibraltar's plants through the years. The changes as reflected in aspects of vegetation are given elsewhere (Cortes 1994). Floristically, it is clear that there has been great dynamism in the plant diversity of Gibraltar over past centuries. While the cumultaive total of native plant species of Gibraltar stands at 651, the maximum ever known to have been growing on the Rock was 501 in 1911-1913. The former figure has given rise notably to the widely held popular notion used by naturalists both verbally and in the literature that Gibraltar holds "about 600" species of flowering (which should instead read "vascular") plant. The present total, including naturalised species, is closer to 500 (519), and if the latter are excluded, it is even less. The even lower number of species given by Kelaart (1846) and Debeaux & Dautez (1888) could have been as a result of under-recording or difficulties in identification, but we can never be certain. It may be that, as the vegetation types were less varied in that the Upper Rock was uniform and with sparse vegetation (Cortes 1994), there were in fact fewer species. This is unlikely as it would have almost definitely been compensated by there being so much more vegetated ground than today. It is safer to compare Wolley Dod to the present than to the past, however, and a number of interesting conclusions can be arrived at from a closer study of those plants confirmed by Wolley Dod (1914) but not recorded by Linares (1993) (Appendix I).

Wolley Dod lists seven taxa that he considered unique in Europe to Gibraltar. These are considered in Table 3.

The former sites of some of the plants recorded by Wolley Dod but not by Linares (1993) are listed in Table 4. Of the 98 species in question 15 grew exclusively on the North Front or the Inundation and 6 others grew there and on other locations also. This area, stretching from the base of the Rock to the Spanish border has now been totally built over and replaced by the airfield and housing except at the North Front Cemetery and the aerial farm at Devil's Tower. The North Front Cemetery, through excessive cutting of vegetation in recent years, has all but lost its value as a haven for species on the isthmus. This area was important in holding a combination of dry sand, including dunes at the eastern end and wet marshy areas at the western end. Three species grew only on Reclamation Road (notably salt tolerant species like *Halimione portulacoides*), and three others had this as one of their few sites in Gibraltar. This area was close to the sea at the time, but has now become separated from it due to further reclamation. Europa Point was also a location for 9 of the lost species. The rough ground of that site has been largely replaced by sports grounds and buildings. The south west slopes of the Rock have also suffered from habitat destruction reflected in loss of plant species. These areas have included Camp Bay (2 species) where car parking and concrete terraces have replaced the old shoreline and notably the area of the Alameda and the lower slopes of the Rock in that area. A large area of red sand and open ground has been either built over or has developped a vegetation cover too dense for many species. Eight of the species in question once grew there.

This area was also the site for many of the species in Appendix Ia, lost before Wolley Dod's day. Other specific sites where changes since 1914 (and largely since 1939) have resulted in loss of species include Governor's Cottage (4 species). The Upper Rock lost 31 species, probably as a result of development of a maquis cover, and the east sand slopes

3, while some had already been lost before then. Some of the lost species grew in very specific sites, *e.g.* a specimen of *Pteridium aquilinum* in the Mount, and *Asplenium scolopendrium* in a cave on the east side. Most of the remaining species are, as would be expected, ruderals, which, as species of waste or cultivated ground have been lost as both types of land use have largely disappeared in the latter part of the century. Many of the plants in Appendix II (recorded in Linares 1993 but not in Wolley Dod 1914) are ruderal also, not surprising due to the dynamic tendencies of these species, especially as colonisers. However at least some of these species may have been overlooked by Wolley Dod during his limited time in Gibraltar.

Conclusion

The brief run through the various floras of Gibraltar, each with limitations, has culminated in a look at how these for historical study purposes and can be used to investigate issues directly linked to conservation. It has highlighted how dynamic plant populations can be, but also how surprisingly small actions can result in the loss of so many species from a given area. Although Gibraltar is small it is privileged in having had so much written about its flora. It has a more complete record of it than many other territories. It therefore has an added responsibility to learn lessons from this that can be used to safeguard the future. As it is, many species, especially those that grow exclusively or almost exclusively on the east sand slopes and the lower western slopes, are currently threatened with extinction from the Gibraltar list.

Acknowledgements

This study was made possible thanks to the work of botanists and others interested in the flora of Gibraltar through the centuries, in particular E. Boissier, E.F. Kelaart, G. Dautez and A. H. Wolley Dod. It was particularly possible thanks to the thorough listings prepared over two decades by Leslie Linares and Arthur Harper, whose contribution to the knowledge of the botany of Gibraltar has, and continues to be, priceless and unique .

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Table 1.
Authors whose work was summarised by Wolley Dod (1914). Dates given are years of publication or years when specimens were collected.

Charles de L'Ecluse (Clusius):
Rar. Stirp. Hisp.Obs. Hist. 1576
Rar. Plant. Hist. 1601
Pitton de Tournefort (1676-1690)
Manuscript in National Herbarium
T. James
History of the Herculean Straits 1771
L. Nee 1780-82
I.L. de Ayala
Historia de Gibraltar (1782)
Francis Masson
Manuscript in National Herbarium (1783)
Abbe Pourret 1790
P. M. A. Broussenet 1793 and 1821
Abbe P. Durand 1798-1807
Pavon . Herbarium collected abou 1800.
F. Haenseler. Collectedabout 1800.
S. de Rojas Clemente. 1802-1804.
Sir Thomas Gage. 1805
Von Spix & Von Martius. 1817.
C. Gaudichaud
Voy. aut. du Monde (L. Freycinet). 1817.
H.W. Schott
Isis. 1818 (collected 1817)
P. Salzmann 1823
P. Barker Webb
Iter Hispaniculll 1838 (collected 1827)
Rambur. 1827
K. Findlay. 1835
E. Boissier.
Voy. Bot. dans le Midi de l'Esp. 1837.
M. Willkomm.
Bot. Zeit. 1845
Prodr. Fl. Hisp. 1870
C.M. Lemann. 1840-41.
H.A. Hurst. 1848.
John Ball. 1851 & 1871.
G. Maw. 1883.
M.A. de Coincy 1887.
E. Reverchon 1887 .

Table 2
Numbers of native vascular plant species recorded in Gibraltar:

a. Cumulative totals of number of species recorded in Gibraltar:

Kelaart (1846):	396
Debeaux & Dautez (1888):	367
Wolley Dod (1914):	585
After Linares (1993)	651

b. Actual current species list:

Wolley Dod (1914):	
(585- 84 not seen by him):	501
Linares (1993):	
(519-45 not native):	474
Drop in species since 1914 = 27	

Table 3.
Current status of taxa considered unique to Gibraltar in Europe by Wolley Dod (1914).

Clematis cirrhosa var. *dautezii*
A form with purple spots now only found near Willis' may be this variety.

Iberis gibraltarica
Continues to be common

Brassica sabularia var. *papillaris (=B. barrelieri)*
Claimed by Wolley Dod to have disappeared from the east sand slopes due to construction of the catchments. Extinct in Gibraltar. This variety was not known from elsewhere.

Saxifraga globulifera var. *gibraltarica*
StilI found on the Rock, but threatened.

Helichrysum rupestre var. *boissieri*
The species still grows in Gibraltar. The taxonomic status as a separate variety is no longer accepted.

Thymus diffusus
The classification of *T. diffusus* and *T. hirtus* has been revised considerably since 1914. What is described as *T. willdenowii* still occurs on the Rock.

Salvia triloba calpeana (=S. fruticosa)
Now extinct in Gibraltar.

Table 4
Locations of plants recorded by Wolley Dod (1914) but not by Linares (1993).

LOCATION	Nº of SPECIES
Upper Rock	31
North Front	21
Alameda area	8
Europa Point	7
Reclamation Road	6
East Sand slopes	3

Appendix I
Species confirmed by Wolley Dod (1914) but not recorded by Linares (1993)
(* Intrduced species)

Asplenium scolopendrium
Pteridium aquilinum
Quercus ilex
Urtica urens
Polygonum maritimum
Rumex pulcher
Halimione portulacoides
Chenopodium opulifolium
Atriplex prostata
Suaeda maritima
Amaranthus deflexus
Cerastium brachypetalum
Sergularia rupicola
Spergularia rubra
Spergularia salina
Silene alba divaricata
Silene bellidifolia
Silene apetala
Ranunculus blephacarpus
Fumaria macrosepala
Fumaria officinalis
Fumaria parviflora
Malcolmia lacera
Matthiola tricuspidata
Sinapsis arvensis
Diplotaxis erucoides
Biscutella microcarpa (lost since 1883)
Capsella bursa-pastoris
Lobularia lybica
Reseda lutea
Reseda media
Lathyrus aphaca
Ononis pendula
Ononis diffusa
Melilotus elegans
Medicago rigidula
Trifolium suffocatum
Trifolium subterraneum
Anthyllis hamosa
Scorpiurus sulcatus
Geranium dissectum
Geranium columbianum
Erodium botrys
Erodium cicutarium
Erodium salzmanii
Linum usitatissimum
Euphorbia portlandica
Euphorbia molonchiquensis
Ruta chalepensis
Malva nicaeensis
Pseudorlaya pumila
Conium maculatum
Samolus valerandi
Echium creticum
Cynoglossum cheifolium
Cynoglossum creticum
Mentha suaveolens
Ballota hirsuta
Marrubium vulgare
Stachys germanica
Salvia fruticosa
Lycium europaea
Datura stramonium
Scrophularia laevigata
Veronica agrestis
Orobanche loricata
Plantago bellardii
Fedia langei
Centranthus macrosiphon
Valerianella disoidea
Scabiosa stellata
Bellis annua
Pulicaria paludosa
Ottospermum glabrum
Senecio gallicus
Cichorium intybus
Carduncellus caeruleus
Hyoseris scabra
Ruppia maritima
Scilla verna
Lolium perenne
Festuca arundinacea
Polypogon monspeliensis
Polypogon maritimus
Bromus sterilis
Bromus hordeaceus
Rostraria pumila
Avenula bromoides
Phalaris minor
Stipa capenis
Setaria verticillata
Juncus acutus
Serapias lingua
Orchis lactea
Malva parviflora
Fumana thymifolia
Tamarix africana *
Frankenia pulverulenta
Eryngium ilicifolium

Appendix Ia

Species not recorded by Linares (1993), nor Wolley Dod (1914) but recorded by earlier authors

Equisetum ramosissimum
Cosontinea (Cheilanthes) velea
Juniperus oxycedrus
Aristolochia pauicensis
Rumex crispus
Alternanthera caracasana
Corrigiola telephifolium
Armeria montana
Silene coarctata
Silene conica
Dianthus sylvestris
Delphinium staphisagra
Brassica barrelieri
Reseda undata
Sarothamnus baeticus
Sarothamnus grandiflorus
Genista monspessulanum
Cytisus villosus
Astragalus epiglottis
Astragalus lusitanis
Vicia laxiflora
Vicia hibrida
Lathyrus angulatus
Medicago coronata
Medicago doliata
Trifolium repens
Triifolium fragiferum
Trifolium pratense
Lotus corniculatus
Lotus paviflorus
Scorpiurus vermiculatus
Ornithopus sativus
Linum maritimum
Linum setaceum
Euphorbia chamaescyse
Thymolea lamiginosa
Bryonia cretica
Orlaya daucoides
Bupleurum lacifolia
Daucus crinitus
Armeria macrophylla
Galium viscosum
Echium pustulatum
Lamium amplexicaule
Lavandula stoechas
Hyoscyamus niger
Anarhinum bellidlifolia
Kickxia cirrhosa
Kickxia lanigera
Linaria triphylla
Linaria viscosa
Orobanche gracilis
Orobanche foetida
Orobanche purpurea
Sambucus nigra
Valeriana tuberosa
Campanula loeflingii
Bellis perenis
Filago germanica
Gnaphalium luteoralbum
Chaemaemalon fuscata
Anthemis arvensis
Coleostphus myconis
Coleostphus segetum
Senecio petraeum
Senecio minutus
Senecio lividus
Rhagadiolus stellatus
Crepis foetida
Andryala laxiflora
Ornithogalum broteri
Asparagus acutifolius
Aeluropus littoralis
Bromus tectorum
Bromus granatensis
Hordeum marinus
Orchis italica
Linum tenue
Linum trigynum
Euphorbia serrata
Thymolea villosa
Oenanthe pimpineloides
Ridolfia segetum
Torilis leptophila
Anagallis morelli
Asperula hirsuta
Galium tricornutum
Verbena officinalis
Teucrium scorodonium baeticum

Appendix II

Species recorded by Linares (1993) but not confirmed by Wolley Dod (1914)
(*: introduced species)

Asplenium onopteris
Pinus halepensis *
Pinus pinea *
Ulmus minor *
Thesium humile
Polygonum equisetifolium
Atriplex halimum
Amaranthus muricatus
Amaranthus blitoides *
Amaranthus lividus *
Achyranthes sicula *
Phytolacca americana *
Mesembrianthemum crystalinum
Stellaria pallida
Spergularia nicaeensis
Silene latifolia
Petrorhagia nanteuilii
Biscutella sempervirens
Aeonium haworthii *
Sedum rubens
Acacia cyclops *
Acacia cyanophylla *
Lupinus angustifolius
Robinia pseudacacia *
Vicia villosa
Lathyrus amphicarpus
Ononis dentata
Setaria adhaerens
Trifolium glomeratum
Coronilla dura
Scorpiurus muricatus
Oxalis articulata *
Erodium chium
Euphorbia exigua
Ruta angustifolia
Lythrum junceum
Eucalyptus globulus *
Centaurium pulchellum
Ipomoea purpurea *
Anchusa azurea
Lantana camara *
Stachys arvensis
Cephalaria leucantha
Aster squamatus
Conyza albida *
Filago piramidata
Pulicaria odora
Asteriscus aquaticus
Xanthium strumarium
Senecio tamoides *
Carlina racemosa
Carthamus lanatus
Cichorium endivia
Tolpis barbata
Hedypnois cretica
Lactuca serriola
Cladanthus arabicum
Chondrilla juncea
Ornithogalum arabicum
Asparagus aphyllus
Agave ghiesbreghtii *
Dracaena draco *
Iris albicans *
Freesia refracta *
Poa infirma
Briza minor
Parapholis incurva
Parapholis filiformis
Avenula gervaisii
Digitaria sanguinalis
Medicago lupulina
Scirpus holoschoenus
Cyperus longus
Anacamptis pyrmidalis
Serapias parviflora
Ophrys bombyliflora
Euphorbia squamigera
Euphorbia segetalis
Tamarix parviflora *
Eucalyptus camaldulensis *
Cachrys libanotis
Convolvulus arvensis
Echium gaditanum
Omphalodes linifolia
Ajuga iva
Orobanche minor
Trachelium caeruleum