

## FLORISTIC AND CYTOTAXONOMIC NOTES ON THE FLORA OF THE MALTESE ISLANDS

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### 1. INTRODUCTION

In the spring of 1968 and 1969 the two senior authors visited the Maltese Islands of Malta and Gozo and collected and photographed plants. The entire herbarium collection amounts to about 350 numbers. The first set is deposited in the herbarium of the State University of Utrecht; duplicates were sent chiefly to the herbarium of the Royal Botanic Gardens, Edinburgh. Critical determination of the material yielded some results which may be interesting from a floristic-taxonomic viewpoint and are therefore reported below. Beside herbarium material fruits and seeds were collected; the samples that germinated were investigated cytotaxonomically by the two junior authors. The results are also presented in the following.

The first truly comprehensive account of the flora of the Maltese Islands is by SOMMIER & CARUANA GATTO (1912-1915); it includes also the lower cryptogams. The older literature is also reviewed there. It is fairly complete and, for its time, taxonomically reasonably up to date. Then the Maltese botanist J. BORG published his "Descriptive flora of the Maltese Islands" (1927), dealing only with vascular plants. This flora, on the other hand, was taxonomically antiquated even when it was published, reflecting the state of knowledge of plant taxonomy of some decades earlier, and therefore nomenclaturally also very much out of date. Since that time Malta has had very little attention in the botanical literature. Some notes or brief paragraphs are devoted to its flora in such general books as ADAMOVIĆ's "Die pflanzengeographische Stellung und Gliederung Italiens" (1933) and RIKLI's "Das Pflanzenkleid der Mittelmeerlande" (2nd ed. 1943-48). In 1960 LANFRANCO published his "Guide to the flora of Malta with 300 illustrations". The plants included in it are a rather arbitrary selection from Borg's flora, whose nomenclature is also uncritically followed. A modern flora, with keys, is lacking.

Perusal of Sommier & Caruana Gatto's and of Borg's work shows a considerable impoverishment of the flora, some species having become quite rare and local or even having disappeared, as also shown by the two senior authors' field experience. The use of practically all surface water and the lowering of the groundwater table for irrigation and other purposes of human habitation are undoubtedly an important cause of this. A similar phenomenon was described, e.g., by BENL (1965) for Tenerife. For a description of the physiography and geology of the Maltese Islands the reader is referred to HYDE (1955).



Fig. 1. *Centaurea crassifolia*. Wied Babu, Malta (photogr. by K. U. Kramer).

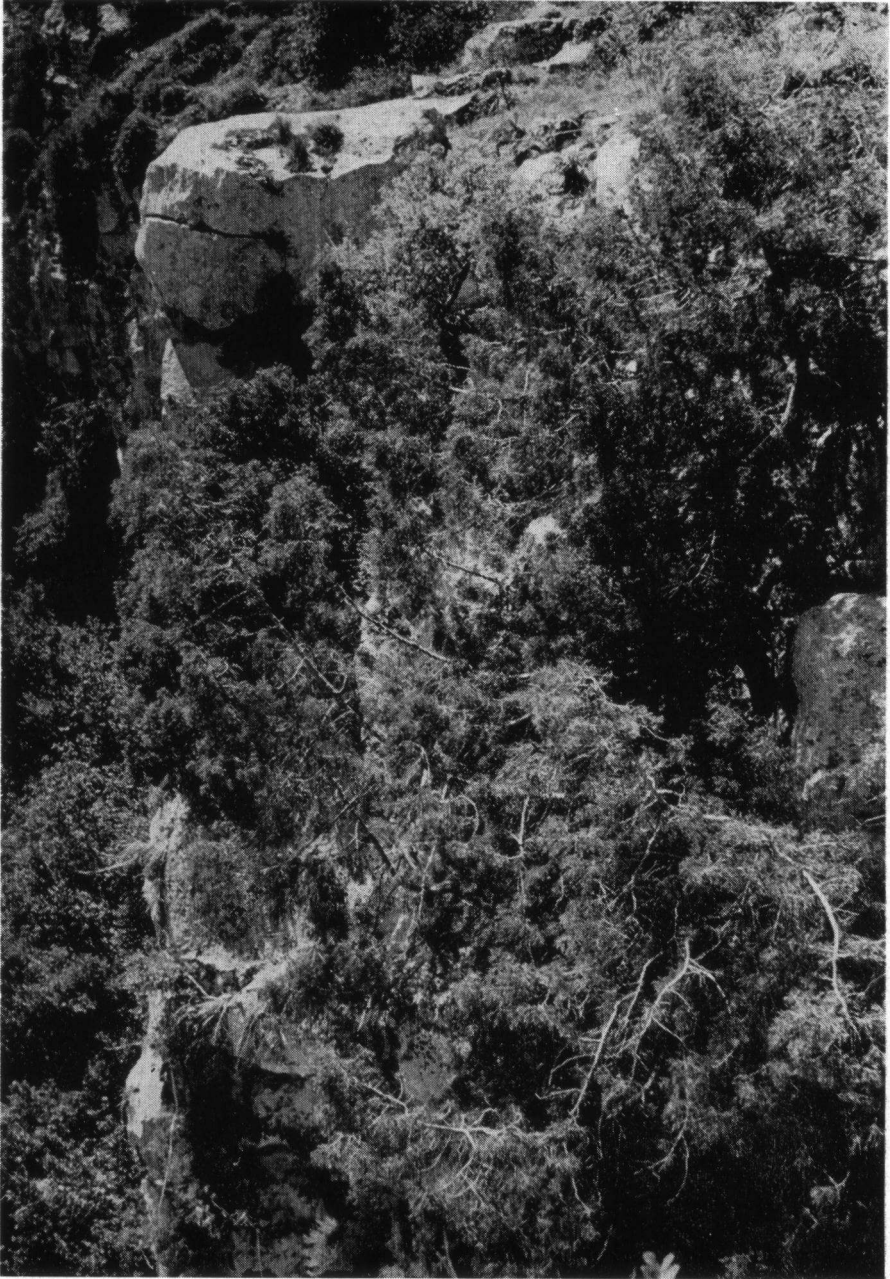


Fig. 2. *Tetraclinis articulata* on the walls of il-Maqluba, Malta (photogr. by L. Y. Th. Westra).

The number of endemic taxa ascribed to the Maltese Islands has declined somewhat, owing to better exploration of other areas and to more critical determinations. The genus *Melitella* of Compositae, consisting of one species, *M. pusilla* Sommier, was originally regarded as endemic in Malta; recently a second species, *M. rechingeri* Zaffran, was described from Crete. *M. pusilla* was shown by MERXMÜLLER (1968) to be a species of *Crepis* and reported, most astonishingly, from Australia; he also supposed *M. rechingeri* to be conspecific. Some distinctive endemics remain, e.g., *Anacamptis urvilleana* Sommier & Caruana Gatto (see below), and *Centaurea crassifolia* Bertol. (*C. spathulata* Zerafa non Tenore), still frequent on the walls of Wied Babu on the South coast (fig. 1). The status of most others will have to be critically redetermined with modern methods and materials.

Another botanical specialty of Malta, the conifer *Tetraclinis articulata* (Vahl) Masters (formerly included in *Callitris*), seems now to be confined to a sole locality, the limestone pit of il-Maqluba near Qrendi (fig. 2). It must formerly have been much more widespread and has only a single other station in Europe.

In identifying their collections the senior authors have tried to use as much modern, critical literature as possible. Notable discrepancies with the two older floras are reported in the list of species below.

## 2. CYTOTAXONOMY

The chromosome counts given below were made by the two junior authors from roottip mitoses of material fixed in Karpechenko's fixative, embedded in paraf-

Table 1.

Name	Provenience	Coll. no.	2n
<i>Caryophyllaceae</i>			
<i>Silene fruticosa</i> L.	Xlendi Valley, Gozo	4360	24
<i>Compositae</i>			
<i>Hyoseris radiata</i> L.	Xlendi, Gozo	4339	16
<i>Hyoseris radiata</i> L.	Kalkara Ravine, Malta	4468	16
<i>Silybum marianum</i> (L.) Gaertner	Xlendi Valley, Gozo	—	34
<i>Euphorbiaceae</i>			
<i>Euphorbia dendroides</i> L.	Victoria to Xlendi, Gozo	—	18
<i>Papilionaceae</i>			
<i>Anthyllis tetraphylla</i> L.	Mġarr, Gozo	4366	16
<i>Hippocrepis multisiliquosa</i> L.	Ghadira, Malta	4278	14
<i>Melilotus messanensis</i> All.	Ghadira, Malta	4451a	16
<i>Scrophulariaceae</i>			
<i>Scrophularia peregrina</i> L.	Victoria to Xlendi, Gozo	4363	36
<i>Theligonaceae</i>			
<i>Theligonum cynocrambe</i> L.	Salina, Malta	4458	20
<i>Umbelliferae</i>			
<i>Myrrinium olusatrum</i> L.	Mellieha, Malta	4297	22

fin, sectioned at 15  $\mu$  and stained according to Heidenhain's haematoxylin method. If possible herbarium vouchers of the plants that served for the counts were prepared; they are also preserved in the collection of the Utrecht herbarium.

Some counts are merely confirmations of previous ones; these are assembled in *table 1*. Others are at variance with some older reports or require comments for other reasons; these are incorporated in the species list that constitutes the main part of this paper.

### 3. SPECIES LIST

(M = Malta, G = Gozo; the numbers are collection numbers of Kramer & Westra).

#### Asclepiadaceae

##### *Periploca angustifolia* Labill.

M: Rdum il-Qammieh, edge of Marfa Ridge, 4288 (*fig. 3*); G: Mgarr, 4367. Called *P. laevigata* Aiton in the two older floras, but according to BROWICZ in his monograph of the genus (1966) that species is restricted to Macaronesia. *P. angustifolia* occurs in North Africa and Syria and just barely reaches southern Europe.



Fig. 3. *Periploca angustifolia*. Rdum il-Qammieh, Malta (photogr. by L. Y. Th. Westra).

**Caryophyllaceae**

*Silene nocturna* L. var. *brachypetala* (Robill. & Cast.) Vis.

M: Wied Baluta near Wardija, 4523. This variety has the chromosome number  $2n = 24$ , like all European *Silenes* for which counts have been published; the present variety had not been counted before, nor had it been distinguished in Malta.

**Chenopodiaceae**

*Suaeda vera* J. F. Gmelin

G: Escarpment below Xaghra, some large, old shrubs, 4379. The identification follows BALL (1964). This is *S. fruticosa* of the two older floras.

**Compositae**

*Carduus pycnocephalus* L.

G: Xlendi Valley, 4355. PODLECH & DIETERLE (1969) reported  $2n = 54$  for ssp. *albidus* (M. Bieb.) Kazmir of this species. MOORE & FRANKTON (1962) failed in determining the exact number but thought it to be about 54; DAHLGREN *et al.* (1971) found  $2n = 62-64$ . The Maltese plant proved to have  $2n = 64$ .

**Cyperaceae**

*Eleocharis ovata* (Roth) Roemer & Schultes

G: Between Santa Luċija and Wardija Point, moist depression, 4352. Not previously reported; probably included in "*Heleocharis*" *palustris*.

**Dioscoreaceae**

*Tamus communis* L.

M: Mellieha, 4293. Apparently a new locality for this species which is quite rare in Malta.

**Euphorbiaceae**

*Euphorbia exigua* L. var. *pycnophylla* Kramer & Westra, var. nova.

Differt a varietate typica foliis carnosis, glaucis, aggregatis, haud linearibus sed superioribus oblongis, basalibus oblongo-ovatis, majoribus (2-)3-5(-6) mm longis, (0.8-) 1-1.8(-2) mm latis, (2½-) 3-3½ × longioribus quam latis, atque habitatione.

Type and only collection: Kramer & Westra 4440 (U; isotype E), Gozo, North coast, escarpment of Wied il-Ghasri at the end of the part flooded by the sea, in pockets of soil on nearly perpendicular limestone rocks exposed to spray by surf, associated with *Hyoseris radiata*, *Hypericum aegypticum*, *Lotus spec.*, *Vaillantia muralis*, *Crithmum maritimum*, etc. (fig. 4).

The literature agrees on the character of the leaf shape and the habitat: cultivated or disturbed ground, of typical *Euphorbia exigua*, e.g. VINDT (1953) and SMITH & TUTIN (1968). This we found also in Gozo (4328, Gharb to Ghasri), typical in appearance as well as in habitat. It may be added, however, that we



Fig. 4. *Euphorbia exigua* var. *pycnophylla* at the type locality, Wied il-Ghasri, Gozo (photogr. by L. Y. Th. Westra).

once found it in Elba in a small patch of undisturbed grassland (3391, near Procchio).

Our plants from Gozo agree in all characters: fruits, seeds, involucre glands of the cyathium, very well with *E. exigua* and are therefore assigned to a variety of it. There is probably some resemblance in habit to the Egyptian *E. parvula*, which differs markedly in gland and seed characters; unfortunately we know it only by description.

The new variety is very probably more widespread in similar habitats in the Maltese Islands and perhaps elsewhere on coastal limestone rocks in the central Mediterranean. It remains to be seen whether it is also cytotaxonomically distinct from the typical variety; seeds contained in our material failed to germinate.

SOMMIER & CARUANA GATTO (1915, p. 258) described a "forma imbricata" of *E. exigua* L. var. *retusa* (Cav.) (sic), very briefly and doubtfully valid; the remark "con fusti flessuosi, diffusi" does not apply to our plants which also definitely do not belong to var. *retusa*.

*Euphorbia spinosa* L.

M: Mnajdra Neolithic Temples, in fissure of wall, 4267 (1968). The plant is without any dead, persistent, subspinescent branches, regarded as a key character of the species in, e.g., SMITH & TUTIN's treatment of the genus for Europe (1968); their key does not lead to *E. spinosa* with our material, in the

absence of these branches. At a second visit to the locality in 1969 we succeeded in relocating this, or a very similar, plant which showed that branches without any dead, persistent parts were produced by otherwise typical plants of *E. spinosa* growing in sheltered places, as already noted by Sommier & Caruana Gatto. Our collection agrees well with the oriental *E. thamnoides* Boissier, which differs from *E. spinosa* in the absence of dead, persistent branches. *E. spinosa* and *E. thamnoides* are mutually geographically exclusive, the former occurring in the central and eastern parts of Mediterranean Europe (see, e.g., RIKLI 1943, map 41), the latter in S.W. Asia, also near the Mediterranean. We suspect that they are not truly specifically distinct; there is a close similarity in characters of cyathium glands, fruits, and seeds. Post also described a var. *dumulosa* of *E. thamnoides* with dead, persistent branches which must be a very close match of *E. spinosa*. – We are indebted to Dr. W. Punt, Utrecht, for helpful advice on this matter.

### Geraniaceae

*Erodium chium* Willd.

G: Wied Marsalforn, 4437. Not reported from Gozo by Sommier & Caruana Gatto; from this island Borg cited only var. *laciniatum*, to which our material does not belong.

### Gramineae

*Festuca fenas* Lag.

M: Dingli Cliffs, 4299; G: small valley running to Qala Dwejra, 4351; Wied il-Ghasri, 4394. Apparently previously included in *F. arundinacea* (or *F. elatior* var. *arundinacea*).

### Guttiferae

*Hypericum pubescens* Boissier

G: Wied Marsalforn, 4344. Erroneously reported as *H. tomentosum* L. by Sommier & Caruana Gatto and Borg. ROBSON (1968) correctly cited *H. pubescens* from Malta.

### Labiatae

*Ballota nigra* L.

G: Head of Xlendi Valley near Victoria, 4337. Our, and presumably all, Maltese material belongs to the Mediterranean ssp. *uncinata* (Fiori & Beg.) Patzak, according to PATZAK's revision of the group (1958).

*Prasium majus* L.

M: Selmun, 4221.  $2n = 34$ . This is the first count for this small genus; the plant is very common in the Maltese Islands.

*Salvia verbenaca* L.

G: From Xaghra to Ramla Bay; no herb. Plants from Algeria investigated by REESE (1957) had  $2n = 42$ . In plants from southern France and Spain GADELLA *et al.* (1966) found  $2n = 59$  and 64, respectively; VAN LOON *et al.* (1971)



counted  $2n = 64$  in plants from the vicinity of Montpellier, S. France. DAHLGREN *et al.* (1971) found  $2n = 60$  in Balearic material. The Maltese plant had  $2n = 42$ , like that of Reese. This is a very polymorphic species, and combined cytological and morphological study is necessary for unravelling its complexity.

### Malvaceae

#### *Lavatera arborea* L.

M: Salina, 4456. In this species four different chromosome numbers are known:  $2n = 36$  (DAVIE 1933), 40 (NAKAJIMA 1936), 42 (SKOVSTED 1935), and 44 (DELAY 1947), all cited after LÖVE & LÖVE (1961). In the Maltese material we counted  $2n = 42$ . The discrepancies between the counts in this not particularly variable species are striking.

### Orchidaceae

#### *Anacamptis urvilleana* Sommier & Caruana Gatto

M: Selmun, 4207. When first publishing this species its authors pointed out that it differs from *A. pyramidalis* (L.) Rich., which is quite common in Malta, in its somewhat smaller size, the paler colour of its flowers, the shape of its inflorescence, and its earlier flowering period. It should be noted that in Malta both species occur in the same habitats but remain quite constant, without any intermediates. Nevertheless Schlechter in KELLER & SCHLECHTER (1926) reduced *A. urvilleana* to a variety of *A. pyramidalis*, in which he was followed by CAMUS & CAMUS (1929). Independently Borg renamed *A. urvilleana* "*O. pyramidalis* var. *sommierana* Borg". This is, of course, an illegitimate synonym.

The two senior authors found *A. urvilleana* to be quite frequent around St. Paul's Bay, Malta. Having observed both species of *Anacamptis* in the field during their visits to Malta, they cannot but strongly support Sommier's & Caruana Gatto's view that they are truly specifically distinct and are convinced that Schlechter and Borg erred in reducing *A. urvilleana* to a mere variety of *A. pyramidalis*.

*A. urvilleana* seems to be confined to the Maltese Islands; to our knowledge it has not been reported from elsewhere. There has, however, been some question as to whether *Orchis brachystachys* d'Urville from the eastern Mediterranean region is identical with *A. urvilleana* or not. Prior to its publication as a species *A. urvilleana* was erroneously identified by d'Urville as *Orchis condensata* Desf., described from Algerian material. Both *O. brachystachys* and *O. condensata* should be regarded as synonyms of *A. pyramidalis*. For a relevant discussion see SOMMIER & CARUANA GATTO (*l.c.*, p. 273–275).

### Orobanchaceae

#### *Orobanche nana* Noë f. *melitensis* (Beck in Sommier & Caruana Gatto) Beck

M: Mellieha, 4178. Not uncommon in shaded places, parasitic on *Oxalis pes-caprae* L. (*O. cernua* Thunb.) (*fig. 5*).

This was originally and, in our opinion, validly published in Sommier & Caruana Gatto who quoted a description by Beck, from a personal communica-



Fig. 5. *Orobanche nana* f. *melitensis*. Mellicha, Malta (photogr. by L. Y. Th. Westra).

tion, as a variety of *O. mutelii* but placed that species themselves in *Kopsia*, a genus later united with *Orobanche*. Afterwards Beck twice changed his mind about its rank and once about the species it belongs to; in 1922 he published it as a subspecies of *O. nana*, but invalidly, calling it "*O. nana* Noë ssp. *O. melitensis* Beck"; in 1930 he reduced it, validly, to a forma under the same species.

It is very odd that this endemic of the Maltese Islands is confined to an alien, naturalized host.

### Papilionaceae

#### *Anagyris foetida* L.

G: Valley of Ta'Lunzjata between Kerċem and Victoria, several shrubs, 4401. This is the first record of the species from Gozo; it is said to be rare in Malta.

#### *Hedysarum spinosissimum* L.

M: Ghadira, 4279. According to LÖVE & LÖVE (1961) in this genus  $x = 7$ . The Maltese sample proved to be diploid,  $2n = 16$ , which agrees with a count by DAHLGREN *et al.* (1971) but disagrees with a basic number of 7. In Flora Europaea II the counts  $2n = 16$  are reported for *H. coronarium* L. and *H. macedonicum* Bornm., and the basic numbers  $x = 7$  and 8 must occur side by side.

#### *Medicago rigidula* (L.) All.

M: Selmun Palace, 4218. Not before reported from Malta, presumably through confusion with *M. aculeata* Gaertner = *M. turbinata* Willd. non (L.) All.

#### *Vicia tenuissima* (Bieb.) Schinz & Thellung

M: Mistra Valley, moist creek valley, 4470. Listed as *Ervum gracile* (Lois.) DC. by Sommier & Caruana Gatto, as *V. tetrasperma* (L.) Moench var. *gracilis* Lois. by Borg.

### Polygonaceae

#### *Rumex obtusifolius* L.

G: Wied Marsalforn, not rare, 4436. Not reported in the two older floras; perhaps introduced since their time, or confused with *R. pulcher* L.

#### *Rumex sanguineus* L.

G: Xlendi Valley, one of the main constituents of the vegetation at the bottom, with *Arundo donax*, *Acanthus mollis*, and *Galium aparine*, 4356. This is probably *R. conglomeratus* of the two older floras, a species not met with.

### Rubiaceae

#### *Galium aparine* L.

G: Xlendi Valley; no herb. In this species there is intraspecific polyploidy, with the series  $2n = 22, 44, 66$ , and 88 (see DARLINGTON & WYLIE 1961 and LÖVE & LÖVE 1961). The tetraploids and hexaploids show aneusomaty, with the numbers  $2n = 61, 62, 63, 64, 65$ , and 66 side by side (KLIPHUIS 1967). In hexaploid plants the number  $2n = 64$  is most common. In the metaphase plates of their cells two large chromosomes are present which are not found in the cells with  $2n = 66$

and may have arisen by fusion, as suggested by BÖCHER *et al.* (1955). In the material from Gozo we found  $2n = 64$  and  $66$ .

### **Theligonaceae**

*Theligonum cynocrambe* L.

M: Near Salina, 4458 (chromosome count in *table 1*); edge of Wied Hoxt, 4519. Said to be "communissimo" in Malta, Gozo and Comino by Sommier & Caruana Gatto, but strangely enough not mentioned by Borg.

### **Umbelliferae**

*Scandix pecten-veneris* L. ssp. *pecten-veneris*

G: Xlendi Valley; no herb. In the literature the number  $2n = 16$  mostly appears for this species, without any details as to the infraspecific taxa involved. Flora Europaea, however, cites for ssp. *pecten-veneris*  $2n = 26$ ; we could not trace the basis for this report, which agrees with a later count by DAHLGREN *et al.* (1971). Our count from Gozo is the same. Further cytotaxonomic study of the species is necessary.

### **Verbenaceae**

*Vitex agnus-castus* L.

G: Valley of Mgarr ix-Xini, 4419; also seen at Qala Dwejra. Said to be rare in the Maltese Islands. PETERMANN (1935; cited by LÖVE & LÖVE 1961) counted  $2n = 24$ ; later SHARMA & MUKHOPADHYAY (1963) reported  $2n = 32$ . The latter agrees with our count.

### **Zygophyllaceae**

*Fagonia cretica* L.

M: Il-Karraba Peninsula in Ghajn Tuffieha Bay, 4270. A new locality for this locally very rare species.

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