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**Autor:** Nardi, Enio / Nardi, Carla Nesi  
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# Taxonomic and chorological notes on the genus *Aristolochia* L. (Aristolochiaceae) from the Central and Eastern Mediterranean area

Enio Nardi and Carla Nesi Nardi

Dipartimento di Biologia Vegetale, Università di Firenze, Via La Pira 4, I-50121 Firenze

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## Abstract

Nardi E., and C. N. Nardi 1987. Taxonomic and chorological notes on the genus *Aristolochia* L. (Aristolochiaceae) from the Central and Eastern Mediterranean area. Bot. Helv. 97: 155–165.

A systematic revision of some Mediterranean species of the genus *Aristolochia* L. throws new light on a few taxa from the Balkan peninsula and the Near East. *A. altissima* Desf. proves to be conspecific with *A. sempervirens* L. and is, therefore, clearly a taxonomic synonym of the latter. *A. parvifolia* Sm., found in the Southern Peloponnese, is recorded as new to continental Greece; also, the first cytological count for this species is recorded ( $2n = 12$ , on Cyprian material). *A. macedonica* Bornm. is put as a synonym of *A. pallida* Willd. Likewise, *A. croatica* Horvatić is considered to be conspecific with *A. lutea* Desf. Finally, a new taxon, *A. rotunda* subsp. *reichsteinii* Nardi, is described on the basis of a few populations from the island of Pag (Croatia, Yugoslavia).

## 1. Introduction

During the systematic revision of the Italian species of *Aristolochia* L. carried out by one of us (Nardi 1984), several problems regarding taxonomy, chorology and nomenclature of the Mediterranean entities came to light. A few have been resolved, others were deferred to a time when more data, coming particularly from the knowledge of living populations, had become available. The trips we had the opportunity to make afterwards through some Mediterranean countries proved to be successful in working out a few questions which had remained pending. In this manner, for instance, the problems concerning the *A. rotunda* complex in the Tyrrhenian area were settled (Nardi 1985, Nardi and Ricceri 1987).

Our trips to Greece and Yugoslavia were also fruitful and the results are shown here.

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Dedicated to Prof. T. Reichstein on the occasion of his 90<sup>th</sup> birthday

## 2. *Aristolochia altissima* Desf.

*A. altissima* Desf., originally described from Algeria (Desfontaines 1799), was kept separate for a long time at specific level from the related *A. sempervirens* L., based on a plant from Crete (Linnaeus 1753, Davis and Khan 1961). The Linnean species was said to occur in Crete only, while *A. altissima* was thought to occupy a larger range, from Algeria to the Near East (Lebanon and Palestine) through Sicily, Greece and Cyprus (Duchartre 1864, Boissier 1879, Halácsy 1904, Holmboe 1914, Hayek 1924, Bouloumoy 1930, Dinsmore 1933, Lindberg 1946, Mouterde 1966). All specimens from the entire Mediterranean area looked very much alike. Nevertheless, *A. sempervirens* and *A. altissima* were kept separate as distinct species, because they were said to differ in habit, stem and leaf size, and flower colour (Bertoloni 1854, Duchartre 1864, Boissier 1879, Halácsy 1904, Holmboe 1914, Hayek 1924, Mouterde 1966).

Although acknowledging in real existence of these distinctive characters, Davis and Khan (1961) considered them of minor importance and worthy, at the most, of two ecotypes, by no means of two taxonomic entities. Consequently these authors accepted only one species which included all the populations previously distinguished as *A. altissima* and *A. sempervirens*, and retained the latter name for priority reasons. Davis and Khan (1961) were soon followed by most authors; as a result recent Floras dealing with the Mediterranean area (Ball 1964, Zohary 1966, Jalas and Suominen 1976, Zangheri 1976, Davis and Khan 1982, Pignatti 1982, Greuter et al. 1984a, Meikle 1985) treated the evergreen Aristolochias growing from Algeria to the Near East as one species and called it *A. sempervirens*.

On the other hand Davis and Khan (1961, 1982) stated that the Eastern Mediterranean populations possess an underground organ consisting of a rootstock, whereas the Italian ones lacked this character, having a short stock with fascicled roots (Nardi 1984). Since the subterranean apparatus is fundamental for the systematics of the genus, it was hypothesized (Nardi 1984) that a taxonomic distinction between the Western and the Eastern populations was reasonable. Therefore, the plants from Algeria and Sicily, all showing a general phenotypic homogeneity, were regarded as belonging to *A. altissima*, kept separate from the allied *A. sempervirens* which included instead the topodemes of Greece and the Near East (Nardi 1984).

A priori it appeared highly unusual that populations so similar in their aerial parts to be easily confused had, on the other hand, quite a different underground organization. So we decided to look into the question.

Every attempt to get useful material or additional information from the competent authors about the Eastern *Aristolochia* had been in vain. Moreover, the comparison of the two nomenclatural types (see Davis and Khan 1961 and 1982 for *A. sempervirens*, and Nardi 1984 for *A. altissima*), both without basal part, has no practical significance. Therefore, the only thing to do in order to solve the problem, was to examine directly the populations which were said to possess a rootstock (Davis and Khan 1982, Meikle 1985), first of all the Cretan ones, originally described as *A. sempervirens*, the identity of which has never been controversial.

### 2.1 Materials and methods

We studied a few living individuals for each population, checking the morphological characters of both the aerial and the subterranean organs of the plant. The voucher specimens are the following.

- Greece, Crete, Lassithi, north-facing side of the northern slopes of Lassithi plateau, 550 m, hedges, 19 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI).
- Greece, Crete, Retimno, Ag. Vasilios between Armeni and Spili, hedges, 18 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI).
- Greece, Arcadia, Mt. Parnonas near Platanos, 450 m, thin pinewood on limestone, 21 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI).
- Greece, Arcadia, Mt. Parnonas near Platanos, 750 m, open dry places on limestone, 21 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI).

## 2.2 Results

All the plants examined from Crete and continental Greece had an underground apparatus consisting of a short knobby stock with fleshy fascicled roots and often with a few stems running horizontally and rooting at the nodes in their proximal part. They showed exactly the same subterranean organization as observed in the Sicilian populations and in specimens from other Italian regions where the plant is adventitious (see Nardi 1984).

As to the other characters regarded as diacritic between *A. altissima* and *A. sempervirens*, we found no remarkable differences between the Cretan and the Arcadian topodemes and between the Greek and the Italian populations. For example, the stem and leaf size proved to be very variable according to the age of the plant and the soil conditions. In Crete, where only the low, small-leaved plant called *A. sempervirens* ought to be found, we met climbing Aristolochias over 2 m tall with large leaves, i.e., possessing both habit and size usually attributed to *A. altissima*. On the other hand, the individuals collected in Arcadia near Platanos possessed several characters which were thought to be exclusive of the Cretan populations of *A. sempervirens*, such as short decumbent stems and reduced leaves, although the first records of *A. altissima* from Greece are based on material coming from the very neighbourhood of that village (*Orphanides 129*, FI!; see Boissier 1879). It is worth-while noting that in Crete the plants were growing on rich, deep soil, while in Arcadia the soil was shallow and stony.

## 2.3 Conclusions

Although the underground parts of the plants from Algeria are unknown (see Maire 1961), there is no reason why it should be different from the subterranean organ found in the Italian and Greek specimens, which show the same stem leaf and flower features as the Algerian samples we have checked (FI!). Even the allied *A. baetica* L. (see Nardi 1984), well-distinguishable from *A. sempervirens* in its aerial parts, proved to have an underground organization without rootstock but with stems bearing fascicled roots instead (see voucher specimens in FI: “Spain, Sierra de Alhama, Ventas de Zafarraya, 20 Mai 1986, *E. Nardi et C. Nesi Nardi*”), contradicting the statements by Castroviejo (1986). Presumably all the evergreen climbing Aristolochias belonging to the *A. sempervirens* complex share this character.

This gives us reason to believe that all Mediterranean populations occurring from Oran to the Near East (Algeria, Sicily, Greece, Crete, Turkey, Cyprus, Syria, Lebanon, Palestine: see Nardi 1984, fig. 6, B + C) belong to the same taxonomic unit, on account of their morphological homogeneity. Consequently they must be combined into one species, *A. sempervirens*. Therefore, we agree with the statement of Davis and Khan (1961) who considered *A. altissima* a synonym of the former, although their taxonomic conclusion was based on a wrong assumption.

*Aristolochia sempervirens* L., Sp. Pl. 961. 1753. Type: in BM, Herb. Cliff. (see Davis and Khan 1961, 1982).

Syn.: *A. altissima* Desf., Fl. Atl. 2: 324. 1799. Type: in P, Herb. Fl. Atl. (see Nardi 1984).

*A. sempervirens* subsp. *altissima* (Desf.) Greuter, Candollea 32: 45. 1977.

### 3. *Aristolochia parvifolia* Sm.

#### 3.1 *New record*

Greece, Laconia, Mani Peninsula near Alika, ruins, 22 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI).

This species was known until a few years ago to be endemic to the Eastern Mediterranean region from the Eastern Aegean Islands to Jordan, through Turkey, Cyprus, Syria, Lebanon and Palestine (Davis and Khan 1961, Al-Eisawi 1982). Recently it has been found on other Greek islands of the Aegean and Cretan area (Cyclades, Kasos, Krete: see Greuter 1974, Jalas and Suominen 1976, Greuter et al. 1983, Greuter et al. 1984b).

With this record, the first finding of *A. parvifolia* in the Peloponnese, the total range of the species is enlarged westwards and spreads to continental Greece.

*A. parvifolia* is likely to be widespread elsewhere in Southern Greece, where it could have been confused with *A. longa* auct. on account of its elongated rootstock. This may be the case, for instance, of the specimen quoted by Davis and Khan (1961) from Gerolimena, in the same Mani Peninsula, not far from Alika.

#### 3.2 *Chromosome number*

Cyprus, Ag. Napa, cliffs, 30 Mar 1986, *F. Garbari et C. Del Prete* (voucher specimen in FI).

$2n=12$ . Method: root tips pretreated with saturated 8-oxiquinoline, fixed in Carnoy's fluid (3:1), then coloured with lacto-propionic-orcein for 18 h; cells in mitotic phase. G. Fiorini *operavit*.

To our knowledge this is the first cytological record of *A. parvifolia*. It has the same chromosome number as *A. clusii* Lojac., a diploid species from Southern Italy, Sicily and Malta (see Nardi 1984), belonging to the *A. fontanesii* group which probably includes *A. parvifolia*, too.

### 4. *Aristolochia macedonica* Bornm.

*A. macedonica* Bornm. is the Balkan representative with long-limbed flowers of the *A. pallida* complex; it grows in Albania, Southern Yugoslavia and Bulgaria (see Jalas and Suominen 1976, Mayer and Greuter 1985). Some modern authors (Ball 1964, Trinajstić 1973, Jalas and Suominen 1976, Greuter et al. 1984a) support the view that *A. macedonica* is a taxon worthy of a specific rank. Nevertheless, its nomenclatural type is hardly distinguishable from that of *A. pallida* Willd. (see Nardi 1984) and, therefore, we were inclined to believe that both belong to the same systematic unit.

#### 4.1 *Materials and methods*

We examined dried and living plants attributed to *A. pallida* and to *A. macedonica*, after seeing their types. As regards Willdenow's taxon the investigated material was the

same as that cited in Nardi (1984). As to *A. macedonica* we had the opportunity of studying Bornmüller's specimens, together with a few samples directly collected in one of the original places reported by the author (Bornmüller 1923, 1928).

- Yugoslavia, Macedonia, Marianska-Planina pr. Hūdova, 100–200 m, 23 Apr 1918, *Bornmüller 4903* (B, lectotype: see Nardi 1984).
- Yugoslavia, Macedonia, Usküb, in faucibus fl. Treska, ad monast. Sv. Nikola, 500–600 m, 12 Apr 1918, *Bornmüller 4901* (B).
- Yugoslavia, Macedonia, distr. lac. Doiran, in nemoribus supra Kaludschkowa, ca. 150 m, 20 Apr 1918, *Bornmüller 4905* (B).
- Yugoslavia, Macedonia, Udovo, slopes of the hills along the right bank of the river Vardar, 100 m, 15 Mai 1985, 26 May 1987, *E. Nardi et C. Nesi Nardi* (FI).

#### 4.2 Results

We found no morphological differences between the examined material of *A. pallida* and that of *A. macedonica*, so that the original description of the latter could cover many of the long-limbed Italian populations. Even the much-stressed character of the perianth colour (see Bornmüller 1923, 1928, Ball 1964, Trinajstić 1973, Mayer and Greuter 1985) does not appear so reliable as to justify a separate treatment of *A. macedonica* and *A. pallida*. The intensity and the extent of the dark pigmentation are very variable in the Italian populations, a few of which, on the other hand, bear the same dark brown or dark purple flowers which are considered peculiar to the Balkan taxon.

#### 4.3 Conclusions

The Balkan populations identified as *A. macedonica*, and those from Southern France and Italy known as *A. pallida* (Nardi 1984), are to be regarded as belonging to the same systematic unit, to be known by the name of *A. pallida*.

*Aristolochia pallida* Willd., Sp. Pl. 4 (1): 162. 1805. Type: in B-W (see Nardi 1984).

Syn.: *A. macedonica* Bornm., Bot. Jahr. Syst. 61, Beibl. 140: 106. 1928. Type: in B, Herb. Bornm. (see Nardi 1984).

*A. melanoglossa* Bornm., Repert. Spec. Nov. Regni Veg. 19: 195. 1923, *non* Speg. (1899).

Alii: see Nardi (1984).

As a consequence, the range of this species extends eastwards and appears to be split into a Western main distribution complex (Southeastern France, Northwestern Italy) and several isolated minor areas (Northeastern, central and Southern Italy; Southwestern + Southern Yugoslavia, Western Bulgaria, Albania). *A. pallida* grows on hills and mountains at low altitude along internal river valleys, or even on the border of plains once lake basins, thus showing relictual features, mainly in the eastern and southern parts of its range.

### 5. *Aristolochia croatica* Horvatić

*A. croatica* Horvatić is a little-known taxon of the *A. pallida* complex (Horvatić 1933, Ball 1964, Mayer and Greuter 1985) regarded as endemic to Northern Dalmatia from Krk to Pag through Rab and the Croatian coast (Horvatić 1933, Trinajstić 1962,

1973, Jalas and Suominen 1976, Mayer and Greuter 1985). Originally reported from four localities on the island of Pag (Horvatić 1933, 1934), it was said to be a characteristic species of the association *Drypetum jacquinianae* (Horvatić 1933, 1934, Trinajstić 1973), occurring on coarse calcareous gravels along the Northern Adriatic barren lands scoured by the NE wind (called “bora” or “bura”). The main diacritic features of *A. croatica* were said to involve the plant habit, marked by rigid stems with short internodes and leaves decreasing rapidly upward, whereas hardly any emphasis was put on the characters of the reproductive organs (Horvatić 1933, Ball 1964, Trinajstić 1973, Mayer and Greuter 1985).

### 5.1 Materials and methods

In order to assess most carefully the identity of the taxon, we searched for its nomenclatural type and also visited the original localities on Pag (Časka, Sv. Vid, Dinjisko polje, Vlašići).

### 5.2 Results

As Horvatić’s herbarium, formerly kept in ZA, is lost probably as a consequence of war events (Trinajstić, in litt.) and no original material could be found elsewhere, it seems convenient to choose table I included in the protologue as the type of *A. croatica*, as this was never designated by its author. The table is a photograph of a dried specimen labelled “Herbarium D. Stj. Horvatić/*Aristolochia* sp./Otok Pag, Girišće ispod Sv. Vida/12. VI. 1932”. The plant is quite interpretable and perfectly agrees with the original description (Horvatić 1933) as well as with the collection place and date (Horvatić 1934). At first sight the specimen of tab. I seems to fall within the variability range of *A. lutea* Desf.

As regards our field observations, we met plants corresponding to Horvatić’s description only in one locality (Sv. Vid near Girišće); in two other places (Časka, Vlašići) we found instead a quite different, small-leaved *Aristolochia*, related to the *A. rotunda* group. Presumably Horvatić assumed that his taxon, described on material from Sv. Vid, and the entity of Časka and Vlašići were the same species, because they appeared to characterize the same plant association (*Drypetum jacquinianae*). Also, when studying the plants from Časka and Vlašići he may have been struck by the small dimensions of their leaves which looked at first glance similar to the upper ones of the type of his *A. croatica*. In this case the phenotypic character displayed by the populations of Časka and Vlašići may have contributed to strengthen the impression that the small upper leaves could be regarded as a constant feature, and consequently it was assumed as distinctive of *A. croatica*.

On the other hand, stems bearing increasingly smaller leaves are the rule with *Aristolochia*; this biological pattern depends on the growth phase and the rate of development of the plant. Furthermore, in another photograph included in the protologue (Horvatić 1933, fig. 1), which shows one living cultivated specimen of *A. croatica*, the character mentioned is not evident, since the difference in size between the basal and the upper leaves is less conspicuous than in the type (see Horvatić 1933, tab. I) and it looks practically the same as in a large number of individuals of *A. lutea*. Both samples pictured in the protologue (Horvatić 1933, tab. I and fig. 1) show shortened internodes, which is exactly what one expects to see in plants growing on poor soil and in dry environmental conditions.

We collected the *Aristolochia* from Sv. Vid in the same locality cited by Horvatić (1933, 1934) where we found it on calcareous gravels along the borders of oakwoods but not inside the *Drypetum jacquinianae*. The main characters of *A. lutea* were present in this population, but also a certain variability of the vegetative parts could be observed. Well characterized individuals showing the phenotype of *A. croatica* (stout stems, shortened internodes, leaves rigid and pronouncedly decreasing above, rather short petioles) grew side by side with plants not possessing the same marked features. Quite to the contrary they had thin stems, elongated internodes, leaves normally decreasing in size, and petioles always clearly longer than peduncles. Intermediate forms were also present. The flower organization was the same. The phenotype “*croatica*” could generally be associated with rather extreme microedaphic conditions (stony soil permitting little underground development to the plant), while “normal” plants grew even at a distance of a few decimeters where however the soil was deeper.

We must obviously admit that the individual plants show different growth forms as a consequence of changes in the microenvironment. This is not rare within *A. lutea*. In fact, the “*croatica*” phenotype can be met elsewhere too, as proved by some exsiccata from Italy (FI!) found on calcareous gravels.

The large population complex of *A. lutea*, ranging from Asia Minor to Italy in different habitats, embraces several morphological variants as regards their vegetative organization. If we accord such individual or population variants taxonomic recognition, as has been done with *A. croatica*, we ought to accept no less than twenty infraspecific entities within *A. lutea*. However, we refuse to accept this philosophy.

The Yugoslav voucher specimens are:

- Yugoslavia, Croatia, Island of Pag, NE slopes of Sv. Vid near Girišće, calcareous gravels, 40–60 m, 28 Mai 1987, *E. Nardi et C. Nesi Nardi* (FI).

### 5.3 Conclusions

In view of the fact that we regard *A. croatica* as a mere morphological individual variant in response to peculiar environmental conditions, we cannot in any way keep it separate from *A. lutea*. Therefore, we recognize only one species which includes both *A. lutea* and *A. croatica*, and which is accorded the former name for priority reasons.

***Aristolochia lutea*** Desf., Ann. Mus. Natl. Hist. Nat. 10: 295. 1807. Type: in P, Herb. Tournefort (see Nardi 1984).

Syn.: *A. croatica* Horvatić, Prirod. Istraž. Kralj. Jugoslav. 18: 195. 1933. Type: Tab. I in Horvatic’s protologue, showing a dried specimen from Sv. Vid, previously kept in the author’s own herbarium (*lectotypus*, here designated) (E.N.).

Alii: see Nardi (1984).

### 6. *Aristolochia rotunda* L. subsp. *reichsteinii* Nardi

The populations growing on calcareous gravels of Časka and Vlašići on the island of Pag, which Horvatić (1933, 1934) considered conspecific with *A. croatica*, showed altogether the qualitative characters peculiar to the *A. rotunda* complex, but all organs, both vegetative and reproductive, proportionally and homogeneously much reduced in size. We observed in the field that this kind of phenotype is constant within the examined populations.

*A. rotunda* L. subsp. *rotunda* occurs on the same island, too (Horvatić 1934, personal observations), growing even a few hundred metres from the small-leaved populations (for instance, near Vlašići), but inhabiting ecologically different places like damp plains covered with Peucedaneto-Molinietum litoralis or Hordeetum secalini (Horvatić 1934). This taxon is generally well-recognizable at first glance owing to its larger leaves and flowers, taller stems, and more elongated internodes. It possesses a bigger rootstock, too. Among normal individuals which form the majority, there are a few very young specimens showing, in their vegetative organs, the same size-range as the adult plants of the gravels. Yet, even in this case they maintain some differential characters such as a lighter green colour and larger flowers.

The small-leaved populations make up a well-defined systematic unit which seems to be the result of an adaptation process undergone by an ancient *A. rotunda* stock to peculiar environmental conditions, such as may be found on calcareous gravels. This implies an evolutionary trend from a hygrophytic to a xerophytic organization involving physiological and morphological changes. This evolutionary pattern is not uncommon in the *A. rotunda* complex. The allied *A. bianorii* Sennen et Pau, another small-leaved entity adapted to dry calcareous places inside a restricted geographical area (see Nardi 1984, Castroviejo 1986), provides a similar case.

In view of these facts we regard the populations of Časka and Vlašići as belonging to a new taxon of subspecific rank within *A. rotunda*.

***Aristolochia rotunda* L. subsp. *reichsteinii* Nardi, subsp. nov. (fig. 1)**

*Herba* perennis. *Caulorhiza* subterranea globosa (10–15 mm crassa) vel parce oblonga (15–35 × 10–20 mm), simplex vel lobata. *Caules* annui, usque ad 35 cm alti, erecti vel decumbentes, plerumque ramosi, quadrangulares, subglabri vel superne dispersim puberuli. *Folia* atroviridia parce glaucescentia, sessilia vel subsessilia, triangulari-ovata vel ovata, acuta, obtusa vel retusa, basi cordata sinu parvo auriculisque rotundatis, divergentibus, parallelis vel convergentibus, amplexicaulibus; *petiolis* 0–2 mm longis, subglabris vel disperse puberulis; *laminis* 10–25 × 7–22 mm, supra glabris, infra glabris vel minute pubescentibus. *Flores* solitarii, axillares. *Pedunculi* 1–5(–9) mm longi, petiolis subiectis longiores, glabrescentes vel puberuli. *Perianthium* 14–26 mm longum, extus minute pubescens; *utriculo* ovoideo, 2–4 × 2–3.5 mm, intus brunneoviolaceo (vide *MHC* 11F7); *tubo* recto, tubaeformi, basi 1–1.5 mm lato, 5–10 mm longo, viridiflavo (vide *MHC* 3C4), intus hispido atque brunneoviolaceo vittato; *limbo* elliptico, plano, obtuso vel retuso, quinquenervi, 7–14 × 3–6 mm, latiore longioreque quam tubo, toto brunneoviolaceo (vide *MHC* 11F7) vel inferne brunneoviolaceo ac superne viridulo (vide *MHC* 3E7); *fauce* ciliata hispida. *Ovarium* 1–2 mm longum, dense minuteque pubescens.

A duabus subspeciebus adhuc cognitis, *A. rotunda* ssp. *rotunda* atque *A. rotunda* ssp. *insulari* (Nardi et Arr.) Gamis., differt statura demissa amplitudineque omnium organorum perspicue minore, praesertim caulorhizae, internodiorum, foliorum, florum eorumque singularum partium; ab ipsa subspecie *insulari* praeterea recedit caudicis forma numquam definite elongata. Ab *A. bianorii* Sennen et Pau porro distinguitur praecipue caulibus magis ramosis robustisque, internodiis brevioribus, foliis confertis, petiolis brevioribus itemque predunculis floralibus pro rata parte.

Praeclaro magistro et amico dilecto Thadeo Reichsteinio, cuius nonagesimus dies natalis hoc tempore agitur, subspecies dicata.



Fig. 1. *A. rotunda* subsp. *reichsteinii*, Whole plant  $\times 0.65$ , flower (particulars)  $\times 0.97$ .

Typus: "Isola di Pag, pendii calcarei a SO di Vlašići, 27 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI, *holotypus* atque *isotypi*).

*A. rotunda* subsp. *reichsteinii*, known at present only from two localities of the island of Pag on coarse calcareous gravels inside the association *Drypetum jacquinianae*, appears to be a Dalmatian endemic taxon limited to a very restricted area, in which it represents an ecological vicariant of *A. rotunda* subsp. *rotunda*.

Voucher specimens:

- Yugoslavia, Croatia, Island of Pag, Časka, calcareous gravels, *Drypetum jacquinianae* Horvatić, 27 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI).
- Yugoslavia, Croatia, Island of Pag, calcareous slopes SW of Vlašići, *Drypetum jacquinianae* Horvatić, 27 Mai 1985, *E. Nardi et C. Nesi Nardi* (FI, *typus*).

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