A new subspecies of Anemone trifolia L.

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RÉSUMÉ

UBALDI, D. & G. PUPPI (1989). Une nouvelle sous-espèce d'Anemone trifolia L. *Candollea* 44: 137-146. En anglais, résumés français et anglais.

Les auteurs proposent une nouvelle sous-espèce d'*Anemone trifolia* L.: subsp. *brevidentata*, qui se trouve dans les Apennines ligures (Italie). On presente également la typification de l'espèce *Anemone trifolia* L. et les résultats d'une analyse biométrique éxecutée sur quatre populations italiennes de la même espèce.

ABSTRACT

UBALDI, D. & G. PUPPI (1989). A new subspecies of Anemone trifolia L. *Candollea* 44: 137-146. In English, French and English abstracts.
A new subspecies of *Anemone trifolia* L. is proposed here: subsp. *brevidentata*, which is widespread in the Ligurian Apennines and neighbouring areas. In the paper the authors also present the typification of *Anemone trifolia* L., and the results of a biometric analysis on four Italian populations of this species.

Introduction

Anemone trifolia L. is found in five widely separated areas in Europe:

1) the first extends, in the Iberian Peninsula, from Galicia to Northern Portugal (CASTROVIEJO & al., 1986);
2) the second one lies in Italy in the Ligurian Apennines and neighbouring territories (from the Maritime Alps to the Alpi Apuane and the mountains of the Parma province);
3) the third lies in the Central Apennines between the regions of Tuscany and the Marches (Casentino, Montefeltro, S. Marino, Urbino province);
4) the forth is a wide territory including the Eastern Alps (from Southern Tyrol and Trentino), the Julian Alps, Kärnten and Steiermark (ULBRICH, 1905; HEGI, 1965);
5) the fifth is sited in Transylvania on the South-Eastern Carpathians (ULBRICH, 1905).

Furthermore, FOURNIER (1961) reported the presence of the species in the French Pyrenees, but this finding is probably disputable, as can be deduced from the fact that it is not mentioned by GUINOCHET & VILMORIN (1978) in their *Flore de France*.

Moreover, *A. trifolia* is present in the Eastern States of North America, spreading from Pennsylvania to Georgia (BRITTON & BROWN, 1970).

At present in the species *A. trifolia* L. two subspecies are recognised: a) subsp. *trifolia* and b) subsp. *albida* (Mariz) Ulbrich.

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The authors hold that populations of the Eastern Alps, of the Central Apennines and of South-Eastern Europe, belong to the first subspecies (ULBRICH, 1905; TUTIN, 1964; PIGNATTI, 1982; UBALDI, 1982) — and that the populations of the Iberian peninsula belong to the second one (MARIZ, 1886; ULBRICH, 1905; TUTIN, 1964; CASTROVIEJO & al., 1986).

Moreover, it has long been recognized that the populations of the Ligurian Apennines are quite different from those of the Alps and Central Apennines (OBERDORFER & HOFMANN, 1967; HOFMANN, 1968; PIGNATTI, 1982; UBALDI, 1982).

OBERDORFER & HOFMANN (1967) established a new variety (var. *"italica"* Oberd.n.n.) and ascribed it to the subspecies *albida*. Subsequently PIGNATTI(1982) suggested that this variety should be included in the subspecies *trifolia*. With regard to this matter we note that the publication of the variety *italica* was invalid , because the phrase-name was lacking.

After a careful analysis of plants coming from Portugal, the Eastern Alps and Apennines, we conclude that the Ligurian plants should be ascribed to a new subspecies, that we have named *brevidentata*.

In fact, these populations are geografically separate and their characters do not correspond satisfactorily to the subspecies already described.

Since the species Anemone trifolia L. has not yet been typified, in this paper, prior to describing the subspecies *brevidentata*, we will typify the species.

Typification

Anemone trifolia was described by LINNAEUS (Sp. pl., 1753: 540-541) with the phrase-name: "Anemone foliis ternatis ovatis integris serratis, caule unifloro". The same phrase-name also appears in a previous work, Hortus upsaliensis (1748), whereas in his Hortus cliffortianus (1738), also cited in Species plantarum, the same species is described as follows: "Anemone foliolis ovatis integris serratis".

We notice that Linnaeus used the term "ovatis" in defining leaflets (that he called "foliis"), although usually *Anemone trifolia* leaflets are lanceolate or ovate-lanceolate.

Two specimens of *A. trifolia* with ovate leaflets were in Linnaeus possession before 1753:

a) A first specimen, belonging to the Clifford Herbarium (BM), that is annotated with "trifolia" by Linnaeus himself, as well as with "p. 224. Anemone 2" (respectively the page and the number that identify the species in Hortus cliffortianus).
b) A second specimen (SAVAGE, 1937), conserved at the Linnean Society of London (LINN), annotated by Linnaeus (SAVAGE, 1945) with "13. trifolia" (13 is the number of the species in Sp. pl. 1753). Comparing the two specimens (BM and LINN) it can be seen that they both match the diagnosis published in 1753, and moreover their morphological features (chiefly the leaflets toothing) show a clear relationship with the populations spread in the Eastern Alps. This fact is in accordance with the traditional belief that the plant described by Linnaeus came from the Eastern Alps (in fact the name was primarily attached by Authors to these populations), but is in contradiction with the geographical information given by Linnaeus himself: "Habitat in Gallia" (Sp. Pl. 1753).

We notice that in France the presence of *Anemone trifolia* is confirmed only in the Maritime Alps (GUINOCHET & VILMORIN, 1978).

However, in Hortus cliffortianus (1738) LINNAEUS stated "Crescit rarius in Suecia et juxta Parisios", while in Hortus upsaliensis (1748) he wrote "Habitat ... in Suecia nondum reperi spontaneam, interim non longinquam esse constet". The last sentence leads us to think that, at least until 1748, Linnaeus had no direct knowledge about the geographical distribution of this species. In the protologus of Species plantarum, besides his Hortus upsaliensis and Hortus cliffortianus, LINNAEUS cited VAN ROYEN (1740), DALIBARD (1749), BAUHIN (1650) and DODONAEUS (1616).

Among these references, only the Florae parisiensis prodromus by DALIBARD provides geographical information on the species (being a "Catalogue des plantes qui naissent dans les environs de Paris"). This indication of the presence of *A. trifolia* in the area around Paris is questionable

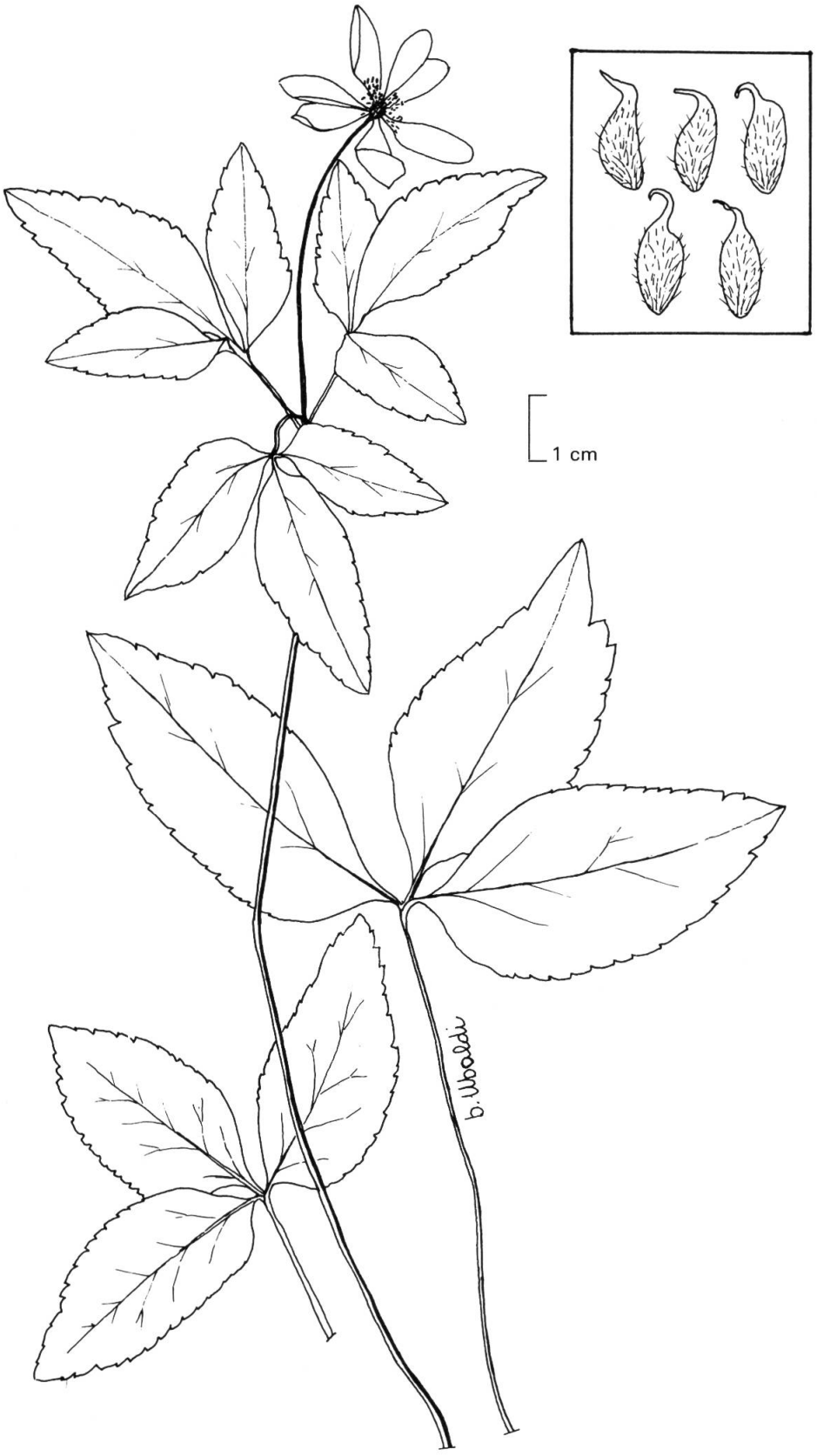

Fig. 1. — Type specimen of *Anemone trifolia* subsp. *brevidentata*.

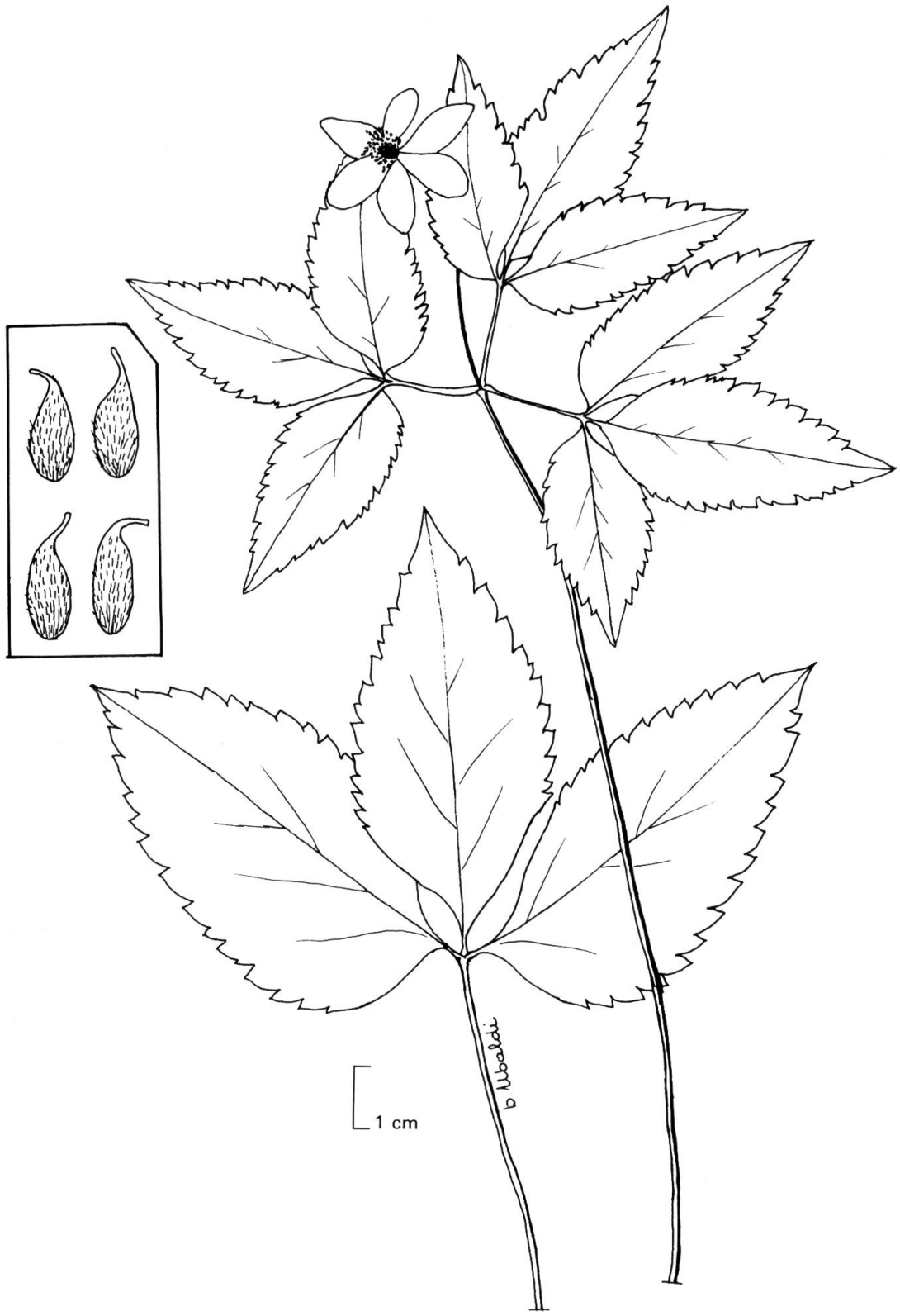

Fig. 2. — A specimen of *Anemone trifolia* subsp. *trifolia* coming from the Marches.

and probably is simply taken from Hortus Cliffortianus, which seems to come in turn from VAILLANT (1719): "M. Danty d'Ifinard à découvert notre troisième espèce de Sylvie dans le Bois de Chantilly. Elle n'est point rapportée dans l'Histoire des Plantes qui naissent aux environs de Paris.".

To sum up, the sentence "Habitat in Gallia" could be simply a confirmation of the previous "juxta Parisios", written in Hortus cliffortianus and probably taken from VAILLANT (1719).

In addition to the cited specimens, we have to mention another antique specimen certainly seen by Linnaeus (even if not classified by him: see SAVAGE, 1937), conserved in the Burser Herbarium at Uppsala (vol. IX: 82, UPS). This last one, however, must be discarded in the typification, because it conflicts with the diagnosis: in fact, its leaflets are not ovate.

We also discard the LINN specimen (even though it agrees with the diagnosis) because it is an anomalous plant: the shape of its leaflets (broadly ovate and obtuse) occurs very rarely in wild populations. In conclusion, we designate the specimen of the Cliffort Herbarium (BM) as the lectotype, since it agrees with Linnaeus' phrase-name and it corresponds with current usage of the name.

Anemone trifolia L., Species plantarum 1: 540-541 (1753).

Lectotype: specimen in Herb. Clifford (BM) p. 224. Anemone 2.

Anemone trifolia L. subsp. **trifolia**

Populations living in the Eastern Alps, Central Apennines and possibly also those of the Carpathian Mountains (ULBRICH, 1905) and of North America (as can be seen from the picture published by BRITTON and BROWN, 1970), belong to this subspecies.

The subspecies shows subglabrous leaflets, markedly toothed with teeth 2-3 mm deep (this character is more evident in the basal leaves), although some deeper incisions can be found especially in the involucral leaves.

The colour of the leaves is dark green, and the shape could be defined ovate-lanceolate or ovate-acute in the basal ones, while it varies from a lanceolate to ovate-lanceolate form in the involucral ones.

Rhizome is thin: 2-3 mm in diameter, seldom more (i.e. 4-5 mm in plants from Vallombrosa (Italy)).

Sepal shape varies from ovate or broadely elliptical on the outside to obovate or oblong in the inner part of the perianth.

The beak of achenes is generally erect, slightly flexuous, sometimes slightly curved; achenes with the beak bent in a large hook can rarely be found (i.e. in some specimens from the Marches).

Flowers of Alpine populations generally have 6(-7) sepals, while the plants from the Central Apennines bear 6-8(-9) sepals.

The colour of flowers is white in the Alpine populations, or pale blue (perianth and anthers) in some localised micropopulations (var. *coerulescens* Hausmann, in FIORI, 1969).

In the plants from the Apennines sepals are white and soffused pink, but never blue; greenish foliaceous sepals are seldom found.

In general, the size of flowers is greater in plants from the Apennines compared to those of the Alps (Table 1).

As regards the plant size, we notice that dimensions vary depending on environment. For example it has been observed (see Tables 2 and 3) that plants living in an eutrophic beech wood *(Anemoni trifoliae-Fagetum)* bear leaves larger than the ones living in a mesoxerophilous pine wood *(Orno-Pinetum nigrae)* or in *Ostrya* woods.

Anemone trifolia L. subsp. **albida** (Mariz) Ulbrich

According to TUTIN (1964) and PIGNATTI (1982) only Iberian populations of *A. trifolia* should be ascribed to the subspecies *albida*. In the past, some authors who used the Tutin's key in "Flora Europaea" (1964), also attributed Ligurian and some other Italian populations to this subspecies (OBERDORFER and HOFMANN, 1967; HOFMANN, 1968; BRILLI-CATTARINI, 1971; UBALDI, 1982). In fact TUTIN (1964), in describing the subspecies *albida*, indicates some

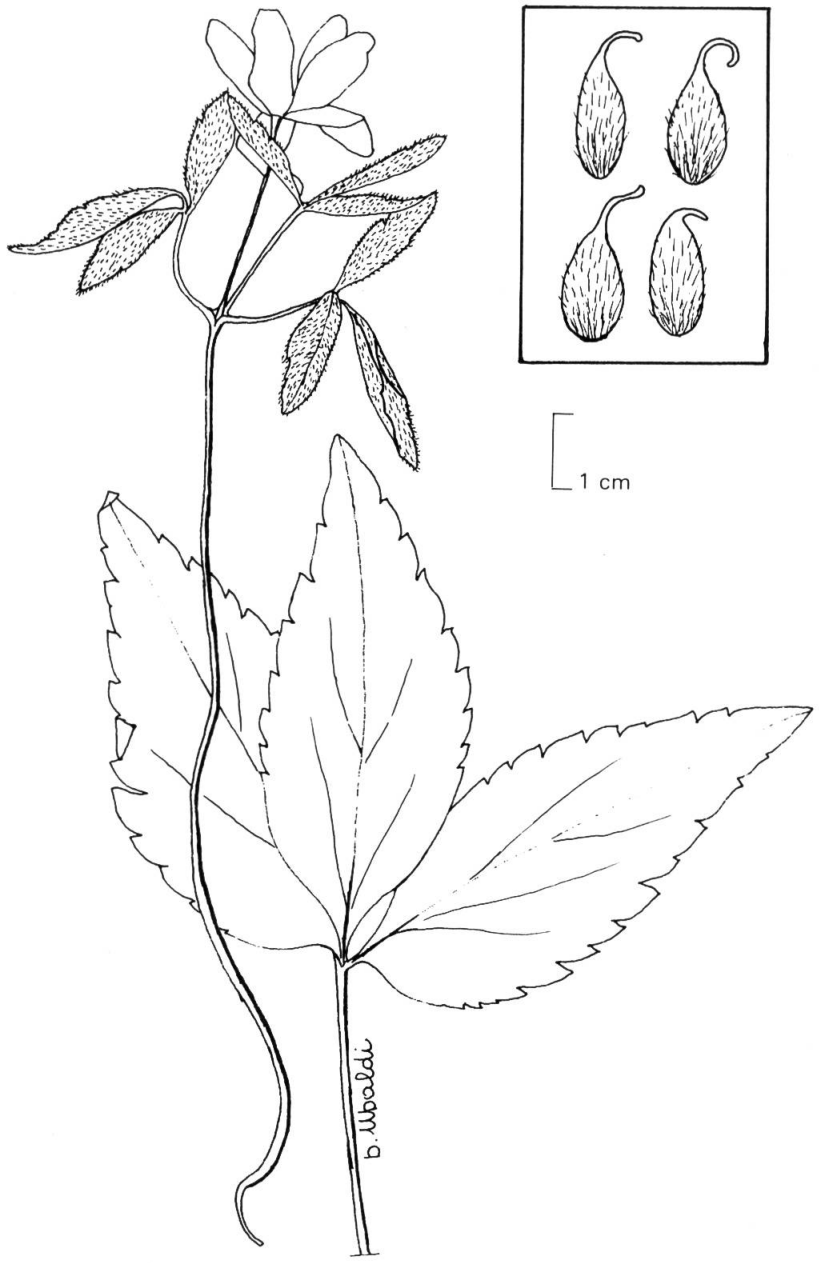

Fig. 3. — A specimen of *Anemone trifolia* subsp. *albida* coming from Portugal (Villa Nova de Gaya-Grijo').

	a	b	c	$\bar{x}$	s
a	—	**	*	6.48	0.71
b	**	—	ns	5.96	0.20
c	*	ns	—	6.08	0.28
Sepal number					

	a	b	c	$\bar{x}$	s
a	—	**	**	18.38	2.06
b	**	—	ns	15.44	1.75
c	**	ns	—	15.48	1.46
Length of sepals (mm)					

	a	b	c	$\bar{x}$	s
a	—	**	**	9.00	0.82
b	**	—	**	7.19	0.82
c	**	**	—	6.56	0.76
Width of sepals (mm)					

	a	b	c	$\bar{x}$	s
a	—	ns	**	2.05	0,24
b	ns	—	**	2.15	0.20
c	**	**	—	2.38	0.27
Length/width ratio of sepals					

Table 1. — Results of analysis of variance on sepal measurements, between groups of plants of *Anemone trifolia* subsp. *trifolia* (a, b) and subsp. *brevidentata* (c). Plants of group a) come from the Central Apennines, collected in *Aceri obtusati-Quercetum cerris (Laburno-Ostryon);* plants of group b) are from the Eastern Alps and were collected in *Anemoni trifoliae-Fagetum*; plants of group c) are from the Ligurian Apennines, collected in an *Ostrya* wood *(Campanulo-Ostryon).* **:significant difference at the 1% level; *: significant difference at the 5% level; ns.: difference not significant; x: mean; s: standard deviation.

	a	b	b'	c	$\bar{x}$	s
a	—	**	ns	**	60.68	7.79
b	**	—	**	**	74.35	7.66
b'	ns	**	—	**	57.22	12.65
c	**	**	**	—	42.22	8.56
Length of the central leaflet (mm)						

	a	b	b'	c	$\bar{x}$	s
a	—	ns	*	**	32.11	4.19
b	ns	—	**	**	34.55	5.45
b'	*	**	—	**	27.94	3.09
c	**	**	**	—	18.96	4.84
Width of the central leaflet (mm)						

	a	b	b'	c	$\bar{x}$	s
a	—	**	ns	**	60.21	8.20
b	**	—	**	**	74.12	7.48
b'	ns	**	—	**	55.31	9.95
c	**	**	**	—	39.69	8.85
Length of lateral leaflets (mm)						

	a	b	b'	c	$\bar{x}$	s
a	—	ns	*	**	32.56	4.45
b	ns	—	**	**	35.40	5.23
b'	*	**	—	**	27.97	3.17
c	**	**	**	—	17.90	4.47
Width of lateral leaflet (mm)						

	a	b	b'	c	$\bar{x}$	s
a	—	*	ns	**	1.90	0.19
b	*	—	ns	ns	2.18	0.29
b'	ns	ns	—	ns	2.12	0.44
c	**	ns	ns	—	2.28	0.38
Length/width ratio of the central leaflet						

	a	b	b'	c	$\bar{x}$	s
a	—	*	ns	**	1.86	0.17
b	*	—	ns	ns	2.11	0.57
b'	ns	ns	—	*	1.97	0.25
c	**	ns	*	—	2.25	0.38
Length/width ratio of lateral leaflet (mm)						

Table 2. — Results of analysis of variance on basal leaves between groups of plants of *Anemone trifolia* subsp. *trifolia* (a, b, b') and subsp. *brevidentata* (c) coming from the same localities cited for Table 1. Plants of group b' are from the Eastern Alps and were collected in an *Orno-Pinetum nigrae;* other symbols as in Table 1.

	a	b	c	$\bar{x}$	s
a	—	**	**	40.32	6.85
b	**	—	**	51.68	8.82
c	**	**	—	33.10	6.70
Length of central leaflets (mm)					

	a	b	c	$\bar{x}$	s
a	—	**	ns	16.34	3.37
b	ns	—	**	17.61	4.09
c	**	**	—	12.43	3.55
Width of central leaflets (mm)					

	a	b	c	$\bar{x}$	s
a	—	**	ns	2.52	0.39
b	**	—	*	3.02	0.58
c	ns	*	—	2.73	0.36
Lenght/width ratio of central leaflets					

	a	b	c	$\bar{x}$	s
a	—	**	ns	15.22	4.77
b	**	—	**	18.83	3.80
c	ns	**	—	14.46	4.22
Length of petioles (mm)					

Table 3. — Results of analysis of variance on involucral leaves between the same groups of plants considered in Table 1. Symbols as in Table 1.

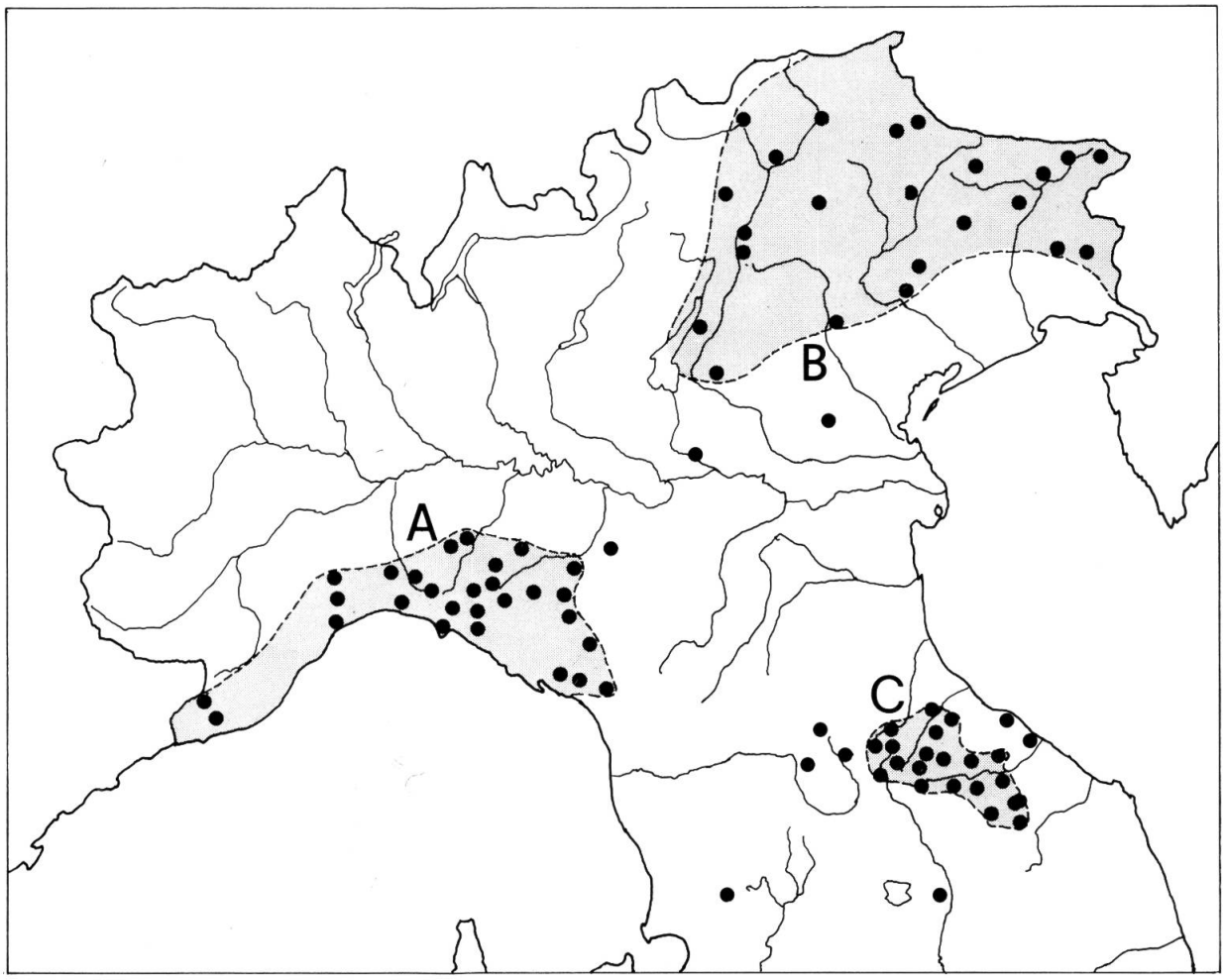

Fig. 4. — Map of the geographical distribution of *Anemone trifolia* in Italy. **A:** subsp. *brevidentata;* **B-C:** subsp. *trifolia.*

differential characters, that in our experience (see also PIGNATTI, 1982) can be found also in the subspecies *trifolia:* white anthers, elliptical sepals, fruit heads nodding.

The features that differentiate subspecies *albida* from *trifolia* are (see also MARIZ,1886): the small size of involucral leaves (mm 12-30 × 3-10) that are densely hirsute ; moreover, the greater thickness of rhizome (4-5 mm in diameter) and the shape of the beak of achenes, which are curved.

Basal leaves and sepals, on the contrary, are undistinguishable in colour and shape from those of the subspecies *trifolia*.

Finally, we point out that the reduction of the species *Anemone albida* Mariz into a subspecies should be attributed (in accordance with CASTROVIEJO (1986)) to ULBRICH (1905) and not to TUTIN (Feddes Repert. 69: 53, 1964).

Anemone trifolia L. subsp. **brevidentata** Ubaldi & Puppi, **subsp. nov.**

This subspecies includes populations living along the Ligurian Apennines and neighbouring territories. Differential characters compared to subspecies *trifolia* (see also OBERDORFER and HOFMANN, 1967; HOFMANN, 1968; PIGNATTI, 1982; UBALDI, 1982) are the slight toothing of the leaves (with teeth about 1 mm deep), which have a light green subglaucous color, and the shape of the beak of achenes, which are curved.

Moreover, sepals are generally more slender (length/width ratio) than those of subspecies *trifolia* (cf. Table 1).

The sepals are 6-7, white and soffused pale pink, and their shape is quite similar to that of the subspecies *trifolia*. Anthers are white.

The size of plants is, on average, smaller than in subspecies *trifolia* (cf. Tables 2-3).

As regards the subspecies *albida*, there are differences in the colour of leaves,in the shape and indumentum of involucral leaflets (they are broader and glabrescent), in the toothing of basal leaves (they are slightly dentate) and in the thickness of rhizoma (it is thinner). Subsp. *brevidentata* resembles subsp. *albida* as regards the shape of the beak of achenes, which are hooked.

Diagnosis. — A typo differt foliis e viridi pallentibus, subglaucis, magis leviter serratis (dentibus 1 mm altis) nec non sepalis fere angustioribus; acheniorum rostro recurvato.

Differt ab *Anemone albida* Mariz (Bol. Soc. Brot. 4, 1886) foliis involucrantibus glabrescentibus, foliis basilaribus magis leviter serratis, rhizomate graciliore (2-3 mm crasso).

Typus: Borzonasca (Genova), iuxta viam ad Brizzolara in silva *Ostryae carpinifoliae*, 2 Mai 1979, Ubaldi (BOLO) (holotypus).

Materials

We analysed Italian material from the Herbaria of Florence (FI), Bologna (BOLO), and Verona (Herbarium Zangheri at the Museum of Natural History, VER) and twelve Iberian specimens of the Herbarium kept at the Faculty of Science of Lisbon (LISU).

In addition we either collected or received specimens from various localities in the Alps and Apennines.

The following is a list of the areas of origin of all the specimens analysed: **Eastern Alps:** Verona, Pontebba, Tarvisio, South Tyrol, Trento, Natisone Valley, Valdinogher, Nova Gorica. **Liguria:** Stella, Portofino, Borzonasca. **Piedmont:** Voltaggio. **Lombardy:** Brallo and S.Albano (Pavia). **Emilia:** Mount Menegosa, Bobbio, Sillara Pass, Tana di Monte Nero, Borgo Val di Taro, Bedonia, Ostia Parmense. **Tuscany:** Massa, Vallombrosa, Pieve S.Stefano, Alpe della Luna, Sestino. **Romagna:** Montecoronaro, Verghereto, S.Piero in Bagno, Torriana, Muraglione Pass. **Republic of S. Marino:** Mount Titano. **Marches:** Carpegna, Pennabilli, Piandimeleto, Sassocorvaro, Bocca Trabaria, Petriano di Urbino, Mount Nerone , Pergola, Mount Catria , Pesaro, Fenile di Fano, Mount S. Bartolo (Fontecorniale). **Umbria:** Perugia, Bocca Serriola Pass. **Portugal:** Villa Nova de Gaya-Grijo', Fulgueiros, Serra de Pilar.

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