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BENITO VALDÉS

## The Euro+Med treatment of *Boraginaceae*

### Abstracts

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The delimitation and tribal subdivision of the *Boraginaceae* are discussed, and a synonymic survey of the genera accepted for the purpose of the Euro+Med Project is presented. Three new combinations at subspecies rank are validated in the genera *Aegonychon*, *Cynoglottis* and *Myosotis*.

A concise characterisation of the Euro+Med PlantBase Project, its main purposes and planned “products”, and of the rationale and prospects of the present Notulae series, can be found in the first instalment of the Notulae (Willdenowia 33: 37-38. 2003). Further information on the setup and structures of Euro+Med is displayed on the Internet (<http://www.euromed.org.uk/>).

The family *Boraginaceae* is a natural group already recognised by Caesalpinus (De Plantis, 1583), Jussieu (Gen. Pl., 1789) and Candolle & Candolle (Prodr. 9: 466-559. 1845; 10: 1-178. 1846). It is formed by about 100 genera and almost 2000 species distributed mainly in temperate, cold and subtropical areas.

Candolle & Candolle (l.c.) divided *Boraginaceae* into four tribes: *Cordieae*, *Ehretieae*, *Heliotropieae* and *Boragineae*, the latter subdivided into six subtribes: *Cerinthinae*, *Echiinae*, *Lithosperminae*, *Craniosperminae*, *Anchusinae* and *Cynoglossinae*. This tribal classification was adopted by Bentham & Hooker (Gen. Pl. 2: 832-865. 1876) but recognising only four subtribes within *Boragineae*: *Cynoglossinae*, *Eritrichinae* (the *Craniosperminae* of the Candolles), *Anchusinae* and *Lithosperminae*, including here the *Cerinthinae*, *Echiinae* and *Lithosperminae* of the Candolles.

Gürke (in Engler & Prantl, Nat. Pflanzenfam. 4(3a): 71-131. 1893) divided the family into four subfamilies: *Cordioideae*, *Ehretioideae*, *Heliotropioideae* and *Boraginoideae*, the latter subdivided into seven tribes, which were reduced to four by Johnston (in Contr. Gray Herb. Harvard Univ. 73: 42-78. 1924) according to morphological and palynological characters: *Lithospermeae*, *Anchuseae*, *Eritrichieae* and *Cynoglosseae*.

Although many authors, including Melchior (in Engler, Syllabus, ed. 12, 2. 1964), have considered this family with the limits given by the Candolles, it appears artificial to include within the same family on the one hand woody tropical and subtropical plants with fleshy fruits

Table 1. The Euro+Med genera of *Boraginaceae*. Accepted names appear in bold-face type, their synonyms in regular italics. Bracketed names are of non-native genera with naturalised species.

<b><i>Heliotropioideae</i></b>	<b><i>Echieae</i></b>	<b><i>Lappula</i></b>
<i>Argusia</i>	<i>Echium</i>	= <i>Echinosperrum</i>
= <i>Tournefortia</i> , p.p.		= <i>Hackelia</i>
<i>Ceballosia</i>	<b><i>Boragineae</i></b>	= <i>Heterocaryum</i>
<i>Heliotropium</i>	<i>Anchusa</i>	= <i>Sclerocaryopsis</i>
	= <i>Lycopsis</i>	<b><i>Myosotis</i></b>
<b><i>Boraginoideae</i></b>	<i>Borago</i>	<b><i>Ogastemma</i></b>
<b><i>Lithospermeae</i></b>	<i>Brunnera</i>	<b><i>Rochelia</i></b>
<i>Aegonychon</i>	<i>Caccinia</i>	= <i>Cervia</i>
= <i>Margarospermum</i>	<i>Cynoglottis</i>	<b><i>Trigonocaryum</i></b>
<i>Alkanna</i>	<i>Elizaldia</i>	<b><i>Trigonotis</i></b>
<i>Arnebia</i>	<i>Mertensia</i>	
<i>Buglossoides</i>	= <i>Steenhammera</i>	<b><i>Cynoglosseae</i></b>
<i>Cerinth</i>	<i>Nonea</i>	<b><i>Cynoglossum</i></b>
<i>Echiochilon</i>	<i>Pentaglottis</i>	= <i>Mattia</i>
<i>Huynhia</i>	= <i>Caryolopha</i>	= <i>Mattiastrum</i>
<i>Lithodora</i>	<i>Pulmonaria</i>	= <i>Paracynoglossum</i>
<i>Lithospermum</i>	<i>Symphytum</i>	= <i>Paracaryum</i>
<i>Macrotomia</i>	= <i>Procopiana</i>	= <i>Pardoglossum</i>
= <i>Aipyanthus</i>	<b><i>Trachystemon</i></b>	= <i>Rindera</i>
<i>Mairetis</i>	<b><i>Trichodesma</i></b>	= <i>Solenanthus</i>
<i>Moltkia</i>	= <i>Friedrichsthalia</i>	= <i>Suchtelenia</i>
<i>Moltkiopsis</i>	<b><i>Eritrichieae</i></b>	= <i>Trachelanthus</i>
<i>Neatostema</i>	[ <i>Amsinckia</i> ]	<b><i>Gyrocarium</i></b>
<i>Onosma</i>	<b><i>Asperugo</i></b>	<b><i>Halacsya</i></b>
<i>Paramoltkia</i>	<b><i>Eritrichium</i></b>	= <i>Zwackhia</i>
		<b><i>Omphalodes</i></b>

(subfamilies *Cordioideae* and *Ehretioideae*) and on the other hand herbaceous plants of warm, cold and subtropical areas with dry fruits often formed by four nutlets (subfamilies *Heliotropioideae* and *Boraginoideae*). Hence, *Ehretiaceae* (including *Ehretioideae* and *Cordioideae*) have been separated from *Boraginaceae* s.str. by several authors, including Johnston (in J. Arnold Arbor. 34: 259-299. 1953, 35: 1-81. 1954), a recognised expert on *Boraginaceae*, following Brown (Prodr., 1810) and Lindley (Intr. Nat. Syst. Bot., 1830) who had already recognised these as *Cordiaceae* and *Ehretiaceae*, respectively.

For Euro+Med, *Boraginaceae* have been considered excluding *Ehretiaceae* (= *Cordiaceae*) and divided into two subfamilies: *Heliotropioideae*, more primitive, and *Boraginoideae*. *Coldenia* L. and *Cordia* L. are consequently excluded from the family. For *Boraginoideae*, the classification by Johnston (l.c. 1924) has been followed, but as proposed by Candolle & Candolle (l.c.) and accepted by Bramwell (in Heywood, Fl. Pl. World: 235-236. 1978), *Echieae* are segregated from *Lithospermeae* mainly on account of their zygomorphic corolla with the stamens inserted at different heights. Consequently, *Boraginoideae* are divided into five tribes, which form three separate evolutionary lines: one is formed by the more primitive *Lithospermeae* and the derived *Echieae*; the second by *Eritrichieae* and its derivative, *Cynoglosseae*; *Boragineae* (= *Anchuseae*) form a third, rather natural collateral group, most probably derived from *Lithospermeae*.

*Boragineae*, *Eritrichieae* and *Echieae* include well characterised genera. The same is true for *Lithospermeae*, where Johnston (l.c. 1953, 1954) has greatly contributed to separate a series of genera clearly characterised by morphological, karyological, biological and palynological char-

acters (see also Luque & Valdés in Bot. J. Linn. Soc. 88: 335-350. 1984; Díez & al. in Grana 25: 171-176. 1986; Valdés in Actes Simp. Bot. Pius Font Quer 2: 43-47. 1992). However, within *Cynoglosseae* the segregation of several genera related to the type genus *Cynoglossum*, mainly based on fruit and androecium characters, seems to be rather artificial. It has consequently been considered appropriate, following Greuter (in Willdenowia 11: 32-33. 1981), to include *Mattia*, *Mattiastrum*, *Paracynoglossum*, *Paracaryum*, *Pardoglossum*, *Rindera*, *Solenanthus*, *Suchtelenia* and *Trachelanthus* into *Cynoglossum* s.l. until further taxonomic and biological studies covering the whole complex indicate another alternative. Although originally placed in *Eritrichieae* (Valdés in Willdenowia 13: 108. 1983), *Gyrocarium* belongs to *Cynoglosseae*.

In Table 1 the accepted Euro+Med genera of *Boraginaceae* are listed according to the adopted classification of the family.

The following new combinations need to be established:

*Aegonychon goulandrionum* subsp. **thessalicum** (Aldén) Valdés, **comb. nova**  $\equiv$  *Lithospermum goulandrionum* subsp. *thessalicum* Aldén in Bot. Not. 129: 305. 1976.

*Cynoglottis barrelieri* subsp. **longisepala** (T. Georgiev & Kitanov) Ančev & Valdés, **comb. nova**  $\equiv$  *Anchusa barrelieri* var. *longisepala* T. Georgiev & Kitanov in Izv. Bulg. Bot. Druž. 8: 75. 1939.

*Myosotis scorpioides* subsp. **radicans** (Opiz) Valdés, **comb. nova**  $\equiv$  *Myosotis radicans* Opiz in Berchtold & al., Ökon.-Techn. Fl. Böhm. 2(2): 113. 1839  $\equiv$  *Myosotis palustris* subsp. *radicans* (Opiz) R. Schust.

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