The Euro+Med treatment of Boraginaceae in Willdenowia 34 — a response

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Abstracts


The classification of B. Valdés proposed in Willdenowia 34 in 2004 is shown to be for practical purposes incomplete, incorrect, inconsistent and out of date. A revised list of genera and tribes of Boraginales (Boraginaceae s.l.) occurring in the region based on recent data is presented.


In a Euro+Med Notula (No. 10) in Willdenowia 34: 59-61, 2004, B. Valdés presented his view of Boraginaceae classification. The most recent literature citation in his article dates from 1992, thus ignoring completely the morpho-anatomical and molecular work published during the last decade. This is unfortunate, because this research has brought a massive improvement of our understanding of taxon limits and phylogenies in Boraginales (e.g. Al-Shebaz 1991, Böhle & al. 1996, Diane & al. 2002, Ferguson 1998, Gottschling & al. 2001, Gottschling & Hilger 2001, Hilger & Böhle 2000, Hilger & Diane 2003, Hilger & al. 2004, Långström & Chase 2002, Långström & Oxelman 2003, Lönn 1999, Smith & al. 2000). A “consensus taxonomic core” should try to evaluate all serious attempts at clarifying relationships and should certainly include recent views on the taxonomy and phylogeny as well as a discussion of the traditional publications. While molecular data represent only one window on reality, they do provide deep new insights
into traditional groupings based on morphology, some of which have to be called tentative at best. Ignoring recent molecular data in morphologically ambiguous cases is likely not a helpful approach. Monophyly is much debated as the sole guideline for taxon delimitation, but provided the evidence for it is sound it is generally the most objective basis for taxonomic grouping (although in some cases a judgement may be made that paraphyletic taxa are in practical terms more acceptable).

On the basis of recent studies on Boraginales, we here want to challenge various judgements and taxonomic decisions provided by Valdés (2004).

1. Delimitation of the family. – Boraginaeae s.l. in his sense are paraphyletic. They either have to include Hydrophyllaceae and Lennaceae at subfamily rank or the subfamilies (Cordioideae, Ehretioideae, Heliotropioideae, Boraginoideae) have to be elevated to family rank. Irrespective of this subjective decision on rank, the arbitrary exclusion of taxa belonging to the monophyletic Boraginales (= Boraginaeae s.l.) is not justified. Hydrophyllaceae (Nemophila and Phacelia as introduced taxa in Europe!) and Lennaceae are clearly nested in Boraginales, and have to be accommodated in some way, most probably in or near Ehretiaceae (Ferguson 1998, Smith & Pamphelis 1998, Smith & al. 2000, Gottschling & al. 2001). Valdés (2004) accepts the segregation of Cordioideae and Ehretioideae, allegedly following I. M. Johnston, but this was never proposed by this outstanding expert of the taxonomy of Boraginaeae in the traditional sense. In the two publications cited in this respect (Johnston 1953, 1954), neither the name Cordioideae nor Ehretioideae are even mentioned. Valdés unites both taxa into one family (which is open to discussion) and uses Ehretiaceae as the proper name. This is, furthermore, formally incorrect, since the name Cordiaceae R. Br. ex Dumort. (1829) has priority over Ehretiaceae Mart. ex Lindl. (1830, see Taxon 49: 292. 2000).

Considering Heliotropioideae (= Heliotropiaceae) as the more “primitive” sister of Boraginaeae s.str. is very heterodoxical, since recent molecular data clearly place it as sister to Cordiaceae and Ehretiaceae (Gottsching & al. 2001), with Boraginaeae as sister group to these three woody clades plus Hydrophyllaceae. It is particularly difficult to understand how Valdés’s interpretation and his taxonomic conclusions contribute towards a more comprehensible taxonomic consensus. The term “primitive” as such is also more than ambiguous or confusing, since the floral morphology in Heliotropiaceae is probably the most derived morphology anywhere in Boraginales (style stigma complex, Gürke 1894, Al-Shebaz 1991), so the statement is both taxonomically irrelevant and morphologically incorrect. Heliotropiaceae may retain some plesiomorphic character states in vegetative morphology, but to consider them as some boraginalean “Ursuppe” is grossly wrong.

2. Delimitation of the tribes. – The statement that the tribes Boragineae, Lithospermeae, Echieae and Eritrichieae can be sorted into “primitive” and “derived” groups is bold, and the implicit statement that they represent natural groups as here defined is in our view incorrect. The judgement that the long, yellow, tubular corollas of, e.g., Onosma (Lithospermeae) are less derived than the zygomorphic corollas of Echium, justifying tribal rank of the latter, is very subjective, and the statement as such is unsubstantiated. Molecular data also strongly indicate that the traditionally defined tribes need some serious re-adjustments, and Table 1 summarizes the current consensus on tribal classification. Salient points are that Echieae is firmly nested in Lithospermeae (Böhle & al. 1996, Hilger & Böhle 2000, Långström & Chase 2002) and has to be reduced under that tribe. Furthermore, Oogastemma does not belong to Eritrichieae and Echiochilon does not belong to Lithospermeae, both instead form part of the Echiochileae (Lönn 1999, Långström & Chase 2002, Långström & Oxelmann 2003).

3. Delimitation of the genera. – We are not sure what to make of the ambiguous statement “Boragineae, Eritrichieae and Echieae include well characterised genera” (Valdés 2004: 60).
Strictly speaking, the statement is true since there are some well characterised genera in each of these groups. If the sentence is, however, supposed to mean that all genera of these tribes are well characterized, then we have to disagree (see, e.g., Anchusa, Hilger & al. 2004).

3.1. Heliotropioideae. – Neither Ceballosia nor Argusia can be retained as genera, since both are firmly nested in Old World Heliotropium, a finding that is supported by both molecular and morphological data (Hilger & Diane 2003), and Argusia itself even might be polyphyletic. Heliotropium is thus the only genus of the subfamily that deserves recognition in Europe (and Euploca in northern Africa). The affinity between Tournefortia and Argusia is not borne out by closer study, and Tournefortia is a largely tropical genus that is found nowhere near Europe (Hilger & Diane 2003, Verdcourt 1991).

3.2. Lithospermeae. – The genera as listed are ill-defined and the list of names is incomplete or taxonomically inconsistent. Podonosma is completely omitted, Halacsya is erroneously placed...
in Cynoglosseae instead of Lithospermeae (compare Seibert 1978 for nutlet morphology and anatomy), Pontechium as segregate of Echium is not mentioned at all, neither as valid name nor as synonym (Hilger & Böhle 2000). Aegonychon S. F. Gray (1821) is a later synonym of Buglossoides Moench (1794). If Aegonychon (type: A. purpureocaeruleum, Holub 1973) was to be kept separate from Buglossoides (type: B. tenuiflorum, Johnston 1954) and Lithospermum, then it would have to be shown that A. goulandriorum is actually more closely related to B. purpureocaeruleum than either is to Buglossoides arvensis, but we are not aware of such a study. For the justification of a genus Buglossoides see Clermont & al. (2003). Echiochilon belongs to tribe Echiochileae (as does Ogastemma, see above, Lönn 1999, Långström & Chase 2002).

3.3. Boragineae. – Boragineae is at present the best investigated tribe of Boraginaceae s.str. (contributions of the Selvi group, Florence). The list of genera by Valdés is incomplete and omits several established generic names, such as Hormuzakia, Anclusella, Paraskevia, Gastrocotyle and Phyllocara (Hilger & al. 2004). If such names are not accepted, then they should at least be cited as synonyms and with an indication where they supposedly belong. Genus delimitation in Boragineae is indeed anything but straightforward and the recent literature is full of taxonomic re-evaluations and transfers of individual species from one genus to the other, especially in paraphyletic Anchusa s.l. (see the comprehensive treatment by Hilger & al. 2004 and references therein). There is no consensus at all about the affinities of Mertensia, and it would be more honest to leave this genus with “incertae sedis”, than arbitrarily “tidying up” and placing it into Boragineae (Hilger & al. 2004). Neither Caccinia nor Trichodesma are generally accepted as belonging to Boragineae (see Hilger & al. 2004) and may best be placed in a separate tribe Trichodesmeae (Riedl 1967).

3.4. Eritrichieae and Cynoglosseae. – The taxon delimitations in these two tribes are very wide and Cynoglossum and Lappula are defined by Valdés in an extremely broad sense. This is a perfectly legitimate approach, but is highly inconsistent with the recognition of tiny segregate genera in Boragineae (e.g., Elizaldia, Cynoglotitis) and Lithospermeae (e.g., Huynhia, Aegonychon, Macrotomia) and thus represents a distinct disadvantage for the aim of a “consensus classification”.

In summary, the classification proposed by B. Valdés (2004) is incomplete, incorrect, inconsistent and out of date. Making new formal combinations, as he does, on such a weak scientific basis runs counter to all attempts at providing a stable consensus classification and stable names with a minimum of synonyms and is bound to generate longer and longer lists of useless names.

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