



## Codonaceae—a newly required family name in Boraginales

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### Abstract

Codonaceae (Boraginales) is here proposed as a novel segregate family from Boraginaceae, based on Boraginaceae subfamily Codonoideae. The family consists of a single genus, *Codon* (2 species, Southwest Africa) which is traditionally considered as the only African representative of the predominantly New World family Hydrophyllaceae. Recent molecular studies clearly indicated that it is more closely allied to Boraginaceae *s.str.* (“herbaceous” Boraginaceae), than to Hydrophyllaceae, however, *Codon* is morphologically highly aberrant for both families with its polymeric perianth and androecium, style inserted on the apex of an ovoidal ovary, many-seeded, sub-bilocular, loculicidal capsules, endospermous seeds with a very irregularly reticulate testa, and peculiar spines with a multicellular pedestal and unicellular apex. The genus was therefore recently placed into a monotypic subfamily Codonoideae in a broadly defined Boraginaceae *s.l.* (i.e., including Heliotropioideae, Hydrophylloideae, Cordioideae as subfamilies). We advocate the recognition of the morphologically well-differentiated clades of Boraginales at family rather than subfamily level and therefore propose the recognition of Codonaceae as a novel segregate family. Boraginales then consists of a total of seven families: Boraginaceae *s.str.*, Codonaceae, Cordiaceae, Heliotropiaceae, Hydrophyllaceae, Lennoaceae and Wellstediaceae.

**Key words:** Asterids, Boraginaceae, *Codon*, endosperm, new family, spine morphology

### Introduction

*Codon* Linnaeus (1767) is a genus of only 2 species, restricted to semi-arid and arid regions of southwestern Africa (Namibia and South Africa). *Codon* has been universally accepted as a member of Boraginales and has been traditionally considered as a member of Hydrophyllaceae, but it has long been recognized as a fairly aberrant representative, not the least because of its geographical isolation: Hydrophyllaceae are an essentially North American family with few South American and East Asian species and *Codon* was its only African member (Peter 1897). Retief & van Wyk (2005) provided an overview over the taxonomic history of the taxon: Brand (1913) included *Codon* in his Hydrophyllaceae tribe Phacelieae A.Gray, but Constance (1963) considered it as an isolated genus in Hydrophyllaceae and suggested it either belongs to a different family or should be moved to a family of its own. Retief & van Wyk (2005) decided to move *Codon* to the separate subfamily Codonoideae Retief & A.E.van Wyk in Boraginaceae *s.l.* They consider the groups often treated as families (e.g., Cordiaceae, Hydrophyllaceae, Heliotropiaceae: Gottschling *et al.* 2001, Luebert & Wen 2008) as subfamilies of a Boraginaceae *sensu lato*. We do not follow this view and argue that the subfamilies should be treated at the family level. In the present paper we propose the elevation of Codonoideae to a segregate family Codonaceae, based on both morphological and previously published molecular data.