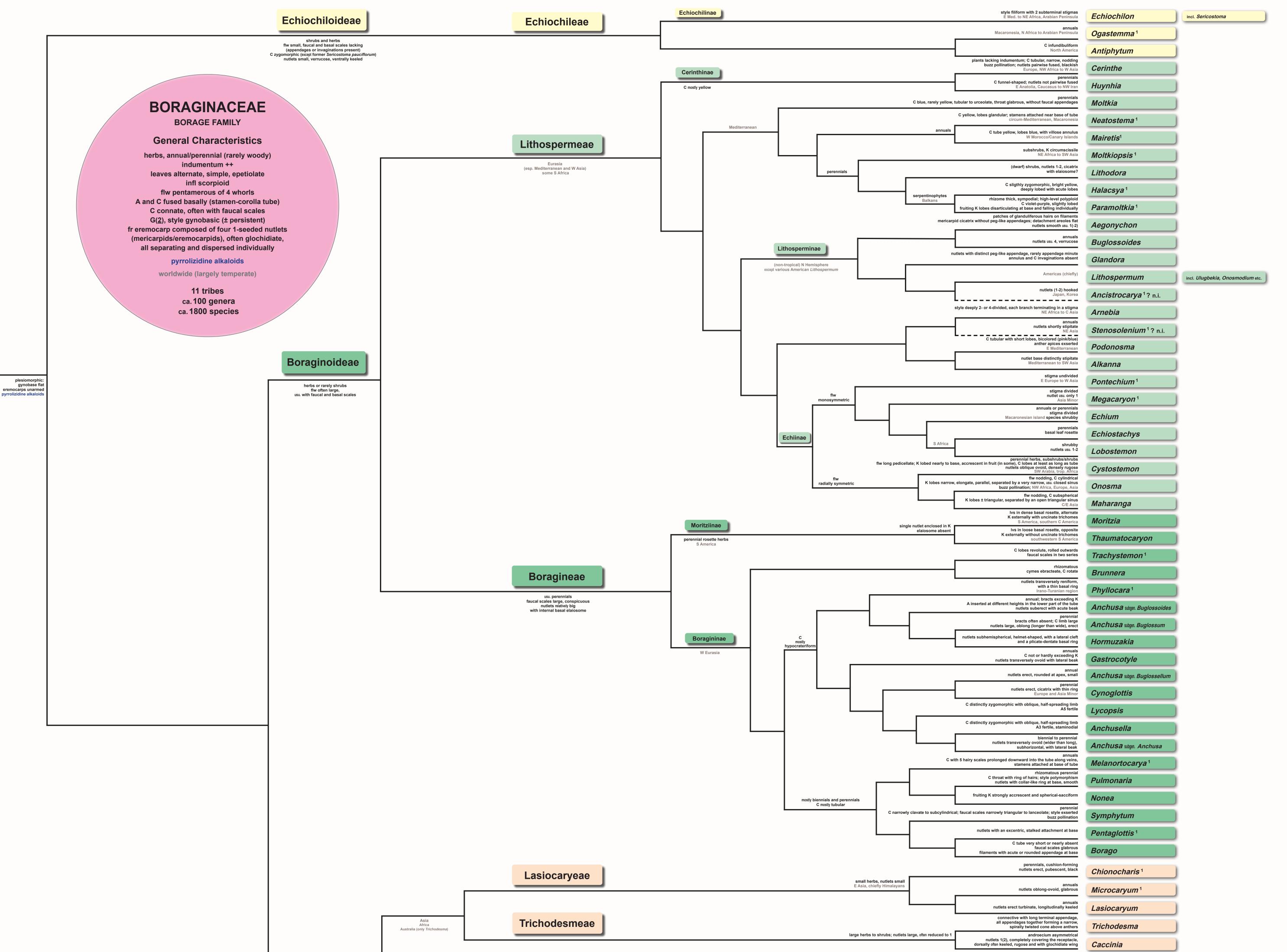
## **BORAGINACEAE PHYLOGENY POSTER**



										flw solitary axillary; cicatrix apical; homogeneously ornamented (smooth trichomes); embryo cu			Memoremea <sup>1</sup>	O. scorpioides
					Asperugeae				]		K atuana	Europe decumbent herbs		C. scorpiones
				]	N Hemisphere					1		gly accrescent, 2-lipped in fr, enclosing laterally flattened nutlets perennial, decumbent/ascending herbs flw pedicellate; K divided nearly to base, spreading in fr nutlets small, ventrally keeled above, ± convex below medial, small, triangular-ovate, elevated on small stipe; C/E Asia	Asperugo <sup>1</sup>	
									L		cicatrix sub	nutiets small, ventrally keeled above, ± convex below medial, small, triangular-ovate, elevated on small stipe; C/E Asia perennial herbs C tubular, nodding	Anoplocaryum	
			Г							_		Holarctic, esp. N America erect annuals	Mertensia	
					Omphalodeae							lvs opposite; nutlets with dorsal inflexed wing Iberian peninsula erect annuals	<i>Gyrocaryum</i> <sup>1</sup>	1
				l				_				nutlets with dorsal inflexed wing W Mediterranean perennials from creeping rhizome	Iberodes	"O. brassicifolia" etc.
Cync	oglossoideae							lvs alternate	   r			perennials from creeping rhizome nutlets with dorsal inflexed wing E Mediterranean	Omphalodes s.str.	<i>O. verna, nitida</i> etc.
u	usu, herbs, rarely shrubs	-								r		annuals or perennials with thin rhizome nutlets winged, sometimes minutely glochidiate along wing rim N America	Mimophytum	"O. cardiophylla, aliena"
often i	pase elevated, usu. pyramidal nutlets ventrally attached, often glochidiate	-							L			megaherb from thick stout rhizome; Ivs appear parallel-veined nutlets large, margins winged Chatham Islands	Myosotidium <sup>1</sup>	
										l		herbs to shrub; Ivs with prominent midvein nutlets glochidiate S America	Selkirkia	S. berteroi, incl. Mapuchea "Cyn. limense" etc.
										_		lvs ovate/oblong-ovate fruiting pedicel slender, 0.8-1 mm thick, often strongly reflexed nutlet rim with two rows of appendages	Heterocaryum	+ <i>Nesocaryum</i> <sup>1</sup> n.i.
							erocaryinae				fruiting pe	Ivs linear/linear-lanceolate dicel stout (if present), 1.5-2 mm thick, erect to slightly recurved nutlet rim with one row of appendages	Pseudoheterocaryum	
					Rochelieae	W Asi	ts not detaching ia, Mediterranean			l		annuals; K enlarged in fr nutlets reduced to 1(-2), wingless	Suchtelenia <sup>1</sup>	
			L		nutlets usu. glochidiate							perennials (rarely annuals) often with pleiocorm or rhizomatous fruiting pedicel deflexed, gynobase short, pyramidal, < 2-3 mm Eurasia, Americas, Australia	Hackelia	incl. Austrocynoglossum latifolium Cynoglossum suaveolens
						Ro	ocheliinae					nutlets ca. 2 mm long, margin indistinct fruiting pedicel recurved , < 8 mm long Sinai through Iran, Caucasus, Armenia to C Asia	Pseudolappula <sup>1</sup>	syn. Lappula sinaica
						nut	tlets detaching			gynoba	perennials; of ase widely pyramidal, nea	iten cushion-forming, vegetative rosettes present when in flower rly flat, < 1mm; nutlets attached in the middle of the adaxial side fruiting pedicel erect or deflexed; Eurasia	Eritrichium	incl. Amblynotus rupestris Lappula marginata
									L		annuals or biennials; ne gynobase narrowly	ever cushion-forming, vegetative rosettes absent when flowering y pyramidal; nutlets usu. attached almost along their entire length fruiting pedicel usu. erect; N Hemisphere	Lappula	Lepechiniella   Mozaffran et al. 2013 Lepechiniella wendelboi, Saadati et al. 2017
					Onenia an anna an					l		nutlets usu. 1-2, twisted, not detaching chiefly Near East to S Russia, Spain	Rochelia	incl. Lappula sessiliflora Lappula drobovii
				_	Craniospermeae							nutlets with dorsal inflexed wing (pseudoaperture) faucal scales absent E Asia	Craniospermum	
				nutlets small						i	perennial infl terminal boragoid of r -	l; rhizome thick, sympodial; lvs large, crowded near end of stem nodding flowers; C widely campanulate, porrect limb, violet-blue anthers coherent around style	Brachybotrys <sup>1</sup>	
			Г	glochids lost	Myosotideae					1	E Asia	C with valvate aestivation nutlets (obliquely) tetrahedral, often stipitate, never (!) with elaiosome	Trigonotis	
				l							perennials; underg flw ca	pround stolons; Ivs in dense rosettes; infl elevated above rosette ampanulate, infundibuliform to hypocrateriform, usu. blue or pink E Asia (mostly Himalayans to China)	Decalepidanthus	= Pseudomertensia
										l		C with contort aestivation nutlets lentil-shaped, never stipitate, occ. with elaiosome cosmopolitan (esp. Medit. and N Zealand)	Myosotis	incl. <i>Trigonocaryum</i>
						Mi	icroulinae					habit and nutlets <i>Cynoglossum</i> -like S/E Africa	Afrotysonia	incl. Cynoglossum amplifolium
							icroulinae					gynobase nearly flat nutlets usu. with pseudoaperture E Asia	Microula	+ Adelocaryum ? n.i. incl. <i>Metaeritrichium, Actinocarya</i>
											pollen with two shap	nutlets erect to horizontal, <i>Cynoglossum</i> -like; cauline lvs sessile bes of pores lacking a transverse groove; pedicels recurved in fr western and eastern N America	Andersonglossum	_ <i>Oncaglossum</i> <sup>1</sup> n.i.
					A.m.	nsinckiinae				perennials, nu polle	Itlets erect to horizontal, <i>Cynoglossum</i> -like; cauline lvs petiolate en with only one pore and transverse groove; pedicels erect in fr coastal western N America	Adelinia <sup>1</sup>	<sup>+</sup> Ailuroglossum n.i.	
						mostly N Arr. a	Americas and S Am. west of the Andes			nutlets large, subcircula		perennial; C large shiny, erect to horizontal, Cynoglossum-like, but not glochidiate NW N America (Idaho)	Dasynotus <sup>1</sup>	
						few reaching A	Australia ( <i>Plagiobothrys</i> spp.)				K in fr unequal, uppe	er 2 arched over nutlet, others, partly fused, arched over 1 nutlet,		





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## HILGER HH, COLE TCH, SELVI F (2020) BORAGINACEAE PHYLOGENY POSTER

• infrafamiliar classification of Boraginaceae s.str. following the recommendations of the Boraginales Working Group • hypothetical tree based on molecular phylogenetic data (Feb. 2020); revisions of several subgroups in progress • gross phylogeny based on Chacón et al. 2016 • suprageneric names after Reveal 2011 ff. and Chacón et al. 2016 • contrary to APG, but in compliance with APweb and other seminal sources, we here recognize several families within Boraginales • branch lengths deliberate, not expressing actual time scale • the characters listed (largely from Kubitzki et al., FGVP Vol. 14 and Chacón et al. 2016) may not necessarily apply to all members of a clade • -aceae = family, -oideae = subfamily, -eae = tribe, -inae = subtribe <sup>1</sup> monospecific genera

## Amsinckiinae: tree based on Hasenstab-Lehman & Simpson 2012 and Simpson et al. 2017, position of Oncaglossum and Ailuroglossum (type: Cynoglossum triste) unclear, but most probably at base of Amsinckiinae Boragininae: tree based on Hilger et al. 2004 \*Cynoglossinae: only partly resolved (currently under revision) paraphyletic taxa with generally glochidiate nutlets, exserted (Solenanthus, Rindera) or inserted stamens and wingless (Cynoglossum, Lindelofia, Pardoglossum) to extremely winged nutlets (Mattiastrum, Rindera) Echiochiloideae: tree based on Långström & Oxelman 2003 Lasiocaryeae: tree based on Chacón et al. 2017 Lithospermeae: tree based on Thomas et al. 2008 Lithosperminae/Echiinae: tree based on Weigend et al. 2009 Megacaryon: position based on Selvi et al. 2017 Omphalodeae: tree based on Otero et al. 2014; Holstein et al. 2016 Pseudoheterocaryum and relatives: tree based on Saadati et al. 2017

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Thanks for valuable advice and support to N. Holstein, M.G. Simpson, G. Walden, and J. Chacón