

**APPENDIX S1.** List of species molecularly investigated in this study with their corresponding accession numbers, including plastid and rDNA-cistron for newly sequenced samples, which are indicated with an \*. For other samples, are provided the rDNA-cistron, NCBI BioSample, SRA RUN and accession numbers, where NCBI BioSamples and genomic data (raw reads) were deposited under BioProject PRJNA607882 and SRA study SRP253072 at the NCBI Sequence Read Archive (SRA). Further information provided includes information on the collector(s) and collection number as well as the year of collection, followed by the herbarium where the vouchers are deposited, and the location of the collection.

**Ingroup:** *Gentiana algida* Pallas\*, A. Favre, AFUS\_19031 (2019), FR, Yankee Boy Basin, Ouray, Colorado (USA), MZ579509, MW248481. *Gentiana algida* Pallas\*, A. Favre, AFUS\_19025b (2019), FR, Spirit Lake, Uinta Mts., Utah (USA), MZ579508, MW248480. *Gentiana algida* Pallas\*, A. & M. Maximov s.n. (1967), M, Chentej-Czikoi Mts., East Siberia (Russia), MW218876, MW248478. *Gentiana algida* Pallas\*, T. Neczaeva s.n. (1970), M, Ezzo, Kamchatka (Russia), MW218875, MW248477. *Gentiana algida* Pallas\*, Staudinger M. I 5275 (2002), W, Seminskii Pass, Altai (Russia), MW218874, MW248476. *Gentiana atuntsiensis* W.W. Smith\*, A. Favre & S. Matuszak 165a (2011), Shickashan, Shangrila, Yunnan (China), KUN, MW405445, MT079994. *Gentiana erectosepala* T.N. Ho, P.C. Fu, 2016192 (2016), Herbarium Luoyang, Linzhi, Tibet (China), MT079975, SAMN14389702, SRR11321291, SRX7925131. *Gentiana frigida* Haenke\*, A. Favre, AFAT\_19004 (2018), FR, Hämmerkogel, Steiermark (Austria), -, MW405446. *Gentiana handeliana* Harry Smith, Liu & al., 1209080 (2012), LZ, Chayu to Jinjiu Town, Xizang (China), MT079978, SAMN14389674, SRR11321321, SRX7925101. *Gentiana nubigena* Edgeworth, A. Favre et al., AFCN18\_051 (2018), HNWP, Amnye Machen, Qinghai, MT079980, SAMN14389675, SRR11321320, SRX7925102. *Gentiana purdomii* C. Marquand\*, A. Favre et al., AFCN18\_033a (2018), HNWP, Baitang Basin, Yushu, Qinghai (China), -, MW405447. *Gentiana susanneae* A. Favre\*, A. Favre, AFCN18\_201e (2018), KUN, Cuopu Lakes, Sichuan (China), MW218877, MW248482.

**Outgroup:** *G. cephalantha* Franchet, A. Favre, AFCN\_18243 (2018), KUN, Cangshan, Dali, Yunnan (China), MT079987, SAMN14389697, SRR11321296, SRX7925126.