Pyšek P., Pergl J., Essl F., Lenzner B., Dawson W., Kreft H., Weigelt P., Winter M., Kartesz J., Nishino M., Antonova L. A., Barcelona J. F., Cabezas F. J., Cárdenas D., Cárdenas-Toro J., Castaño N., Chacón E., Chatelain C., Dullinger S., Ebel A. L., Figueiredo E., Fuentes N., Genovesi P., Groom Q, J., Henderson L., Inderjit, Kupriyanov A., Masciadri S., Maurel N., Meerman J., Morozova O., Moser D., Nickrent D., Nowak P. M., Pagad S., Patzelt A., Pelser P. B., Schulze M., Seebens H., Shu W., Thomas J., Velayos M., Weber E., Wieringa J. J., Baptiste M. P. & van Kleunen M. (2017): Naturalized alien flora of the world: species diversity, taxonomic and phylogenetic patterns, geographic distribution and global hotspots of plant invasion. – Preslia 89: 203–274, 2017.

Electronic Appendix 2. – Procedure for building a phylogenetic tree of the vascular plant families and calibration of its branch lengths.

The topology of the phylogenetic tree of vascular plant families was largely built using Phylomatic version 3 (http://phylodiversity.net/phylomatic/), and the most recent megatree available (from the 29th of August 2012). This tree included angiosperms and gymnosperms, but did not include ferns (monilophyta) and club mosses (lycophyta). Therefore, the monilophyte clade was built using the maximum likelihood molecular phylogeny presented in Lehtonen (2011), and the lycophyte clade according the angiosperm phylogeny website (http://www.mobot.org/MOBOT/research/APweb/).

The branch lengths for the resulting tree topology were calibrated using the function BLADJ- Branch Length ADJustment- in the program Phylocom version 4.1 (Webb et al. 2008). The branch lengths were calibrated according to fixed node and root ages (Table 1). The majority of the node ages were drawn from Wikström (2001). However, additional node ages were obtained from Zanne et al. (2014), Magallon et al. (2013), Leslie et al. (2012), Qiu et al. (2007) and Schneider et al. (2004) (see Table 1). Mean node ages were used where available. Where minimum and maximum values were given, the midpoint was taken as the node age. In Magallon et al. (2013), multiple estimates were given, and a mean was obtained from these.

Table 1. – Node and root ages used to calibrate the branch lengths of the phylogenetic tree of the 465 vascular-plant families. The node name, node age (mYa= millions of years ago) and reference are given.

Node name	Age (mYa)	Reference
Alismatales	124	Wikström et al. (2001)
Angiosperms	179	Wikström et al. (2001)
Apiales	69	Wikström et al. (2001)
Aquifoliales	91	Zanne et al. 2014
Aquifoliales	91	Zanne et al. 2014
Araucariaceae to Podocarpaceae	203	Leslie et al. (2012)
Arecales	73	Zanne et al. 2014
Asparagales	107	Wikström et al. (2001)
Asterales	90	Wikström et al. (2001)
Asterids	117	Wikström et al. (2001)
Austrobaileyales to Asterales	165	Wikström et al. (2001)
Brassicales	79	Wikström et al. (2001)
Burseraceae to Anacardiaceae	51	Wikström et al. (2001)
Buxales	118	Zanne et al. 2014
Canellales	132	Zanne et al. 2014
Caryophyllales	89	Zanne et al. 2014
Celastrales	42	Wikström et al. (2001)
Chloranthales	127	Zanne et al. 2014
Commelinales	68	Wikström et al. (2001)

Core eudicots	127	Wikström et al. (2001)
Cornales	92	Zanne et al. 2014
Crossosomatales	62	Wikström et al. (2001)
Cucurbitales	65	Wikström et al. (2001)
Dioscoreales	95	Wikström et al. (2001)
Dipsacales	81	Wikström et al. (2001)
Ericales	97	Zanne et al. 2014
Euasterid1	107	Wikström et al. (2001)
Euasterid2	107	Wikström et al. (2001)
Eudicots	147	Wikström et al. (2001)
Euphyllophytes	400	Wikström et al. (2001)
Fabales	66	Zanne et al. 2014
Fabids	98	Wikström et al. (2001)
Fagales	102	Zanne et al. 2014
Garryales	93	Wikström et al. (2001)
Gentianales	71	Wikström et al. (2001)
Geraniales	92	Wikström et al. (2001)
Gnetales	125	Magallon et al. (2013)
Gunnerales	84	Zanne et al. 2014
Gymnosperms	312	Magallon et al. (2013)
Lamiales	50	Zanne et al. 2014
Laurales	115	Zanne et al. 2014
Liliales	96	Wikström et al. (2001)
Lycophytes	384	Magallon et al. (2013)
Magnoliales	115	Zanne et al. 2014
Magnoliids	145	Magallon et a. (2013
Malpighiales	81	Wikström et al. (2001)
Malvales	76	Zanne et al. 2014
Malvids	95	Wikström et al. (2001)
Monilophytes	392	Magallon et al. (2013)
Myrtales	94	Zanne et al. 2014
Nymphaeales to Asterales	171	Wikström et al. (2001)
Oxalidales	77	Wikström et al. (2001)
Pandanales	73	Zanne et al. 2014
Piperales	132	Wikström et al. (2001)
Poales	72	Wikström et al. (2001)
Poales to Asterales	161	Wikström et al. (2001)
Polypodiales	176	Schneider et al. (2004)
Polypodiopsids	323	Qiu et al. (2007)
Proteales	115	Zanne et al. 2014

Ranunculales	140	Wikström et al. (2001)
Rosales	76	Wikström et al. (2001)
Rosids	121	Wikström et al. (2001)
Santalales	59	Zanne et al. 2014
Sapindales	71	Zanne et al. 2014
Saxifragales	95	Zanne et al. 2014
Seedplants	325	Wikström et al. (2001)
Solanales	78	Wikström et al. (2001)
Taxodiaceae to Cupressaceae	207	Leslie et al. (2012)
Trochodendrales to Asterales	137	Wikström et al. (2001)
Vascular plants (root age)	422	Magallon et al. (2013)
Vitales	64	Zanne et al. 2014
Zingiberales	62	Wikström et al. (2001)
Zygophyllales	70	Wikström et al. (2001)

References

Leslie A. B., Beaulieu J. M., Rai H. S., Crane P. R., Donoghue M. J. & Mathews S. (2014): Hemisphere-scale differences in conifer evolutionary dynamics. – Proc. Natl. Acad. Sci. USA 109: 16217–16221.

Lehtonen S. (2011): Towards resolving the complete fern tree of life. – PLoS One 6: e24851.

Magallón S., Hilu K. W. & Quandt D. (2013): Land plant evolutionary timeline: Gene effects are secondary to fossil constraints in relaxed clock estimation of age and substitution rates. – Am. J. Bot. 100: 556–573.

Qiu Y.-L., Li L., Wang B., Chen Z., Dombrovska O., Lee J., Kent L., Li R., Jobson R. J., Hendry T. A., Taylor D. W., Testa C. M. & Ambros M. (2007): A nonflowering land plant phylogeny inferred from nucleotide sequences of seven chloroplast, mitochondrial, and nuclear genes. – Int. J. Plant Sci. 168: 691–708.

Schneider H., Schuettpelz E., Pryer K. M., Cranfill R., Magallón S. & Lupia R. (2004): Ferns diversified in the shadow of angiosperms. – Nature 428: 553–556.

Webb C. O., Ackerly D. D. & Kembel S. W. (2008): Phylocom: software for the analysis of phylogenetic community structure and character evolution. – Bioinformatics 24: 2098–2100. [version 4.1].

Wikström N., Savolainen V. & Chase M. W. (2001): Evolution of the angiosperms: calibrating the family tree. – Proc. R. Soc. B 268: 2211–2220.

Zanne A. E. et al. (2014): Three keys to the radiations of angiosperms into freezing environments. – Nature 506: 89–92.