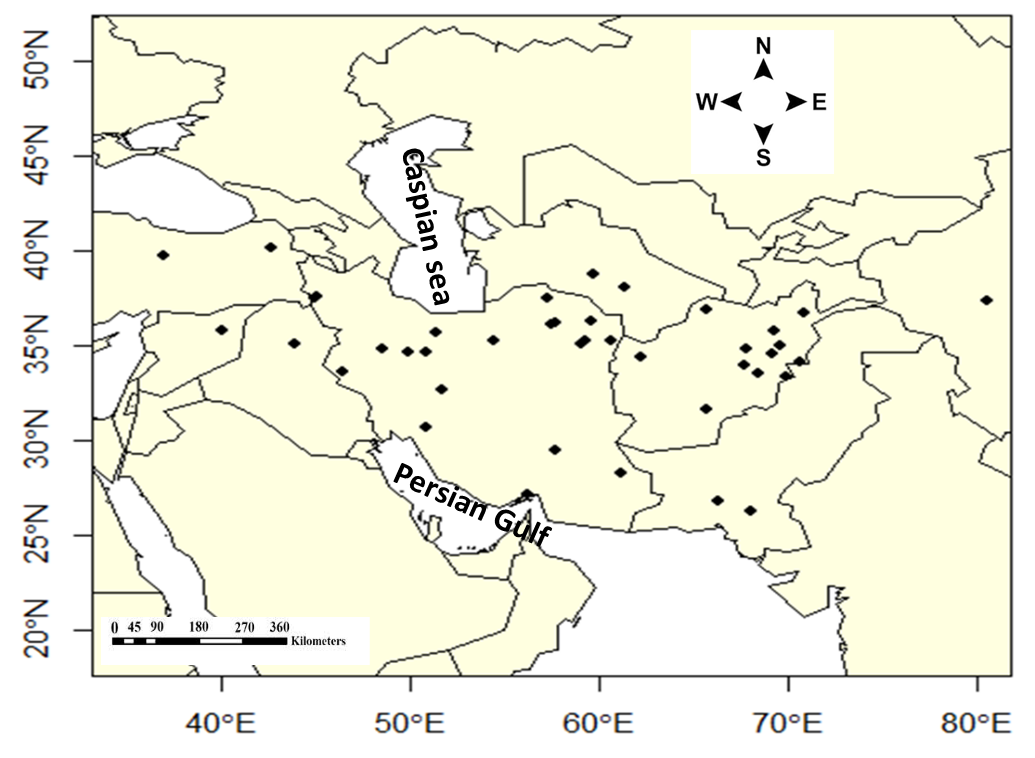
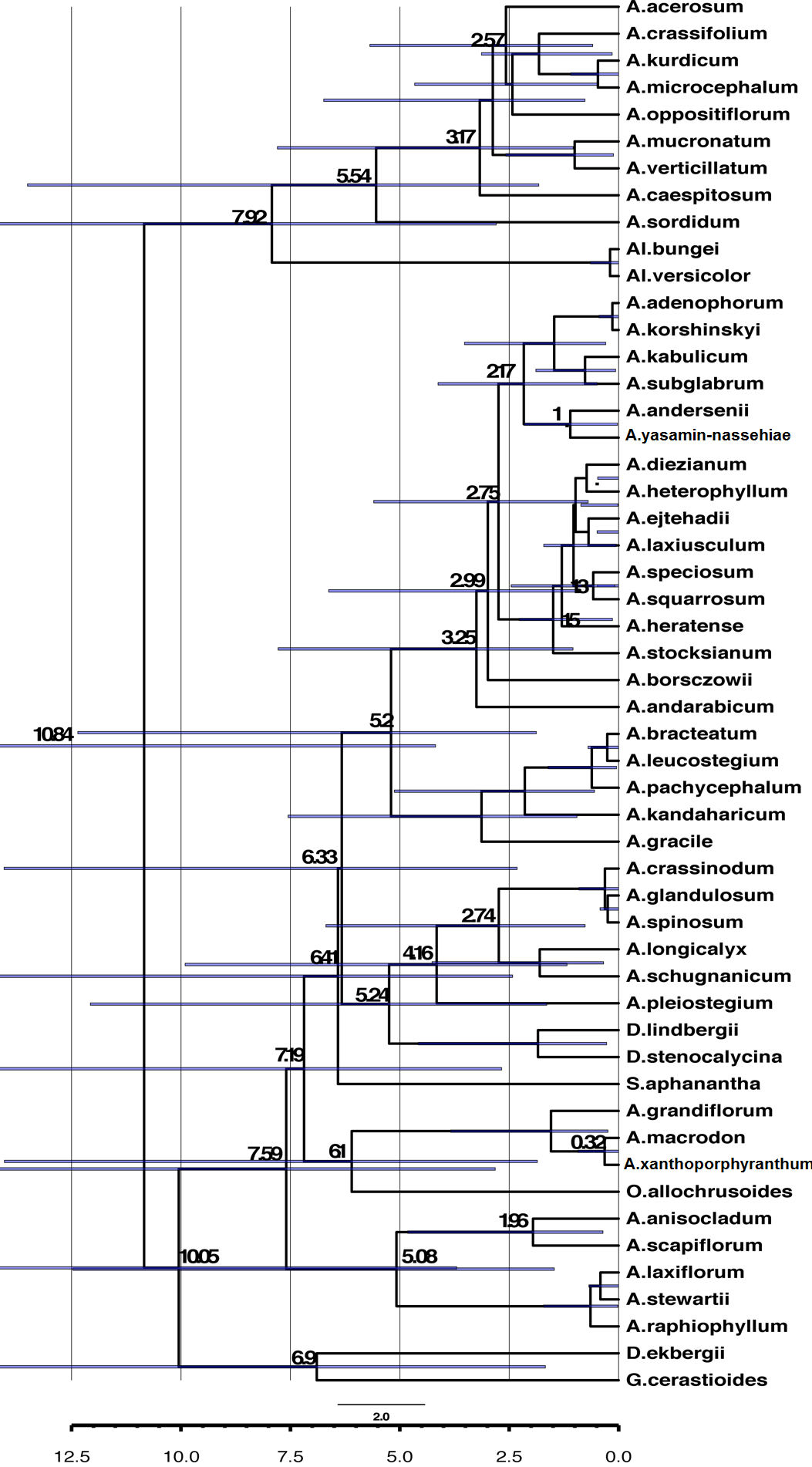
Supplementary Material

Figure S1. Location of *Acanthophyllum*s.l. samples used in this study (map made in dismo package in R).

Figure S2: Bayesian inference analysis of *Acanthophyllum*s.l.A) based on two combined DNA regions (nrDNA ITS and *rps16*) using published ITS and plastid substitution rates, B)based onnrDNA ITS using published ITS substitution rate, C) based on *rps16* using published plastid substitution rate, D)based on two combined DNA regions (nrDNA ITS and *rps16*) using a lognormal distribution prior with offset = 33.9 Ma, and SD = 1 Ma, using the age of a described fossil inflorescence from the Middle–Late Eocene (33.9–47.8 Ma; see text). Chronograms represent the maximum clade credibility trees using \*BEAST implemented in BEAST, with mean divergence dates in million years ago (Ma) shown for key nodes. Blue bars represent 95% highest posterior density credibility intervals for node ages.

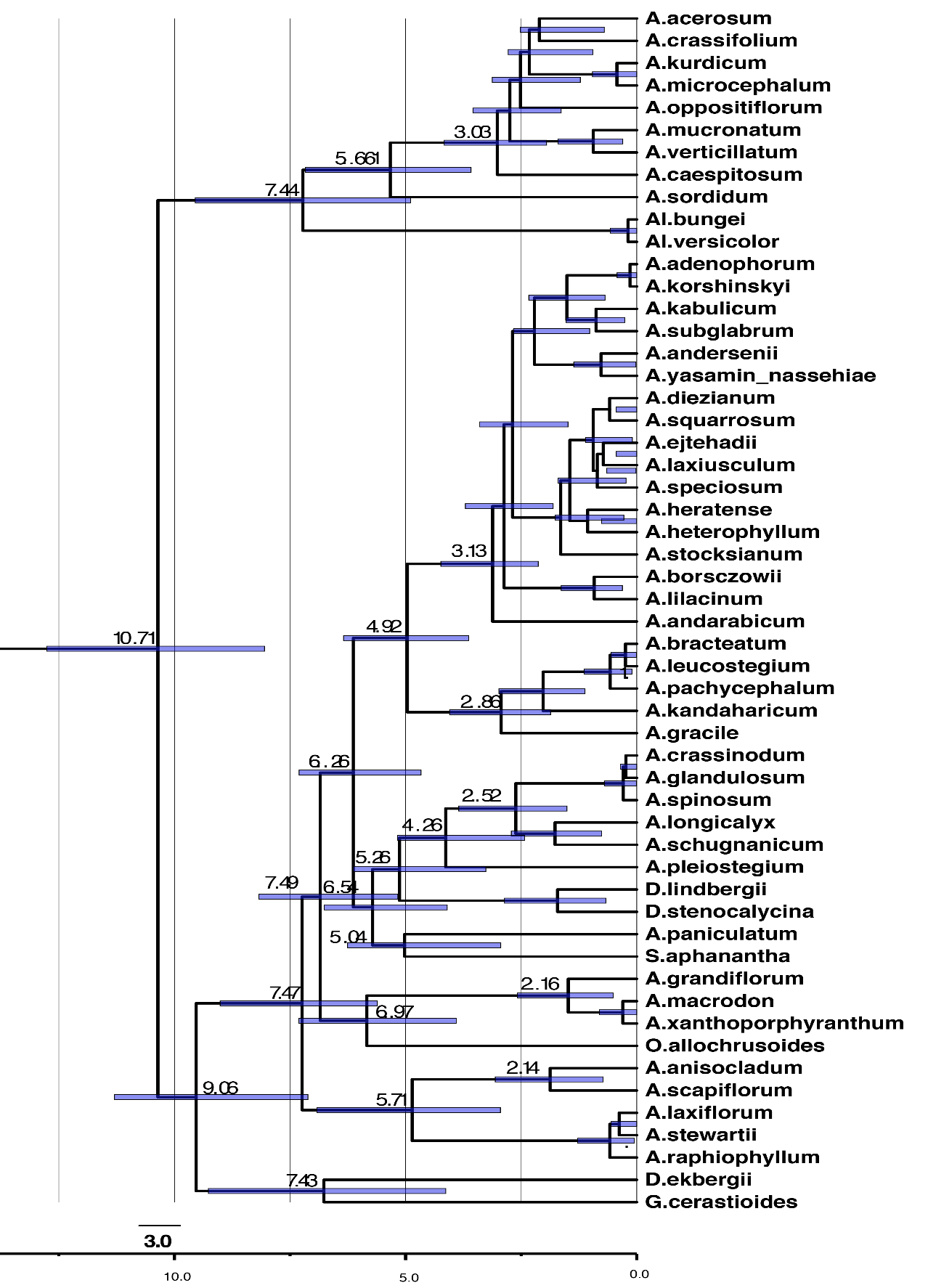
Appendix S1. Voucher information: species name, geographical origin, collector(s), voucher (herbarium), GenBank accession numbers for ITS and *rps16* markers.





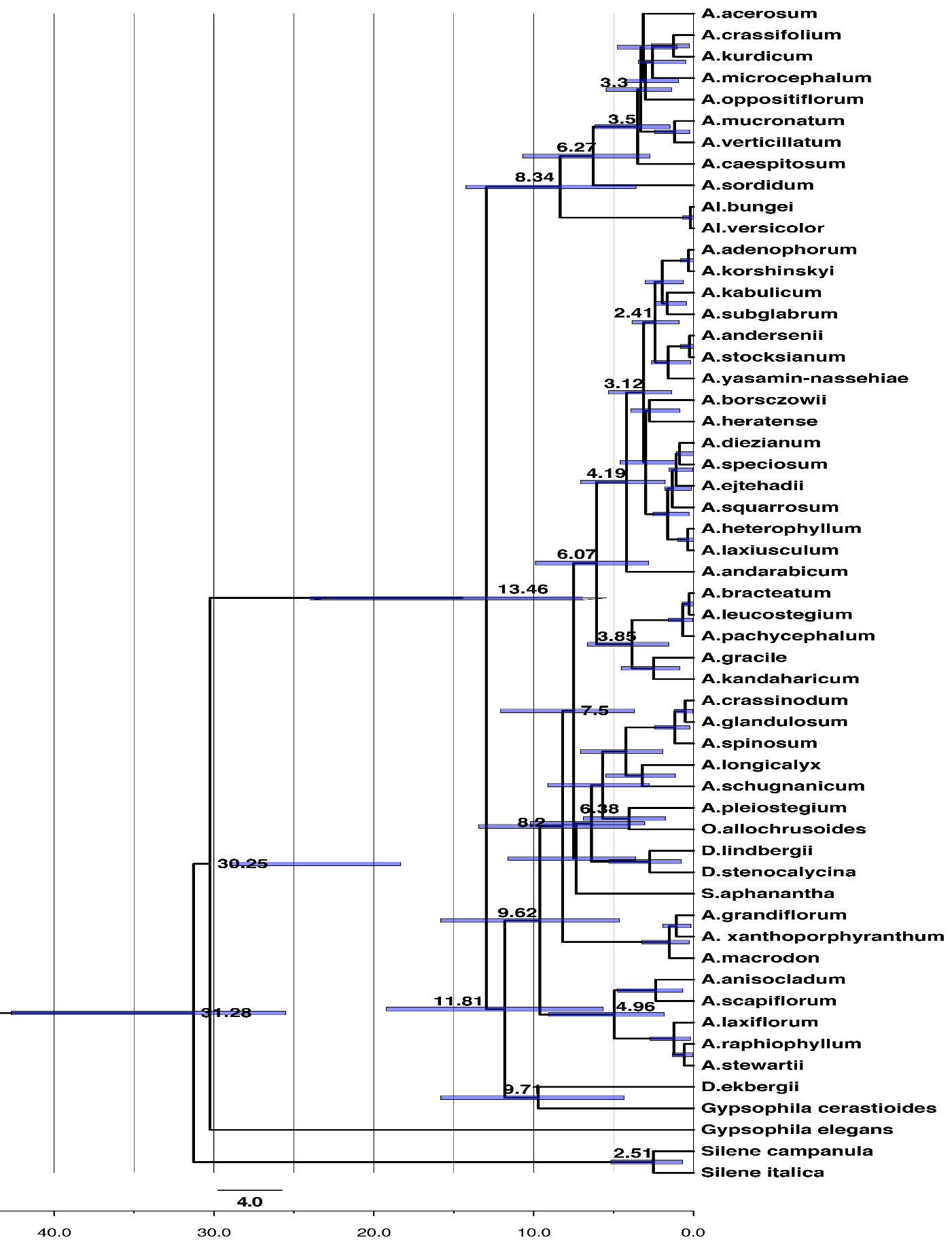
**A**

**B**





**C**



**D**

**Appendix S1.**

|  |  |
| --- | --- |
| **Species name** | **geographical origin, collector(s), voucher** |
| *Acanthophyllumacerosum*Sosn. | Iran, W Azarbaijan, Zarre& al. 41900 (TUH),KF924680, KF924732 |
| *Acanthophyllumadenophorum*Freyn | Iran, Khorassan, Pirani &Moazzeni 1947 (TMRC),KF924679, KF924731 |
| *Acanthophyllumandarabicum*Podlech ex Schiman-Czeika | Afghanistan, Baghlan, Podlech 10985 (MSB),KF924678, KF924730 |
| *Acanthophyllumandersenii*Rech.f. &Schiman-Czeika | Iran, Khorassan, Anders & Peterson 320 (GB), KF924677, KF924729 |
| *Acanthophyllumanisocladum*Schiman-Czeika | Afghanistan, Lugar, Ekberg W9180 (GB), KF924676, KF924728 |
| *Acanthophyllumborsczowii*Litv. | Iran, Khorassan, Zarre& al. 41034 (TUH),KF924675, KF924727 |
| *Acanthophyllumbracteatum*Boiss. | Iran, Kohghiluyeh&Boyerahmad, Pirani &Moazzeni 2104 (TMRC), KF924674, KF924726 |
| *Acanthophyllumcaespitosum*Boiss. | Iran, Hamadan, Zarre& al. 41903 (TUH), KF924673, KF924725 |
| *Acanthophyllumcrassifolium*Boiss. | Iran, Mazandaran, Pirani&Moazzeni 41702 (TUH), KF924672, KF924724 |
| *Acanthophyllumcrassinodum*Yukhan. &J.R.Edm. | Iran, Kerman, Pirani &Moazzeni 2923 (TMRC), KF924671, KF924723 |
| *Acanthophyllumdiezianum*Hand.-Mazz. | Iran, Khorassan, Zarre& al. 41040 (TUH), KF924669, KF924721 |
| *Acanthophyllumejtehadii*Mahmoudi&Vaezi | Iran, Khorassan, Pirani &Moazzeni 2181 (TMRC), KF924669, KF924721 |
| *Acanthophyllumglandulosum* Bunge ex Boiss. | Iran, Khorassan, Zarre& al. 41037 (TUH), KF924668, KF924720 |
| *Acanthophyllum gracile* Bunge ex Boiss. | Iran, Semnan, Pirani&Moazzeni 2989 (TMRC), KF924667, KF924719 |
| *Acanthophyllum grandiflorum* Stocks | Afghanistan, Bamian, Podlech 1340 (MSB), KF924666, KF924718 |
| *Acanthophyllumheratense*Schiman-Czeika | Iran, Tehran, Bomhen,Abali road, Arazm&Dini 1994 (TARI), LC523987.  Iran, Isfahan, Pirani &Moazzeni 2152 (TMRC), KF924665, KF924717 |
| *Acanthophyllumheterophyllum*Rech.f. | Iran, Kerman, Pirani &Moazzeni 2921 (TMRC), KF924664, KF924716 |
| *Acanthophyllumkabulicum*Schiman-Czeika | Afghanistan, Ghazni, Frey s.n. (GB), KF924663, KF924715 |
| *Acanthophyllumkandaharicum*Gilli | Iran, Khorassan, Joharchi&Zangouei 36245 (FUMH), KF924662, KF924714 |
| *Acanthophyllumkorshinskyi*Schischk. | Iran, Khorassan, Pirani &Moazzeni 2123 (TMRC), KF924661, KF924713 |
| *Acanthophyllumkurdicum*Boiss. &Hausskn. ex Boiss. | Iran, Ilam, Hamzehee&Lashkarbolooki 1756 (TARI), KF924660, KF924712 |
| *Acanthophyllumlaxiflorum*Boiss. | Afghanistan, Lugar, Ekberg W9184 (GB), KF924659, KF924711 |
| *Acanthophyllumlaxiusculum*Schiman-Czeika | Iran, Azarbaijan, Jolfa, Foroghi, 3823(TARI),LC523988.  Iran, Qom, Pirani&Moazzeni 1941 (TMRC), KF924658, KF924710 |
| *Acanthophyllumleucostegium*Schiman-Czeika | Iran, Bandar Abbas, Ghahreman&Mozaffarian 5656 (TUH), KF924657, KF924709 |
| *Acanthophyllumlilacinum*Schischk. | Afghanistan, Badghis, Podlech&Jarmal 29855 (MSB), KF924656 |
| *Acanthophyllumlongicalyx* Hedge &Wendelbo | Afghanistan, Jawzjan, Freitag 6580 (MSB), KF924655, KF924708 |
| *Acanthophyllummacrodon*Edgew. | Afghanistan, Kandahar, Hedge & al. W7641 (GB), KF924654, KF924707 |
| *Acanthophyllummicrocephalum*Boiss. | Iran, Tehran, Rajamand&Bazargan 32055 (TARI),KF924653, KF924706 |
| *Acanthophyllummucronatum*C.A.Mey. | Iran, W Azarbaijan, Assadi&Olfat 68668 (TARI), KF924652, KF924705 |
| *Acanthophyllumoppositiflorum*Aytaç | Turkey, Sivas, Aytaç 7476 (GAZI), KF924651, KF924704 |
| *Acanthophyllumpachycephalum*Schiman-Czeika | Iran, Tehran, Ganjalizadeh 6106 (TUH), KF924650,  KF924703 |
| *Acanthophyllumpachystegium*Rech.f. | Afghanistan, Badakhshan, Hedge &Wendelbo W9282 (GB), KF924649, KF924702 |
| *Acanthophyllumpleiostegium*Schiman-Czeika | Afghanistan, Kataghan, Grey-Wilson & Hewer 1320 (GB), KF924648, KF924701 |
| *Acanthophyllumraphiophyllum* (Rech.f.) Barkoudah | Afghanistan, Kapisa, Podlech 12548 (MSB), KF924647, KF924700 |
| *Acanthophyllumscapiflorum*Schiman-Czeika | Afghanistan, Kabul, Podlech 31232 (MSB), KF924646, KF924699 |
| *Acanthophyllumschugnanicum*Schischk. | Afghanistan, Bamian, Wendelbo& Ekberg W9796 (GB), KF924645, KF924698 |
| *Acanthophyllumsordidum* Bunge ex Boiss. | Iran, Isfahan, Pirani &Moazzeni 2147 (TMRC), KF924644, KF924697 |
| *Acanthophyllumspeciosum*Rech.f. &Schiman-Czeika. | Iran, Khorassan, Pirani &Moazzeni 2186 (TMRC), KF924643, KF924733 |
| *Acanthophyllumspinosum*C.A.Mey. | Iran, Isfahan, Pirani &Moazzeni 2150 (TMRC), KF924642, KF924696 |
| *Acanthophyllumsquarrosum*Boiss. | Iran, Kerman, Shahrebabak, Assadi&Bazgosha, 56451 (TARI), LC523986.  Iran, Semnan, Pirani&Moazzeni 2974 (TMRC), KF924641, KF924695 |
| *Acanthophyllumstewartii* (Thoms. ex Edgew. &Hook.f.) Barkoudah | Afghanistan, Khost, Anders 8994 (MSB), KF924640, KF924694 |
| *Acanthophyllumstocksianum*Boiss. | Afghanistan, Kandahar, Toncevs.n. (MSB), KF924639, KF924693 |
| *Acanthophyllumsubglabrum*Schischk. | Afghanistan, Nangarhar, Hedge & al. W7483 (GB), KF924638, KF924692 |
| *Acanthophyllumverticillatum*Hand.-Mazz. | Iran, Markazi, Mozaffarian&Sardabi 42175 (TARI), KF924637, KF924691 |
| *Acanthophyllumxanthoporphyranthum* Hedge &Wendelbo | Afghanistan, Herat, Hedge & al. W8003 (GB), KF924636, KF924690 |
| *Acanthophyllumyasamin-nassehiae*Joharchi& Pirani | Iran, Khorassan, Memariani&Zangouei 41448 (FUMH), KF924635, KF924689 |
| *Allochrusabungei*Boiss. | Iran, E Azarbaijan, Rechinger 43834 (M), KF924634, KF924688 |
| *Allochrusa versicolor*Boiss. | Turkey, Kars, Nydegger 43597b (MSB), KF924633, KF924687 |
| *Diaphanopteralindbergii* Hedge &Wendelbo | Afghanistan, Fariab, Hedge & al. W8336 (GB), KF924630 KF924685 |
| *Diaphanopterastenocalycina*Rech.f. &Schiman-Czeika | Iran, Golestan, Attar &Mehdigholi 24422 (TUH), KF924629, KF924684 |
| *Diaphanopteraekbergii*Hedge &Wendelbo | Afghanistan, Takhar, Podlech11848 (MSB) & 11760 (MSB), KF924631, KF924686 |
| *Diaphanopteraafghanica*Podlech | Afghanistan, Baghlan, Podlech 21075 (MSB), KF924632 |
| *Ochotonophilaallochrusoides*Gilli | Afghanistan, Bamian, Wendelbo& Ekberg W9801 (GB), KF924627, KF924682 |
| *Scleranthopsisaphanantha* (Rech.f.) Rech.f. | Afghanistan, Kabul, Rechinger 31265 (M), KF924626, KF924681 |
| *Gypsophila cerastioides*D.Don | Pakistan, Hazar, Ewald &Zetterlund 6227 (GB), KF924628, KF924683 |
| *Spergularia marina* (L.) Besser | KX282437.1 |
| *Spergulaarvensis* L. | KY513576.1 , JX966242.1 |
| *Sileneitalica* (L.) Pers. | DQ059395.1 , KF305909.1 |
| *Silene campanula* Pers. | KX852586.1 , KX852604.1 |
| *Silenerothmaleri*P.Silva | DQ059402.1 |
| *Lychniscoronaria* (L.) Desr. | EF674193.1 |
| *Saponariaofficinalis* L. | AY594313.1 |
| *Saponariaocymoides* L. | MF401130.1, KX183966.1 |
| *Gypsophila repens* L. | MF401153.1 , KX183987.1 |
| *Gypsophila elegans*M.Bieb. | MF401143.1 , MF401081.1 |
| *Drypisspinosa* L. | KF737482.1 |
| *Minuartialaricifolia* (L.) Schinz&Thell. | AY936282.1 |
| *Minuartiageniculata* (Poir.) Thell. | KF737455.1 |
| *Holosteumumbellatum* L. | AY936242.1 |
| *Cerastiumarvense* L. | MH219805.1 |