Appendix 1. The list of specimens included in phylogenetic estimation with voucher details and GenBank accession numbers, newly sequenced data are in bold.

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| --- | --- | --- |
| Taxon | Specimen voucher | GenBank accession number |
| ITS1-2 nrDNA | *rbc*L cpDNA | *trn*L-F cpDNA |
| *Acrobolbus ochrophyllus*  | Chile, *Engel 26633* (F) |   | KF852285 | KJ802071 |
| *Acroscyphella phoenicorhiza*  | New Zealand, *Braggins & Renner 4174* (F) |   | KF852339 |   |
| *Anastrepta orcadensis*  | China: Yunnan Prov., *Long 34711* (E) |   | KF852268 |   |
| *Anastrepta orcadensis*  | Russia: Buryatia Rep., *Konstantinova 59-1-01* (KPABG-102486) | DQ875126 |   | DQ875088 |
| *Anthelia julacea*  | United Kingdom: Scotland, *Long 31292* (E) |   | KF852280 | KJ802070 |
| *Arnellia fennica*  | Finland, *Shaw 1250* (DUKE) |   | KF852402 | KJ802096 |
| *Arnellia fennica*  | Russia: Buryatia Rep., *Konstantinova K372-1-17,* (KPABG-122033) | **OR611950** | **OR604353** | **OR604343** |
| *Balantiopsis diplophylla*  | Australia, *Streimann 59554* (NY) |   | KF852348 |   |
| *Blepharidophyllum vertebrale*  | New Zealand, *Engel & von Konrat s.n.* (F) |   | KF852363 | KJ802086 |
| *Calypogeia muelleriana*  | USA, *Davis 130* (DUKE) |   | JF316291 |   |
| *Calypogeia vietnamica*  | Viet Nam: Lao Cai Prov., *Bakalin V-8-61-17* (VBGI) | MK335824 |   | MK336253 |
| *Cephalozia bicuspidata*  | Dominican Rep.: San Jose de Ocoa Prov., *Schaefer-Verwimp & Verwimp 26879/A* (M) |   | KX098877 | KX098955 |
| *Cephalozia bicuspidata*  |  Russia: Kemerovo Prov., *Konstantinova 61-4-00* (KPABG-101873) | JX629821 |   | JX629938 |
| *Clandarium gottscheanum*  | Chile, *Engel 26229* (F) |   | KF852329 |   |
| *Cryptocolea imbricata*  | Norway: Svalbard, *Frisvoll* *732314* (KPABG-122667) | **OR664122** | **OR604355** | **OR604345** |
| *Cryptocolea imbricata*  | Russia: Kamchatka Terr., *Bakalin K-66-5-15* (KPABG-120389) | **OR611952** | **OR604356** | **OR604346** |
| *Cryptocolea imbricata*  | Russia: Khabarovsk Terr., *Bakalin Kh-36-56-13* (KPABG-119106) | **OR611955** |  | **OR604349** |
| *Cryptocolea imbricata*  | Russia: Krasnoyarsk Terr., Khatanga Settl., *Fedosov 13-3-0382* (KPABG-116993) | **OR611956** |  | **OR604350** |
| *Cryptocolea imbricata*  | Russia: Krasnoyarsk Terr., Taimyr, *Fedosov G107969* (KPABG-107969) | **OR611957** |  | **OR604351** |
| *Cryptocolea imbricata*  | Russia: Trans-Baikal Terr., *Mamontov YuSM-524-3-6* (KPABG-119564) | **OR611954** |  | **OR604348** |
| *Cryptocolea imbricata* var. *minima*  | Russia: Krasnoyarsk Terr., Taimyr, *Lapshina 213E/4-3-21* (KPABG-124714) | **OR611953** | **OR604357** | **OR604347** |
| *Cryptocoleopsis imbricata*  | Russia, *Bakalin* (DUKE) |   |   | KJ802098 |
| *Cylindrocolea recurvifolia*  | Japan, *Yamaguchi* (F) |   | KF852297 |   |
| *Delavayella serrata*  | China: Yunnan Prov., *Long 34809* (E) |   | KF852269 | KJ802066 |
| *Endogemma caespiticia*  | Russia: Murmansk Prov., *Konstantinova 2/3-02* (KPABG) |   |   | JF421605 |
| *Eocalypogeia quelpaertensis*  | Japan: Kyushu, *Furuki 20233* ( HIRO) |   | AB476566 |   |
| *Eremonotus myriocarpus*  | Russia: Karachaevo-Cherkesia Rep. *Konstantinova* *K446-6-05* (KPABG-109615) | EU791839 |   | EU791716 |
| *Eremonotus myriocarpus*  | United Kingdom: Scotland, *Buryová 165/93* (DUKE) |   | KF852354 | KJ802082 |
| *Geocalyx caledonicus*  | New Zealand, *Engel & von Konrat 28342* (F) |   | KF943584 |   |
| *Geocalyx graveolens*  | China: Yunnan Prov., *Long 34828* (E) |   | KF852271 | KJ802067 |
| *Goebelobryum unguiculatum*  | New Zealand: North Island, *Qiu, Renner, Schuster NZ-03054* (AK) |   | KF852375 |   |
| *Gongylanthus ericetorum*  | Greece, *Duell 63.(35.)* (GOET) |   | AM392303 |   |
| *Gongylanthus ericetorum*  | Portugal, *Long 31-Mar-2007* |   | JX305547 |   |
| *Gongylanthus himalayensis* | Bhutan, *Long 18-Sep-1999* |   | JX305548 |   |
| *Gongylanthus limbatus*  | Ecuador, *Schaefer-Verwimp 24463* (MO) | **OR611958** | **OR604358** | **OR604352** |
| *Gymnomitrion alpinum*  | United Kingdom: Scotland, *Long 38270* (DUKE) |   | KF852406 | KJ802101 |
| *Gymnomitrion commutatum*  | Russia: Buryatya Rep., *Konstantinova 83-2-02* (KPABG-104502) | EU791828 |   | EU791707 |
| *Gymnomitrion concinnatum*  | Norway: Svalbard, *Konstantinova & Savchenko K158/8-07* (F)  |   | KF943557 | KF942980 |
| *Gymnomitrion concinnatum*  | Russia: Murmansk Prov., *Konstantinova 366-00* (KPABG-8182) | EU791832 |   | AF519202 |
| *Gymnomitrion pacificum*  | Russia: Commander Islands, I. Bering, *Bakalin K 26-4-02-VB* (KPABG-103350) | EU791835 |   | EU791713 |
| *Gymnomitrion pacificum*  | USA: Alaska, *Shaw F956/3* (DUKE) |   | KF943591 | KF943050 |
| *Gymnomitrion verrucosum*  | China: Yunnan Prov., *Long & Shevock 37182* (DUKE) |   | KF852409 | KJ802102 |
| *Gyrothyra underwoodiana*  | Canada: Vancouver Island, *Forrest 593* (ABSH) |   | DQ268970 | KF942997 |
| *Harpanthus flotovianus*  | Norway, *Long & Schill 31355* (E) |   | KF852272 | KJ802065 |
| *Hygrobiella laxifolia*  | Russia, *Bakalin* (F) |   | KF852320 |   |
| *Hygrobiella laxifolia*  | Russia: Murmansk Prov., *Konstantinova K201-1-04* (KPABG- 12761) | JX629931 |   | JX630054 |
| *Hygrobiella nishimurae*  | Japan, *Bakalin J-11-42-15* (KPABG- 122546, VGBI) | MH580594 |   | MH580592 |
| *Isotachis lyallii*  | New Zealand, *Engel 21825* (F) |   | KF852343 | AY608130 |
| *Jackiella curvata*  | New Zealand, *Qiu, Braggins, Renner, Schuster NZ-03064* (AK) |   | DQ787461 |   |
| *Jungermannia atrovirens*  | Russia: Karachaevo-Cherkesia Rep., *Ignatov, Ignatova MHA 4.8.02* (KPABG) | GQ220782 |   | GQ220766 |
| *Jungermannia atrovirens*  | Switzerland, *Hrad lek 2-Nov-2008* (DUKE) |   | KF852398 | KJ802093 |
| *Jungermannia borealis*  | Russia: Buryatia Rep., *Konstantinova 21-4-02* (KPABG-104405) | GQ220781 |   | GQ220765 |
| *Jungermannia* cf. *exsertifolia*  | Russia: Kamchatka Terr., *Bakalin K-74-13a-04* (KPABG-106804) | GQ220780 |   | GQ220764 |
| *Jungermannia* cf. *exsertifolia*  | Russia: Karachaevo-Cherkesia Rep., *Konstantinova K421-6-05* (KPABG-109568) | GQ220779 |   | GQ220763 |
| *Jungermannia exsertifolia* subsp. *cordifolia*  | USA: Alaska, *Shaw F951/5* (DUKE) |   | KF943592 | KF943051 |
| *Jungermannia pumila*  | Norway, *Sova 19-Jul-2008* (DUKE) |   | KF943603 | KF943070 |
| *Leiomylia anomala*  | Canada: Alberta, *Vitt s.n.* (ABSH) |   | KF852367 | KJ802088 |
| *Lethocolea glossophylla*  | Ecuador, *Davis 259* (DUKE) |   | DQ439692 | KJ802080 |
| *Liochlaena lanceolata*  | Russia: Vladimir Prov., *Kokoshnikova G112323* (KPABG-112323) | KF516120 |   | KF516228 |
| *Liochlaena lanceolata*  | USA: Oregon, *Shaw 6259a* (DUKE) |   |  KF852381 | KJ802091 |
| *Liochlaena sichuanica*  | China: Sichuan Prov., *Bakalin & Klimova China-40-10-17* (VBGI-37315, KPABG-122540) | MH703731 |   | MH686187 |
| *Marsupella aquatica*  | Russia: Murmansk Prov., *Konstantinova 152-5-87* (KPABG-6090) | EU791813 |   | AF519201 |
| *Marsupella aquatica*  | United Kingdom: Scotland, *Long 29202* (E) |   | KF943544 | KF942959 |
| *Marsupella arctica*  | Norway: Svalbard, *Konstantinova 128-04* (KPABG) | EU791815 |   | EU791695 |
| *Marsupella arctica*  | Norway: Svalbard, *Konstantinova & Savchenko k113/2-06* (F) |   | KF852300 | KJ802072 |
| *Marsupella funckii*  | Russia, *Konstantinova and Savchenko* (F) |   |  KF943562 | KF942985 |
| *Marsupella funckii*  | Russia: Karachaevo-Cherkesia Rep. *Konstantinova K516-1-05* (KPABG-109804) | EU791820 |   | EU791700 |
| *Mesoptychia badensis*  | Russia: Amur Terr., *Bakalin 33-1-00* (KPABG-101674) | EU791842 |   | EU791718 |
| *Mesoptychia badensis*  | Russia: Komi Rep., *Dulin & Konstantinova 24-Jun-2001* (KPABG-101313) | EU791841 |   | EU791717 |
| *Mesoptychia polymorpha*  | USA: California, *Doyle 11541* (ABSH) |   | KF943581 | KF943034 |
| *Mesoptychia rutheana*  | Canada: British Columbia, *Shaw F702* (DUKE) |   | KF943573 | KF943025 |
| *Mesoptychia sahlbergii*  | Russia, *Fedosov 107967* (F) |   | KF852310 | KJ802078 |
| *Mesoptychia sahlbergii*  | Russia: Chukotka A.O., *Afonina, 10-Aug-1979* (KPABG) | EU791840 |   | AF519189 |
| *Metacalypogeia alternifolia*  | Bhutan, *Long 28712* (E) |   | KF852276 | KJ802068 |
| *Mizutania riccardioides*  | Malaysia: Fraser's Hill, *Masuzaki 147* (HIRO) |   | AB476582 |   |
| *Mnioloma fuscum*  | Fiji, *Braggins et al. 16-Apr-2008* (NSW) |   | KF852404 | KJ802100 |
| *Mylia anomala*  | Russia: Magadan Prov., *Bakalin, D#Mag 21-6-14* (VBGI) |   | MF989962 | MF989970 |
| *Mylia taylorii*  | China: Yunnan Prov., *Long 34707* (E) |   | KF852277 |   |
| *Mylia taylorii*  | Russia: Primorsky Terr., *Bakalin P-18-4-12* (VBGI) | MF989964 |   | MF989972 |
| *Nardia assamica*  | Russia: Kuril Islands, I. Iturup, *Bakalin K-54-1a-05* (KPABG-123316) | EU791838 |   | EU791715 |
| *Nardia compressa*  | Canada: British Columbia, *Konstantinova A97/1-95* (KPABG) | EU791837 |   | AF519188 |
| *Nardia compressa*  | Russia, *Bakalin K-74-9-04* (F) |   | KF943556 | KF942978 |
| *Nardia insecta*  | Belgium, *Konstantinova 1-99* (KPABG-102077) | EU791836 |   | EU791714 |
| *Nardia scalaris*  | Russia, *Konstantinova & Savchenko 1/3/2002* (F) |   | KF852307 | KJ802077 |
| *Nardia succulenta*  | Colombia, *Benavides* (SIU) |   | KF943622 | KF943094 |
| *Neesioscyphus argillaceus*  | Brazil, *Schaefer-Verwimp & Verwimp 11107* (GOET) |   | DQ312509 |   |
| *Odontoschisma elongatum*  | Norway: Svalbard, *Konstantinova & Savchenko K142-1-04* (KPABG-110058) | JX629870 |   | JX630001 |
| *Odontoschisma elongatum*  | Portugal: Azores, Terceira Island, *Schaefer-Verwimp & Verwimp 33337* (M) |   | KX098925 | KX099007 |
| *Plectocolea obovata*  | Russia: Buryatia Rep., *Konstantinova 70-2-01* (KPABG- 102519) | GQ220767 |   | GQ220751 |
| *Plectocolea obovata*  | Russia: Kemerovo Prov., *Konstantinova 72-2-00* (KPABG-102004) | GQ220769 |   | GQ220753  |
| *Plectocolea obovata*  | Russia: Murmansk Prov., *Konstantinova 196-6-02* (KPABG-9543) | GQ220770 |   | GQ220754 |
| *Plectocolea obovata*  | Russia: Perm Terr., *Konstantinova K324-1-04* (KPABG-108265) | GQ220771 |   | GQ220755 |
| *Plectocolea obovata*  | Russia, *Konstantinova & Savchenko ?382-3?-04* (F) |   | KF943552 | KF942974 |
| *Plectocolea* sp.  | Russia: Karachaevo-Cherkesia Rep., *Konstantinova K495-2-05* (KPABG-109772) | GQ220778 |   | GQ220762 |
| *Plectocolea* sp.  | Russia: Murmansk Prov., *Konstantinova 30-1-97* (KPABG-6176) | GQ220777 |   | GQ220761 |
| *Plectocolea subelliptica*  | Russia: Kamchatka Terr., *Bakalin K-48-13-03* (KPABG-105188) | GQ220768 |   | GQ220752 |
| *Prasanthus suecicus*  | Norway: Svalbard, *Konstantinova K121-5-06* (KPABG-111821) | EU791825 |   | EU791704 |
| *Prasanthus suecicus*  | Norway: Svalbard, *Konstantinova & Savchenko K106/1-07* (F) |   | KF852304 | KJ802074 |
| *Saccogyna viticulosa*  | Portugal: Sintra, *Stotler & Crandall-Stotler 4657* (SIU) |   | KF852385 |   |
| *Saccogynidium decurvum*  | Australia: Tasmania, *Shaw 6410* (DUKE) |   | KF852389 |   |
| *Solenostoma appressifolium*  | China: Yunnan Prov., *Shaw 5761* (DUKE) |   | KF943570 | KF943010 |
| *Solenostoma confertissimum*  | Norway, *Sova 15-Jul-2008* (DUKE) |   | KF943601 | KF943065 |
| *Solenostoma confertissimum*  | Russia: Karachaevo-Cherkesia Rep., *Konstantinova K459-8a-05* (KPABG- 109680) |  GQ220774 |   | GQ220758 |
| *Solenostoma crenuliforme*  | USA: North Carolina, *Shaw 7212* (DUKE) |   | KF943617 | KF943085 |
| *Solenostoma fusiforme* | Russia: Kamchatka Terr., *Bakalin HRE 42* (KPABG) | GQ220773 |   | GQ220757 |
| *Solenostoma gracillimum*  | Austria, *Sova 21-Aug-2008* (DUKE) |   | KF943614 | KF943082 |
| *Solenostoma handelii*  | Japan, *Itouga Bryophytes of Asia 194* (KPABG) | GQ220772 |   | GQ220756 |
| *Solenostoma inundatum*  | New Zealand, *Renner 4201 ? 4021* (DUKE) |   | KF943596 | KF943058 |
| *Solenostoma montanum*  | Australia, *Pocs & Streimann* (F) |   | KF943564 | KF942987 |
| *Solenostoma orbiculatum*  | New Zealand, *Engel & von Konrat 28158* (F) |   | KF943583 | KF943036 |
| *Solenostoma pseudopyriflorum*  | Russia: Buryatia Rep., *Konstantinova 30-2-01* (KPABG-102426) | GQ220775 |   | GQ220759 |
| *Solenostoma rosulans*  | China: Yunnan Prov., *Long 36185* (E) |   | KF943574 | KF943026 |
| *Solenostoma sphaerocarpum*  | Norway, *Sova 21-Jul-2008b* (DUKE) |   | KF943618 | KF943086 |
| *Solenostoma sphaerocarpum*  | Russia: Karachaevo-Cherkesia Rep., *Konstantinova K419-05* (KPABG-109579) | GQ220776 |   | GQ220760 |
| *Southbya nigrella*  | Italy: Sicily, *Buryová 621* (DUKE) |   | KF852355 | KJ802083 |
| *Southbya tophacea*  | Italy, *Long 35466* (E) |   |   | KF942954 |
| *Southbya tophacea*  | Russia: Krasnodar Terr., *Konstantinova & Savchenko K312-4-11*(KPABG-122707) | **OR611951** | **OR604354** | **OR604344** |
| *Trichotemnoma corrugatum*  | New Zealand, *Glenny 8426* |   | AY462333 | AY463591 |
| *Trilophozia quinquedentata*  | Russia, *Konstantinova & Savchenko 515-3 -05* (F) |   | KF852302 |   |
| *Trilophozia quinquedentata*  | Russia: Kareliya Rep., *Bakalin 02-Jul-1997* (KPABG) | EU791804 |   | AY327786 |
| *Tylimanthus laxus*  | Ecuador, *Schaefer-Verwimp & Nebel 32025* (F) |   | JX461053 | JX461095 |
| *Vietnamiella epiphytica*  | Vietnam: Lao Cai Prov., *Bakalin V-9-7-17* (VBGI, KPABG- 122594) | MK277316 | MK290986 | MK290984 |