

Supplemental Material 2. A list of sampled specimens included in molecular phylogeny. Newly produced sequences are shown in bold. Origin U.S.A. unless stated otherwise. Sequences LSU is included in ITS published Westberg et al. (2015).

| Taxon | Origin | Sample | ITS | mtSSU | LSU |
|--------------------------------|------------------------|----------------------------|-----------------|-----------------|-----------------|
| Acarospora species | California Joshua Tree | Knudsen 13111.2 (SBBG) | OP162387 | OP177771 | OP216704 |
| <i>Acarospora admissa</i> | Czech Republic | Maliček 7900 (hb. Maliček) | ON447564 | ON367836 | ON391422 |
| <i>Acarospora affinis</i> | Mexico | Nash 33959 (hb. K&K) | ON707071 | ON715667 | |
| <i>Acarospora agostiniana</i> | New Mexico | Knudsen 19236 (PRM) | OP162389 | ON715682 | ON725172 |
| <i>Acarospora alba</i> | California Joshua Tree | Knudsen 13181 (SBBG) | OQ171055 | OQ184771 | OQ195825 |
| <i>Acarospora americana</i> | California | Dart 1526.1 (hb. K&k) | OP162349 | OP177737 | OP216668 |
| <i>Acarospora americana</i> | California | Dart 750 (hb. K&K) | OP177738 | OP177738 | OP216669 |
| <i>Acarospora atrata</i> | Norway | Westberg 08-125 (S) | LN810761 | LN810886 | |
| <i>Acarospora atrata</i> | Sweden | Arup L02737 (LD) | LN810760 | LN810885 | |
| <i>Acarospora badiofusca</i> | Austria | Türk 32318 (GZU) | OP162390 | OP177774 | OP216707 |
| <i>Acarospora boulderensis</i> | Kansas | Morse 15147 (SBBG) | OP162359 | OP177746 | OP216677 |
| <i>Acarospora boulderensis</i> | Minnesota | Wetmore 37667 (GZU) | OP162391 | OP177775 | OP216708 |
| <i>Acarospora cervina</i> | Czech Republic | Kocourková (PRM 952325) | OK142756 | OK032141 | |
| <i>Acarospora chrysops</i> | New Mexico | Kocourková 10386 (hb. K&K) | ON707091 | ON715686 | ON725176 |
| <i>Acarospora chrysops</i> | New Mexico | Knudsen 19385 (hb. K&K) | ON447623 | ON367896 | ON391451 |

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| <i>Acarospora chrysops</i> | New México | Knudsen 19269 (hb. K&K) | ON447626 | ON367899 | ON391454 |
| <i>Acarospora divisa</i> | New Mexico | Knudsen 19364 (BRY-C) | OK142748 | OK032133 | |
| <i>Acarospora fusca</i> | Germany | Schiefelbein 4446 (NY) | MT809052 | MT809052 | MT809053 |
| <i>Acarospora fusca</i> | Czech Republic | Maliček 14932 (hb. Maliček) | OP162405 | OP177790 | OP216720 |
| <i>Acarospora fuscata</i> | Norway | Tønsberg 45870 (BG) | ON447607 | ON367880 | ON391440 |
| <i>Acarospora fuscata</i> | Czech Republic | Kocourková 8499 (S) | MW989393 | MW989442 | |
| <i>Acarospora glaucocarpa</i> s. str. | Sweden, Gotland | Westberg SAR08 (LD) | LN810768 | LN810893 | |
| <i>Acarospora glaucocarpa</i> s. str. | Sweden, Öland | Westberg, W23 (LD) | LN810769 | LN810894 | |
| <i>Acarospora indistincta</i> | California Joshua Tree | Knudsen 5782 (SBBG) | ON707096 | ON715691 | ON725180 |
| <i>Acarospora indistincta</i> | California Joshua Tree | Knudsen 12772 (SBBG) | ON707099 | ON715695 | ON725184 |
| <i>Acarospora intermedia</i> | Czech Republic | Knudsen 18342 (hb. K&K) | MW715700 | MW715732 | MW715723 |
| <i>Acarospora imbriculata</i> | Italy | Buschardt 2187 (B) | OP162381 | OP177765 | |
| <i>Acarospora impressula</i> | Norway Oslo | Westberg 08-107 (S) | LN810776 | LN810901 | |
| <i>Acarospora irregularis</i> | Czech Republic | Maliček 2128 (hb. Maliček) | OP162363 | OP177750 | OP216681 |
| <i>Acarospora lapponica</i> | Czech Republic | Bouda (923411 PRM) | OP162380 | OP177764 | OP216698 |
| <i>Acarospora leavittii</i> | California | Knudsen 9705 (S) | LN810817 | LN810942 | |
| <i>Acarospora macrospora</i> | Norway, Oslo | Westberg 08-109 (S) | LN810779 | LN810904 | |

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| <i>Acarospora macrospora</i> | Sweden, Gotland | Westberg 159 (LD) | LN810780 | LN810905 | |
| <i>Acarospora moenium</i> | Sweden | Westberg 09-066 (S) | LN810781 | LN810906 | |
| <i>Acarospora monacensis</i> | Czech Republic | Peksa PL BL 2878 | OP162370 | OP177756 | OP216688 |
| <i>Acarospora murorum</i> | Spain | Westberg SCIN014 (S) | LN810784 | LN810909 | |
| <i>Acarospora nicolai</i> | Kansas | Morse 16138 (S) | LN810785 | LN810910 | |
| <i>Acarospora nodulosa</i> | Spain | Westberg SCIN032 (S) | LN810788 | LN810913 | |
| <i>Acarospora nodulosa</i> | Spain, Madrid | Westberg 10-215 (S) | LN810789 | LN810914 | |
| <i>Acarospora obpallens</i> | California | Knudsen 9325 (S) | LN810790 | LN810915 | |
| <i>Acarospora oligospora</i> | Czech Republic | Kocourková 9006 (hb. K&K) | ON794216 | ON787700 | |
| <i>Acarospora oligospora</i> | California | Dart 1424 (hb. K&K) | OP162348 | OP177735 | |
| <i>Acarospora privigna</i> | Germany | Kison 4432/3 (hb. K&K) | OK142747 | OK032132 | ON303622 |
| <i>Acarospora radicata</i> | California Joshua Tree | Knudsen 13537 (SBBG) | ON447602 | ON367875 | ON391435 |
| <i>Acarospora radicata</i> | California, Joshua tree | Knudsen 13482 (SBBG) | ON447604 | ON367877 | ON391437 |
| <i>Acarospora rosulata</i> | Norway, Oppland | Westberg 08-193 (S) | LN810797 | LN810922 | |
| <i>Acarospora rimulosa</i> | New Mexico | Knudsen 19053 (SBBG) | ON707057 | ON715653 | ON725160 |
| <i>Acarospora rimulosa</i> | New Mexico, Organ Mountains | Knudsen 19034 (hb. K&K) | ON707059 | ON715655 | ON725162 |
| <i>Acarospora rimulosa</i> | New Mexico | Kocourková 10336 (hb. K&K) | ON707094 | ON715689 | ON725179 |

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| <i>Acarospora robiniae</i> | California, Santa Ana Mountains | Knudsen 7972 (SBBG) | ON707078 | ON715674 | ON725169 |
| <i>Acarospora rugulosa</i> | Norway, Telemark | Westberg 08-119 (S) | LN810798 | LN810923 | |
| <i>Acarospora rugulosa</i> | Norway | Westberg 10-099 (S) | LN810799 | LN810924 | |
| <i>Acarospora schleicheri</i> | California, San Diego | Knudsen 15559 (SBBG) | ON794213 | ON787697 | |
| <i>Acarospora schleicheri</i> | Arizona | Sweat KGS1196 (UPS) | LN810801 | LN810926 | |
| <i>Acarospora scottii</i> | Minnesota | Scott 5146 (PRM) | MT809048 | MT809049 | MT809050 |
| <i>Acarospora sharnoffii</i> | California, Joshua Tree | Sharnoff 4107 (SBBG) | ON707101 | ON715697 | ON725185 |
| <i>Acarospora socialis</i> | California | Dart 518 (hb. K&K) | MW989390 | MW989439 | MW989408 |
| <i>Acarospora squamulosa</i> | Sweden, Uppland | Westberg 09-222 (S) | LN810793 | LN810918 | |
| <i>Acarospora squamulosa</i> | Norway | Westberg 08-153 (S) | LN810794 | LN810919 | |
| <i>Acarospora subcontigua</i> | New Mexico | Knudsen 19366 (SBBG) | ON707045 | ON715642 | ON725148 |
| <i>Acarospora thamnina</i> | California, Sierra Nevada Mountains | Knudsen 15881 (SBBG) | ON707090 | ON715685 | ON725175 |
| <i>Acarospora tuckerae</i> | Mexico | Huereca 906 (SBBG) | ON794193 | ON787675 | |
| <i>Acarospora utahensis</i> | Colorado | Anderson & Poelt (GZU) | ON707051 | ON715648 | ON725154 |
| <i>Glypholecia scabra</i> | Norway, Oppland | Westberg 08-232 (S) | LN810811 | LN810936 | |
| <i>Myriospora bullata</i> | Germany | Schieftlbein 5321 (B) | ON707077 | ON715673 | ON725168 |
| <i>Myriospora bullata</i> | Germany | Schiefelbein 4763 (B) | MZ262727 | MZ262739 | MZ262739 |
| <i>Myriospora myochroa</i> | Sweden, Bohuslän | Westberg 06-051 (LD) | EU870677 | EU870729 | LN810873 |

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| <i>Myriospora rhagazida</i> | Sweden, Bohuslän | Westberg 06-040 (LD) | EU870647 | EU870699 | LN810875 |
| <i>Myriospora scabrida</i> | Sweden | Santesson 33077a (UPS) | LN810812 | LN810937 | |
| <i>Myriospora smaragdula</i> | Sweden | Ågren 345 (UPS) | EU870686 | EU870738 | LN810878 |
| <i>Pleopsidium chlorophanum</i> | Sweden | Nordin 4439 (UPS) | LN810813 | LN810938 | |
| <i>Pleopsidium chlorophanum</i> | Sweden | Nordin 6209 (UPS) | LN810813 | LN810938 | |
| <i>Pleopsidium flavum</i> | Austria | Obermayer 5590 (UPS) | AY853385 | AY853336 | |
| <i>Pycnora sorophora</i> | Sweden | Hermansson 7903a (UPS) | FJ959357 | AY853387 | AY853387 |
| <i>Sarcogyne adscendens</i> | California, Santa Ana Mountains | Knudsen 6079 (H) | OP162367 | OP177753 | OP216685 |
| <i>Sarcogyne adscendens</i> | California | Dart 1230 (SBBG) | OK142749 | OK032134 | |
| <i>Sarcogyne alcesensis</i> | Montana | Wheeler 5971 (PRM) | ON794197 | ON787680 | |
| <i>Sarcogyne algoviae</i> | Norway, Oppland | Westberg 08-276 (S) | LN810849 | LN810975 | |
| <i>Sarcogyne algoviae</i> | Norway, Oppland | Westberg 06-168(S) | LN810850 | LN810976 | |
| <i>Sarcogyne arenosa</i> | California | Dart 19949 (SBBG) | OQ171124 | OQ184835 | OQ195884 |
| <i>Sarcogyne belarusensis</i> | Belarus | Golubkov 80 (H) | OQ171089 | OQ184801 | OQ195852 |
| <i>Sarcogyne belarusensis</i> | Belarus | Golubkov 73 (PRM) | OQ171092 | OQ184804 | OQ195855 |
| <i>Sarcogyne canadensis</i> | Montana | Wheeler 5783 (PRM) | ON794196 | ON787678 | |
| <i>Sarcogyne clavus</i> | California Santa Ana Mountains | Kocourková 10880 (hb. K&K) | OQ171051 | OQ184767 | OQ195822 |
| <i>Sarcogyne coeruleonigrans</i> | New Mexico | Schultz 16242 (HBG) | OQ171108 | OQ184820 | OQ195870 |

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| <i>Sarcogyne coeruleonigrans</i> | California | Kocourková 11119 (hb. K&K) | PP091276 | OR754074 | OR742179 |
| <i>Sarcogyne distinguenda</i> | Sweden | Westberg 08-305 (S) | LN810854 | LN810979 | |
| <i>Sarcogyne fasciculata</i> | California Joshua Tree | Knudsen 5215 (SBBG) | ON707100 | ON715696 | |
| <i>Sarcogyne fasciculata</i> | California | Knudsen 16494.2 (SBBG) | ON707072 | ON715668 | ON725164 |
| <i>Sarcogyne fasciculata</i> | New Mexico | Kocourková 10848 (PRM) | OQ171069 | OQ184781 | OQ195834 |
| <i>Sarcogyne fasciculata</i> | New Mexico | Kocourková 10974 (PRM) | OQ171105 | OQ184817 | OQ195867 |
| <i>Sarcogyne fasciculata</i> | New Mexico | Kocourková 10863 (SBBG) | OQ171106 | OQ184818 | OQ195868 |
| <i>Sarcogyne fasciculata</i> | New Mexico | Kocourková 10974 (hb. K&K) | OQ171116 | OQ184827 | OQ195876 |
| <i>Sarcogyne hypophaea</i> | Sweden, Uppland | Westberg SAR198 (S) | LN810856 | LN810981 | |
| <i>Sarcogyne hypophaea</i> | Finland | Pykälä 23561 (H) | LN810857 | LN810982 | |
| <i>Sarcogyne hypophaeoides</i> | Sweden | Westberg 08-002 | LN810858 | LN810983 | |
| <i>Sarcogyne hypophaeoides</i> | Norway | Westberg 08-139 (S) | LN810859 | LN810984 | |
| <i>Sarcogyne nogalensis</i> | New Mexico | Knudsen 19340 (SBBG) | ON447632 | ON367905 | ON391460 |
| <i>Sarcogyne malpaiensis</i> | New Mexico | Knudsen 19317.1 (SBBG) | OK142764 | OK032149 | |
| <i>Sarcogyne magnussonii</i> | Canada | Freebury 829B (SBBG) | MW715694 | MW715694 | MW715727 |
| <i>Sarcogyne nivea</i> | Czech Republic | Malíček 14530 (hb. Malíček) | OQ171085 | OQ184797 | OQ195848 |
| <i>Sarcogyne platycarpoides</i> | Italy | Nimis 34786 (TSB) | OQ171137 | OQ184847 | OQ195896 |

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| <i>Sarcogyne poeltii</i> | Greece | Poelt 78 (GZU) | OP162398 | OP177782 | OP216714 |
| <i>Sarcogyne praetermissa</i> | Czech Prague | Maliček 9962 (hb. Maliček) | ON794209 | ON787693 | |
| <i>Sarcogyne pruinosa</i> | Czech Republic | Maliček 2560 (hb. Maliček) | OQ171097 | OQ184809 | OQ195860 |
| <i>Sarcogyne pruinosa</i> | Czech Republic | Maliček 6296 (hb. Maliček) | OQ171098 | OQ184810 | OQ195861 |
| <i>Sarcogyne similis</i> | California | Knudsen 6431 (SBBG) | OK142766 | OK032151 | |
| <i>Sarcogyne similis</i> | California | Dart 1332 (SBBG) | MW715720 | MW715741 | MW715730 |
| <i>Timdalia intricata</i> | Sweden | Westberg P114 (S) | LN810867 | LN810992 | |
| <i>Timdalia intricata</i> | Sweden | Westberg SAR92 (LD) | LN810866 | LN810991 | |
| <i>Trimmatothelopsis rhizobola</i> | Sweden | Westberg 2994 (LD) | EU870640 | EU870692 | LN810868 |
| <i>Trimmatothelopsis terricola</i> | California | Knudsen 11216 (S) | LN810806 | LN810931 | |
| <i>Trimmatothelopsis schorica</i> | Czech Republic | Kocourková 8980 (hb. K&K) | ON303958 | ON303849 | ON303963 |