

# SUPPLEMENTARY MATERIAL

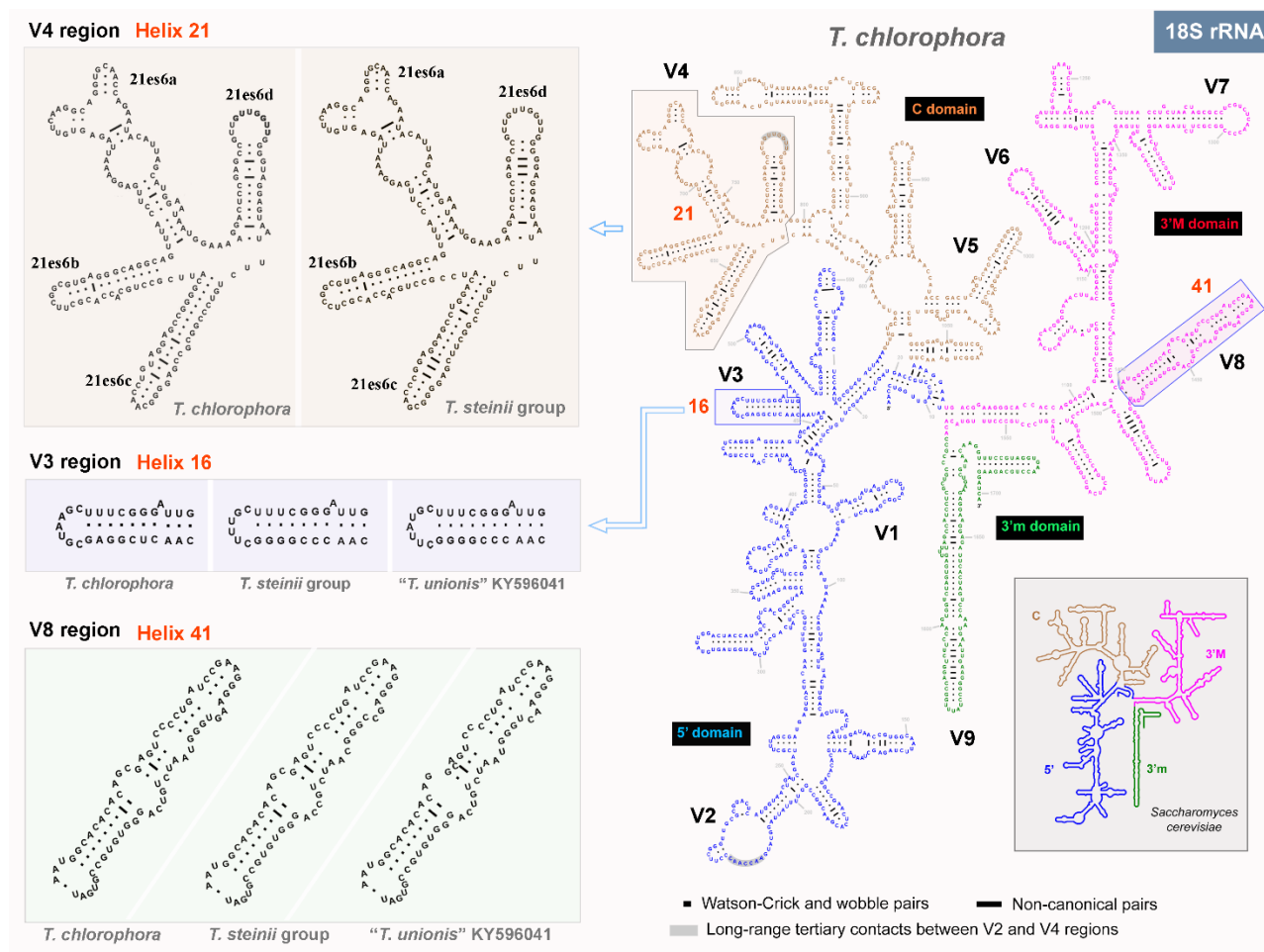
**Morpho-molecular characterization of *Trichodina chlorophora* Richards, 1948 (Protista, Ciliophora), a central component in the ‘snail–ciliate–zoochlorellae’ hyper-symbiotic system**

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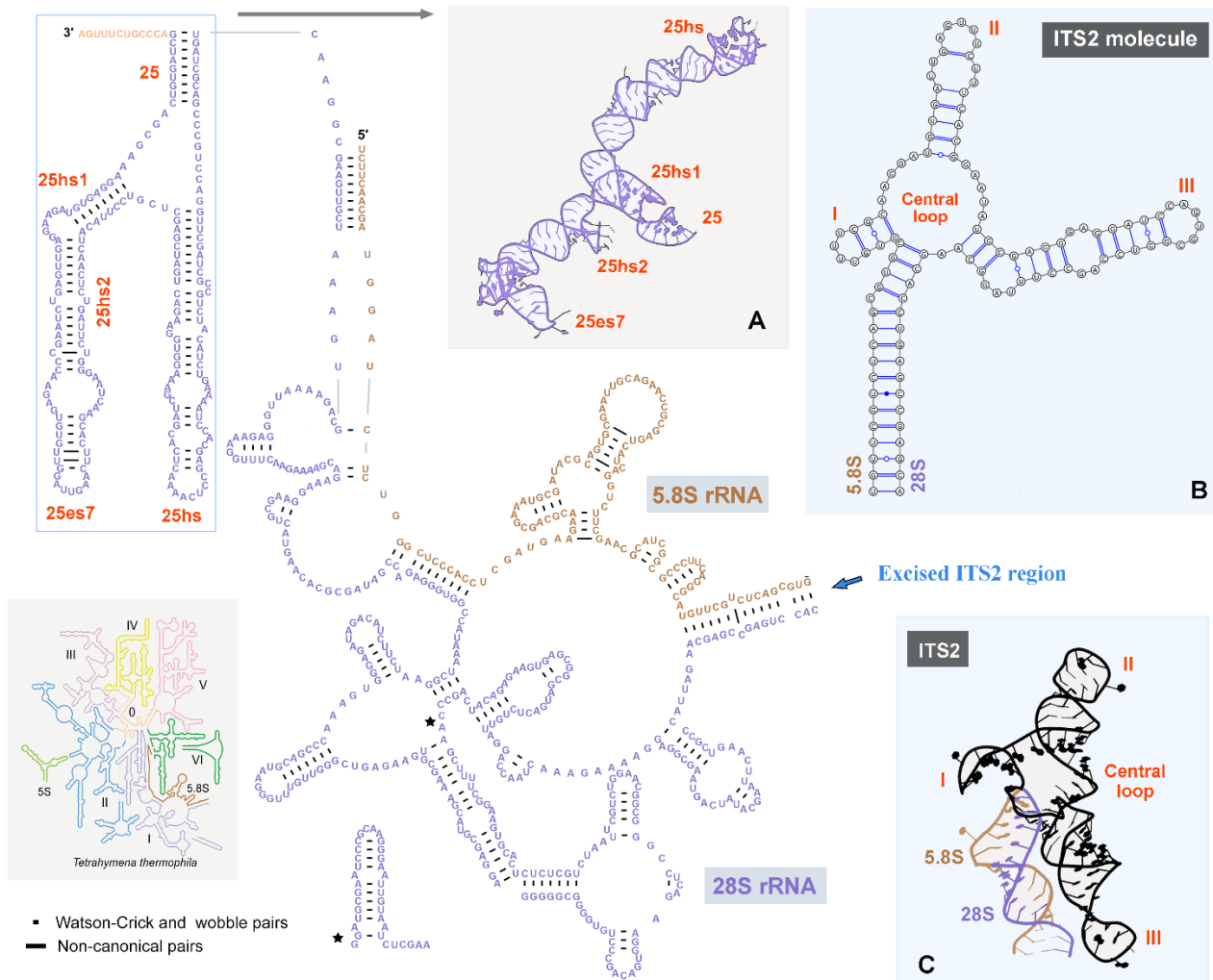
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**Suppl. Fig. S1** Secondary structure model of the macronuclear 18S rRNA molecule of *Trichodina chlorophora* and comparison with closely related taxa. The secondary structure prediction is based on the *Saccharomyces cerevisiae* model, considering the 3D ribosomal structure. The secondary structure map of the *S. cerevisiae* 18S rRNA molecule (lower right panel) is from <http://apollo.chemistry.gatech.edu/RibosomeGallery> (Petrov et al. 2014)



**Suppl. Fig. S2** Secondary structure models of the macronuclear 5.8S rRNA, the first domain of the 28S rRNA, and the ITS2 molecule of *Trichodina chlorophora*. The secondary structure prediction of the 5.8S-28S rRNA molecules is based on the *Tetrahymena thermophila* model, considering the 3D ribosomal structure. The secondary structure map of the *T. thermophila* 5.8S and 28S rRNA molecules (lower left panel) is from <http://apollo.chemistry.gatech.edu/RibosomeGallery> (Petrov et al. 2014). **A** Three-dimensional model of the hypervariable helix 25. **B, C** Two- and three-dimensional models of the ITS2 molecule, including the imperfect hybridization helix 10 formed by 3'-end of 5.8S and 5'-end of 28S. The three helices radiating from the central loop of the ITS2 molecule are labeled with Roman numerals I–III

## Supplementary Table S1

Origin and GenBank accession numbers of mobilid 18S rRNA gene sequences used to construct the 18S rRNA gene trees

| Taxon                                         | GenBank accession number | Host organism                      | Higher taxonomic group of host | Life history of host | Reference                         |
|-----------------------------------------------|--------------------------|------------------------------------|--------------------------------|----------------------|-----------------------------------|
| <i>Trichodina acuta</i> pop. 1                | KX904932                 | <i>Misgurnus anguillicaudatus</i>  | Fish                           | Freshwater           | Wang et al. (2017)                |
| <i>Trichodina acuta</i> pop. 2                | MT982920                 | <i>Cyprinus carpio</i>             | Fish                           | Freshwater           | Wang et al. (2022)                |
| <i>Trichodina acuta</i> pop. 3                | MK757999                 | <i>Cyprinus carpio</i>             | Fish                           | Freshwater           | Wang et al. (2020)                |
| <i>Trichodina acuta</i> TAJF01                | MT648464                 | <i>Notodiaptomus</i> sp.           | Copepod                        | Freshwater           | de Oliveira Furtado et al. (2020) |
| <i>Trichodina baltica</i> KR 112 TF           | ON970912                 | <i>Theodoxus flutviatilis</i>      | Mollusk                        | Freshwater           | Zhang et al. (2023)               |
| <i>Trichodina bellottii</i>                   | MH730162                 | <i>Austrolebias bellottii</i>      | Fish                           | Freshwater           | Marcotegui et al. (2018)          |
| <i>Trichodina centrostrigata</i>              | KP295473                 | <i>Oreochromis aureus</i>          | Fish                           | Freshwater           | Wang et al. (2015)                |
| <i>Trichodina chlorophora</i> VO 167 PA       | PV770921                 | <i>Physella acuta</i>              | Mollusk                        | Freshwater           | Present study                     |
| <i>Trichodina domerguei</i>                   | KY596037                 | <i>Gasterosteus aculeatus</i>      | Fish                           | Anadromous           | Irwin et al. (2017)               |
| <i>Trichodina funduli</i>                     | MK757998                 | <i>Paramisgurnus dabryanus</i>     | Fish                           | Freshwater           | Wang et al. (2020)                |
| <i>Trichodina heterodentata</i> <sup>a</sup>  | AY788099                 | <i>Ctenopharyngodon idella</i>     | Fish                           | Freshwater           | Gong et al. (2006)                |
| <i>Trichodina hokkaidoensis</i>               | LC598228                 | <i>Verasper moseri</i>             | Fish                           | Marine               | Mizuno et al. (2021)              |
| <i>Trichodina hyperparasitis</i> <sup>b</sup> | KX904933                 | <i>Pelteobagrus fulvidraco</i>     | Fish                           | Freshwater           | Wang et al. (2017)                |
| <i>Trichodina hypsilepis</i> <sup>c</sup>     | EF524274                 | <i>Rana</i> sp.                    | Amphibian                      | Freshwater           | Gong (2007)                       |
| <i>Trichodina koloti</i>                      | MT214940                 | <i>Sclerophrys gutteralis</i>      | Amphibian                      | Freshwater           | de Jager et al. (2019)            |
| <i>Trichodina lishuiensis</i>                 | MW325344                 | <i>Odorrana schmackeri</i>         | Amphibian                      | Freshwater           | Zhou et al. (2021b)               |
| <i>Trichodina matsu</i>                       | MN072382                 | <i>Tachysurus fulvidraco</i>       | Fish                           | Freshwater           | Zhou et al. (2021a)               |
| <i>Trichodina meretricis</i>                  | FJ499387                 | <i>Meretrix lyreta</i>             | Mollusk                        | Marine               | Zhan et al. (2009)                |
| <i>Trichodina nigra</i>                       | MT982921                 | <i>Cyprinus carpio</i>             | Fish                           | Freshwater           | Wang et al. (2022)                |
| <i>Trichodina nobilis</i>                     | AY102172                 | <i>Hypophthalmichthys molitrix</i> | Fish                           | Freshwater           | Gong (2007)                       |
| <i>Trichodina</i> sp.                         | MG198569                 | <i>Micropercops swinhonis</i>      | Fish                           | Freshwater           | Wang et al. (2018)                |
| <i>Trichodina pectenis</i>                    | JQ663868                 | <i>Patinopecten yessoensis</i>     | Mollusk                        | Marine               | Zhan et al. (2013)                |
| <i>T. polycelis</i> HR 95 PF                  | MW759641                 | <i>Polycelis felina</i>            | Planarian                      | Freshwater           | Rataj and Vd'ačný (2021)          |
| <i>T. pseudoheterodentata</i>                 | KT804995                 | <i>Ictalurus punctatus</i>         | Fish                           | Freshwater           | Tang et al. (2017)                |
| <i>Trichodina pseudominuta</i>                | HQ407385                 | <i>Carassius auratus</i>           | Fish                           | Freshwater           | Tang and Zhao (2016)              |

| Taxon                                         | GenBank accession number | Host organism                                                                                                      | Higher taxonomic group of host | Life history of host | Reference                         |
|-----------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------|-----------------------------------|
| <i>Trichodina reticulata</i> pop. 1           | AY741784                 | <i>Ctenopharyngodon idella</i>                                                                                     | Fish                           | Freshwater           | Gong et al. (2006)                |
| <i>Trichodina reticulata</i> pop. 2           | MG198568                 | <i>Microperops swinhonis</i>                                                                                       | Fish                           | Freshwater           | Wang et al. (2018)                |
| <i>Trichodina reticulata</i> S1               | MH191329                 | <i>Carassius auratus</i>                                                                                           | Fish                           | Freshwater           | Wang et al. (2019)                |
| <i>Trichodina reticulata</i> S2               | MH191330                 | <i>Carassius auratus</i>                                                                                           | Fish                           | Freshwater           | Wang et al. (2019)                |
| <i>Trichodina reticulata</i> S3               | MH191331                 | <i>Carassius auratus</i>                                                                                           | Fish                           | Freshwater           | Wang et al. (2019)                |
| <i>Trichodina reticulata</i> W1               | MH191332                 | <i>Ctenopharyngodon idella</i>                                                                                     | Fish                           | Freshwater           | Wang et al. (2019)                |
| <i>Trichodina reticulata</i> W2               | MH191333                 | <i>Ctenopharyngodon idella</i>                                                                                     | Fish                           | Freshwater           | Wang et al. (2019)                |
| <i>Trichodina ruditapicis</i>                 | FJ499385                 | <i>Ruditapes philippinarum</i>                                                                                     | Mollusk                        | Marine               | Zhan et al. (2009)                |
| <i>Trichodina schmidtea</i> JJ 108 SP         | MW759648                 | <i>Schmidtea polychroa</i>                                                                                         | Planarian                      | Freshwater           | Rataj and Vďačný (2021)           |
| <i>Trichodina sinipercae</i>                  | EF599288                 | <i>Ctenopharyngodon idella</i>                                                                                     | Fish                           | Freshwater           | Gong (2007)                       |
| <i>Trichodina sinonovaculae</i>               | FJ499386                 | <i>Sinonovacula constricta</i>                                                                                     | Mollusk                        | Marine               | Zhan et al. (2009)                |
| <i>Trichodina</i> sp. B4-D22                  | MH204149                 | <i>Channa argus</i>                                                                                                | Fish                           | Freshwater           | Tang et al. (unpublished)         |
| <i>Trichodina</i> sp. CCo-2020                | MT431558                 | <i>Lycodes</i> spp.                                                                                                | Fish                           | Marine               | Collins et al. (unpublished)      |
| <i>Trichodina</i> sp. FS                      | HM583859                 | <i>Salmo salar</i>                                                                                                 | Fish                           | Anadromous           | Nylund and Isaksen (unpublished)  |
| <i>Trichodina</i> sp. TEL-2012                | JQ821348                 | <i>Clarias gariepinus</i>                                                                                          | Fish                           | Freshwater           | Isaksen et al. (unpublished)      |
| <i>Trichodina</i> sp. Ydu-2019                | MH204138                 | <i>Channa argus</i>                                                                                                | Fish                           | Freshwater           | Du et al. (unpublished)           |
| <i>Trichodinella</i> sp. ZZ-2012              | JQ663869                 | <i>Ctenopharyngodon idella</i>                                                                                     | Fish                           | Freshwater           | Zhan et al. (2013)                |
| <i>Trichodina steinii</i> BB 104 DG           | MW759652                 | <i>Dugesia gonocephala</i>                                                                                         | Planarian                      | Freshwater           | Rataj and Vďačný (2021)           |
| <i>Trichodina tenuidens</i> HL-1              | KY596038                 | <i>Gasterosteus aculeatus</i>                                                                                      | Fish                           | Anadromous           | Irwin et al. (2017)               |
| <i>Trichodina tenuidens</i> UBC-6             | KY596040                 | <i>Gasterosteus aculeatus</i>                                                                                      | Fish                           | Anadromous           | Irwin et al. (2017)               |
| <i>Trichodina truttae</i>                     | LC186029                 | <i>Oncorhynchus keta</i> , <i>O. masou</i> , <i>O. mykiss</i> ,<br><i>Salvelinus leucomaenis</i> , <i>S. malma</i> | Fish                           | Anadromous           | Mizuno et al. (2016)              |
| <i>Trichodina unionis</i> HO 12 UT            | ON970917                 | <i>Unio tumidus</i>                                                                                                | Mollusk                        | Freshwater           | Zhang et al. (2023)               |
| <i>Trichodina unionis</i> 29_BB1 <sup>d</sup> | MN082436                 | <i>Gyraulus siamensis</i> , <i>Physella acuta</i>                                                                  | Mollusk                        | Freshwater           | Wiroonpan and Purivirojkul (2019) |
| <i>Trichodina unionis</i> 99_BB1 <sup>d</sup> | MN082437                 | <i>Gyraulus siamensis</i> , <i>Physella acuta</i>                                                                  | Mollusk                        | Freshwater           | Wiroonpan and Purivirojkul (2019) |
| <i>Trichodina unionis</i> UBC-2 <sup>d</sup>  | KY596041                 | <i>Stagnicola</i> sp.                                                                                              | Mollusk                        | Freshwater           | Irwin et al. (2017)               |
| <i>Trichodinella epizootica</i> (C)           | HQ407386                 | <i>Carassius auratus</i>                                                                                           | Fish                           | Freshwater           | Zhang et al. (2015)               |
| <i>Trichodinella epizootica</i> (D)           | HQ407387                 | <i>Cyprinus carpio</i>                                                                                             | Fish                           | Freshwater           | Zhang et al. (2015)               |

| Taxon                                | GenBank accession number | Host organism                  | Higher taxonomic group of host | Life history of host | Reference               |
|--------------------------------------|--------------------------|--------------------------------|--------------------------------|----------------------|-------------------------|
| <i>Trichodinella epizootica</i> (H)  | GU906246                 | <i>Carassius auratus</i>       | Fish                           | Freshwater           | Zhang et al. (2015)     |
| <i>Trichodinella myakkae</i>         | AY102176                 | <i>Ctenopharyngodon idella</i> | Fish                           | Freshwater           | Gong et al. (2006)      |
| <i>Tripartiella macrosoma</i>        | MT777618                 | <i>Tachysurus fulvidraco</i>   | Fish                           | Freshwater           | Qin et al. (2021)       |
| <i>Tripartiella obtusa</i>           | MT777619                 | <i>Hemibarbus maculatus</i>    | Fish                           | Freshwater           | Qin et al. (2021)       |
| <i>Urceolaria korschelti</i>         | JQ663870                 | <i>Solen strictus</i>          | Mollusk                        | Marine               | Zhan et al. (2013)      |
| <i>Urceolaria korschelti</i> C1      | KY596045                 | <i>Lepidochitona cinerea</i>   | Mollusk                        | Marine               | Irwin et al. (2017)     |
| <i>Urceolaria mitra</i> BB 76 DG     | MW759660                 | <i>Dugesia gonocephala</i>     | Planarian                      | Freshwater           | Rataj and Vďačný (2021) |
| <i>Urceolaria mitra</i> C15/8        | MK454735                 | <i>Dugesia gonocephala</i>     | Planarian                      | Freshwater           | Rataj and Vďačný (2019) |
| <i>Urceolaria mitra</i> KU 45 DG     | MW759668                 | <i>Dugesia gonocephala</i>     | Planarian                      | Freshwater           | Rataj and Vďačný (2021) |
| <i>Urceolaria mitra</i> RT45/5       | MK454736                 | <i>Dugesia gonocephala</i>     | Planarian                      | Freshwater           | Rataj and Vďačný (2019) |
| <i>Urceolaria parakorschelti</i> L1  | KP698205                 | <i>Lottia pelta</i>            | Mollusk                        | Marine               | Irwin et al. (2017)     |
| <i>Urceolaria parakorschelti</i> L42 | KP698204                 | <i>Lottia pelta</i>            | Mollusk                        | Marine               | Irwin et al. (2017)     |
| <i>Urceolaria parakorschelti</i> L47 | KP698206                 | <i>Lottia pelta</i>            | Mollusk                        | Marine               | Irwin et al. (2017)     |
| <i>Urceolaria serpulorum</i>         | JQ663867                 | <i>Serpula</i> sp.             | Annelid                        | Marine               | Zhan et al. (2013)      |
| <i>Urceolaria urechi</i>             | FJ499388                 | <i>Urechis unicinctus</i>      | Annelid                        | Marine               | Zhan et al. (2009)      |

<sup>a</sup> *Trichodina heterodentata* (AY788099) is considered to be a synonym of *T. hypsilepis* by de Jager et al. (2019)

<sup>b</sup> *Trichodina hyperparasitis* (KX904933) is considered to be a misidentified *T. matsu* (MN072382) according to Zhou et al. (2021b)

<sup>c</sup> *T. hypsilepis* (EF524274) is considered to be a synonym of *T. koloti* by de Jager et al. (2019)

<sup>d</sup> *Trichodina unionis* 29\_BB1 (MN082436), *T. unionis* 99\_BB1 (MN082437), and *T. unionis* UBC-2 (KY596041) are misidentifications according to Zhang et al. (2023) and they very likely represent new species

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## Supplementary Table S2

Origin and GenBank accession numbers of mobilid sequences used to construct the multigene trees

| Species               | Specimen  | Host organism                | GenBank accession number |          |          |          |
|-----------------------|-----------|------------------------------|--------------------------|----------|----------|----------|
|                       |           |                              | 18S                      | ITS-28S  | 16S      | COI      |
| <i>T. chlorophora</i> | VO 167 PA | <i>Physella acuta</i>        | PV770921                 | PV770895 | PV770908 | PV769974 |
|                       | VO 168 PA | <i>Physella acuta</i>        | PV770922                 | PV770896 | PV770909 | PV769975 |
|                       | VO 169 PA | <i>Physella acuta</i>        | PV770923                 | PV770897 | PV770910 | PV769976 |
|                       | VO 170 PA | <i>Physella acuta</i>        | PV770924                 | PV770898 | PV770911 | PV769977 |
|                       | VO 171 PA | <i>Physella acuta</i>        | PV770925                 | PV770899 | PV770912 | PV769978 |
|                       | VO 172 PA | <i>Physella acuta</i>        | PV770926                 | PV770900 | PV770913 | PV769979 |
|                       | VO 173 PA | <i>Physella acuta</i>        | PV770927                 | PV770901 | PV770914 | PV769980 |
|                       | VO 174 PA | <i>Physella acuta</i>        | PV770928                 | PV770902 | PV770915 | PV769981 |
|                       | VO 180 PA | <i>Physella acuta</i>        | PV770929                 | PV770903 | PV770916 | PV769982 |
|                       | VO 182 PA | <i>Physella acuta</i>        | PV770930                 | PV770904 | PV770917 | PV769983 |
|                       | VO 183 PA | <i>Physella acuta</i>        | PV770931                 | PV770905 | PV770918 | PV769984 |
|                       | VO 184 PA | <i>Physella acuta</i>        | PV770932                 | PV770906 | PV770919 | PV769985 |
|                       | VO 185 PA | <i>Physella acuta</i>        | PV770933                 | PV770907 | PV770920 | PV769986 |
| <i>T. baltica</i>     | KR 113 TF | <i>Theodoxus fluviatilis</i> | ON970913                 | ON985383 | ON970933 | ON968465 |
|                       | KR 115 TF | <i>Theodoxus fluviatilis</i> | ON970915                 | ON985385 | ON970935 | ON968466 |
|                       | KR 116 TF | <i>Theodoxus fluviatilis</i> | ON970916                 | ON985386 | ON970936 | ON968467 |
| <i>T. polycelis</i>   | HR 95 PF  | <i>Polycelis felina</i>      | MW759641                 | MW759669 | MW768981 | MW759776 |
|                       | HR 96 PF  | <i>Polycelis felina</i>      | MW759642                 | MW759670 | MW768982 | MW759777 |
|                       | HR 118 PF | <i>Polycelis felina</i>      | MW759643                 | MW759671 | MW768983 | MW759778 |
|                       | HR 119 PF | <i>Polycelis felina</i>      | MW759644                 | MW759672 | MW768984 | MW759779 |
|                       | CU 122 PF | <i>Polycelis felina</i>      | MW759645                 | MW759673 | MW768985 | MW759780 |
|                       | CU 127 PF | <i>Polycelis felina</i>      | MW759646                 | MW759674 | MW768986 | MW759781 |
|                       | CU 128 PF | <i>Polycelis felina</i>      | MW759647                 | MW759675 | MW768987 | MW759782 |
| <i>T. schmidtea</i>   | JJ 108 SP | <i>Schmidtea polychroa</i>   | MW759648                 | MW759676 | MW768988 | MW759783 |
|                       | JJ 112 SP | <i>Schmidtea polychroa</i>   | MW759649                 | MW759677 | MW768989 | MW759784 |
|                       | JJ 114 SP | <i>Schmidtea polychroa</i>   | MW759650                 | MW759678 | MW768990 | MW759785 |
|                       | JJ 116 SP | <i>Schmidtea polychroa</i>   | MW759651                 | MW759679 | MW768991 | MW759786 |
| <i>T. steinii</i>     | BY 141 DG | <i>Dugesia gonocephala</i>   | MW759655                 | MW759683 | MW768995 | MW759787 |
|                       | BY 145 DG | <i>Dugesia gonocephala</i>   | MW759656                 | MW759684 | MW768996 | MW759788 |
|                       | BY 150 DG | <i>Dugesia gonocephala</i>   | MW759657                 | MW759685 | MW768997 | MW759789 |
|                       | ST 133 DG | <i>Dugesia gonocephala</i>   | MW759658                 | MW759686 | MW768998 | MW759790 |
| <i>T. unionis</i>     | HO 12 UT  | <i>Unio tumidus</i>          | ON970917                 | ON985387 | ON970937 | ON968468 |
|                       | HO 13 UT  | <i>Unio tumidus</i>          | ON970918                 | ON985388 | ON970938 | ON968469 |
|                       | HO 14 UT  | <i>Unio tumidus</i>          | ON970919                 | ON985389 | ON970939 | ON968470 |
|                       | HO 15 UT  | <i>Unio tumidus</i>          | ON970920                 | ON985390 | ON970940 | ON968471 |

| Species         | Specimen  | Host organism              | GenBank accession number |          |          |          |
|-----------------|-----------|----------------------------|--------------------------|----------|----------|----------|
|                 |           |                            | 18S                      | ITS-28S  | 16S      | COI      |
| <i>U. mitra</i> | HO 16 UT  | <i>Unio tumidus</i>        | ON970921                 | ON985391 | ON970941 | ON968472 |
|                 | HO 17 UT  | <i>Unio tumidus</i>        | ON970922                 | ON985392 | ON970942 | ON968473 |
|                 | SL 51 UT  | <i>Unio tumidus</i>        | ON970923                 | ON985393 | ON970943 | ON968474 |
|                 | SL 52 UT  | <i>Unio tumidus</i>        | ON970924                 | ON985394 | ON970944 | ON968475 |
|                 | SL 53 UT  | <i>Unio tumidus</i>        | ON970925                 | ON985395 | ON970945 | ON968476 |
|                 | SL 54 UT  | <i>Unio tumidus</i>        | ON970926                 | ON985396 | ON970946 | ON968477 |
|                 | SL 55 UT  | <i>Unio tumidus</i>        | ON970927                 | ON985397 | ON970947 | ON968478 |
|                 | SL 56 UT  | <i>Unio tumidus</i>        | ON970928                 | ON985398 | ON970948 | ON968479 |
|                 | SL 57 UT  | <i>Unio tumidus</i>        | ON970929                 | ON985399 | ON970949 | ON968480 |
|                 | SL 66 AA  | <i>Anodonta anatina</i>    | ON970930                 | ON985400 | ON970950 | ON968481 |
|                 | BB 76 DG  | <i>Dugesia gonocephala</i> | MW759660                 | MW759688 | MW768900 | MW759791 |
|                 | BB 77 DG  | <i>Dugesia gonocephala</i> | MW759661                 | MW759689 | MW768901 | MW759792 |
|                 | BB 102 DG | <i>Dugesia gonocephala</i> | MW759664                 | MW759692 | MW768902 | MW759795 |
|                 | BY 138 DG | <i>Dugesia gonocephala</i> | MW759665                 | MW759693 | MW768903 | MW759796 |
|                 | BY 143 DG | <i>Dugesia gonocephala</i> | MW759666                 | MW759694 | MW768904 | MW759797 |
|                 | BY 147 DG | <i>Dugesia gonocephala</i> | MW759667                 | MW759695 | MW768905 | MW759798 |
|                 | KU 45 DG  | <i>Dugesia gonocephala</i> | MW759668                 | MW759697 | MW768907 | MW759799 |

### Supplementary Table S3

Origin and GenBank accession numbers of green algae sequences used to construct the 18S rRNA gene and multigene trees

| Taxon                               | Symbiotic or epiphytic strain | Host organism                      | Higher taxonomic group of host | GenBank accession number |              | Reference                  |
|-------------------------------------|-------------------------------|------------------------------------|--------------------------------|--------------------------|--------------|----------------------------|
|                                     |                               |                                    |                                | 18S                      | ITS-5.8S-28S |                            |
| <i>Actinastrum hantzschii</i> pop.1 | no                            | –                                  | –                              | FM205884                 | FM205884     | Luo et al. (2010)          |
| <i>Actinastrum hantzschii</i> pop.2 | no                            | –                                  | –                              | AF288365                 | FM205841     | Luo et al. (2010)          |
| <i>Asterochloris magna</i> UTEX 902 | yes                           | <i>Pilophorus aciculare</i>        | Lichenized Ascomycota          | KP318691                 | –            | Škaloud et al. (2015)      |
| <i>Chlorella chlorelloides</i>      | no                            | –                                  | –                              | HQ111432                 | HQ111432     | Pitsch et al. (2017)       |
| <i>Chlorella coloniales</i>         | no                            | –                                  | –                              | FM205862                 | FM205862     | Pitsch et al. (2017)       |
| <i>Chlorella elongata</i>           | no                            | –                                  | –                              | FM205858                 | FM205858     | Pitsch et al. (2017)       |
| <i>Chlorella heliozoae</i>          | yes                           | <i>Acanthocystis turfacea</i>      | Heliozoa; Centrohelea          | FM205850                 | FM205850     | Pitsch et al. (2017)       |
| <i>Chlorella lewinii</i>            | no                            | –                                  | –                              | FM205861                 | FM205861     | Pitsch et al. (2017)       |
| <i>Chlorella minutissima</i>        | no                            | –                                  | –                              | FM205861                 | FM205861     | Pitsch et al. (2017)       |
| <i>Chlorella pituita</i>            | no                            | –                                  | –                              | EF030564                 | –            | Summerer et al. (2008)     |
| <i>Chlorella pulchelloides</i>      | no                            | –                                  | –                              | HQ111430                 | HQ111430     | Pitsch et al. (2017)       |
| <i>Chlorella pyrenoidosa</i>        | no                            | –                                  | –                              | AB240151                 | LR215766     | Serra et al. (2021)        |
| <i>Chlorella rotunda</i>            | no                            | –                                  | –                              | HQ111433                 | HQ111433     | Pitsch et al. (2017)       |
| <i>Chlorella singularis</i>         | no                            | –                                  | –                              | HQ111435                 | HQ111435     | Pitsch et al. (2017)       |
| <i>Chlorella sorokiniana</i> pop.1  | no                            | –                                  | –                              | FM205859                 | FM205859     | Luo et al. (2010)          |
| <i>Chlorella sorokiniana</i> pop.2  | no                            | –                                  | –                              | FM205860                 | FM205860     | Luo et al. (2010)          |
| <i>Chlorella</i> sp. AcGKS          | yes                           | <i>Askenasia chlorelligera</i> GKS | Ciliophora; Prostomatea        | EF030560                 | EF030577     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. AcPIB          | yes                           | <i>Askenasia chlorelligera</i> PIB | Ciliophora; Prostomatea        | EF030559                 | EF030576     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. B-type         | yes                           | <i>Bursellopsis spumosa</i>        | Ciliophora; Prostomatea        | LC075788                 | LC075788     | Hoshina and Kusuoka (2016) |
| <i>Chlorella</i> sp. CCAP 1660/11   | yes                           | <i>Paramecium bursaria</i>         | Ciliophora; Oligohymenophorea  | AB206548                 | AB206548     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. CCAP 1660/12   | yes                           | <i>Paramecium bursaria</i>         | Ciliophora; Oligohymenophorea  | AB260894                 | AB260895     | Hoshina and Imamura (2008) |
| <i>Chlorella</i> sp. C-type         | yes                           | <i>Cyclotrichium viride</i>        | Ciliophora; Prostomatea        | LC075792                 | LC075792     | Hoshina and Kusuoka (2016) |
| <i>Chlorella</i> sp. L9             | yes                           | <i>Hydra</i> sp. L9                | Animalia; Cnidaria             | AB713412                 | –            | Kawaida et al. (2013)      |
| <i>Chlorella</i> sp. M8             | yes                           | <i>Hydra</i> sp. M9                | Animalia; Cnidaria             | AB713413                 | –            | Kawaida et al. (2013)      |
| <i>Chlorella</i> sp. MRBG1          | yes                           | <i>Paramecium bursaria</i>         | Ciliophora; Oligohymenophorea  | AB219527                 | AB219527     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. OCH            | yes                           | <i>Paramecium bursaria</i>         | Ciliophora; Oligohymenophorea  | EF030561                 | EF030578     | Summerer et al. (2008)     |

| Taxon                                        | Symbiotic or epiphytic strain | Host organism                                                | Higher taxonomic group of host                 | GenBank accession number |              | Reference                  |
|----------------------------------------------|-------------------------------|--------------------------------------------------------------|------------------------------------------------|--------------------------|--------------|----------------------------|
|                                              |                               |                                                              |                                                | 18S                      | ITS-5.8S-28S |                            |
| <i>Chlorella</i> sp. PbKM2                   | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | EF030567                 | EF030584     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. PbPIB                   | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | EF030565                 | EF030582     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. PBSW1                   | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | AB206547                 | AB206547     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. Pbu                     | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | EF030562                 | EF030579     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. PbW                     | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | EF030566                 | EF030583     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. PtPIB                   | yes                           | <i>Pelagodileptus trachelioides</i>                          | Ciliophora; Litostomatea                       | EF030556                 | EF030573     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. P-type                  | yes                           | <i>Pelagodileptus trachelioides</i> /<br><i>Didinium</i> sp. | Ciliophora; Litostomatea                       | LC075784                 | LC075784     | Hoshina and Kusuoka (2016) |
| <i>Chlorella</i> sp. SpPIB                   | yes                           | <i>Stentor polymorphus</i>                                   | Ciliophora; Heterotrichea                      | EF030558                 | EF030575     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. S-type                  | yes                           | <i>Stokesia vernalis</i> / <i>Didinium</i> sp.               | Ciliophora; Oligohymenophorea/<br>Litostomatea | LC075779                 | LC075779     | Hoshina and Kusuoka (2016) |
| <i>Chlorella</i> sp. SvPIB                   | yes                           | <i>Stokesia vernalis</i>                                     | Ciliophora; Oligohymenophorea                  | EF030555                 | EF030572     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. TtPIB                   | yes                           | <i>Teuthophrys trisulca trisulca</i>                         | Ciliophora; Litostomatea                       | EF030557                 | EF030574     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. unique                  | yes                           | <i>Didinium</i> sp.                                          | Ciliophora; Litostomatea                       | LC075798                 | LC075798     | Hoshina and Kusuoka (2016) |
| <i>Chlorella</i> sp. UPIB                    | yes                           | <i>Uroleptus</i> sp.                                         | Ciliophora; Hypotrichea                        | EF030554                 | EF030571     | Summerer et al. (2008)     |
| <i>Chlorella</i> sp. J8                      | yes                           | <i>Hydra</i> sp. J8                                          | Animalia; Cnidaria                             | AB713408                 | –            | Kawaida et al. (2013)      |
| <i>Chlorella</i> sp. M10                     | yes                           | <i>Hydra</i> sp. strain M10                                  | Animalia; Cnidaria                             | AB713410                 | –            | Kawaida et al. (2013)      |
| <i>Chlorella</i> sp. M9                      | yes                           | <i>Hydra</i> sp. M9                                          | Animalia; Cnidaria                             | AB713409                 | –            | Kawaida et al. (2013)      |
| <i>Chlorella thermophila</i>                 | no                            | –                                                            | –                                              | KF661334                 | KJ002639     | Serra et al. (2021)        |
| <i>Chlorella variabilis</i> pop.1            | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | AB260893                 | AB260893     | Hoshina and Imamura (2008) |
| <i>Chlorella variabilis</i> pop.3            | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | FM205849                 | FM205849     | Luo et al. (2010)          |
| <i>Chlorella variabilis</i> pop.2            | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | AB206550                 | ON167513     | Summerer et al. (2008)     |
| <i>Chlorella volutis</i>                     | no                            | –                                                            | –                                              | HQ111434                 | HQ111434     | Serra et al. (2021)        |
| <i>Chlorella vulgaris</i> pop.1              | unknown                       | –                                                            | –                                              | FM205854                 | FM205854     | Luo et al. (2010)          |
| <i>Chlorella vulgaris</i> pop.2              | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | AB260895                 | AB260895     | Hoshina and Imamura (2008) |
| <i>Chlorella vulgaris</i> pop.3 <sup>a</sup> | yes                           | <i>Paramecium bursaria</i>                                   | Ciliophora; Oligohymenophorea                  | AB191207                 | –            | Hoshina et al. (2004)      |
| <i>Chlorella</i> sp1.                        | yes                           | <i>Hydra viridis</i>                                         | Animalia; Cnidaria                             | AB206551                 | AB288025     | Hoshina and Imamura (2008) |
| <i>Chlorella</i> sp. TchVO                   | yes                           | <i>Trichodina chlorophora</i>                                | Ciliophora; Oligohymenophorea                  | PX870620                 | PX870620     | Present study              |
| <i>Chlorella</i> -like endosymbiont 1        | yes                           | <i>Frontonia vernalis</i>                                    | Ciliophora; Oligohymenophorea                  | MT040853                 | –            | Serra et al. (2021)        |
| <i>Chlorella</i> -like endosymbiont 2        | yes                           | <i>Frontonia paravernalis</i>                                | Ciliophora; Oligohymenophorea                  | MT040852                 | –            | Serra et al. (2021)        |

| Taxon                                 | Symbiotic or epiphytic strain | Host organism                 | Higher taxonomic group of host | GenBank accession number |              | Reference                     |
|---------------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------|--------------|-------------------------------|
|                                       |                               |                               |                                | 18S                      | ITS-5.8S-28S |                               |
| <i>Chlorella</i> -like endosymbiont 3 | yes                           | <i>Frontonia paravernalis</i> | Ciliophora; Oligohymenophorea  | MT040851                 | –            | Serra et al. (2021)           |
| <i>Chloroidium ellipsoideum</i>       | no                            | –                             | –                              | FM946015                 | FM946015     | Pitsch et al. (2017)          |
| <i>Chloroidium engadiense</i>         | no                            | –                             | –                              | FM946011                 | FM946011     | Darienko and Pröschold (2019) |
| <i>Chloroidium laureanum</i>          | no                            | –                             | –                              | MH551522                 | MH551522     | Darienko and Pröschold (2019) |
| <i>Chloroidium lobatum</i>            | no                            | –                             | –                              | MH551523                 | MH551523     | Darienko and Pröschold (2019) |
| <i>Chloroidium saccharophilum</i>     | no                            | –                             | –                              | FM946000                 | FM946000     | Darienko and Pröschold (2019) |
| <i>Choricystis parasitica</i>         | no                            | –                             | –                              | FN298929                 | FN298929     | Darienko et al. (2019)        |
| <i>Closteriopsis acicularis</i>       | no                            | –                             | –                              | FM205847                 | FM205847     | Luo et al. (2010)             |
| <i>Coccomyxa</i> sp. CCAP 1660/13     | yes                           | <i>Paramecium bursaria</i>    | Ciliophora; Oligohymenophorea  | AB260896                 | AB260896     | Hoshina and Imamura (2008)    |
| <i>Coccomyxa subellipsoidea</i>       | no                            | –                             | –                              | HG972978                 | HG972978     | Darienko et al. (2019)        |
| <i>Compactochlorella kochii</i>       | no                            | –                             | –                              | HQ322124                 | HQ322124     | Pitsch et al. (2017)          |
| <i>Coronastrum ellipsoideum</i>       | no                            | –                             | –                              | GQ507370                 | GQ507370     | Pitsch et al. (2017)          |
| <i>Crucigenia lauterbornii</i>        | no                            | –                             | –                              | JQ356710                 | JQ356710     | Pitsch et al. (2017)          |
| <i>Diclostera acuatus</i>             | no                            | –                             | –                              | FM205848                 | FM205848     | Pitsch et al. (2017)          |
| <i>Dictyosphaerium ehrenbergianum</i> | no                            | –                             | –                              | GQ487192                 | GQ487192     | Pitsch et al. (2017)          |
| <i>Dictyosphaerium lacustre</i>       | no                            | –                             | –                              | GQ487204                 | GQ487204     | Pitsch et al. (2017)          |
| <i>Dictyosphaerium libertatis</i>     | no                            | –                             | –                              | GQ487211                 | GQ487211     | Pitsch et al. (2017)          |
| <i>Didymogenes anomala</i>            | no                            | –                             | –                              | FM205839                 | FM205839     | Pitsch et al. (2017)          |
| <i>Didymogenes palatina</i>           | no                            | –                             | –                              | FM205840                 | FM205840     | Pitsch et al. (2017)          |
| <i>Didymogenes soliella</i>           | no                            | –                             | –                              | AB731605                 | AB731605     | Pitsch et al. (2017)          |
| <i>Didymogenes sphaerica</i>          | no                            | –                             | –                              | AB731603                 | AB731603     | Pitsch et al. (2017)          |
| <i>Edaphochlorella mirabilis</i> S2   | no                            | –                             | –                              | OM472009                 | OM472009     | Darienko et al. (2019)        |
| <i>Elliptochloris bilobata</i>        | no                            | –                             | –                              | HG972969                 | HG972969     | Darienko et al. (2019)        |
| <i>Eremosphaera viridis</i>           | no                            | –                             | –                              | KY006556                 | KY006556     | Darienko et al. (2019)        |
| <i>Franceia amphitricha</i>           | no                            | –                             | –                              | KM020072                 | KM020072     | Darienko et al. (2019)        |
| <i>Hegewaldia parvula</i>             | no                            | –                             | –                              | FM205842                 | FM205842     | Pitsch et al. (2017)          |
| <i>Heynigia dictyosphaerioides</i>    | no                            | –                             | –                              | GQ487221                 | GQ487221     | Pitsch et al. (2017)          |
| <i>Heynigia riparia</i>               | no                            | –                             | –                              | GQ487225                 | GQ487225     | Pitsch et al. (2017)          |
| <i>Hindakia fallax</i>                | no                            | –                             | –                              | GQ487223                 | GQ487223     | Pitsch et al. (2017)          |

| Taxon                                  | Symbiotic or epiphytic strain | Host organism                    | Higher taxonomic group of host | GenBank accession number |              | Reference                               |
|----------------------------------------|-------------------------------|----------------------------------|--------------------------------|--------------------------|--------------|-----------------------------------------|
|                                        |                               |                                  |                                | 18S                      | ITS-5.8S-28S |                                         |
| <i>Hindakia tetrachotoma</i>           | no                            | –                                | –                              | GQ487238                 | GQ487238     | Pitsch et al. (2017)                    |
| <i>Jaagichlorella roystonensis</i>     | no                            | –                                | –                              | MH780940                 | MH780940     | Darienko and Pröschold (2019)           |
| <i>Jaagichlorella africana</i>         | no                            | –                                | –                              | MH780938                 | MH780938     | Darienko and Pröschold (2019)           |
| <i>Jaagichlorella geometrica</i> TchVO | yes                           | <i>Trichodina chlorophora</i>    | Ciliophora; Oligohymenophorea  | PX870621                 | PX870621     | Present study                           |
| <i>Jaagichlorella geometrica</i>       | no                            | –                                | –                              | MH780944                 | MH780944     | Darienko and Pröschold (2019)           |
| <i>Jaagichlorella hainangensis</i>     | no                            | –                                | –                              | MH780943                 | MH780943     | Darienko and Pröschold (2019)           |
| <i>Jaagichlorella luteoviridis</i>     | no                            | –                                | –                              | MH780927                 | MH780927     | Darienko and Pröschold (2019)           |
| <i>Jaagichlorella roystonensis</i>     | no                            | –                                | –                              | JN003601                 | –            | Darienko and Pröschold (2019)           |
| <i>Jaagichlorella sphaerica</i>        | no                            | –                                | –                              | MH780945                 | MH780945     | Darienko and Pröschold (2019)           |
| <i>Kalenjinia gelatinosa</i>           | no                            | –                                | –                              | GQ477061                 | GQ477061     | Pitsch et al. (2017)                    |
| <i>Kalinella apyrenoidosa</i>          | no                            | –                                | –                              | MH780947                 | MH780947     | Darienko and Pröschold (2019)           |
| <i>Kalinella bambusicola</i>           | no                            | –                                | –                              | MH780946                 | MH780946     | Darienko and Pröschold (2019)           |
| <i>Lobosphaera incisa</i>              | no                            | –                                | –                              | KM020046                 | KM020046     | Darienko et al. (2019)                  |
| <i>Lobosphaeropsis lobophora</i>       | no                            | –                                | –                              | FM205833                 | FM205833     | Luo et al. (2010); Pitsch et al. (2017) |
| <i>Marasphaerium gattermannii</i>      | no                            | –                                | –                              | GQ477057                 | GQ477057     | Pitsch et al. (2017)                    |
| <i>Masaia oloidia</i>                  | no                            | –                                | –                              | GQ477059                 | GQ477059     | Pitsch et al. (2017)                    |
| <i>Meyerella planktonica</i>           | no                            | –                                | –                              | AY195973                 | AY543044     | Fawley et al. (2005)                    |
| <i>Meyerella</i> sp.                   | yes                           | <i>Paramecium chlorelligerum</i> | Ciliophora; Oligohymenophorea  | JX010741                 | –            | Kreutz et al. (2012)                    |
| <i>Micractinium belenophorum</i>       | no                            | –                                | –                              | FM205880                 | FM205880     | Pitsch et al. (2017)                    |
| <i>Micractinium conductrix</i>         | no                            | –                                | –                              | FM205852                 | FM205852     | Pitsch et al. (2017)                    |
| <i>Micractinium inermum</i>            | no                            | –                                | –                              | KF597304                 | KF597304     | Pitsch et al. (2017)                    |
| <i>Micractinium pusillum</i> pop.1     | no                            | –                                | –                              | FM205875                 | FM205875     | Pitsch et al. (2017)                    |
| <i>Micractinium pusillum</i> pop.2     | no                            | –                                | –                              | AF364101                 | FM205866     | Serra et al. (2021)                     |
| <i>Micractinium pusillum</i> pop.3     | no                            | –                                | –                              | AF364102                 | FM205838     | Serra et al. (2021)                     |
| <i>Micractinium reisseri</i> pop.1     | yes                           | <i>Paramecium bursaria</i>       | Ciliophora; Oligohymenophorea  | AB437244                 | AB437244     | Serra et al. (2021)                     |
| <i>Micractinium reisseri</i> pop.2     | yes                           | <i>Paramecium bursaria</i>       | Ciliophora; Oligohymenophorea  | AB506070                 | AB506070     | Serra et al. (2021)                     |
| <i>Micractinium</i> sp.1               | yes                           | <i>Paramecium bursaria</i>       | Ciliophora; Oligohymenophorea  | FM205851                 | FM205851     | Luo et al. (2010)                       |
| <i>Micractinium</i> sp.2               | yes                           | <i>Tetrahymena utriculariae</i>  | Ciliophora; Oligohymenophorea  | LT605003                 | LT605003     | Pitsch et al. (2017)                    |

| Taxon                                      | Symbiotic or epiphytic strain | Host organism | Higher taxonomic group of host | GenBank accession number |              | Reference              |
|--------------------------------------------|-------------------------------|---------------|--------------------------------|--------------------------|--------------|------------------------|
|                                            |                               |               |                                | 18S                      | ITS-5.8S-28S |                        |
| <i>Mucidosphaerium palustre</i>            | no                            | –             | –                              | GQ487197                 | GQ487197     | Pitsch et al. (2017)   |
| <i>Mucidosphaerium planctonicum</i>        | no                            | –             | –                              | GQ487201                 | GQ487201     | Pitsch et al. (2017)   |
| <i>Mucidosphaerium pulchellum</i>          | no                            | –             | –                              | GQ487198                 | GQ487198     | Pitsch et al. (2017)   |
| <i>Mucidosphaerium sphagnale</i>           | no                            | –             | –                              | GQ487219                 | GQ487219     | Pitsch et al. (2017)   |
| <i>Muriella terrestris</i>                 | no                            | –             | –                              | OM472001                 | –            | Darienko et al. (2019) |
| <i>Neocystis brevis</i>                    | no                            | –             | –                              | PQ276650                 | PQ276650     | Darienko et al. (2019) |
| <i>Oocystis heteromucosa</i>               | no                            | –             | –                              | KY013466                 | KY013466     | Darienko et al. (2019) |
| <i>Parachlorella beijerinckii</i>          | no                            | –             | –                              | FM205845                 | FM205845     | Pitsch et al. (2017)   |
| <i>Parachlorella hussii</i>                | no                            | –             | –                              | HM126550                 | HM126550     | Pitsch et al. (2017)   |
| <i>Parachlorella kessleri</i>              | no                            | –             | –                              | FM205846                 | FM205846     | Pitsch et al. (2017)   |
| <i>Parachlorella kessleri</i> CCAP 211/11G | no                            | –             | –                              | FM205885                 | FM205885     | Luo et al. (2010)      |
| <i>Parietochloris pseudoalveolaris</i>     | no                            | –             | –                              | MT735204                 | MT735204     | Darienko et al. (2019) |
| <i>Pseudochlorella pyrenoidosa</i>         | no                            | –             | –                              | LT560357                 | MW077556     | Darienko et al. (2019) |
| <i>Pumilosphaera acidophila</i>            | no                            | –             | –                              | LN610705                 | LN610705     | Darienko et al. (2019) |
| <i>Stichococcus bacillaris</i>             | no                            | –             | –                              | FR717539                 | FR717539     | Darienko et al. (2019) |
| <i>Trebouxia asymmetrica</i>               | no                            | –             | –                              | Z21553                   | AJ249565     | Darienko et al. (2019) |
| <i>Trebouxia impressa</i>                  | no                            | –             | –                              | Z21551                   | AF345891     | Darienko et al. (2019) |
| <i>Viridiella fridericiana</i>             | no                            | –             | –                              | FM958481                 | FM958481     | Darienko et al. (2019) |
| <i>Watanabea reniformis</i>                | no                            | –             | –                              | FM958480                 | FM958480     | Darienko et al. (2019) |

<sup>a</sup> *Chlorella vulgaris* pop.3 could not be identified by Hoshina et al. (2004)

A dash (–) indicates unavailable data

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# Supplementary Table S4

Characterization and evolutionary models selected under the Bayesian information criterion by the IQTREE program for the four datasets analyzed

| Dataset <sup>a</sup> | Marker         | No. of<br>chars | No. of<br>taxa | Model <sup>b</sup> | A      | C      | G      | T      | [AC]   | [AG]   | [AT]   | [CG]   | [CT]    | [GT]   | I      | Γ      |
|----------------------|----------------|-----------------|----------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|--------|
| #1                   | 18S            | 1680            | 65             | TIM2               | 0.2636 | 0.2087 | 0.2783 | 0.2494 | 1.5358 | 3.0110 | 1.5358 | 1.0000 | 5.2353  | 1.0000 | 0.4833 | 0.5097 |
| #2                   | 18S            | 1730            | 43             | K2P                | 0.2500 | 0.2500 | 0.2500 | 0.2500 | 1.0000 | 3.3757 | 1.0000 | 1.0000 | 3.3757  | 1.0000 | 0.7707 | —      |
|                      | ITS region-28S | 902             | 43             | TNe                | 0.2500 | 0.2500 | 0.2500 | 0.2500 | 1.0000 | 2.9566 | 1.0000 | 1.0000 | 5.0643  | 1.0000 | —      | 0.2234 |
|                      | 16S            | 887             | 43             | TPM3               | 0.3410 | 0.1375 | 0.1992 | 0.3224 | 0.3758 | 2.7669 | 1.0000 | 0.3758 | 2.7669  | 1.0000 | —      | 0.5004 |
|                      | COI            | 652             | 43             | K3Pu               | 0.3076 | 0.1248 | 0.1594 | 0.4082 | 5.2859 | 1.9706 | 1.0000 | 1.0000 | 1.9706  | 5.2859 | —      | 0.4040 |
| #3                   | 18S            | 5738            | 130            | TNe                | 0.2500 | 0.2500 | 0.2500 | 0.2500 | 1.0000 | 2.4812 | 1.0000 | 1.0000 | 4.2259  | 1.0000 | 0.2870 | 0.4399 |
| #4                   | 18S            | 5738            | 109            | TN                 | 0.2500 | 0.2500 | 0.2500 | 0.2500 | 1.0000 | 2.5446 | 1.0000 | 1.0000 | 4.14114 | 1.0000 | 0.2915 | 0.3776 |
|                      | ITS region-28S | 1929            | 109            | GTR                | 0.2043 | 0.3078 | 0.2772 | 0.2107 | 0.9699 | 1.4178 | 0.8840 | 0.6204 | 3.0842  | 1.0000 | 0.0498 | 0.6561 |

<sup>a</sup> The first dataset comprised mobilid 18S rDNA sequences, the second dataset comprised mobilid nuclear (18S, ITS-5.8S-28S) and mitochondrial (16S and COI) sequences, the third dataset comprised algal 18S rDNA sequences, and the fourth dataset comprised algal 18S and ITS-5.8S-28S rDNA sequences

<sup>b</sup> Base frequencies (A, C, G, T), rate substitution matrix ([AC], [AG], [AT], [CG], [CT], [GT]), proportion of invariable sites (I), gamma distribution shape parameter (Γ)