

Table S1. Protein data used for the phylogenomic analyses

Taxa	atpA		atpB		atpE		atpF	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	437	0	446	0.2	118	0	70	0
<i>Bryopsis hypnoides</i>	437	0	447	0	118	0	70	0
<i>Chlamydomonas reinhardtii</i>	437	0	447	0	118	0	70	0
<i>Chlorella variabilis</i>	437	0	447	0	118	0	70	0
<i>Chlorokybus atmophyticus</i>	437	0	447	0	118	0	70	0
<i>Coccomyxa subellipsoidea</i>	437	0	447	0	118	0	70	0
<i>Dunaliella salina</i>	437	0	447	0	118	0	70	0
<i>Euglena gracilis</i>	437	0	447	0	118	0	70	0
<i>Floydiella terrestris</i>	437	0	447	0	118	0	70	0
<i>Lepidodinium chlorophorum</i>	437	0	447	0	118	0	70	0
<i>Leptosira terrestris</i>	437	0	447	0	118	0	70	0
<i>Mesostigma viride</i>	437	0	447	0	118	0	70	0
<i>Micromonas sp. RCC299</i>	437	0	447* ¹	0	118	0	70	0
<i>Monomastix sp.</i>	437	0	447	0	118	0	70	0
<i>Nephroselmis olivacea</i>	437	0	447	0	118	0	70	0
<i>Oedogonium cardiacum</i>	437	0	447	0	118	0	70	0
<i>Oltmannsiellopsis viridis</i>	437	0	447	0	118	0	70	0
<i>Oocystis solitaria</i>	437	0	447	0	118	0	70	0
<i>Ostreococcus tauli</i>	437	0	447	0	118	0	70	0
<i>Parachlorella kessleri</i>	437	0	447	0	118	0	70	0
<i>Pedinomonas minor</i>	437	0	447	0	118	0	70	0
<i>Picocystis salinarum</i>	437	0	447	0	118	0	70	0
<i>Prasinococcus sp. CCMP1194</i>	437	0	447	0	118	0	70	0
<i>Prasinoderma coloniale</i>	437	0	447	0	118	0	70	0
<i>Prasinophyceae sp. CCMP1205</i>	437	0	447	0	118	0	70	0
<i>Pseudendoclonium akinetum</i>	437	0	447	0	118	0	70	0
<i>Pycnococcus provasoli</i>	437	0	447	0	118	0	70	0
<i>Pyramimonas parkeae</i>	437	0	447	0	118	0	70	0
<i>Autodesmus obliquus</i>	437	0	447	0	118	0	70	0
<i>Stigeoclonium helveticum</i>	437	0	447	0	118	0	70	0
<i>Trebouxia aggregata</i>	437	0	447	0	118	0	70	0
<i>Volvox carteri</i>	437	0	447	0	118	0	70	0

*1: Not annotated in NC_012575

*2: Not annotated in GQ892829

Table S1. Continued.

Taxa	atpH		atpI		ClpP		petA	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	79	1.3	219	0	144	0	274	0.7
<i>Bryopsis hypnoides</i>	80	0	219	0	144	0	276	0
<i>Chlamydomonas reinhardtii</i>	80	0	219	0	144	0	276	0
<i>Chlorella variabilis</i>	80	0	219	0	144	0	276	0
<i>Chlorokybus atmophyticus</i>	80	0	219	0	144	0	276	0
<i>Coccomyxa subellipsoidea</i>	57	28.8	219	0	144	0	276	0
<i>Dunaliella salina</i>	80	0	219	0	144	0	276	0
<i>Euglena gracilis</i>	79	1.3	219	0	0	100	0	100
<i>Floydiella terrestris</i>	80	0	219	0	144	0	0	100
<i>Lepidodinium chlorophorum</i>	80	0	219	0	144	0	274	0.7
<i>Leptosira terrestris</i>	80	0	219	0	144	0	276	0
<i>Mesostigma viride</i>	80	0	219	0	144	0	275	0.4
<i>Micromonas sp. RCC299</i>	80	0	218	0.5	144	0	276	0
<i>Monomastix sp.</i>	80	0	219	0	144	0	276	0
<i>Nephroselmis olivacea</i>	80	0	218	0.5	144	0	276	0
<i>Oedogonium cardiacum</i>	80	0	219	0	144	0	0	100
<i>Oltmannsiellopsis viridis</i>	80	0	219	0	144	0	276	0
<i>Oocystis solitaria</i>	80	0	219	0	144	0	276	0
<i>Ostreococcus tauli</i>	80	0	218	0.5	144	0	276	0
<i>Parachlorella kessleri</i>	80	0	219	0	144	0	276	0
<i>Pedinomonas minor</i>	80	0	219	0	144	0	276	0
<i>Picocystis salinarum</i>	80	0	219	0	144	0	275	0.4
<i>Prasinococcus sp. CCMP1194</i>	80	0	218	0.5	144	0	276	0
<i>Prasinoderma coloniale</i>	79	1.3	219	0	144	0	276	0
<i>Prasinophyceae sp. CCMP120t</i>	80	0	219	0	144	0	271	1.8
<i>Pseudendoclonium akinetum</i>	80	0	219	0	144	0	276	0
<i>Pycnococcus provasoli</i>	80	0	219	0	144	0	276	0
<i>Pyramimonas parkeae</i>	80	0	219	0	144	0	276	0
<i>Autodesmus obliquus</i>	80	0	219	0	144	0	276	0
<i>Stigeoclonium helveticum</i>	80	0	219	0	144	0	0	100
<i>Trebouxia aggregata</i>	80	0	219	0	144	0	276	0
<i>Volvox carteri</i>	80	0	219	0	144	0	276	0

Table S1. Continued.

Taxa	petB		petD		petG		petL	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	215	0	160	0	31	0	0	100
<i>Bryopsis hypnoides</i>	215	0	160	0	31	0	31	0
<i>Chlamydomonas reinhardtii</i>	215	0	160	0	31	0	31	0
<i>Chlorella variabilis</i>	215	0	160	0	31	0	31	0
<i>Chlorokybus atmophyticus</i>	215	0	160	0	31	0	31	0
<i>Coccomyxa subellipsoidea</i>	215	0	160	0	31	0	31	0
<i>Dunaliella salina</i>	215	0	160	0	31	0	31	0
<i>Euglena gracilis</i>	215	0	0	100	31	0	0	100
<i>Floydiella terrestris</i>	215	0	160	0	31	0	31	0
<i>Lepidodinium chlorophorum</i>	215	0	160	0	31	0	31	0
<i>Leptosira terrestris</i>	215	0	160	0	31	0	31	0
<i>Mesostigma viride</i>	215	0	160	0	31	0	31	0
<i>Micromonas sp. RCC299</i>	215	0	160	0	31	0	0	100
<i>Monomastix sp.</i>	215	0	160	0	31	0	0	100
<i>Nephroselmis olivacea</i>	215	0	160	0	31	0	31	0
<i>Oedogonium cardiacum</i>	215	0	160	0	31	0	31	0
<i>Oltmannsiellopsis viridis</i>	215	0	160	0	31	0	31	0
<i>Oocystis solitaria</i>	215	0	160	0	31	0	31	0
<i>Ostreococcus tauli</i>	215	0	0	100	31	0	0	100
<i>Parachlorella kessleri</i>	215	0	160	0	31	0	31	0
<i>Pedinomonas minor</i>	215	0	160	0	31	0	31	0
<i>Picocystis salinarum</i>	215	0	160	0	31	0	31	0
<i>Prasinococcus sp. CCMP1194</i>	215	0	160	0	31	0	0	100
<i>Prasinoderma coloniale</i>	215	0	160	0	31	0	0	100
<i>Prasinophyceae sp. CCMP120t</i>	215	0	160	0	31	0	31	0
<i>Pseudendoclonium akinetum</i>	215	0	160	0	31	0	31	0
<i>Pycnococcus provasoli</i>	215	0	160	0	31	0	31	0
<i>Pyramimonas parkeae</i>	215	0	0	100	31	0	0	100
<i>Autodesmus obliquus</i>	215	0	160	0	31	0	31	0
<i>Stigeoclonium helveticum</i>	215	0	160	0	31	0	31	0
<i>Trebouxia aggregata</i>	215	0	160	0	0	100	31	0
<i>Volvox carteri</i>	215	0	160	0	31	0	31	0

Table S1. Continued.

Taxa	psaA		psaB		psaC		psaI	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	749	0	708	3.0	79	2.5	0	100
<i>Bryopsis hypnoides</i>	749	0	730	0	81	0	29 ^{*2}	0
<i>Chlamydomonas reinhardtii</i>	749	0	730	0	81	0	0	100
<i>Chlorella variabilis</i>	680	9.2	730	0	81	0	29	0
<i>Chlorokybus atmophyticus</i>	748	0.1	730	0	81	0	29	0
<i>Coccomyxa subellipsoidea</i>	749	0	730	0	81	0	29	0
<i>Dunaliella salina</i>	749	0	730	0	81	0	0	100
<i>Euglena gracilis</i>	749	0	730	0	81	0	0	100
<i>Floydiella terrestris</i>	749	0	730	0	81	0	0	100
<i>Lepidodinium chlorophorum</i>	749	0	730	0	81	0	29	0
<i>Leptosira terrestris</i>	749	0	730	0	81	0	29	0
<i>Mesostigma viride</i>	748	0.1	730	0	81	0	29	0
<i>Micromonas sp. RCC299</i>	749	0	730	0	81	0	29	0
<i>Monomastix sp.</i>	747	0.3	730	0	0	100	29	0
<i>Nephroselmis olivacea</i>	749	0	730	0	81	0	29	0
<i>Oedogonium cardiacum</i>	749	0	730	0	81	0	0	100
<i>Oltmannsiellopsis viridis</i>	749	0	730	0	81	0	29	0
<i>Oocystis solitaria</i>	749	0	730	0	81	0	29	0
<i>Ostreococcus tauli</i>	749	0	729	0.1	81	0	29	0
<i>Parachlorella kessleri</i>	749	0	730	0	81	0	29	0
<i>Pedinomonas minor</i>	749	0	730	0	81	0	29	0
<i>Picocystis salinarum</i>	749	0	730	0	81	0	29	0
<i>Prasinococcus sp. CCMP1194</i>	749	0	730	0	81	0	29	0
<i>Prasinoderma coloniale</i>	749	0	730	0	81	0	29	0
<i>Prasinophyceae sp. CCMP120</i>	748	0.1	730	0	81	0	0	100
<i>Pseudendoclonium akinetum</i>	749	0	730	0	81	0	29	0
<i>Pycnococcus provasoli</i>	749	0	730	0	81	0	29	0
<i>Pyramimonas parkeae</i>	749	0	730	0	81	0	29	0
<i>Autodesmus obliquus</i>	749	0	730	0	81	0	0	100
<i>Stigeoclonium helveticum</i>	749	0	730	0	81	0	0	100
<i>Trebouxia aggregata</i>	749	0	730	0	81	0	29	0
<i>Volvox carteri</i>	749	0	730	0	81	0	0	100

Table S1. Continued.

Taxa	psaJ		psbA		psbB		psbC	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	39	0	341	0	508	0	461	0
<i>Bryopsis hypnoides</i>	39	0	341	0	508	0	461	0
<i>Chlamydomonas reinhardtii</i>	39	0	341	0	508	0	461	0
<i>Chlorella variabilis</i>	39	0	341	0	479	5.7	461	0
<i>Chlorokybus atmophyticus</i>	39	0	341	0	508	0.0	461	0
<i>Coccomyxa subellipsoidea</i>	39	0	341	0	506	0.4	455	1.3
<i>Dunaliella salina</i>	39	0	341	0	508	0	461	0
<i>Euglena gracilis</i>	37	5.1	341	0	508	0	461	0
<i>Floydiella terrestris</i>	39	0	341	0	508	0	461	0
<i>Lepidodinium chlorophorum</i>	37	5.1	341	0	489	3.7	461	0
<i>Leptosira terrestris</i>	39	0	341	0	508	0	461	0
<i>Mesostigma viride</i>	39	0.0	341	0	508	0.0	461	0
<i>Micromonas sp. RCC299</i>	39	0	341	0	497	2.2	461	0
<i>Monomastix sp.</i>	39	0	341	0	508	0	461	0
<i>Nephroselmis olivacea</i>	39	0	341	0	508	0	461	0
<i>Oedogonium cardiacum</i>	39	0	341	0	508	0	461	0
<i>Oltmannsiellopsis viridis</i>	39	0	341	0	508	0	461	0
<i>Oocystis solitaria</i>	39	0	341	0	508	0	461	0
<i>Ostreococcus tauli</i>	39	0	341	0	443	12.8	461	0
<i>Parachlorella kessleri</i>	39	0	341	0	508	0	461	0
<i>Pedinomonas minor</i>	39	0	341	0	508	0	461	0
<i>Picocystis salinarum</i>	0	100	341	0	508	0.0	461	0
<i>Prasinococcus sp. CCMP1194</i>	39	0	341	0	508	0.0	461	0
<i>Prasinoderma coloniale</i>	39	0	341	0	508	0.0	461	0
<i>Prasinophyceae sp. CCMP120</i>	39	0	341	0	508	0.0	461	0
<i>Pseudendoclonium akinetum</i>	39	0	341	0	508	0	461	0
<i>Pycnococcus provasoli</i>	0	100	341	0	508	0	461	0
<i>Pyramimonas parkeae</i>	39	0	341	0	508	0	461	0
<i>Autodesmus obliquus</i>	39	0	341	0	508	0	461	0
<i>Stigeoclonium helveticum</i>	39	0	341	0	507	0.2	461	0
<i>Trebouxia aggregata</i>	39	0	341	0	508	0	461	0
<i>Volvox carteri</i>	39	0	341	0	508	0	461	0

Table S1. Continued.

Taxa	psbD		psbE		psbF		psbH	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	352	0	70	7.9	34	0	59	1.7
<i>Bryopsis hypnoides</i>	352	0	76	0	34	0	60	0
<i>Chlamydomonas reinhardtii</i>	352	0	76	0	34	0	60	0
<i>Chlorella variabilis</i>	352	0	76	0	34	0	60	0
<i>Chlorokybus atmophyticus</i>	352	0	76	0	34	0	60	0
<i>Coccomyxa subellipsoidea</i>	352	0	76	0	34	0	60	0
<i>Dunaliella salina</i>	352	0	76	0	34	0	60	0
<i>Euglena gracilis</i>	342	2.8	76	0	34	0	56	6.7
<i>Floydiella terrestris</i>	352	0	76	0	34	0	60	0
<i>Lepidodinium chlorophorum</i>	352	0	76	0	34	0	60	0
<i>Leptosira terrestris</i>	352	0	76	0	34	0	60	0
<i>Mesostigma viride</i>	352	0	76	0	34	0	60	0
<i>Micromonas sp. RCC299</i>	352	0	76	0	34	0	60	0
<i>Monomastix sp.</i>	352	0	76	0	34	0	60	0
<i>Nephroselmis olivacea</i>	352	0	76	0	34	0	60	0
<i>Oedogonium cardiacum</i>	352	0	76	0	34	0	60	0
<i>Oltmannsiellopsis viridis</i>	352	0	76	0	34	0	60	0
<i>Oocystis solitaria</i>	352	0	76	0	34	0	60	0
<i>Ostreococcus tauli</i>	352	0	76	0	34	0	60	0
<i>Parachlorella kessleri</i>	352	0	76	0	34	0	60	0
<i>Pedinomonas minor</i>	352	0	76	0	34	0	60	0
<i>Picocystis salinarum</i>	352	0	76	0	34	0	60	0
<i>Prasinococcus sp. CCMP1194</i>	352	0	76	0	34	0	60	0
<i>Prasinoderma coloniale</i>	352	0	76	0	34	0	60	0
<i>Prasinophyceae sp. CCMP120</i>	352	0	76	0	34	0	60	0
<i>Pseudendoclonium akinetum</i>	352	0	76	0	34	0	60	0
<i>Pycnococcus provasoli</i>	352	0	76	0	34	0	60	0
<i>Pyramimonas parkeae</i>	352	0	76	0	34	0	60	0
<i>Autodesmus obliquus</i>	352	0	76	0	34	0	60	0
<i>Stigeoclonium helveticum</i>	352	0	76	0	34	0	60	0
<i>Trebouxia aggregata</i>	352	0	76	0	34	0	60	0
<i>Volvox carteri</i>	352	0	76	0	34	0	60	0

Table S1. Continued.

Taxa	psbI		psbJ		psbK		psbL	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	32	0	42	0	39	0	34	0
<i>Bryopsis hypnoides</i>	32	0	42	0	39	0	34	0
<i>Chlamydomonas reinhardtii</i>	32	0	42	0	39	0	34	0
<i>Chlorella variabilis</i>	32	0	42	0	39	0	34	0
<i>Chlorokybus atmophyticus</i>	32	0	42	0	39	0	34	0
<i>Coccomyxa subellipsoidea</i>	32	0	42	0	39	0	34	0
<i>Dunaliella salina</i>	32	0	42	0	39	0	34	0
<i>Euglena gracilis</i>	32	0	42	0	39	0	34	0
<i>Floydiella terrestris</i>	32	0	42	0	39	0	34	0
<i>Lepidodinium chlorophorum</i>	32	0	42	0	39	0	34	0
<i>Leptosira terrestris</i>	32	0	42	0	39	0	34	0
<i>Mesostigma viride</i>	32	0	42	0	39	0	34	0
<i>Micromonas sp. RCC299</i>	32	0	41	2.4	39	0	34	0
<i>Monomastix sp.</i>	32	0	42	0	39	0	34	0
<i>Nephroselmis olivacea</i>	32	0	42	0	39	0	34	0
<i>Oedogonium cardiacum</i>	32	0	42	0	39	0	34	0
<i>Oltmannsiellopsis viridis</i>	32	0	42	0	39	0	34	0
<i>Oocystis solitaria</i>	32	0	42	0	39	0	34	0
<i>Ostreococcus tauli</i>	32	0	41	2.4	39	0	34	0
<i>Parachlorella kessleri</i>	32	0	42	0	39	0	34	0
<i>Pedinomonas minor</i>	32	0	42	0	39	0	34	0
<i>Picocystis salinarum</i>	32	0	42	0	39	0	34	0
<i>Prasinococcus sp. CCMP1194</i>	32	0	42	0	39	0	34	0
<i>Prasinoderma coloniale</i>	32	0	42	0	39	0	34	0
<i>Prasinophyceae sp. CCMP120t</i>	32	0	42	0	39	0	34	0
<i>Pseudendoclonium akinetum</i>	32	0	42	0	39	0	34	0
<i>Pycnococcus provasoli</i>	32	0	42	0	39	0	34	0
<i>Pyramimonas parkeae</i>	32	0	42	0	39	0	34	0
<i>Autodesmus obliquus</i>	32	0	42	0	39	0	34	0
<i>Stigeoclonium helveticum</i>	32	0	42	0	39	0	34	0
<i>Trebouxia aggregata</i>	0	100	42	0	39	0	34	0
<i>Volvox carteri</i>	32	0	42	0	39	0	17	50.0

Table S1. Continued.

Taxa	psbM		psbN		psbT		psbZ	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	31	0	44	0	31	0	0	100
<i>Bryopsis hypnoides</i>	31	0	44	0	31	0	62	0
<i>Chlamydomonas reinhardtii</i>	31	0	44	0	31	0	62	0
<i>Chlorella variabilis</i>	31	0	44	0	31	0	62	0
<i>Chlorokybus atmophyticus</i>	31	0	43	2.3	31	0	62	0
<i>Coccomyxa subellipsoidea</i>	31	0	44	0	31	0	62	0
<i>Dunaliella salina</i>	31	0	44	0	31	0	62	0
<i>Euglena gracilis</i>	0	100	44	0	31	0	62	0
<i>Floydiella terrestris</i>	31	0	44	0	31	0	62	0
<i>Lepidodinium chlorophorum</i>	31	0	44	0	31	0	62	0
<i>Leptosira terrestris</i>	31	0	44	0	31	0	62	0
<i>Mesostigma viride</i>	31	0	43	2.3	31	0	62	0
<i>Micromonas sp. RCC299</i>	0	100	44	0	31	0	62	0
<i>Monomastix sp.</i>	31	0	44	0	31	0	62	0
<i>Nephroselmis olivacea</i>	31	0	44	0	31	0	62	0
<i>Oedogonium cardiacum</i>	31	0	44	0	31	0	62	0
<i>Oltmannsiellopsis viridis</i>	31	0	44	0	31	0	62	0
<i>Oocystis solitaria</i>	31	0	44	0	31	0	62	0
<i>Ostreococcus tauli</i>	0	100	44	0	31	0	62	0
<i>Parachlorella kessleri</i>	31	0	44	0	31	0	62	0
<i>Pedinomonas minor</i>	31	0	44	0	31	0	62	0
<i>Picocystis salinarum</i>	31	0	44	0	31	0	62	0
<i>Prasinococcus sp. CCMP1194</i>	0	100	43	2.3	31	0	62	0
<i>Prasinoderma coloniale</i>	0	100	43	2.3	31	0	62	0
<i>Prasinophyceae sp. CCMP120t</i>	31	0	44	0	31	0	62	0
<i>Pseudendoclonium akinetum</i>	31	0	44	0	31	0	62	0
<i>Pycnococcus provasoli</i>	0	100	44	0	31	0	62	0
<i>Pyramimonas parkeae</i>	0	100	44	0	31	0	62	0
<i>Autodesmus obliquus</i>	31	0	44	0	31	0	62	0
<i>Stigeoclonium helveticum</i>	30	3.2	44	0	31	0	62	0
<i>Trebouxia aggregata</i>	31	0	44	0	31	0	62	0
<i>Volvox carteri</i>	30	3.2	44	0	31	0	62	0

Table S1. Continued.

Taxa	rbcL		rpl2		rpl5		rpl14	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	466	1.9	192	24.1	154	0	113	0
<i>Bryopsis hypnoides</i>	475	0	253	0	152	1.3	113	0
<i>Chlamydomonas reinhardtii</i>	475	0	253	0	154	0	113	0
<i>Chlorella variabilis</i>	475	0	253	0	154	0	113	0
<i>Chlorokybus atmophyticus</i>	475	0	253	0	154	0	113	0
<i>Coccomyxa subellipsoidea</i>	475	0	253	0	154	0	113	0
<i>Dunaliella salina</i>	475	0	253	0	154	0	113	0
<i>Euglena gracilis</i>	475	0	253	0	154	0	113	0
<i>Floydiella terrestris</i>	475	0	253	0	154	0	113	0
<i>Lepidodinium chlorophorum</i>	475	0	253	0	152	1.3	113	0
<i>Leptosira terrestris</i>	475	0	253	0	154	0	113	0
<i>Mesostigma viride</i>	475	0	252	0.4	154	0	113	0
<i>Micromonas sp. RCC299</i>	475	0	253	0	154	0	113	0
<i>Monomastix sp.</i>	475	0	253	0	151	1.9	113	0
<i>Nephroselmis olivacea</i>	475	0	253	0	154	0	113	0
<i>Oedogonium cardiacum</i>	475	0	253	0	154	0	113	0
<i>Oltmannsiellopsis viridis</i>	474	0.2	253	0	154	0	113	0
<i>Oocystis solitaria</i>	475	0	253	0	154	0	113	0
<i>Ostreococcus tauli</i>	475	0	253	0	154	0	113	0
<i>Parachlorella kessleri</i>	475	0	253	0	154	0	113	0
<i>Pedinomonas minor</i>	475	0	253	0	154	0	113	0
<i>Picocystis salinarum</i>	475	0	253	0	154	0	113	0
<i>Prasinococcus sp. CCMP1194</i>	475	0	253	0	154	0	113	0
<i>Prasinoderma coloniale</i>	475	0	252	0.4	154	0	113	0
<i>Prasinophyceae sp. CCMP120</i>	475	0	253	0	154	0	113	0
<i>Pseudendoclonium akinetum</i>	475	0	253	0	154	0	113	0
<i>Pycnococcus provasoli</i>	475	0	253	0	154	0	113	0
<i>Pyramimonas parkeae</i>	475	0	253	0	154	0	113	0
<i>Autodesmus obliquus</i>	475	0	253	0	154	0	113	0
<i>Stigeoclonium helveticum</i>	475	0	253	0	154	0	113	0
<i>Trebouxia aggregata</i>	475	0	253	0	154	0	113	0
<i>Volvox carteri</i>	475	0	253	0	154	0	113	0

Table S1. Continued.

Taxa	rpl16		rpl20		rpl23		rpl36	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	131	0	101	0	36	0	37	0
<i>Bryopsis hypnoides</i>	131	0	101	0	36	0	36	2.7
<i>Chlamydomonas reinhardtii</i>	131	0	101	0	36	0	37	0
<i>Chlorella variabilis</i>	131	0	101	0	36	0	37	0
<i>Chlorokybus atmophyticus</i>	131	0	101	0	36	0	37	0
<i>Coccomyxa subellipsoidea</i>	131	0	101	0	36	0	37	0
<i>Dunaliella salina</i>	131	0	101	0	36	0	37	0
<i>Euglena gracilis</i>	131	0	101	0	32	11.1	37	0
<i>Floydiella terrestris</i>	131	0	101	0	36	0	37	0
<i>Lepidodinium chlorophorum</i>	131	0	101	0	36	0	37	0
<i>Leptosira terrestris</i>	131	0	101	0	36	0	37	0
<i>Mesostigma viride</i>	131	0	101	0	36	0	37	0
<i>Micromonas sp. RCC299</i>	131	0	101	0	36	0	0	100
<i>Monomastix sp.</i>	131	0	101	0	36	0	37	0
<i>Nephroselmis olivacea</i>	131	0	101	0	36	0	37	0
<i>Oedogonium cardiacum</i>	131	0	101	0	36	0	37	0
<i>Oltmannsiellopsis viridis</i>	131	0	101	0	36	0	37	0
<i>Oocystis solitaria</i>	131	0	101	0	36	0	37	0
<i>Ostreococcus tauli</i>	131	0	101	0	36	0	37	0
<i>Parachlorella kessleri</i>	131	0	101	0	36	0	37	0
<i>Pedinomonas minor</i>	131	0	101	0	36	0	37	0
<i>Picocystis salinarum</i>	131	0	101	0	36	0	37	0
<i>Prasinococcus sp. CCMP1194</i>	131	0	101	0	36	0	37	0
<i>Prasinoderma coloniale</i>	131	0	101	0	36	0	37	0
<i>Prasinophyceae sp. CCMP120t</i>	131	0	101	0	36	0	37	0
<i>Pseudendoclonium akinetum</i>	131	0	101	0	36	0	37	0
<i>Pycnococcus provasoli</i>	131	0	101	0	36	0	37	0
<i>Pyramimonas parkeae</i>	131	0	101	0	36	0	37	0
<i>Autodesmus obliquus</i>	131	0	101	0	36	0	37	0
<i>Stigeoclonium helveticum</i>	131	0	101	0	36	0	37	0
<i>Trebouxia aggregata</i>	131	0	101	0	36	0	37	0
<i>Volvox carteri</i>	131	0	101	0	36	0	37	0

Table S1. Continued.

Taxa	rps2		rps3		rps4		rps7	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	174	0	115	0	108	12.2	128	0
<i>Bryopsis hypnoides</i>	174	0	115	0	123	0	128	0
<i>Chlamydomonas reinhardtii</i>	174	0	115	0	123	0	128	0
<i>Chlorella variabilis</i>	174	0	115	0	123	0	128	0
<i>Chlorokybus atmophyticus</i>	174	0	115	0	115	6.5	128	0
<i>Coccomyxa subellipsoidea</i>	174	0	115	0	123	0	128	0
<i>Dunaliella salina</i>	174	0	115	0	123	0	128	0
<i>Euglena gracilis</i>	173	0.6	115	0	108	12.2	128	0
<i>Floydiella terrestris</i>	174	0	115	0	123	0	128	0
<i>Lepidodinium chlorophorum</i>	173	0.6	76	33.9	109	11.4	128	0
<i>Leptosira terrestris</i>	174	0	115	0	123	0	128	0
<i>Mesostigma viride</i>	174	0	115	0	114	7.3	128	0
<i>Micromonas sp. RCC299</i>	174	0	115	0	123	0	128	0
<i>Monomastix sp.</i>	174	0	115	0	123	0	128	0
<i>Nephroselmis olivacea</i>	174	0	115	0	123	0	128	0
<i>Oedogonium cardiacum</i>	174	0	115	0	123	0	128	0
<i>Oltmannsiellopsis viridis</i>	174	0	115	0	123	0	128	0
<i>Oocystis solitaria</i>	174	0	115	0	123	0	128	0
<i>Ostreococcus tauli</i>	174	0	115	0	123	0	128	0
<i>Parachlorella kessleri</i>	174	0	115	0	123	0	128	0
<i>Pedinomonas minor</i>	174	0	115	0	123	0	128	0
<i>Picocystis salinarum</i>	174	0	115	0	123	0	128	0
<i>Prasinococcus sp. CCMP1194</i>	174	0	115	0	115	6.5	128	0
<i>Prasinoderma coloniale</i>	174	0	115	0	123	0	128	0
<i>Prasinophyceae sp. CCMP120t</i>	174	0	111	3.5	115	6.5	128	0
<i>Pseudendoclonium akinetum</i>	174	0	115	0	123	0	128	0
<i>Pycnococcus provasoli</i>	174	0	115	0	123	0	128	0
<i>Pyramimonas parkeae</i>	174	0	115	0	123	0	128	0
<i>Autodesmus obliquus</i>	92	47.1	115	0	123	0	128	0
<i>Stigeoclonium helveticum</i>	174	0	115	0	123	0	128	0
<i>Trebouxia aggregata</i>	174	0	115	0	109	11.4	128	0
<i>Volvox carteri</i>	174	0	115	0	123	0	128	0

Table S1. Continued.

Taxa	rps9		rps11		rps12		rps14	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	0	100	120	0	119	0	100	0
<i>Bryopsis hypnoides</i>	88	0	120	0	119	0	100	0
<i>Chlamydomonas reinhardtii</i>	88	0	120	0	119	0	100	0
<i>Chlorella variabilis</i>	88	0	120	0	119	0	100	0
<i>Chlorokybus atmophyticus</i>	88	0	120	0	119	0	100	0
<i>Coccomyxa subellipsoidea</i>	88	0	120	0	119	0	100	0
<i>Dunaliella salina</i>	88	0	120	0	119	0	100	0
<i>Euglena gracilis</i>	88	0	120	0	119	0	100	0
<i>Floydiella terrestris</i>	88	0	120	0	119	0	100	0
<i>Lepidodinium chlorophorum</i>	88	0	119	0.8	119	0	100	0
<i>Leptosira terrestris</i>	88	0	120	0	119	0	100	0
<i>Mesostigma viride</i>	88	0	120	0	119	0	100	0
<i>Micromonas sp. RCC299</i>	88	0	120	0	119	0	100	0
<i>Monomastix sp.</i>	0	100	120	0	119	0	99	1
<i>Nephroselmis olivacea</i>	88	0	120	0	119	0	100	0
<i>Oedogonium cardiacum</i>	88	0	120	0	119	0	100	0
<i>Oltmannsiellopsis viridis</i>	88	0	120	0	119	0	100	0
<i>Oocystis solitaria</i>	88	0	120	0	119	0	100	0
<i>Ostreococcus tauli</i>	88	0	120	0	119	0	100	0
<i>Parachlorella kessleri</i>	88	0	120	0	119	0	100	0
<i>Pedinomonas minor</i>	88	0	120	0	119	0	100	0
<i>Picocystis salinarum</i>	88	0	120	0	119	0	100	0
<i>Prasinococcus sp. CCMP1194</i>	88	0	120	0	119	0	98	2
<i>Prasinoderma coloniale</i>	88	0	120	0	119	0	100	0
<i>Prasinophyceae sp. CCMP120t</i>	88	0	118	1.7	119	0	100	0
<i>Pseudendoclonium akinetum</i>	88	0	120	0	119	0	100	0
<i>Pycnococcus provasoli</i>	0	100	120	0	119	0	100	0
<i>Pyramimonas parkeae</i>	88	0	120	0	119	0	100	0
<i>Autodesmus obliquus</i>	88	0	120	0	119	0	100	0
<i>Stigeoclonium helveticum</i>	88	0	120	0	119	0	100	0
<i>Trebouxia aggregata</i>	88	0	120	0	119	0	100	0
<i>Volvox carteri</i>	88	0	120	0	119	0	100	0

Table S1. Continued.

Taxa	rps18		rps19		tufA		ycf3	
	aa	missing (%)	aa	missing (%)	aa	missing (%)	aa	missing (%)
<i>Bigelowiella natans</i>	48	0	77	3.8	359	0	161	0
<i>Bryopsis hypnoides</i>	48	0	80	0	359	0	161	0
<i>Chlamydomonas reinhardtii</i>	48	0	80	0	359	0	161	0
<i>Chlorella variabilis</i>	48	0	80	0	359	0	161	0
<i>Chlorokybus atmophyticus</i>	48	0	80	0	359	0	161	0
<i>Coccomyxa subellipsoidea</i>	48	0	80	0	359	0	161	0
<i>Dunaliella salina</i>	48	0	80	0	359	0	161	0
<i>Euglena gracilis</i>	48	0	80	0	359	0	0	100
<i>Floydiella terrestris</i>	48	0	80	0	359	0	161	0
<i>Lepidodinium chlorophorum</i>	48	0	78	2.5	358	0.3	161	0
<i>Leptosira terrestris</i>	48	0	80	0	359	0	161	0
<i>Mesostigma viride</i>	48	0	80	0	359	0	161	0
<i>Micromonas sp. RCC299</i>	48	0	80	0	359	0	161	0
<i>Monomastix sp.</i>	48	0	80	0	359	0	161	0
<i>Nephroselmis olivacea</i>	48	0	80	0	359	0	161	0
<i>Oedogonium cardiacum</i>	48	0	80	0	359	0	161	0
<i>Oltmannsiellopsis viridis</i>	48	0	80	0	359	0	161	0
<i>Oocystis solitaria</i>	48	0	80	0	359	0	161	0
<i>Ostreococcus tauli</i>	48	0	80	0	359	0	161	0
<i>Parachlorella kessleri</i>	48	0	80	0	359	0	161	0
<i>Pedinomonas minor</i>	48	0	80	0	359	0	161	0
<i>Picocystis salinarum</i>	48	0	80	0	359	0	41	74.5
<i>Prasinococcus sp. CCMP1194</i>	48	0	80	0	359	0	161	0
<i>Prasinoderma coloniale</i>	48	0	80	0	359	0	161	0
<i>Prasinophyceae sp. CCMP120</i>	48	0	80	0	359	0	161	0
<i>Pseudendoclonium akinetum</i>	48	0	80	0	359	0	161	0
<i>Pycnococcus provasoli</i>	48	0	80	0	359	0	161	0
<i>Pyramimonas parkeae</i>	48	0	80	0	359	0	161	0
<i>Autodesmus obliquus</i>	48	0	80	0	359	0	161	0
<i>Stigeoclonium helveticum</i>	48	0	80	0	359	0	161	0
<i>Trebouxia aggregata</i>	48	0	80	0	359	0	161	0
<i>Volvox carteri</i>	48	0	80	0	359	0	161	0

Table S1. Continued.

Taxa	Total	
	aa	missing (%)
<i>Bigelowiella natans</i>	8585	3.7
<i>Bryopsis hypnoides</i>	8915	0.0
<i>Chlamydomonas reinhardtii</i>	8889	0.3
<i>Chlorella variabilis</i>	8820	1.1
<i>Chlorokybus atmophyticus</i>	8908	0.1
<i>Coccomyxa subellipsoidea</i>	8887	0.3
<i>Dunaliella salina</i>	8889	0.3
<i>Euglena gracilis</i>	8049	9.7
<i>Floydiella terrestris</i>	8613	3.4
<i>Lepidodinium chlorophorum</i>	8835	0.9
<i>Leptosira terrestris</i>	8918	0.0
<i>Mesostigma viride</i>	8905	0.1
<i>Micromonas sp. RCC299</i>	8806	1.3
<i>Monomastix sp.</i>	8712	2.3
<i>Nephroselmis olivacea</i>	8917	0.0
<i>Oedogonium cardiacum</i>	8613	3.4
<i>Oltmannsiellopsis viridis</i>	8917	0.0
<i>Oocystis solitaria</i>	8918	0.0
<i>Ostreococcus tauli</i>	8628	3.3
<i>Parachlorella kessleri</i>	8918	0.0
<i>Pedinomonas minor</i>	8918	0.0
<i>Picocystis salinarum</i>	8758	1.8
<i>Prasinococcus sp. CCMP1194</i>	8844	0.8
<i>Prasinoderma coloniale</i>	8853	0.7
<i>Prasinophyceae sp. CCMP120</i>	8869	0.5
<i>Pseudendoclonium akinetum</i>	8918	0.0
<i>Pycnococcus provasoli</i>	8760	1.8
<i>Pyramimonas parkeae</i>	8696	2.5
<i>Autodesmus obliquus</i>	8807	1.2
<i>Stigeoclonium helveticum</i>	8611	3.4
<i>Trebouxia aggregata</i>	8841	0.9
<i>Volvox carteri</i>	8871	0.5

Table S2. Codon frequency¹ and tRNA genes encoded in *Lepidodinium chlorophorum* plastid genome

Codons	AA	Freq (%)	tRNA	Codons	AA	Freq (%)	tRNA	Codons	AA	Freq (%)	tRNA	Codons	AA	Freq (%)	tRNA	
UUU	F	58.59	GAA	UCU	S	25.93	GGA	UAU	Y	25.8	GUA	UGU	C	8.73	GCA	
UUC		11.10		UCC		6.67		UAC		9.31		UGC		3.40		
UUA	L	2.57	CAA	UCA	P	1.03	CGA	UAA	*	2.82	— ³	UGA	*	0.39	— ³	
UUG		36.07		UCG		15.27		UAG	*	0.71		UGG	W	16.94		CCA
CUU		26.95		CCU		17.01		CAU	H	15.92		GUG	CGU	R		17.58
CUC		6.48	CCC	2.89	CAC	6.42	CGC	6.48								
CUA		19.38	CCA	14.57	CAA	Q	32.41	UUG	CGA	18.87	3.02					
CUG		7.19	CCG	4.43	CAG		6.16		CGG							
AUU		I	54.74	GAU	ACU	T	18.74	UGU	AAU	N	35.81	GUU	AGU	S	12.26	GCU
AUC	13.09		ACC		4.88		AAC		15.02		AGC		5.58			
AUA	M	28.62	CAU ²	ACA	A	26.50	UGC	AAA	K	52.56	UUU	AGA	R	15.66	UCU	
AUG		14.57		ACG		6.55		AAG		9.88		CUU		AGG		3.40
GUU	V	27.66	UAC	GCU	A	18.93	UGC	GAU	D	24.84	GUC	GGU	G	23.49	UCC	
GUC		5.84		GCC		4.24		GAC		7.64		GGC		4.68		
GUA		20.86		GCA		22.53		GAA	E	35.81	UUC	GGA		28.94		
GUG		7.44		GCG		6.23		GAG		7.12		GGG		4.81		

¹This analysis included functionally unassigned open reading frames (URFs) and excluded the supposed pseudogene of *rpoC1*.

²Both methionyl-tRNA genes for initiation and elongation were found.

³No tRNA for termination codons.