

Clade	L	Nucleotide positions of CBC and [hCBC]/Evolutionary change		Characterization of HS CBCs and [hCBCs]
		NHS	HS	
Kornmanniaceae + Bolbocoleonaceae	10	28/33: C-G => G-C	54/121: U-A => A-U [126/128: G-C => G-U]	54/121: U-A => A-U parallel in <i>Collinsiella</i> = PAR 5 , and A-U convergent in <i>Gloeotilopsis sarcinoidea</i> UTEX 1710 (U-G =>A-U) = CONV 1 [126/128: G-C => G-U] parallel in Gomontiaceae (marine/ brackish) + <i>Ulothrix zonata</i> , <i>Acrochaete</i> + ' <i>Umbraulva</i> <i>japonica</i> ', <i>Ulva muscoides</i> and <i>Ulva lactuca</i> clade = hPAR 14
Kornmanniaceae	6	----	55/120: U-A => G-C [62/114: U-G => C-G] 78/102: U-A => G-C	55/120: U-A => G-C parallel in ' <i>Blidingia minima</i> ' = PAR 6 [62/114: U-G => C-G] parallel in Ulvaceae = hPAR 10 78/102: U-A => G-C parallel in Ulvaceae = PAR 7
<i>Kornmannia</i>	21	23/38: C-G => U-A 67/110: C-G => U-A 79/101: G-C => A-U	55/120: G-C => A-U [72/108: G-C => G-U]	55/120: G-C => A-U, A-U convergent in <i>Acrosiphonia</i> (U-A => A-U) = CONV 3 [72/108: G-C => G-U] parallel in Gomontiaceae + Capsosiphonaceae and <i>Ulva</i> = hPAR 12
<i>Blidingia chadefaudii</i>	2	[60/116: C-G => U-G]	----	----
Bolbocoleonaceae	14	[68/109: U-G => C-G]	[20/41: G-U => G-C]	[20/41: G-U => G-C] parallel in <i>Gloeotilopsis</i> clade = hPAR 1

			[21/40: G-C => G-U]	[21/40: G-C => G-U] parallel in <i>Acrochaete heteroclada</i> = hPAR 2
Ulvaceae	16	29/32: A-U => G-C 54/121: U-A => C-G 75/105: A-U => C-G	[62/114: U-G => C-G 78/102: A-U => G-C	[62/114: U-G => C-G] parallel in Kornmanniaceae = hPAR 10 78/102: U-A => G-C parallel in Kornmanniaceae = PAR 7
<i>Ulva</i> + <i>Percursaria</i> + <i>Ulvaria</i>	3	----	[55/120: U-A => U-G]	[55/120: U-A => U-G] parallel in <i>Monostroma</i> excluding <i>M. grevillei</i> AJ000205 and <i>Gloeotilopsis sarcinoidea</i> UTEX 1710 = hPAR 6
<i>Ulva</i>	10	8/11: C-G => G-C	---- [58/118: C-G => U-G] [72/108: G-C => G-U]	[58/118: C-G => U-G] parallel in <i>Ulva californica</i> AB280867 = hPAR 7 [72/108: G-C => G-U] parallel in Gomontiaceae + Capsosiphonaceae and <i>Kornmannia</i> = hPAR 12
<i>Ulva flexuosa</i> + <i>Ulva californica</i> AJ234315	1	----	[59/117: G-C => G-U]	[59/117: G-C => G-U] parallel in <i>Acrochaete</i> sp. EF595429, <i>Ulva tanneri</i> and <i>Ulva linza</i> AJ012276, AJ000203 + <i>U. prolifera</i> + <i>U. lactuca</i> clade + <i>U. muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U. californica</i> AB280867 + <i>Ulva</i> sp. EU933983 = hPAR 8
<i>Ulva californica</i> AJ234315	2	----	[55/120: U-G => U-A]	[55/120: U-G => U-A] reversal in <i>Ulva</i> + <i>Percursaria</i> + <i>Ulvaria</i> (<u>U-A</u> => U-G) = hREV 1
<i>Ulva linza</i> AJ012276,	1	----	[59/117: G-C => G-U]	[59/117: G-C => G-U] parallel in <i>Acrochaete</i> sp. EF595429,

AJ000203 + <i>U. prolifera</i> + <i>U. lactuca</i> clade + <i>U.</i> <i>muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U.</i> <i>californica</i> AB280867 + <i>Ulva</i> sp. EU933983			<i>Ulva tanneri</i> and <i>Ulva flexuosa</i> + <i>Ulva californica</i> AJ234315 = hPAR 8	
<i>Ulva lactuca</i> clade + <i>U.</i> <i>muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U.</i> <i>californica</i> AB280867 + <i>Ulva</i> sp. EU933983	2	----	[58/118: U-G => C-G]	[58/118: U-G => C-G] reversal in <i>Ulva</i> (<u>C-G</u> => U-G) = hREV 2
<i>Ulva lactuca</i> clade	3	----	[126/128: G-C => G-U]	[126/128: G-C => G-U] parallel in Kornmanniaceae + Bolbocoleonaceae, Gomontiaceae (marine/ brackish) + <i>Ulothrix zonata</i> , <i>Acrochaete</i> + ‘ <i>Umbraulva japonica</i> ’ and <i>Ulva muscoides</i> = hPAR 14
<i>Ulva muscoides</i> + <i>Ulva taeniata</i>	2	----	[72/108: G-U => G-C]	[72/108: G-U => G-C] reversal in <i>Ulva</i> (<u>G-C</u> => G-U) = hREV 6
<i>Ulva muscoides</i>	3	[8/11: G-C => G-U]	[126/128: G-C => G-U]	[126/128: G-C => G-U] parallel in Kornmanniaceae + Bolbocoleonaceae, Gomontiaceae (marine/ brackish) + <i>Ulothrix zonata</i> , <i>Acrochaete</i> + ‘ <i>Umbraulva japonica</i> ’ and <i>Ulva lactuca</i> clade = hPAR 14

<i>Ulva taeniata</i>	3	----	[59/117: G-U => G-C]	[59/117: G-U => G-C] parallel in <i>Ulva fasciata</i> + <i>Ulva pertusa</i> = hPAR 9 , and reversal in <i>Ulva linza</i> AJ012276, AJ000203 + <i>U. prolifera</i> + <i>U. lactuca</i> clade + <i>U. muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U. californica</i> AB280867 + <i>Ulva</i> sp. EU933983 (<u>G-C</u> => G-U) = hREV 5
<i>Ulva reticulata</i> clade	4	6/13: A-U => G-C	[63/113: G-C => G-U]	[63/113: G-C => G-U] parallel in <i>Ulva</i> sp. EF595507 + <i>Acrochaete</i> sp. EF595429 = hPAR 11
<i>Ulva fasciata</i> + <i>Ulva pertusa</i>	1	----	[59/117: G-U => G-C]	[59/117: G-U => G-C] parallel in <i>Ulva taeniata</i> = hPAR 9 , and reversal in <i>Ulva linza</i> AJ012276, AJ000203 + <i>U. prolifera</i> + <i>U. lactuca</i> clade + <i>U. muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U. californica</i> AB280867 + <i>Ulva</i> sp. EU933983 (<u>G-C</u> => G-U) = hREV 4
<i>Ulva californica</i> AB280867	2	----	[58/118: C-G => U-G]	[58/118: C-G => U-G] parallel in <i>Ulva</i> = hPAR 7 , and reversal in <i>Ulva lactuca</i> clade + <i>U. muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U. californica</i> AB280867 + <i>Ulva</i> sp. EU933983 (<u>U-G</u> => C-G) = hREV 3
<i>Ulva tanneri</i>	3	----	[27/34: C-G => U-G] [59/117: G-C => G-U]	[27/34: C-G => U-G] parallel in <i>Capsosiphonaceae</i> and <i>Monostroma nitidum</i> + <i>M. arcticum</i> = hPAR 4 [59/117: G-C => G-U] parallel in <i>Acrochaete</i> sp. EF595429, <i>Ulva flexuosa</i> + <i>U. californica</i> AJ234315 and <i>Ulva linza</i> AJ012276, AJ000203 + <i>U. prolifera</i> + <i>U. lactuca</i> clade + <i>U.</i>

muscoides + *U. taeniata* + *U. reticulata* clade + *U. californica*
AB280867 + *Ulva* sp. EU933983 = **hPAR 8**

<i>Percursaria</i>	7	[125/129: G-C => G-U]	8/11: C-G => U-A	8/11: C-G => U-A parallel in Gomontiaceae = PAR 2
<i>Acrochaete</i> + ' <i>Umbraulva japonica</i> '	8	[80/100: C-G => U-G]	[126/128: G-C => G-U]	[126/128: G-C => G-U] parallel in Kornmanniaceae + Bolbocoleonaceae, Gomontiaceae (marine/ brackish) + <i>Ulothrix zonata</i> , <i>Ulva muscoides</i> and <i>Ulva lactuca</i> clade = hPAR 14
<i>Acrochaete viridis</i>	3	21/40: G-C => A-U	----	----
<i>Acrochaete heteroclada</i>	8	74/106: C-G => U-A	[21/40: G-C => G-U]	[21/40: G-C => G-U] parallel in Bolbocoleonaceae = hPAR 2
<i>Acrochaete repens</i>	2	[73/107: G-C => G-U]	----	----
<i>Acrochaete</i> sp. EF595429	4	----	[59/117: G-C => G-U]	[59/117: G-C => G-U] parallel in <i>Ulva tanneri</i> , <i>U. flexuosa</i> + <i>U. californica</i> AJ234315 and <i>Ulva linza</i> AJ012276, AJ000203 + <i>U. prolifera</i> + <i>U. lactuca</i> clade + <i>U. muscoides</i> + <i>U. taeniata</i> + <i>U. reticulata</i> clade + <i>U. californica</i> AB280867 + <i>Ulva</i> sp. EU933983 = hPAR 8
			[63/113: G-C => G-U]	[63/113: G-C => G-U] parallel in Ulvales sp. EF595507, <i>Ulva reticulata</i> clade = hPAR 11
' <i>Umbraulva japonica</i> ', <i>Acrochaete</i> sp. EF595429, <i>Acrochaete</i> sp. EF595413, <i>Acrochaete</i> sp. EF595372	7	[78/102: G-C => G-U]	----	----

[90/93: A-U => G-U]

Capsosiphonaceae + Gomontiaceae	6	----	[72/108: G-C => G-U]	[72/108: G-C => G-U] parallel in <i>Kornmannia</i> and <i>Ulva</i> = hPAR 12
Capsosiphonaceae	1	----	[27/34: C-G => U-G]	[27/34: C-G => U-G] parallel in <i>Ulva tanneri</i> and <i>Monostroma arcticum</i> + <i>M. nitidum</i> = hPAR 4
Capsosiphonaceae excluding <i>Protomonostroma undulatum</i>	1	----	[22/39: C-G => U-G]	[22/39: C-G => U-G] parallel in <i>Monostroma</i> and <i>Gloeotilopsis</i> clade excluding <i>Gloeotilopsis</i> sp. M3284 = hPAR 3
<i>Acrosiphonia</i>	6	----	30/31: G-C => C-G	30/31: G-C => C-G parallel in Gomontiaceae excluding <i>Chamaetrichon capsulatum</i> and ‘ <i>Pseudendoclonium basiliense</i> ’ = PAR 4
			55/120: U-A => A-U	55/120: U-A => A-U convergent in <i>Kornmannia</i> (G-C => A-U) = CONV 3
<i>Pseudoneochloris marina</i>	12	----	7/12: U-A => C-G	7/12: U-A => C-G parallel in <i>Monostroma</i> and <i>Gloeotilopsis</i> sp. ACOI + <i>Gloeotilopsis sarcinoidea</i> UTEX 1710 = PAR 1
			8/11: U-A => C-G	8/11: U-A => C-G parallel in <i>Gloeotilopsis paucicellularis</i> <i>Gloeotilopsis</i> sp. M3284 = PAR 3
<i>Urospora</i> sp. AY476812 + <i>Urospora wormskioldii</i>	1	----	[91/92: G-C => G-U]	[91/92: G-C => G-U] parallel in Gomontiaceae (marine/brackish) = hPAR 13
Ulvales sp. EF595507 +	1	[8/11: U-A => U-G]	----	----

Ulvaes sp. EF595508 + Ulvaes sp. EF595509				
Ulvaes sp. EF595507	1	----	[63/113: G-C => G-U]	[63/113: G-C => G-U] parallel in <i>Acrochaete</i> sp. EF595429 + <i>Ulva reticulata</i> clade = hPAR 11
' <i>Blidingia minima</i> '	9	----	55/120: U-A => G-C	55/120: U-A => G-C parallel in Kornmanniaceae = PAR 6
' <i>Blidingia minima</i> ' AJ000206	3	----	[54/121: U-A => U-G]	[54/121: U-A => U-G] parallel in <i>Gloeotilopsis</i> clade = hPAR 5
' <i>Blidingia minima</i> ' EF595512	6	9/10: C-G => G-C	----	----
Gomontiaceae	2	----	8/11: C-G => U-A	8/11: C-G => U-A parallel in <i>Percursaria</i> = PAR 2
Gomontiaceae excluding <i>Chamaetrichon capsulatum</i> and ' <i>Pseudendoclonium</i> <i>basiliense</i> '	2	----	30/31: G-C => C-G	30/31: G-C => C-G parallel in <i>Acrosiphonia</i> = PAR 4
Gomontiaceae (marine/ brackish) + <i>Ulothrix zonata</i>	3	53/122: G-C => A-U	[126/128: G-C => G-U]	[126/128: G-C => G-U] parallel in Kornmanniaceae + Bolbocoleonaceae, <i>Acrochaete</i> + ' <i>Umbraulva japonica</i> ', <i>Ulva</i> <i>muscoidea</i> and <i>Ulva lactuca</i> clade = hPAR 14
Gomontiaceae (marine/ brackish)	13	90/93: A-U => G-C 125/129: G-C => A-U	[91/92: G-C => G-U]	[91/92: G-C => G-U] parallel in <i>Urospora</i> sp. AY476812 + <i>Urospora wormskioldii</i> = hPAR 13
<i>Monostroma</i>	5	30/31: C-G => U-A	7/12: U-A => C-G	7/12: U-A => C-G parallel in <i>Pseudoneochloris marina</i> and <i>Gloeotilopsis</i> sp. ACOI + <i>G. sarcinoidea</i> UTEX 1710 = PAR 1

			[22/39: C-G => U-G]	[22/39: C-G => U-G] parallel in Capsosiphonaceae excluding <i>Protomonostroma undulatum</i> , <i>Gloeotilopsis</i> clade excluding <i>Gloeotilopsis</i> sp. M3284 = hPAR 3
<i>Monostroma</i> excluding <i>M. grevillei</i> AJ000205	1	----	[55/120: U-A => U-G]	[55/120: U-A => U-G] parallel in <i>Ulva</i> + <i>Percursaria</i> + <i>Ulvaria</i> , <i>Gloeotilopsis sarcinoidea</i> UTEX 1710 = hPAR 6
<i>Monostroma arcticum</i> + <i>M. nitidum</i>	1	----	[27/34: C-G => U-G]	[27/34: C-G => U-G] parallel in <i>Ulva tanneri</i> and Capsosiphonaceae = hPAR 4
<i>Collinsiella</i>	8	23/38: C-G => G-C	54/121: U-A => A-U	54/121: U-A => A-U parallel in Kornmanniaceae + Bolbocoleonaceae = PAR 5 , and A-U convergent in <i>Gloeotilopsis sarcinoidea</i> UTEX 1710 (U-G=>A-U) = CONV 2
<i>Gloeotilopsis</i> clade	4	----	[20/41: G-U => G-C] [54/121: U-A => U-G]	[20/41: G-U => G-C] parallel in Bolbocoleonaceae = hPAR 1 [54/121: U-A => U-G] parallel in <i>Blidingia minima</i> AJ000206 = hPAR 5
<i>Gloeotilopsis</i> clade excluding <i>Gloeotilopsis</i> sp. M3284	1	----	[22/39: C-G => U-G]	[22/39: C-G => U-G] parallel in Capsosiphonaceae excluding <i>Protomonostroma undulatum</i> and <i>Monostroma</i> = hPAR 3
<i>Gloeotilopsis paucicellularis</i>	2	----	8/11: U-A => C-G	8/11: U-A => C-G parallel in <i>Pseudoneochloris marina</i> , <i>Gloeotilopsis</i> sp. M3284 = PAR 3 , and reversal in Gomontiaceae (C-G => U-A) = REV 2
<i>Gloeotilopsis</i> sp. ACOI + <i>G. sarcinoidea</i> UTEX 1710	2	----	7/12: U-A => C-G	7/12: U-A => C-G parallel in <i>Pseudoneochloris marina</i> , <i>Monostroma</i> = PAR 1

<i>Gloeotilopsis</i> sp. ACOI	4	6/13: A-U => C-G 9/10: C-G => U-A	----	----
<i>Gloeotilopsis sarcinoidea</i> UTEX 1710	5	----	54/121: U-G => A-U [55/120: U-A => U-G]	54/121: U-G => A-U, A-U convergent in Kornmanniaceae + Bolbocoleonaceae, <i>Collinsiella</i> (U-A => A-U) = CONV 2 [55/120: U-A => U-G] parallel in <i>Ulva</i> + <i>Percursaria</i> + <i>Ulvaria</i> , <i>Monostroma</i> excluding <i>M. grevillei</i> AJ000205 = hPAR 6
<i>Gloeotilopsis</i> sp. M3284	2	----	8/11: U-A => C-G	8/11: U-A => C-G parallel in <i>Pseudoneochloris marina</i> , <i>Gloeotilopsis paucicellularis</i> = PAR 3 , and reversal in Gomontiaceae (<u>C-G</u> => U-A) = REV 1
‘ <i>Pseudendoclonium basiliense</i> ’	3	[26/35: C-G => U-G]	----	----