

Supplementary Materials

Table S1: Fatty acid distribution in the neutral lipid (NL), free fatty acid (FFA) and polar lipid (PL) fractions of blade and stipe from *Laminaria hyperborea*.

	Blade			Stipe		
	NL	FFA	PL	NL	FFA	PL
C8:0	-	< LOQ	-	-	-	-
C9:0	< 0.1	< 0.1	-	-	< 0.1	-
C10:0	< 0.1	< LOQ	-	< 0.1	0.1 ± 0.0	-
C11:0	-	< 0.1	-	< 0.1	-	-
C12:0	< 0.1	< 0.1	-	< 0.1	0.1 ± 0.0	< 0.1
C13:0	< 0.1	< 0.1	-	-	< 0.1	-
C14:0	5.6 ± 0.2	8.5 ± 0.1	8.0 ± 0.1	8.1 ± 0.2	9.2 ± 0.2	17.4 ± 0.3
C15:0	0.1 ± 0.0	0.2 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.5 ± 0.0	0.2 ± 0.0
C16:0	7.0 ± 0.1	23.0 ± 0.2	10.2 ± 0.1	8.0 ± 0.2	32.8 ± 0.4	15.5 ± 0.1
C17:0	3.2 ± 0.1	< 0.1	< 0.1	0.1 ± 0.0	0.3 ± 0.0	0.1 ± 0.0
C18:0	0.2 ± 0.0	0.6 ± 0.0	0.2 ± 0.0	0.3 ± 0.0	5.9 ± 0.3	0.2 ± 0.0
C20:0	0.1 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.3 ± 0.0
C22:0	-	< 0.1	-	-	< 0.1	-
C24:0	-	< 0.1	< 0.1	-	0.1 ± 0.0	-
C26:0	-	< 0.1	-	-	-	-
ΣSFA	16.2 ± 0.2	32.5 ± 0.2	18.7 ± 0.1	16.8 ± 0.2	49.2 ± 0.4	33.7 ± 0.3
C14:1 ^b	-	< 0.1	-	-	0.1 ± 0.0	-
C14:1 _{cis} 9	0.1 ± 0.0	< 0.1	< 0.1	0.1 ± 0.0	-	< 0.1
C16:1 _{cis} 7	< 0.1	< 0.1	< 0.1	0.1 ± 0.0	0.1 ± 0.0	< 0.1
C16:1 _{cis} 9	3.3 ± 0.0	4.3 ± 0.0	3.3 ± 0.0	6.1 ± 0.2	10.6 ± 0.1	5.8 ± 0.1
C16:1 _{cis} 11 ^a	-	< 0.1	-	< 0.1	0.2 ± 0.0	< 0.1
C17:1 _{cis} 9	< 0.1	< 0.1	-	< 0.1	0.2 ± 0.0	< 0.1
C18:1 _{cis} 9	19.3 ± 0.2	18.8 ± 0.1	17.7 ± 0.2	23.1 ± 0.4	15.3 ± 0.1	31.4 ± 0.3
C18:1 _{cis} 11	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.3 ± 0.0	2.3 ± 0.1	0.4 ± 0.0
C20:1 _{cis} 9	-	< 0.1	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	-
C20:1 _{cis} 11	-	-	0.1 ± 0.0	-	-	-
C24:1 ^b	-	< 0.1	< 0.1	-	0.1 ± 0.0	-
C24:1 _{cis} 15	-	-	-	-	0.1 ± 0.0	-
ΣMUFA	22.8 ± 0.2	23.4 ± 0.1	21.4 ± 0.2	29.8 ± 0.4	29.1 ± 0.1	37.7 ± 0.3

Table S1:
continues

	Blade			Stipe		
	NL	FFA	PL	NL	FFA	PL
C16:2 <i>trans</i> 7,10 ^a	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0
C16:2 <i>trans</i> 9,12 ^a	< 0.1	< 0.1	< 0.1	0.1 ± 0.0	0.2 ± 0.0	0.1 ± 0.0
C16:4 <i>cis</i> 6,9,12,15 ^a	-	< 0.1	-	-	-	-
C18:2 <i>cis</i> 9, 12 (n-6) (LA)	4.2 ± 0.0	3.7 ± 0.0	4.1 ± 0.1	4.1 ± 0.1	2.2 ± 0.0	4.4 ± 0.0
C18:2 ^b	-	< 0.1	-	-	-	-
C18:3 ^b	0.1 ± 0.0	< 0.1	0.1 ± 0.0	0.2 ± 0.0	0.1 ± 0.0	0.3 ± 0.0
C18:3 <i>cis</i> 6,9,12 (n-6)	0.2 ± 0.0	0.3 ± 0.0	0.2 ± 0.0	0.4 ± 0.0	0.3 ± 0.0	0.4 ± 0.0
C18:3 <i>cis</i> 9,12,15 (n-3) (ALA)	3.7 ± 0.1	6.7 ± 0.1	1.4 ± 0.0	0.7 ± 0.0	1.1 ± 0.0	0.2 ± 0.0
C18:4 <i>cis</i> 6,9,12,15 (n-3) (SDA)	8.3 ± 0.2	13.8 ± 0.1	12.7 ± 0.2	0.8 ± 0.0	1.3 ± 0.0	1.0 ± 0.0
C20:2 <i>cis</i> 11,14 (n-6)	0.1 ± 0.0	0.1 ± 0.0	0.4 ± 0.0	0.2 ± 0.0	0.2 ± 0.0	0.4 ± 0.0
C20:3 <i>cis</i> 5,8,11 ^a	< 0.1	< 0.1	< 0.1	0.1 ± 0.0	0.1 ± 0.0	0.1 ± 0.0
C20:3 <i>cis</i> 5,11,14 (n-6) ^a	< 0.1	< 0.1	0.1 ± 0.0	0.1 ± 0.0	0.2 ± 0.0	0.1 ± 0.0
C20:3 <i>trans</i> 7,10,13 ^a	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1 ± 0.0
C20:3 <i>cis</i> 8,11,14 (n-6)	0.2 ± 0.0	0.1 ± 0.0	0.6 ± 0.0	0.3 ± 0.0	0.1 ± 0.0	0.8 ± 0.0
C20:4 <i>cis</i> 5,8,11,14 (n-6) (AA)	23.3 ± 0.2	8.1 ± 0.1	17.1 ± 0.1	34.3 ± 0.1	12.2 ± 0.3	15.7 ± 0.3
C20:4 <i>cis</i> 5,11,14,17 (n-3) ^a	< 0.1	< 0.1	0.1 ± 0.0	0.1 ± 0.0	-	-
C20:4 <i>cis</i> 8,11,14,17 (n-3)	1.0 ± 0.0	0.5 ± 0.0	1.7 ± 0.0	0.3 ± 0.0	0.2 ± 0.0	0.3 ± 0.0
C20:5 <i>cis</i> 5,8,11,14,17 (n-3) (EPA)	19.4 ± 0.2	10.4 ± 0.1	21.0 ± 0.1	11.1 ± 0.2	3.0 ± 0.0	4.6 ± 0.1
C22:5 <i>cis</i> 7,10,13,16,19 (n-3)	0.3 ± 0.0	0.1 ± 0.0	0.4 ± 0.0	0.3 ± 0.0	0.1 ± 0.0	0.1 ± 0.0
C22:6 <i>cis</i> 4,7,10,13,16,19 (n-3) (DHA)	-	-	-	0.1 ± 0.0	0.3 ± 0.0	-
ΣPUFA	61.0 ± 0.2	44.0 ± 0.1	59.8 ± 0.2	53.4 ± 0.2	21.7 ± 0.3	28.7 ± 0.3
Σn-6	28.1 ± 0.2	12.3 ± 0.1	22.5 ± 0.1	39.5 ± 0.1	15.3 ± 0.3	21.8 ± 0.3
Σn-3	32.8 ± 0.2	31.6 ± 0.1	37.2 ± 0.2	13.3 ± 0.2	5.9 ± <0.0	6.2 ± 0.1
n-6/n-3 ratio	0.86	0.39	0.60	2.96	2.57	3.51

Four technical replicates were used for each fraction of blade and stipe. ^a Identified by NIST search only ^b Unknown isomer, identified by NIST search only. The standard deviations for the summarized categories, are the highest standard deviation among the summarized values. SFA; saturated fatty acids, MUFA; monounsaturated fatty acids, PUFA; polyunsaturated fatty acids, < LOQ; below limit of quantification, < 0.1; Fatty acid was identified –relative amount was less than 0.1 %, ± 0.0; 1 SD < 0.0, -; Fatty acid was not detected.

Table S2: Molecular species of monogalactosyldiacylglycerol in blade from *Laminaria hyperborea*.

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)			
30	0	87.6	725.51	14:0/16:0			
30	1	76.6	723.50	14:0/16:1	16:0/14:1		
32	1	81.7	751.53	14:0/18:1			
32	1	90.8	751.53	14:0/18:1	16:0/16:1		
32	2	81.8	749.51	14:0/18:2	14:1/18:1		
32	3	73.7	747.50	14:0/18:3			
33	1	97.3	765.54	15:0/18:1	16:0/17:1	17:0/16:1	
34	1	103.4	779.56	16:0/18:1			
34	3	87.8	775.53	16:0/18:3			
34	4	79.1	773.51	16:1/18:3	16:3/18:1	18:4/16:0	14:0/20:4
34	4	81.2	773.51	18:4/16:0	20:4/14:0	16:3/18:1	
34	5	70.4	771.50	16:1/18:4	16:2/18:3		
34	5	71.8	771.50	18:4/16:1	16:4/18:1	16:2/18:3	
34	5	73.2	771.50	20:5/14:0		16:4/18:1	
34	6	62.2	769.48	16:2/18:4	20:5/14:1		
34	8	45.7	765.54	16:4/18:4			
36	2	105.9	805.58	18:1/18:1	16:0/20:2		
36	2	107.1	805.58	16:0/20:2	18:1/18:1	18:0/18:2	
36	3	98.0	803.56	18:2/18:1			
36	4	90.8	801.54	18:3/18:1			
36	5	76.7	799.53	20:5/16:0	18:4/18:1	20:4/16:1	18:2/18:3
36	5	82.1	799.53	18:3/18:2	18:1/18:4	20:4/16:1	
36	5	84.3	799.53	18:4/18:1	20:4/16:1	18:3/18:2	
36	5	87.4	799.53	20:5/16:0			
36	6	74.2	797.51	18:3/18:3			
36	6	75.2	797.51	18:4/18:2	18:3/18:3	18:5/18:1	
36	6	76.8	797.51	20:5/16:1	18:4/18:2	18:3/18:3	20:4/16:2
36	7	66.4	795.59	18:3/18:4	16:0/20:7 or 17:7/19:0		
36	7	67.3	795.59	18:4/18:3			
36	8	59.5	793.48	18:4/18:4			
36	9	49.3	791.58	18:4/18:5			
36	9	52.4	791.58	20:5/16:4	18:5/18:4		
38	5	90.3	827.56	20:5/18:0	20:4/18:1		
38	5	95.6	827.56	20:4/18:1			
38	5	97.4	827.56	20:4/18:1	22:5/16:0	18:4/20:1	
38	6	90.1	825.54	20:4/18:2			

Table S2:
continues

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)		
38	7	76.2	823.53	20:3/18:4		
38	7	78.8	823.53	20:4/18:3	18:2/20:5	
38	7	79.9	823.53	18:4/20:3	20:4/18:3	
38	7	81.6	823.53	20:5/18:2	20:4/18:3	20:3/18:4
38	7	81.6	823.53	20:4/18:3		
38	7	83.4	823.53	20:5/18:2	20:4/18:3	18:4/20:3
38	8	66.5	821.51	20:5/18:3	20:4/18:4	
38	8	73.7	821.51	20:5/18:3	18:4/20:4	
38	8	74.6	821.51	20:5/18:3	20:4/18:4	
38	9	66.8	819.50	20:5/18:4		
40	6	100.1	853.58	22:5/18:1	20:4/20:2	
40	8	84.1	849.54	22:5/18:3	20:4/20:4	
40	8	85.2	849.54	22:5/18:3	22:4/18:4	
40	8	85.9	849.54	20:5/20:3	20:4/20:4	
40	8	88.3	849.54	20:4/20:4		
40	9	78.6	847.53	22:5/18:4	20:5/20:4	
40	9	81.0	847.53	20:4/20:5		
40	10	73.2	845.51	20:5/20:5		

C; total number of carbon atoms in the acyl chains, DBE; total number of double bond equivalents in the acyl chains, RT; retention time (min)

Table S3: Molecular species of digalactosyldiacylglycerol in blade from *Laminaria hyperborea*

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)			
30	1	67.7	885.64	14:0/16:1	12:0/18:1		
32	1	81.7	913.67	14:0/18:1	16:0/16:1		
32	2	72.6	911.65	14:0/18:2	14:1/18:1		
32	3	64.4	909.64	14:0/18:3			
34	1	95.0	941.70	16:0/18:1	14:0/20:1		
34	2	85.3	939.69	16:1/18:1	20:2/14:0		
34	2	86.7	939.69	16:0/18:2	14:0/20:2		
34	4	68.2	935.57	18:3/16:1	16:2/18:2		
34	4	72.1	935.57	18:4/16:0	20:4/14:0	18:1/16:3	
34	5	61.1	933.56	16:1/18:4			
34	5	64.0	933.56	20:5/14:0			
35	1	101.0	955.64	17:0/18:1	16:0/19:1		
36	1	97.8	969.65	18:1/18:0			
36	2	98.0	967.72	18:1/18:1	16:0/20:2		
36	3	89.5	965.70	18:2/18:1	16:1/20:2		
36	4	81.0	963.60	18:2/18:2	16:1/20:3		
36	4	82.1	963.60	18:3/18:1	18:2/18:2	16:1/20:3	
36	5	73.2	961.59	18:3/18:2	20:4/16:1		
36	5	75.5	961.59	18:4/18:1	20:4/16:1	18:3/18:2	14:0/22:5
36	5	78.4	961.59	20:5/16:0			
36	6	67.8	959.57	20:5/16:1			
36	7	58.3	957.56	18:3/18:4	20:5/16:2	16:0/20:7 or 17:7/19:0	
36	7	60.3	957.56	20:5/16:2	18:3/18:4		
36	8	50.8	955.54	18:4/18:4			
38	5	81.7	989.62	20:5/18:0	18:1/20:4		
38	5	87.0	989.62	20:4/18:1	20:3/18:2		
38	5	89.0	989.62	20:4/18:1	22:5/16:0	18:4/20:1	
38	6	80.3	987.60	20:4/18:2	20:2/18:4		
38	6	81.6	987.60	20:5/18:1			
38	7	72.7	985.59	20:5/18:2	20:4/18:3	18:4/20:3	
38	7	74.6	985.59	20:5/18:2	20:4/18:3	20:3/18:4	
38	8	64.7	983.57	20:5/18:3			
38	8	65.8	983.57	20:4/18:4	20:5/18:3		
38	9	57.6	981.56	20:5/18:4			

C; total number of carbon atoms in the acyl chains, DBE; total number of double bond equivalents in the acyl chains, RT; retention time (min)

Table S4: Molecular species of monogalactosyldiacylglycerol in stipe from *Laminaria hyperborea*

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)			
28	0	74.2	697.48	14:0/14:0	12:0/16:0		
30	0	87.7	725.51	14:0/16:0			
30	1	77.3	723.50	14:0/16:1	12:0/18:1		
31	1	84.4	737.51	14:0/17:1	15:0/16:1	13:0/18:1	
31	1	85.4	737.51	15:0/16:1			
32	1	91.0	751.53	14:0/18:1	16:0/16:1		
32	2	81.0	749.51	16:1/16:1	14:1/18:1		
32	2	82.3	749.51	14:0/18:2			
32	3	72.6	747.50	16:2/16:1	14:1/18:2		
32	3	74.4	747.50	14:0/18:3	16:1/16:2	14:1/18:2	16:3/16:0
32	3	75.5	747.50	14:0/18:3	16:0/16:3		
32	3	76.8	747.50	14:0/18:3	16:0/16:3	16:2/16:1	
33	1	89.0	765.54	15:0/18:1			
33	1	97.1	765.54	15:0/18:1	14:0/19:1	16:0/17:1	17:0/16:1
34	1	103.1	779.56	16:0/18:1	14:0/20:1		
34	2	94.1	777.54	16:1/18:1			
34	2	95.6	777.54	16:0/18:2			
34	3	85.7	775.53	16:1/18:2			
34	3	86.5	775.53	16:2/18:1	16:1/18:2		
34	3	87.6	775.53	16:2/18:1	14:0/20:3	16:1/18:2	
34	3	88.2	775.53	16:0/18:3	14:0/20:3	16:1/18:2	
34	3	89.4	775.53	16:0/18:3	14:0/20:3		
34	3	90.2	775.53	14:0/20:3	16:0/18:3	18:0/16:3	
34	4	78.1	773.51	18:3/16:1			
34	4	79.4	773.51	16:1/18:3	16:3/18:1		
34	4	80.0	773.51	14:0/20:4	16:3/18:1	16:1/18:3	
34	4	80.7	773.51	16:2/18:2	20:4/14:0	16:1/18:3	16:3/18:1
34	4	81.7	773.51	20:4/14:0	18:4/16:0		
34	4	82.1	773.51	14:0/20:4	16:0/18:4	16:3/18:1	
34	5	71.7	771.50	16:1/18:4	16:2/18:3	20:4/14:1	
34	5	74.0	771.50	20:5/14:0			
34	7	52.8	767.69	14:0/20:7 or 15:7/19:0			
34	7	53.5	767.69	14:0/20:7 or 15:7/19:0	16:0/18:7 or 17:7/17:0		
34	7	55.1	767.69	16:3/18:4	14:0/20:7 or 15:7/19:0	16:4/18:3	
34	7	55.9	767.69	16:4/18:3	18:4/16:3	20:5/14:2	
35	1	108.6	793.58	17:0/18:1	16:0/19:1	15:0/20:1	

Table S4:
continues

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)			
36	1	105.6	807.59	18:1/18:0	16:1/20:0		
36	1	106.3	807.59	16:0/20:1	18:1/18:0		
36	1	113.9	807.59	18:0/18:1	16:0/20:1	14:0/22:1	20:0/16:1
36	2	105.7	805.58	18:1/18:1	16:1/20:1		
36	2	106.2	805.58	16:0/20:2	18:1/18:1		
36	2	107.1	805.58	16:0/20:2	18:0/18:2		
36	3	98.2	803.56	18:2/18:1			
36	3	99.6	803.56	18:2/18:1	16:0/20:3		
36	3	100.6	803.56	16:0/20:3	18:0/18:3		
36	3	102.3	803.56	16:0/20:3			
36	5	82.9	799.53	18:3/18:2	16:2/20:3		
36	5	84.1	799.53	18:2/18:3	20:4/16:1	16:2/20:3	
36	5	85.1	799.53	18:4/18:1	20:4/16:1	18:3/18:2	22:5/14:0
36	5	87.8	799.53	20:5/16:0			
36	5	92.5	799.53	20:5/16:0			
36	6	69.4	797.51	18:3/18:3	18:4/18:2		
36	6	70.5	797.51	20:5/16:1	20:4/16:2	18:3/18:3	18:4/18:2
36	6	75.3	797.51	18:3/18:3	16:2/20:4		
36	6	76.3	797.51	18:2/18:4	18:3/18:3	18:5/18:1	16:2/20:4
36	6	77.1	797.51	18:3/18:3	20:4/16:2	18:4/18:2	
36	6	77.8	797.51	20:5/16:1	18:4/18:2	18:3/18:3	
36	6	78.0	797.51	18:4/18:2	18:3/18:3	20:4/16:2	
36	6	79.2	797.51	20:5/16:1	18:4/18:2	18:5/18:1	16:2/20:4
36	6	84.8	797.51	20:6/16:0			
36	7	61.2	795.65	18:4/18:3			
36	7	62.1	795.65	20:5/16:2	16:3/20:4	18:4/18:3	
36	7	67.5	795.65	16:0/20:7 or 17:7/19:0			
36	7	68.3	795.65	16:0/20:7 or 17:7/19:0	18:3/18:4	19:1/17:6	
36	7	69.3	795.65	18:4/18:3	20:5/16:2		
36	7	70.5	795.65	20:5/16:2	18:3/18:4		

Table S4:
continues

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)				
36	8	54.7	793.58	20:5/16:3	16:4/20:4			
36	8	56.7	793.58	16:1/20:7 or 17:8/19:0	18:7/18:1 or 17:0/19:8			
36	8	57.3	793.58	16:1/20:7 or 17:8/19:0	18:7/18:1 or 17:0/19:8			
36	8	61.2	793.58	18:4/18:4	16:0/20:8 or 17:7/19:1	11:3/25:5		
36	8	62.2	793.58	20:5/16:3	18:4/18:4			
36	8	68.2	793.58	16:0/20:8 or 17:7/19:1				
36	8	68.9	793.58	16:0/20:8 or 17:7/19:1				
36	9	50.1	791.56	16:1/20:8 or 17:8/19:1	18:8/18:1 or 17:1/19:8			
36	9	51.4	791.56	18:4/18:5	18:8/18:1 or 17:1/19:8			
36	9	54.6	791.56	20:5/16:4	18:5/18:4			
36	9	57.1	791.56	18:8/18:1 or 17:1/19:8	16:1/20:8 or 17:8/19:1			
36	9	60.9	791.56	16:0/20:9 or 17:7/19:2	18:8/18:1 or 17:1/19:8			
38	5	88.6	827.56	22:5/16:0	22:4/16:1			
38	5	89.6	827.56	20:4/18:1	20:3/18:2			
38	5	90.6	827.56	20:5/18:0	20:4/18:1	18:2/20:3		
38	5	95.9	827.56	20:4/18:1	20:3/18:2	20:2/18:3		
38	5	96.6	827.56	20:4/18:1	20:3/18:2	18:3/20:2		
38	5	97.5	827.56	20:4/18:1	16:0/22:5	20:1/18:4	20:3/18:2	
38	5	98.7	827.56	20:4/18:1	20:3/18:2	18:4/20:1		
38	5	100.1	827.56	20:5/18:0				
38	6	82.5	825.54	20:5/18:1	20:4/18:2	20:3/18:3		
38	6	83.2	825.54	20:4/18:2	18:3/20:3			
38	6	84.2	825.54	20:5/18:1	18:2/20:4	18:3/20:3		
38	6	88.5	825.54	22:5/16:1	20:4/18:2	20:3/18:3		
38	6	89.5	825.54	20:4/18:2	20:3/18:3	16:1/22:5	20:2/18:4	22:4/16:2
38	6	90.7	825.54	20:5/18:1	20:4/18:2			
38	7	74.8	823.53	20:4/18:3	20:5/18:2	18:4/20:3		
38	7	75.7	823.53	20:5/18:2	20:4/18:3	18:4/20:3		
38	7	78.1	823.53	20:3/18:4				
38	7	82.5	823.53	20:5/18:2	20:4/18:3	20:3/18:4		
38	7	83.2	823.53	20:4/18:3				
38	7	84.1	823.53	20:5/18:2	20:4/18:3			
38	8	74.8	821.61	20:5/18:3	20:4/18:4			
38	8	75.8	821.61	20:5/18:3	20:4/18:4			
38	9	68.1	819.59	20:5/18:4				

Table S4:
continues

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)	
40	8	79.4	849.70	22:5/18:3	18:4/22:4
40	8	82.0	849.70	20:4/20:4	20:5/20:3
40	8	86.7	849.54	22:5/18:3	22:4/18:4
40	8	89.0	849.54	20:4/20:4	
40	9	74.6	847.53	20:5/20:4	
40	9	79.5	847.53	22:5/18:4	
40	9	80.1	847.53	20:5/20:4	22:5/18:4
40	9	81.9	847.53	20:4/20:5	
40	10	74.6	845.53	20:5/20:5	

C; total number of carbon atoms in the acyl chains, DBE; total number of double bond equivalents in the acyl chains, RT; retention time (min)

Table S5: Molecular species of digalactosyldiacylglycerol in stipe from *Laminaria hyperborea*

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)			
30	1	68.3	885.64	14:0/16:1	12:0/18:1		
32	1	82.2	913.67	14:0/18:1	16:0/16:1		
32	2	72.1	911.65	16:1/16:1			
32	2	72.6	911.65	14:1/18:1	16:1/16:1		
32	2	73.4	911.65	14:0/18:2			
34	1	95.0	941.70	16:0/18:1	14:0/20:1		
34	2	85.6	939.69	16:1/18:1			
34	2	86.9	939.69	16:0/18:2			
34	3	72.8	937.67	14:0/20:3			
34	3	76.9	937.67	16:1/18:2			
34	3	77.7	937.67	16:2/18:1	16:1/18:2		
34	3	78.7	937.67	16:2/18:1	14:0/20:3	16:1/18:2	
34	3	79.5	937.67	16:0/18:3	14:0/20:3	18:2/16:1	
34	3	80.8	937.67	16:0/18:3			
34	3	81.7	937.67	14:0/20:3	16:0/18:3		
34	4	65.0	935.72	14:0/20:4			
34	4	69.1	935.72	18:3/16:1	16:2/18:2		
34	4	70.4	935.72	16:1/18:3	16:3/18:1		
34	4	71.1	935.72	14:0/20:4	18:3/16:1	16:3/18:1	18:2/16:2
34	4	72.8	935.72	20:4/14:0	18:4/16:0		
34	4	73.2	935.72	14:0/20:4	16:0/18:4	16:3/18:1	
35	1	100.6	955.64	17:0/18:1	16:0/19:1	15:0/20:1	
36	2	97.7	967.72	18:1/18:1	16:1/20:1	16:0/20:2	
36	3	89.9	965.70	18:2/18:1	20:2/16:1		
36	3	91.5	965.70	18:2/18:1	16:0/20:3		
36	3	92.4	965.70	16:0/20:3	18:2/18:1		
36	4	76.4	963.60	20:4/16:0	16:1/20:3	18:4/18:0	
36	4	79.2	963.60	16:0/20:4			
36	4	81.7	963.60	18:2/18:2	20:3/16:1		
36	4	82.8	963.60	18:3/18:1	16:1/20:3	18:2/18:2	
36	4	83.6	963.60	18:3/18:1	18:2/18:2		
36	4	84.7	963.60	18:3/18:1	16:0/20:4	20:3/16:1	18:2/18:2
36	4	86.3	963.60	20:4/16:0			
36	4	86.7	963.60	16:0/20:4			

Table S5:
continues

C	DBE	RT	<i>m/z</i> [M + Na] ⁺	Acyl chains, listed in order of MS signal intensity (<i>sn</i> -1/ <i>sn</i> -2)			
36	5	74.1	961.59	18:3/18:2			
36	5	76.4	961.59	20:4/16:1	18:4/18:1	14:0/22:5	18:3/18:2
36	5	79.1	961.59	20:5/16:0			
36	6	66.3	959.57	18:3/18:3			
36	6	67.6	959.57	18:2/18:4	18:3/18:3	18:5/18:1	
36	6	68.9	959.57	20:5/16:1	18:4/18:2	18:3/18:3	
36	6	70.4	959.57	20:5/16:1	18:5/18:1	18:4/18:2	
36	6	76.3	959.57	20:6/16:0			
36	6	77.0	959.57	20:6/16:0			
36	7	60.4	957.65	20:5/16:2	18:4/18:3	16:0/20:7 or 17:7/19:0	
36	7	61.6	957.65	20:5/16:2	18:3/18:4		
38	5	82.3	989.62	20:5/18:0	18:1/20:4		
38	5	86.5	989.62	20:3/18:2	18:3/20:2		
38	5	87.5	989.62	20:4/18:1			
38	5	89.2	989.62	20:4/18:1	22:5/16:0		
38	6	73.7	987.60	20:5/18:1	18:2/20:4	18:3/20:3	
38	6	75.6	987.60	20:5/18:1	20:4/18:2	20:3/18:3	
38	6	80.0	987.60	22:5/16:1	20:4/18:2		
38	6	81.1	987.60	20:4/18:2	20:5/18:1	18:4/20:2	16:1/22:5
38	6	82.4	987.60	20:5/18:1	20:4/18:2		
38	7	59.5	985.68	20:4/18:3	20:5/18:2	18:4/20:3	
38	7	66.0	985.68	20:5/18:2	18:3/20:4	18:4/20:3	
38	7	67.0	985.68	20:5/18:2	20:4/18:3	20:3/18:4	
38	7	73.7	985.68	20:5/18:2	20:4/18:3	20:3/18:4	22:5/16:2
38	7	74.6	985.68	20:4/18:3	20:5/18:2		
38	7	75.6	985.68	20:5/18:2	20:3/18:4		
38	8	59.2	983.67	20:5/18:3	18:4/20:4		
38	8	66.0	983.67	20:5/18:3	20:4/18:4		
38	8	67.1	983.67	20:5/18:3	20:4/18:4		
38	9	59.2	981.56	20:5/18:4			

C; total number of carbon atoms in the acyl chains, DBE; total number of double bond equivalents in the acyl chains, RT; retention time (min)

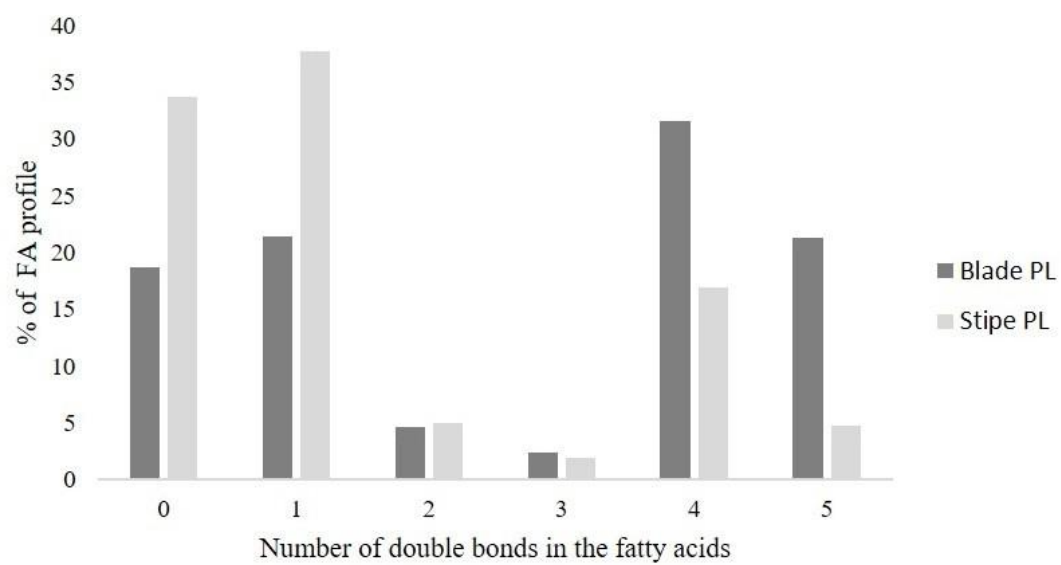


Figure S1: Distribution of double bonds for the fatty acids in the polar lipid (PL) fraction of stipe and blade from *Laminaria hyperborea*.