SUPPLEMENTARY INFORMATION

Cyanobiont-bearing dinoflagellate *Ornithocercus* in temperate coastal waters: cyanobiont genetic diversity and host specificity

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Target	Primer	Oligonucleotide sequence (5'-3')	Remarks	Reference
V3-V4 regions of 16S rDNA	Pro341F	TCGTCGGCAGCGTCAGATGTGTATAAGA GACAG**CCTACGGGNSGCWGCAG**	Forward primer for MiSeq	Modified Takahashi et al. 2014
	Pro805R	GTCTCGTGGGCTCGGAGATGTGTATAAG AGACAG**GACTACNVGGGTATCTAAT**	Reverse primer for MiSeq	
	CYA359F	TCGTCGGCAGCGTCAGATGTGTATAAGA GACAG**GGGGAATYTTCCGCAATGGG**	Forward primer for MiSeq	Nübel et al. 1997
	CAY781R	GTCTCGTGGGCTCGGAGATGTGTATAAG AGACAG**GACTACAGGGGTATCTAATCCCTT**	Reverse primer for MiSeq	
Illumina index	i5	AATGATACGGCGACCACCGAGATCTACAC		
	i7	CAAGCAGAAGACGGCATACGAGAT		
partial 16S rDNA-entire ITS genes	U16F1	AGAGTTTGATCCTGGCTCAG	Forward primer for 1st PCR	Yoon et al. 2009
	ITS-br	CCGTGAGCCCTTTGTAGCTTG	Reverse primer for PCR/ Sequencing reverse primer	Lavin et al. 2008
	CYA106F	CGGACGGGTGAGTAACGCGTGA	Forward primer for 2nd PCR	Nübel et al. 1997
	CYA359F	GGGGAATYTTCCGCAATGGG	Sequencing forward primer	Nübel et al. 1997

Supplementary Table S1. Primers used in this study. Underlined regions indicate Illumina over hang adapter sequences. Bold text indicates PCR primer sequences.

Taxon	16SrDNA	ITS sequence
Synechococcus sp. WH5701	AY172832	AF397729
Synechococcus sp. RS9907	AY172817	JF306818
Synechococcus sp. WH8012	AF539812	AF397709
Synechococcus sp. WH8002	AY172833	AF397707
Synechococcus sp. WH8109	AY172836	AF397710
Synechococcus sp. RS9905	AY172815	JF306816
Synechococcus sp. WH8102	BX569694	AF397712
Synechococcus sp. WH8103	LN847356	AF397713
Synechococcus sp. WH8016	AY172834	AF397718
Synechococcus sp. WH8020	AY172835	AF397719
Synechococcus sp. UW105	JQ421034	DQ351310
Synechococcus sp. KORDI-100	CP006269	KC192550
Synechococcus sp. WH7805	AF001478	AF397721
Synechococcus sp. KORDI-53	FJ497736	FJ497764
Synechococcus sp. RCC1020	JF306719	JF306776
Synechococcus sp. RCC66	JF306679	JF306808
Synechococcus sp. UW179	JQ421033	JQ421041
Synechococcus sp. UW180	JQ421032	JQ421042
Cyanobiont of *Ornithocercus* sp. clone AAtl	AY444956	
Cyanobiont of *Ornithocercus* sp. clone BAtl	AY444957	
Cyanobiont of *Ornithocercus* sp. clone CPac	AY444960	
Cyanobiont of *Ornithocercus* sp. clone DPac	AY444961	
Cyanobiont of *Ornithocercus* sp. clone HAtl	AY444965	
Cyanobiont of *Ornithocercus* sp. clone EPac	AY444962	
Cyanobiont of *Ornithocercus* sp. clone FPac	AY444963	
Cyanobiont of *Ornithocercus* sp. clone GAtl	AY444964	
Cyanobiont of *Ornithocercus* sp. clone IAtl	AY444966	
Cyanobiont of *Ornithocercus magnificus* OmCyn01	BIMP01000001	BIMP01000001
Prochlorococcus sp. MIT9313	AF053399	AF397704
Prochlorococcus sp. MIT9303	AF053397	AF397703
Prochlorococcus marinus SB	AF001473	AF397693
Prochlorococcus marinus MIT9202	AF115269	AF397683
Prochlorococcus marinus AS 9601	CP000551	AF397677
Prochlorococcus marinus NATL2A	AF311219	AF397695
Prochlorococcus marinus NATL1A	CP000553	AF397694
Prochlorococcus marinus SS2	NZ_JNAY01000018	AF397698
Prochlorococcus marinus MIT9211	AF115270	AF397702

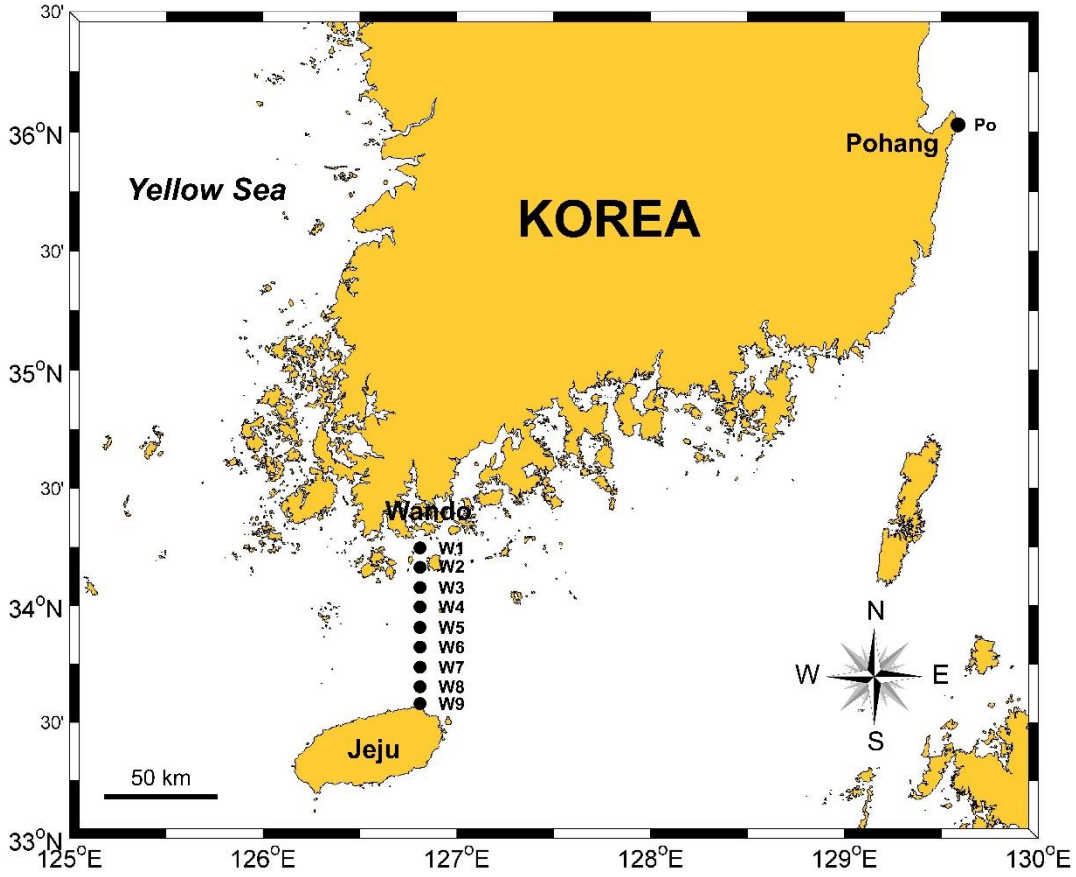
Supplementary Table S2. GenBank accession numbers used in the phylogenetic tree of Fig. 3 and 7.

emperature (℃)		Station									
Date	Depth (m)	W1	W2	W3	W4	W5	W6	W7	W8	W9	Pohang
Mar 2017-2019	0	11.1	11.3	12.9	13.2	13.7	14.2	14.4	14.7	14.4	
	30	11.0	11.2	12.9	13.1	13.5	14.0	14.1	14.3	14.3	
Jun 2017-2019	0	18.8	17.5	18.8	19.5	21.8	21.5	21.8	21.2	19.7	
	30	16.5	14.8	14.4	14.7	15.2	17.0	17.5	18.0	16.9	
Sep 2017-2019	0	22.4	22.2	23.0	23.5	24.4	24.5	25.2	25.2	24.5	
	30	21.9	21.1	20.0	20.1	20.0	20.3	21.1	23.1	23.4	
Nov 2017-2019	0	14.5	14.8	15.2	15.7	16.6	18.4	18.7	19.1	18.9	
	30	14.4	14.6	15.2	15.5	15.9	18.7	18.9	19.3	18.8	
Dec 2017	0										11.7

Salinity		Station									
Date	Depth (m)	W1	W2	W3	W4	W5	W6	W7	W8	W9	Pohang
Mar 2017-2019	0	33.9	33.8	34.3	34.2	34.4	34.0	34.5	34.4	34.4	
	30	33.9	34.0	34.3	34.3	34.4	34.4	34.4	34.5	34.4	
Jun 2017-2019	0	33.6	33.6	33.5	33.0	32.5	32.5	33.0	33.1	33.5	
	30	33.6	33.6	33.7	33.6	33.8	33.7	33.7	33.7	33.9	
Sep 2017-2019	0	32.3	32.2	32.0	31.7	31.3	31.8	32.0	31.9	31.8	
	30	32.4	32.5	32.6	32.4	32.7	32.9	32.6	32.5	32.4	
Nov 2017-2019	0	32.5	33.6	33.4	33.4	33.5	33.8	34.0	34.0	34.1	
	30	33.2	33.2	33.4	33.5	33.7	34.0	34.0	34.0	34.1	
Dec 2017	0										34.3

Supplementary Table S3. Temperatures and salinities at the surface and depth of 30 m in the study areas.

Supplementary Figure S1. Location of sampling stations. The South Sea of Korea transects between Wando and Jeju (Stans W1 to W9) and coastal area of Pohang (Po).



Supplementary Figure S2. Micrographs of the cyanobionts of Type 1b (a) and Type 2 (b) and dividing *Ornithocercus* host cell (c). The cyanobionts used for the single-cell PCR were isolated from the live *Ornithocercus* hosts, respectively. The dividing host cell was observed in the fixed field sample.