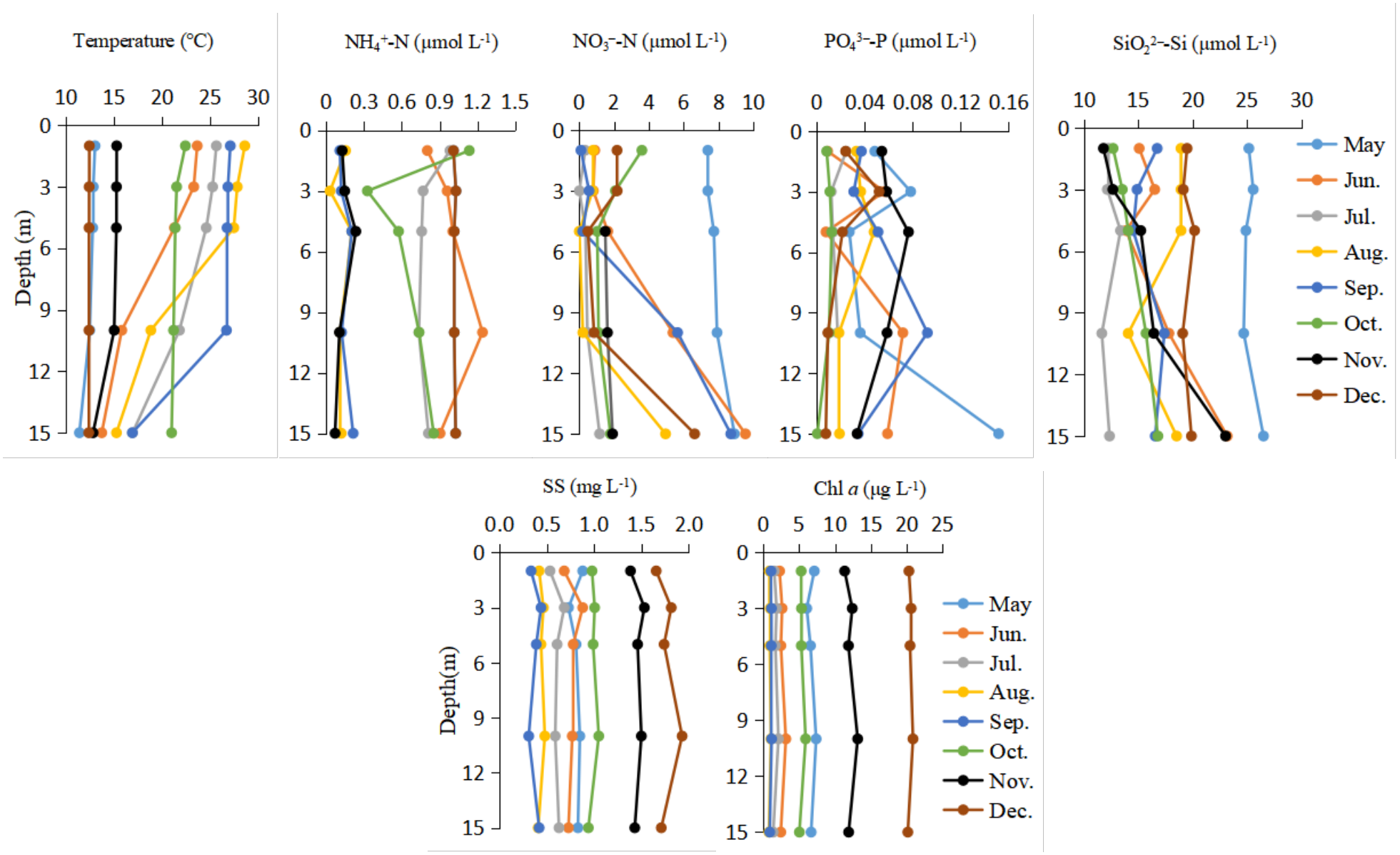

Temperature (°C)
10 15 20 25 30
NH_4^+-N (μmol L^{-1})
0 0.3 0.6 0.9 1.2 1.5
NO_3^--N (μmol L^{-1})
0 2 4 6 8 10
PO_4^{3-}-P (μmol L^{-1})
0 0.04 0.08 0.12 0.16
SiO_2^{2-}-Si (μmol L^{-1})
10 15 20 25 30
Depth (m)
0 3 6 9 12 15
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
SS (mg L^{-1})
0.0 0.5 1.0 1.5 2.0
Chl *a* (μg L^{-1})
0 5 10 15 20 25
Depth(m)

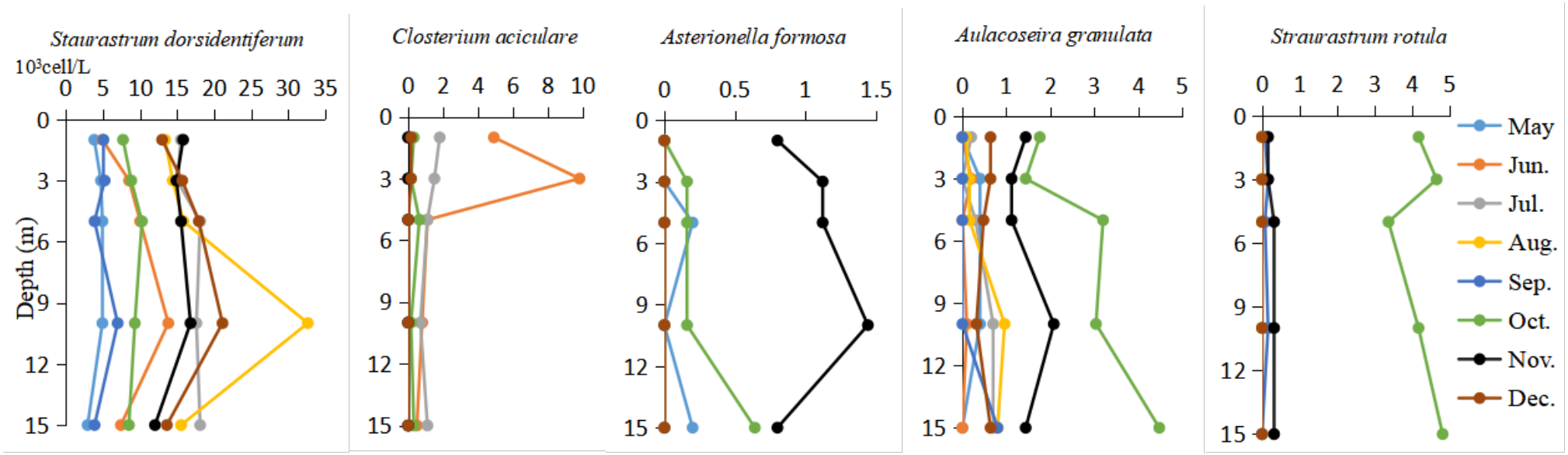
Fig. S1. Vertical profiles in water temperature, concentrations of ammonium nitrogen (NH_4^+-N), nitrate nitrogen (NO_3^--N), phosphate phosphorus (PO_4^{3-}-P) and silicate silicon (SiO_2^{2-}-Si) and concentrations of chlorophyll *a* (Chl. *a*) and suspended solids (SS) at Stn. 3 in north basin of Lake Biwa from 6 May to 12 December 2016. The water samples for measuring nutrients were filtered through a 0.45-µm membrane filter (pore size, 0.45 µm; Millipore HA) and stored at −20°C until measurements were made. Ammonium nitrogen (NH_4^+-N), nitrite nitrogen (NO_2^--N), nitrate nitrogen (NO_3^--N) and silicate silicon (SiO_2^{2-}-Si) concentrations were measured with the spectrophotometric method using an auto-analyzer (BRAN+LUEBBE, AACS-II). Orthophosphate phosphorus (PO_4^{3-}-P) concentrations were measured with ion chromatography (Dionex, DX-AQ system), as proposed by Maruo et al. (2016). We filtered 2 L of the water samples for measuring SS concentrations through a pre-weighed glass fiber filter (Whatman, GF/F) combusted at 420°C for 4 h, dried in an oven (Advantec, FS-620) at 60°C for 24 h and then weighed on an electro-balance (Shimadzu, AW220). A 200-ml water sample for measuring Chl. *a* concentration was filtered with a glass fiber filter (Whatman, GF/F). The pigments were extracted with 90% acetone, and then Chl. *a* concentrations were fluorometrically measured using a spectro-fluorometer (Turner Designs, TD-700) (Holm-Hansen et al. 1965).

References

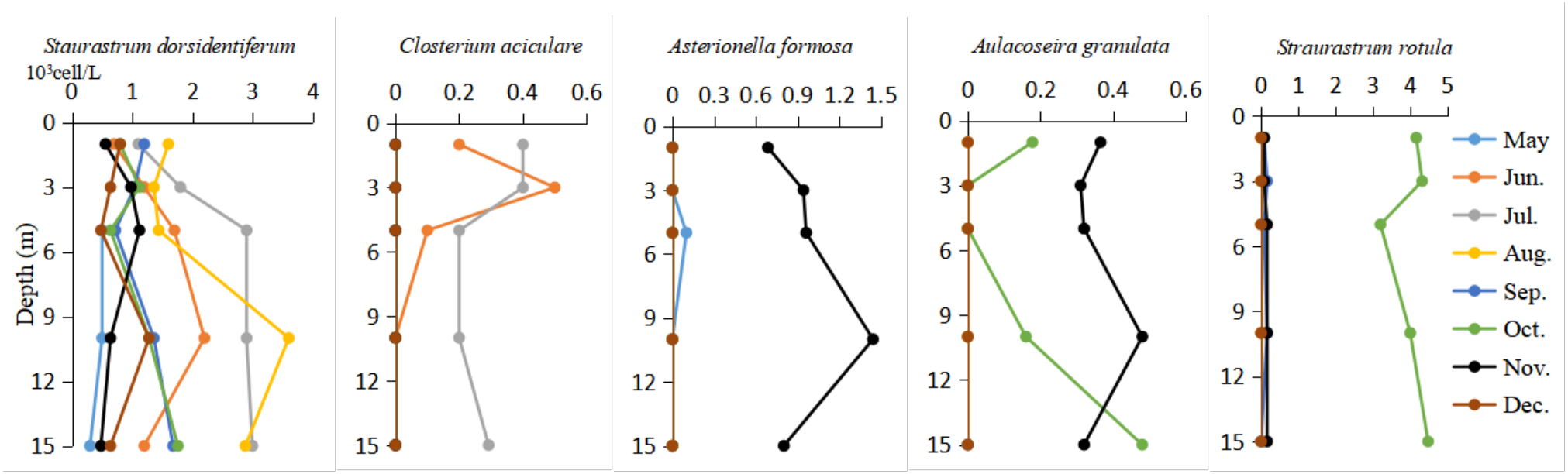
Maruo M, Ishimaru M, Azumi Y, Kawasumi Y, Nagafuchi O, Obata H (2016) Comparison of soluble reactive phosphorus and orthophosphate concentrations in river waters. Limnology 17:7–12 https://doi.org/10.1007/s10201-015-0463-6

Holm-Hansen O, Lorenzen CJ, Holmes RW, Strickland JD (1965) Fluorometric determination of chlorophyll. ICES J Mar Sci 30:3–15

Phytoplankton density



Sporangia



Infection rate

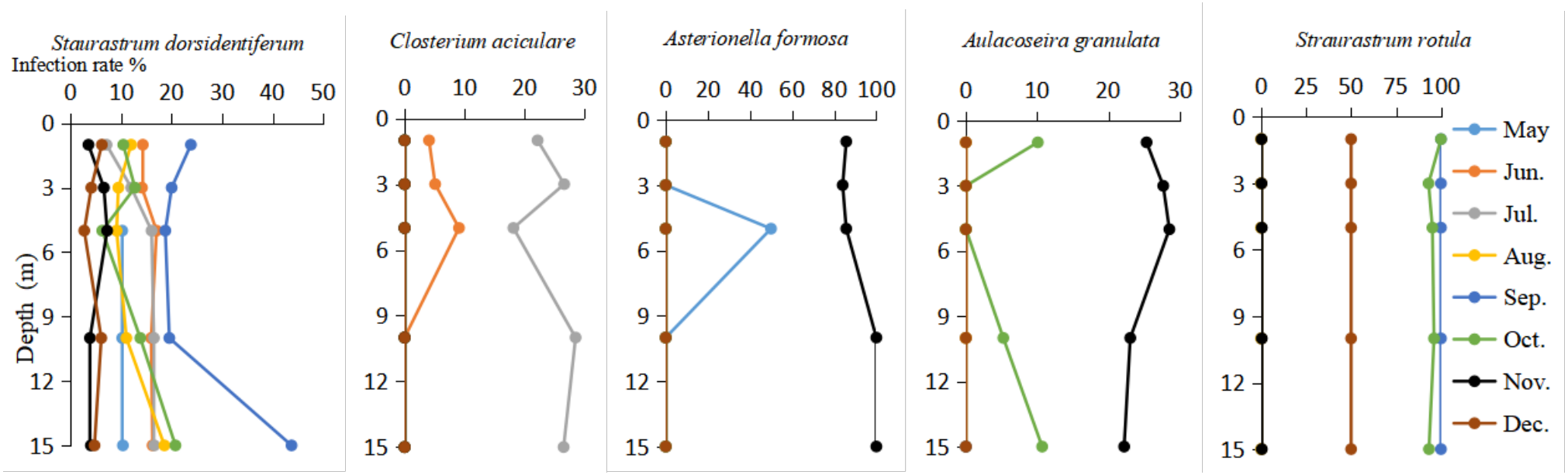
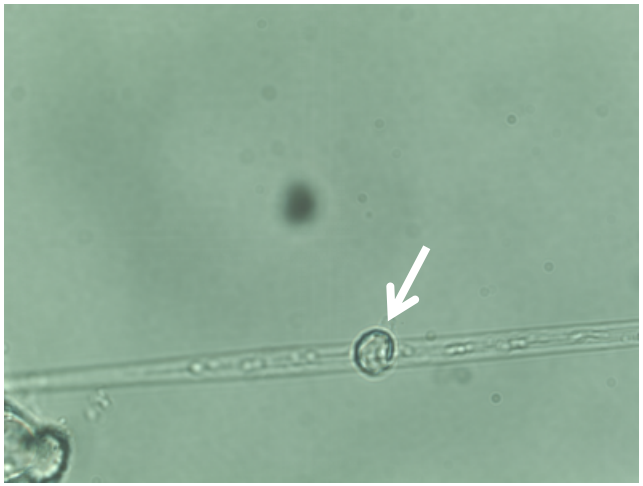
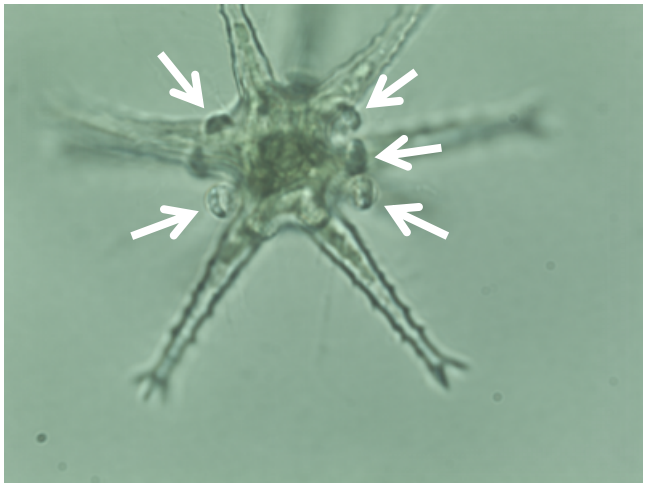


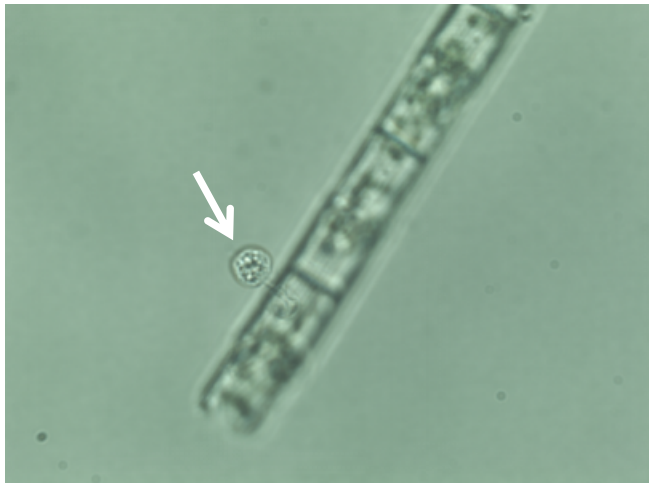
Fig. S2. Vertical profiles in density of phytoplankton species, sporangia attached to the host cells and infection rates of the chytrids at Stn. 3 in north basin of Lake Biwa from 6 May to 12 December 2016.



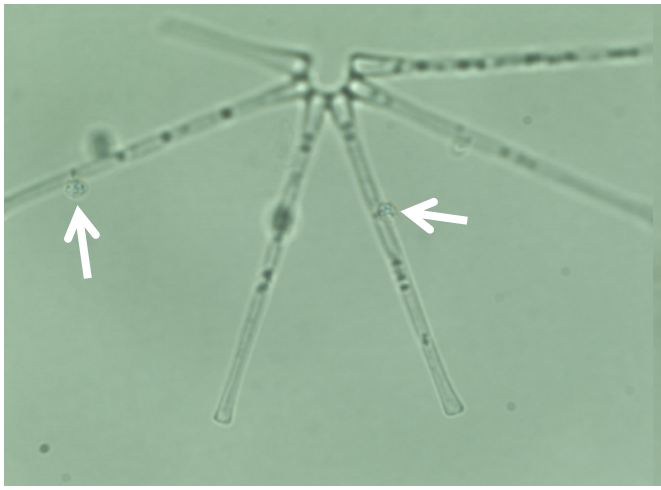
Closterium aciculare



Straurastrum rotula



Aulacoseira granulata



Asterionella formosa

Staurastrum dorsidentiferum

Figure S3. Chytrid sporangium-like cells (pointed by white arrows) attached to each of the five large phytoplankton species at Stn 3 in north basin of Lake Biwa from 6 May to 12 December 2016 under a light microscope (Oliympus, BX-50) at magnification of 400 x. All of the sporandium-like cells were stained with calcofluor white and checked under an epifluorecence microscope (Olympus, BX-51).

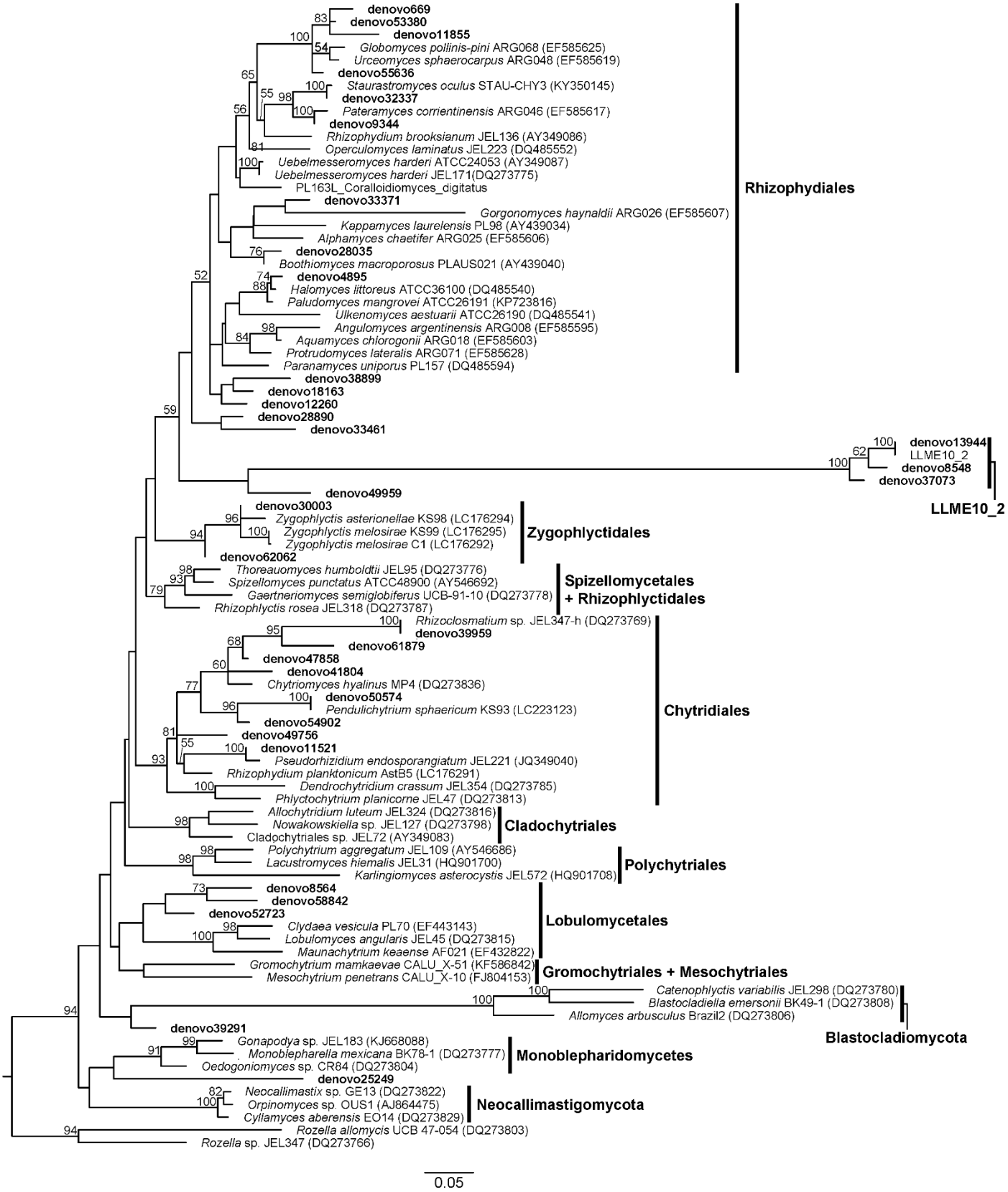


Figure S4. Phylogenetic tree including the blasted Neocallimastigomycota OTUs with LSU sequences of known fungi based on maximum likelihood analysis from 6 May to 12 December 2016 at Stn 3 in the north basin of Lake Biwa, Japan.

Table S1. Mean water temperatures, concentrations of suspended solids, chlorophyll *a* and five nutrients, nitrate nitrogen (NO_3^--N), nitrite nitrogen (NO_2^--N), ammonium nitrogen (NH_4^+-N), phosphate phosphorus (PO_4^--P) and silicate silicon (SiO_2^{2-}-Si), at depths of 1, 3, 5, 10 and 15 m from 6 May to 12 December 2016 at Stn 3 in the north basin of Lake Biwa.

Date	Temperature (℃)	SS (mg L^{-1})	Chl. *a* (μg L^{-1})	Nutrients (μmol L^{-1})				
				NO_3^--N	NO_2^--N	NH_4^+-N	PO_4^--P	SiO_2^{2-}-Si
6 May 2016	11.63	0.81	6.56	7.89	0.29	1.02	0.005	25.35
22 Jun 2016	17.26	0.78	2.42	3.66	0.63	0.98	0.008	19.27
5 Jul 2016	20.91	0.61	1.66	0.47	0.11	0.81	0.02	12.34
4 Aug 2016	20.87	0.44	0.88	1.35	0.23	0.12	0.05	17.86
12 Sep 2016	23.34	0.39	1.08	3.05	0.24	0.15	0.05	16
18 Oct 2016	19.92	0.99	5.28	1.93	0.04	0.73	0.01	14.54
22 Nov 2016	13.76	1.46	11.86	1.68	0.01	0.14	0.03	15.81
12 Dec 2016	11.58	1.74	20.46	2.47	0.06	0.22	0.02	19.53

Table S2. The primer index barcode of the second PCR.

	Index1	Index2
May	CTAGTACG	TCTCTCCG
Jun	TTCTGCCT	CTCTCTAT
Jul	TTCTGCCT	TATCCTCT
Aug	TTCTGCCT	GTAAGGAG
Sep	TTCTGCCT	ACTGCATA
Oct	TTCTGCCT	AAGGAGTA
Nov	TTCTGCCT	CTAAGCCT
Dec	TTCTGCCT	CGTCTAAT

Table S3. List of blasted Neocallimastigomycota OTUs from 6 May to 12 December 2016 at Stn 3 in the north basin of Lake Biwa, Japan.

OTU ID	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**No. of reads**	**Kingdom**	**Phylum**
denovo37073	0	0	223	35	0	0	815	2306	3379	Fungi	Neocallimastigomycota
denovo51221	324	0	0	0	0	11	2127	0	2462	Fungi	Neocallimastigomycota
denovo13944	0	175	88	93	160	0	0	9	525	Fungi	Neocallimastigomycota
denovo8548	0	0	0	23	19	89	43	0	174	Fungi	Neocallimastigomycota
denovo49399	0	0	0	0	0	0	0	2	2	Fungi	Neocallimastigomycota
denovo12283	0	0	0	0	0	0	2	0	2	Fungi	Neocallimastigomycota