

Table S1 Distribution of *xfp* homolog genes in cyanobacteria. Sequence data were obtained from the CyanoClust database.<sup>13)</sup>

Species	Number of <i>xfp</i> homolog gene	
	Group 1	Group 3
<i>Acaryochloris marina</i> MBIC11017	1	0
<i>Anabaena</i> sp. PCC 7120	2	1
<i>Anabaena variabilis</i> ATCC 29413	1	1
<i>Arthrospira (Spirulina) platensis</i> NIES 39	1	1
<i>Arthrospira maxima</i> CS-328	1	1
<i>Crocospaera watsonii</i> WH8501	3	1
<i>Cyanobacterium</i> UCYN_A	0	0
<i>Cyanobacterium</i> Yellowstone A-prime	1	1
<i>Cyanobacterium</i> Yellowstone B-prime	1	1
<i>Cyanothece</i> ATCC51142	2	1
<i>Cyanothece</i> PCC7424	1	1
<i>Cyanothece</i> PCC7425	2	1
<i>Cyanothece</i> PCC8801	1	1
<i>Gloeobacter violaceus</i>	1	1
<i>Microcystis aeruginosa</i> NIES843	1	1
<i>Nostoc punctiforme</i> sp. PCC73102	1	1
<i>Prochlorococcus marinus</i> AS9601	0	0
<i>Prochlorococcus marinus</i> CCMP 1986,1378 (MED4)	0	0
<i>Prochlorococcus marinus</i> CCMP1375 (SS120)	0	0
<i>Prochlorococcus marinus</i> MIT9211	0	0
<i>Prochlorococcus marinus</i> MIT9215	0	0
<i>Prochlorococcus marinus</i> MIT9301	0	0
<i>Prochlorococcus marinus</i> MIT9303	0	0
<i>Prochlorococcus marinus</i> MIT9312	0	0
<i>Prochlorococcus marinus</i> MIT9313	0	0
<i>Prochlorococcus marinus</i> MIT9515	0	0
<i>Prochlorococcus marinus</i> NATL1A	0	0
<i>Prochlorococcus marinus</i> NATL2A	0	0
<i>Synechococcus</i> sp. 9605	0	0
<i>Synechococcus</i> sp. 9902	0	0
<i>Synechococcus</i> sp. CC9311	0	0
<i>Synechococcus</i> sp. PCC 6301	1	0
<i>Synechococcus</i> sp. PCC 7942	1	0
<i>Synechococcus</i> sp. PCC7002	0	0
<i>Synechococcus</i> sp. RCC307	0	0
<i>Synechococcus</i> sp. WH7803	1	0
<i>Synechococcus</i> sp. WH8102	0	0
<i>Synechococcus</i> sp. WH5701	1	0
<i>Synechocystis</i> sp. PCC 6803	1	1
<i>Thermosynechococcus elongatus</i>	1	1
<i>Trichodesmium erythraeum</i> 405 1	0	1

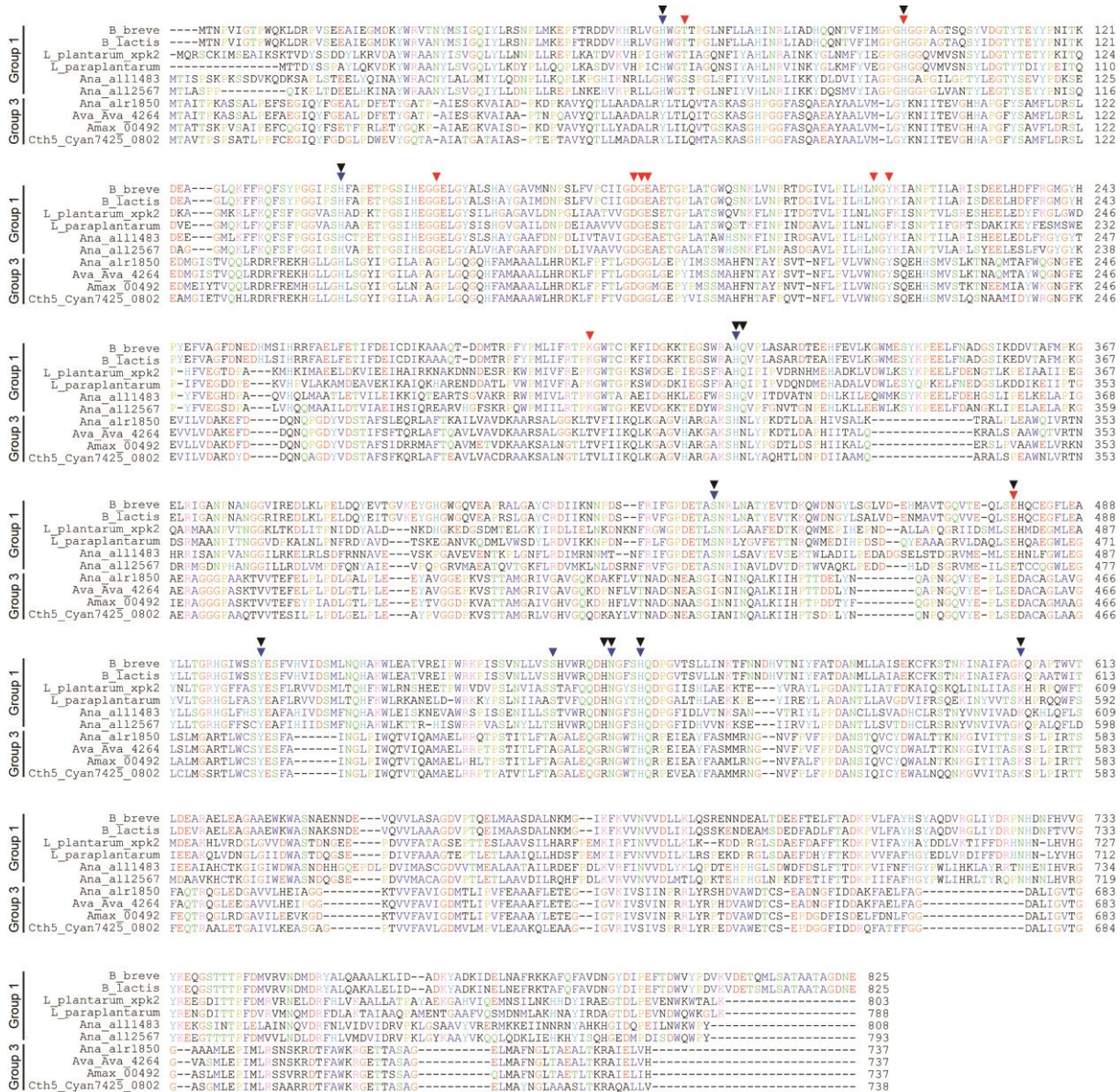


Fig. S1 Amino acid sequence alignment of Xfp homologs. Black arrowheads show key residues for catalysis and substrate binding characterized by Suzuki et al.<sup>8)</sup> Red and blue arrowheads show residues involved in TPP binding and potential F6P binding, respectively, which are characterized by Takahashi et al.<sup>9)</sup> *B\_breve*, *Bifidobacterium breve* 203 (GenBank ID: GU936109); *B\_lactis*, *Bifidobacterium lactis* (GenBank ID: CAC29121); *L\_plantarum*, *Lactobacillus plantarum* (GenBank ID: AGL65571); *L\_paraplantarum*, *Lactobacillus paraplantarum* (GenBank ID: CAD65631); *Ana*, *Anabaena* sp. PCC 7120; *Ava*, *Anabaena variabilis* ATCC 29413; *Amax*, *Arthrospira maxima* CS-328; *Cth5*, *Cyanospora PCC7425*. Sequences of cyanobacterial Xfp homologs were obtained from the Cyanoclust database (version 2010-04, dataset Cyanoclust4).<sup>13)</sup>

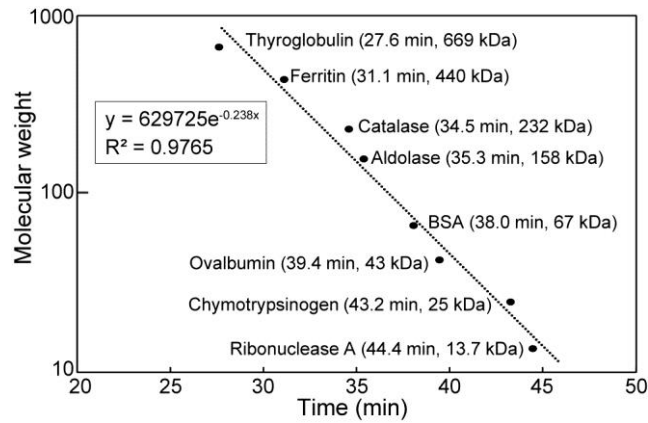


Fig. S2 Elution time of standard proteins in gel filtration chromatography. Standard proteins, thyroglobulin (669 kDa), ferritin (440 kDa), catalase (232 kDa), aldolase (158 kDa), bovine serum albumin (67 kDa), ovalbumin (43 kDa), chymotrypsinogen (25 kDa), and ribonuclease A (13.7 kDa) were applied to Superdex 200HR 10/30 column (GE Healthcare Bio-Science) at a flow rate of  $0.4 \text{ ml min}^{-1}$ .

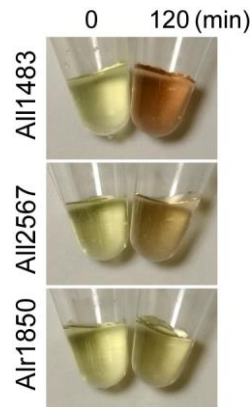


Fig. S3 Detection of xylulose 5-phosphate phosphoketolase activity in purified Xfps. The purified All1483 (0.24  $\mu\text{g}$ ), All2567 (0.22  $\mu\text{g}$ ) or Alr1850 (0.22  $\mu\text{g}$ ) was added in 5  $\mu\text{L}$  reaction buffer containing 25 mM Xu5P and reacted at  $30^\circ\text{C}$  for 0 and 120 min in a 0.2 ml-PCR tube. After reaction, 5  $\mu\text{L}$  of 2 M hydroxylamine hydrochloride (pH 6.5) was added, which was incubated at  $30^\circ\text{C}$  for 10 minutes. Then, 10  $\mu\text{L}$  of color development solution was added to the mixture, whose final volume became to 20  $\mu\text{L}$ . Images of color-developed mixtures were shown.

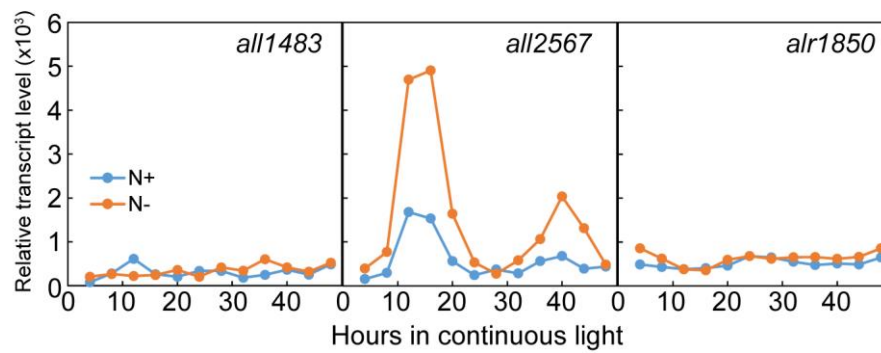


Fig. S4 Circadian expression of *xfp* genes under continuous light conditions.

The expression data with microarray, which were normalized by global normalization, were adopted from the data by Kushige et al.<sup>20)</sup> After two 12h-light 12h-dark cycles, the cells of *Anabaena* sp. PCC 7120 were transferred into the continuous light. N+, BG11 medium containing nitrogen (17.6 mM NaNO<sub>3</sub>); N-, BG11 medium without nitrogen.