Supplemental Information

Supplemental Figures:

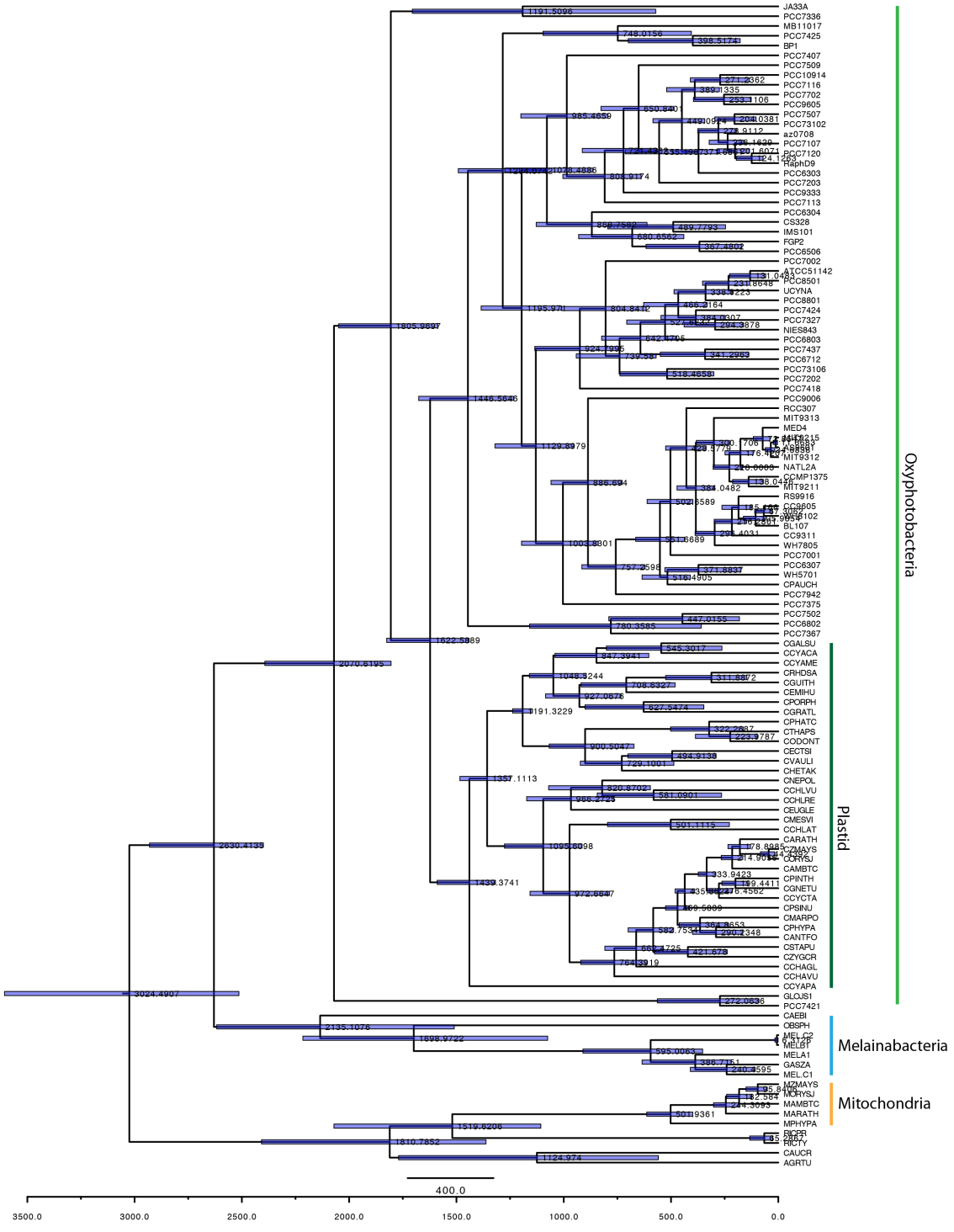

Figure S1. Chronogram of T64 cross-calibrated BEAST run. "Rise of Oxygen" prior was set on the Melainabacteria/Oxyphotobacteria divergence. Bangiomorpha fossil was used as a calibration. All land plant constraints were used.

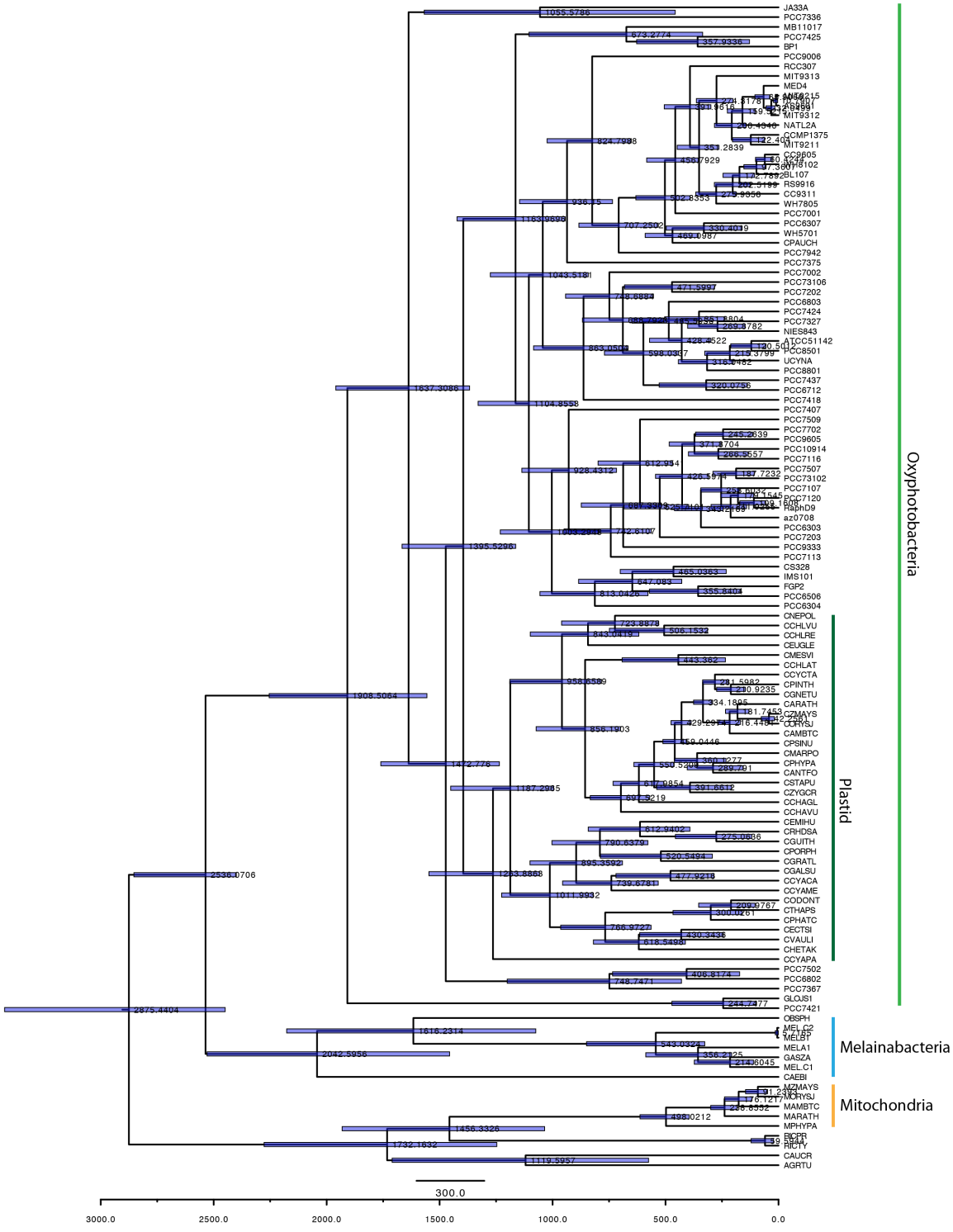

Figure S2. Chronogram of T65 cross-calibrated BEAST run. "Rise of Oxygen" prior was set on the Melainabacteria/Oxyphotobacteria divergence. Bangiomorpha fossil constraint was omitted. All land plant constraints were used.

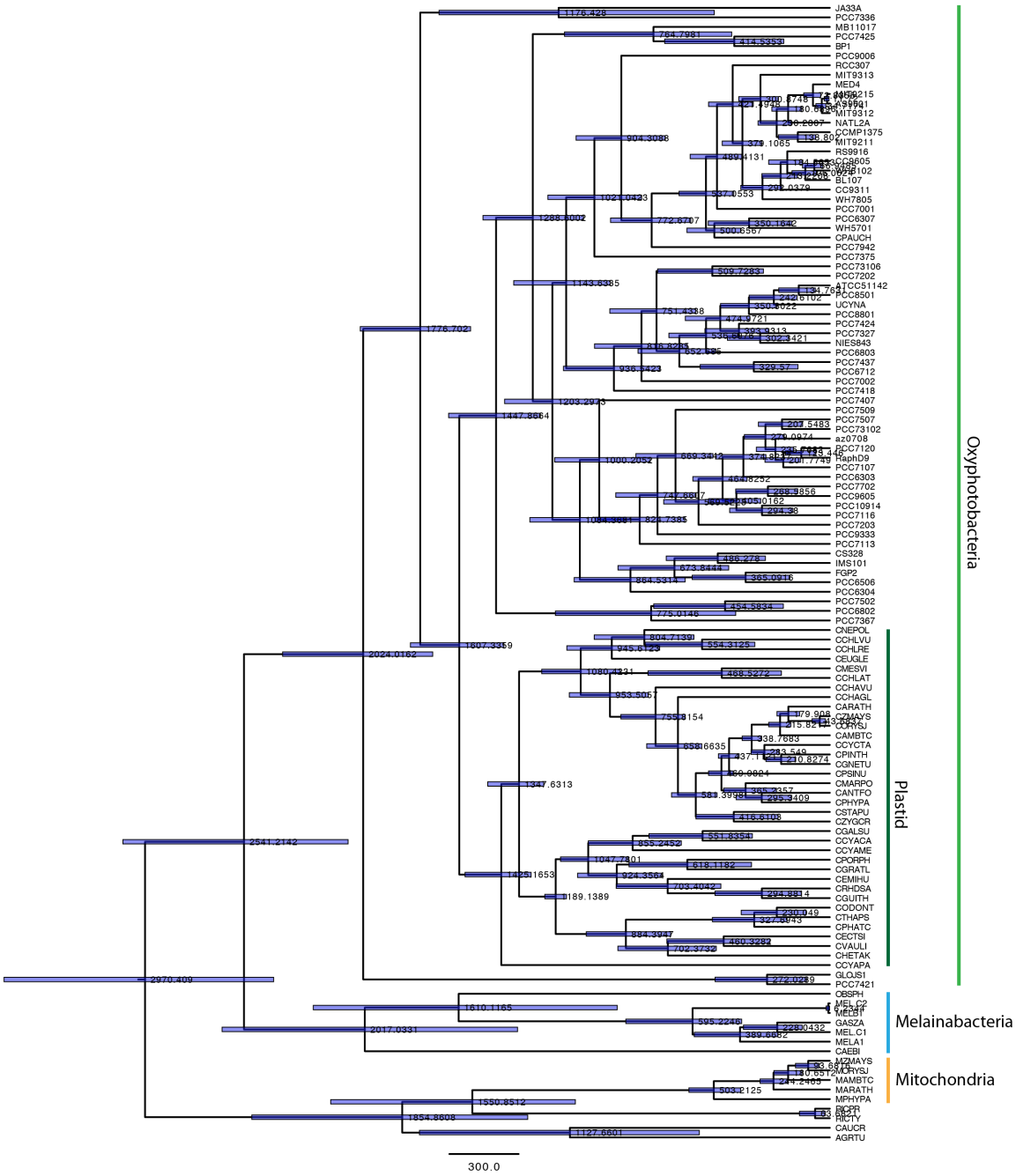

Figure S3. Chronogram of T68 cross-calibrated BEAST run. "Rise of Oxygen" prior was omitted. Bangiomorpha fossil was used as a calibration. All land plant constraints were used.

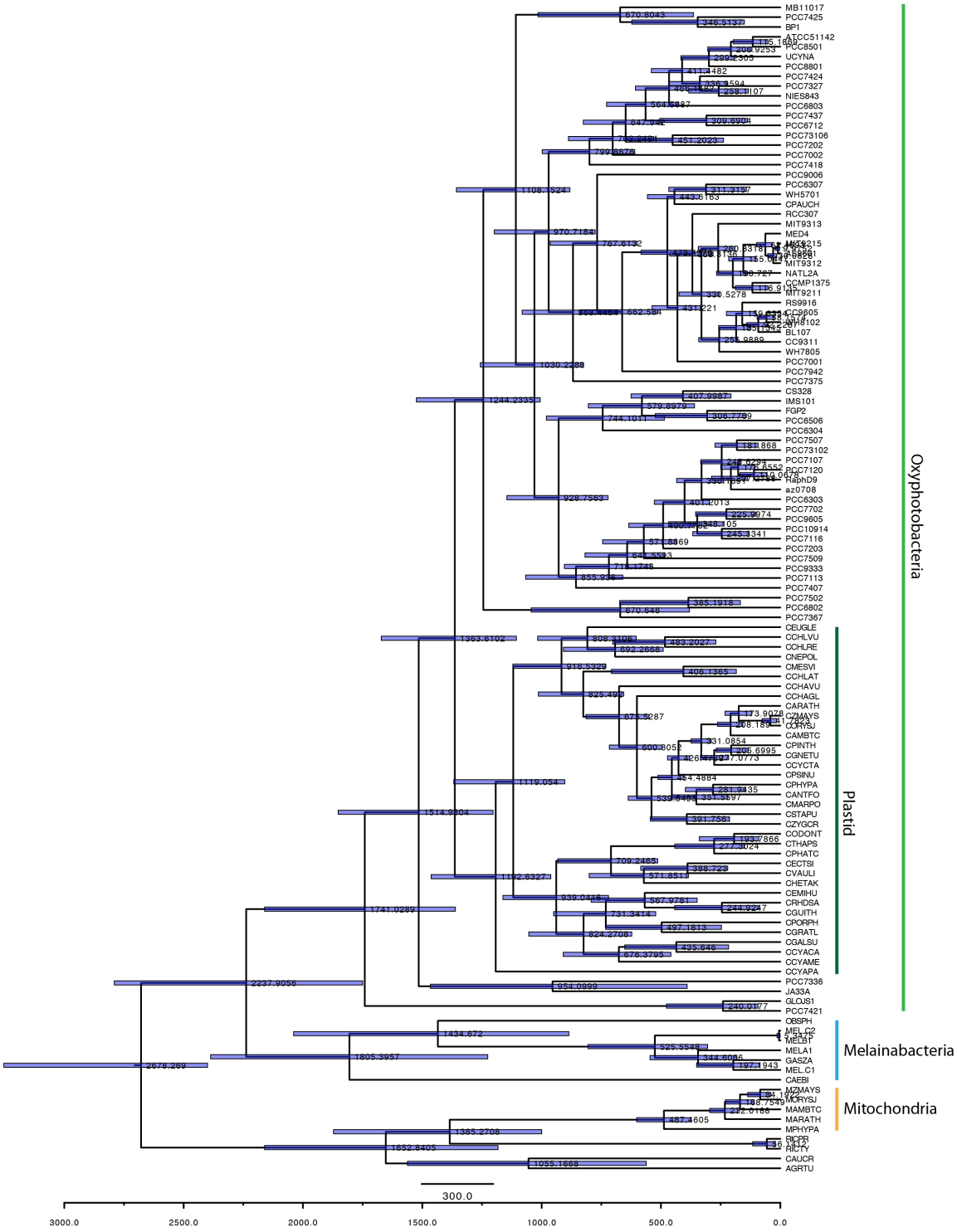

Figure S4. Chronogram of T69 cross-calibrated BEAST run. Both the "Rise of Oxygen" calibration and the Bangiomorpha fossil were omitted as constraints. All land plant constraints were used.

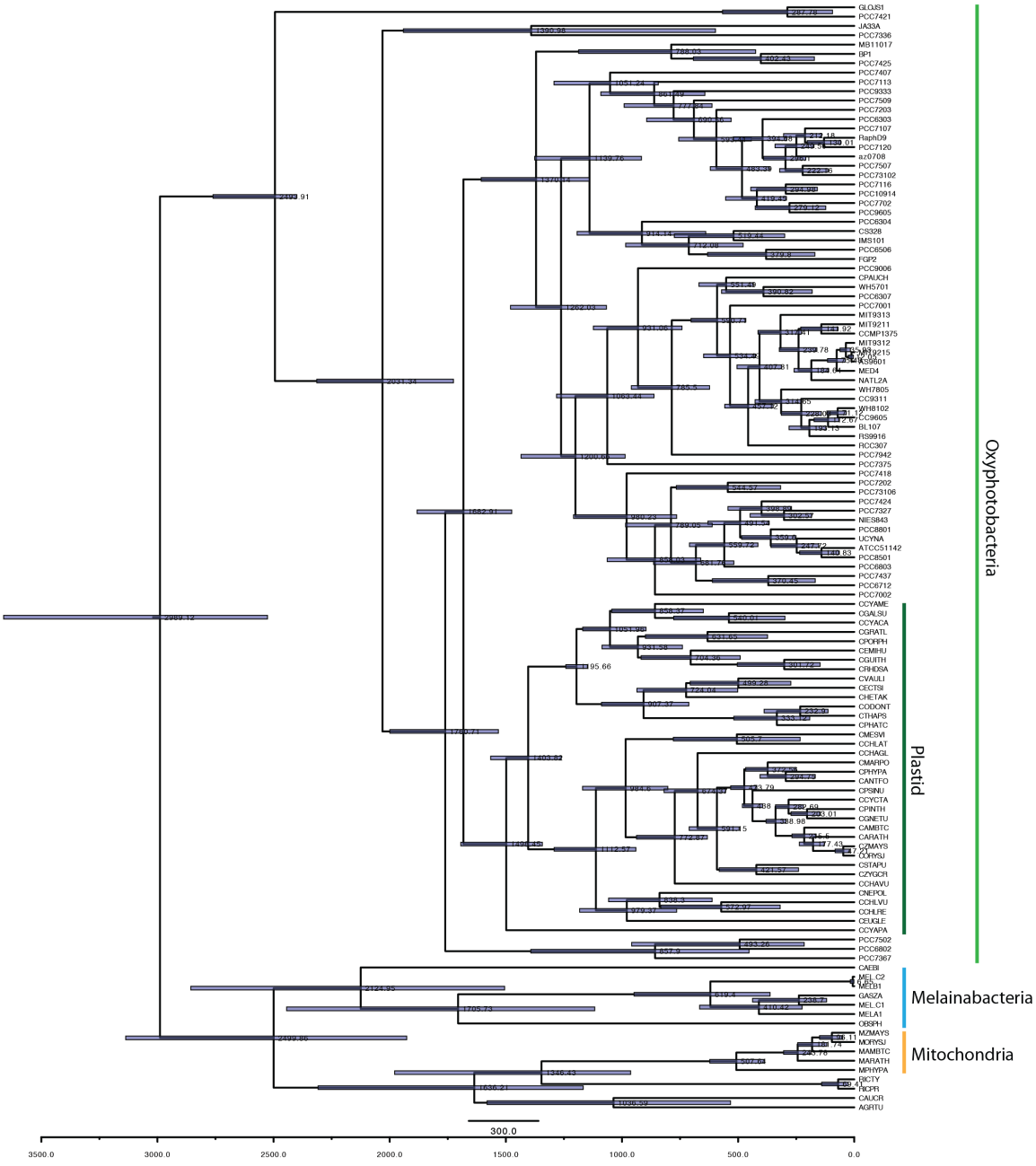

Figure S5. Chronogram of T72 cross-calibrated BEAST run. "Rise of Oxygen" prior was set on the crown Oxyphotobacteria divergence. Bangiomorpha fossil was used as a calibration. All land plant constraints were used.

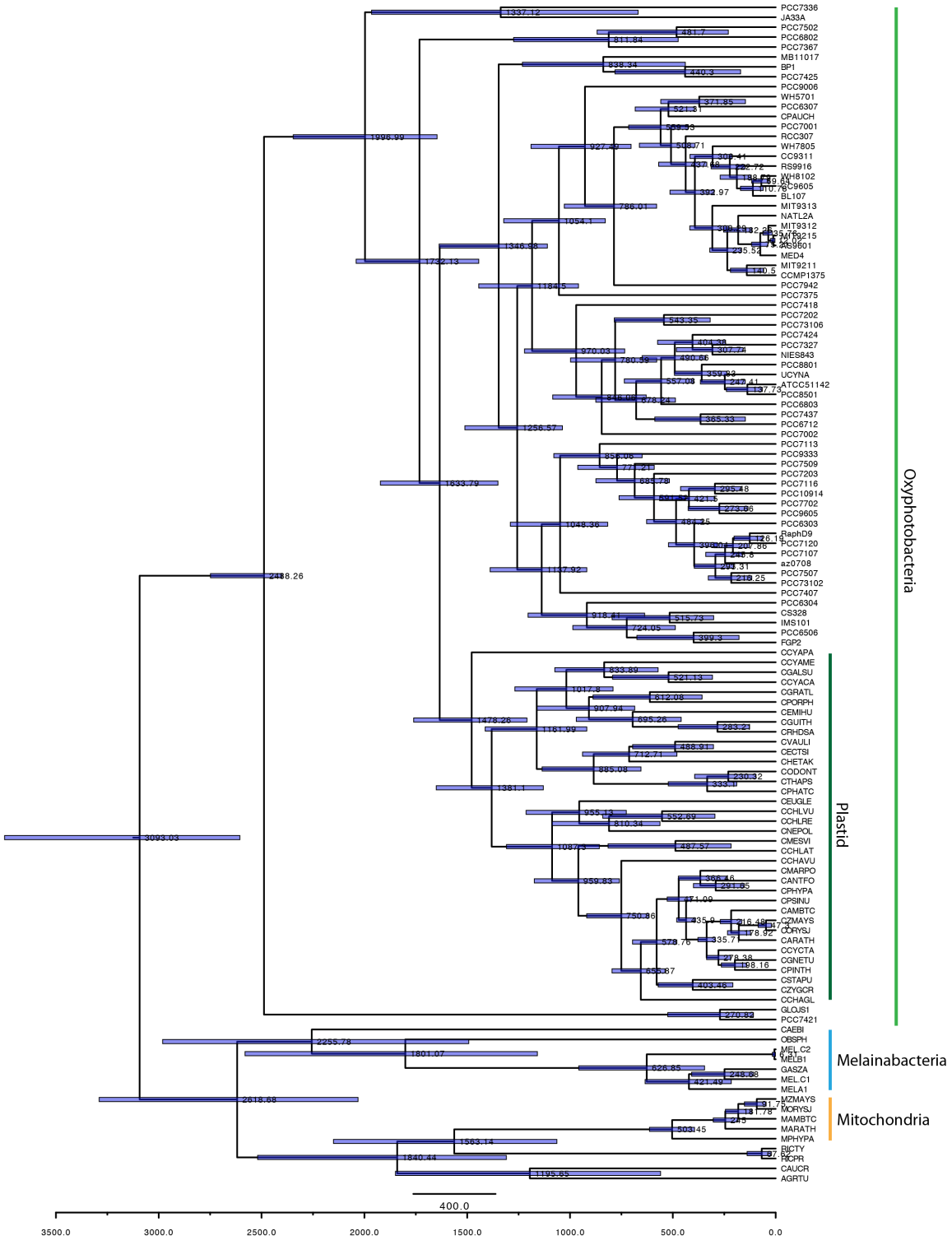

Figure S6. Chronogram of T73 cross-calibrated BEAST run. "Rise of Oxygen" prior was set on the crown Oxyphotobacteria divergence. Bangiomorpha fossil constraint was omitted. All land plant constraints were used.

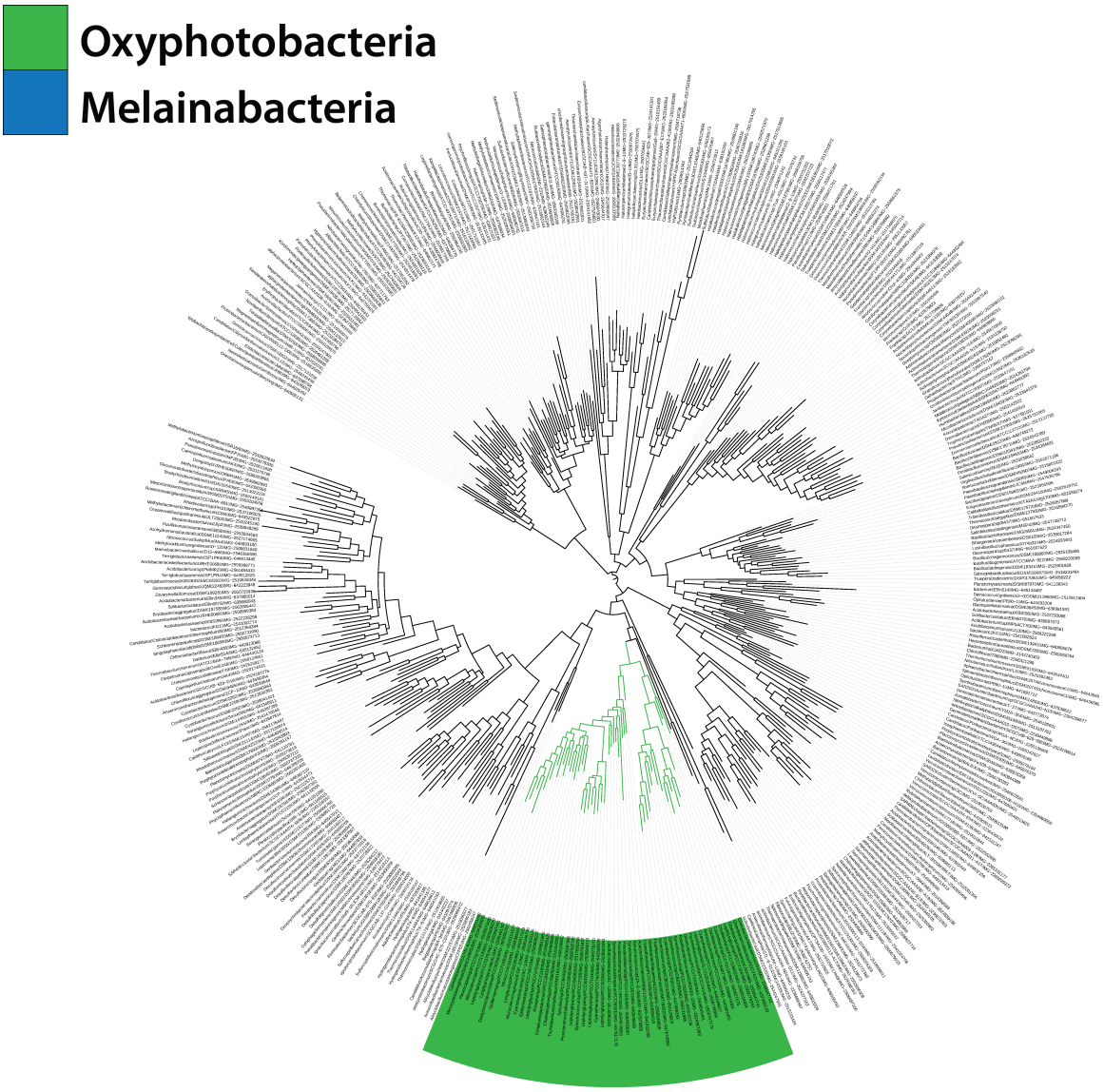

Figure S7. Complete labeled A-family heme-copper oxidoreductase tree. Oxyphotobacteria clade shown in green. All Oxyphotobacteria are capable of aerobic respiration and use a low-affinity A-family heme-copper O_2 reductase for this task. None of the few members of the Melainabacteria with the capacity for aerobic respiration use an A-family protein member to do so.

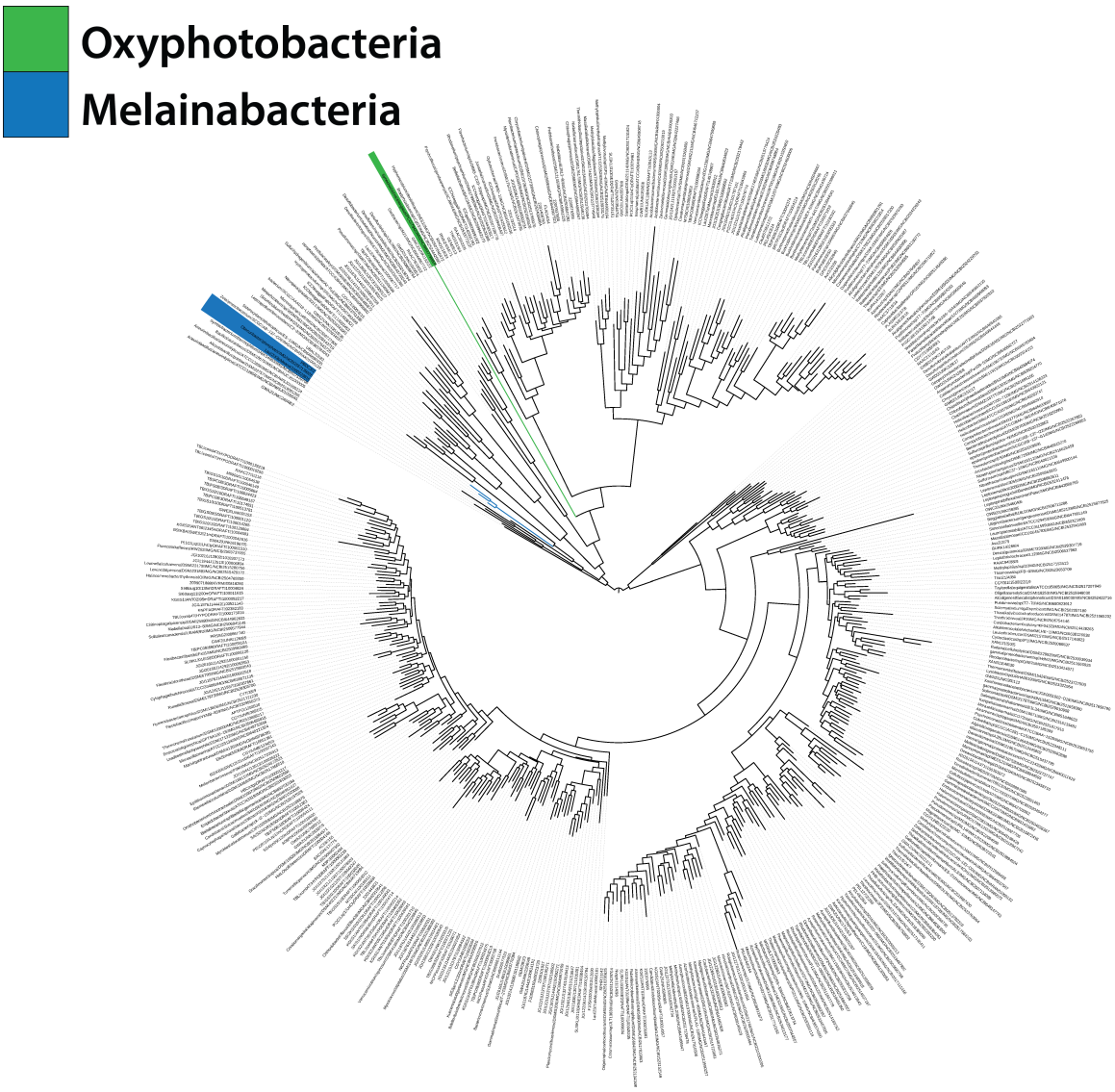

Figure S8. Complete labeled C-family heme-copper oxidoreductase tree. Those few Melainabacteria with genes for aerobic respiration are shown in blue. Only one member of the Oxyphotobacteria (*Synechococcus elongatus* PCC 7942) contains a C-family O_2 reductase in addition to an A-family O_2 reductase and is highlighted in green. Note that these proteins occur in distinct parts of the tree, and do not share an immediate common ancestor.

Supplemental Tables:

Table S1. List of taxa and accessions for sequences included in this study.

Species	Group	Abbreviation	GenBank Accession
AtpA			
Gloeobacter violaceus PCC 7421	Cyanobacteria	CATPA_PCC7421	NP_925851
Gloeobacter kilaueensis JS1	Cyanobacteria	CATPA_GLOJS1	YP_008712184
Synechococcus sp. PCC 7336	Cyanobacteria	CATPA_PCC7336	WP_017324765
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CATPA_JA33A	YP_475516
Pseudanabaena sp. PCC 7367	Cyanobacteria	CATPA_PCC7367	YP_007102994
Pseudanabaena sp. PCC 6802	Cyanobacteria	CATPA_PCC6802	WP_019499097
Synechococcus sp. PCC 7502	Cyanobacteria	CATPA_PCC7502	YP_007106864
Acaryochloris marina MBIC11017	Cyanobacteria	CATPA_MB11017	YP_001515252
Cyanothece sp. PCC 7425	Cyanobacteria	CATPA_PCC7425	YP_002482223
Thermosynechococcus elongatus BP-1	Cyanobacteria	CATPA_BP1	NP_681225
Geitlerinema sp. PCC 7407	Cyanobacteria	CATPA_PCC7407	YP_007109880
Leptolyngbya sp. PCC 7375	Cyanobacteria	CATPA_PCC7375	WP_006516211
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CATPA_PCC9006	WP_016922611
Synechococcus elongatus PCC 7942	Cyanobacteria	CATPA_PCC7942	YP_399355
Cyanobium sp. PCC 7001	Cyanobacteria	CATPA_PCC7001	WP_006909873
Cyanobium gracile PCC 6307	Cyanobacteria	CATPA_PCC6307	2508553472*
Synechococcus sp. WH 5701	Cyanobacteria	CATPA_WH5701	WP_006171977
Synechococcus sp. RS 9916	Cyanobacteria	CATPA_RS9916	WP_007098844
Synechococcus sp. CC 9311	Cyanobacteria	CATPA_CC9311	YP_731510
Synechococcus sp. WH 7805	Cyanobacteria	CATPA_WH7805	WP_006043305
Synechococcus sp. BL 107	Cyanobacteria	CATPA_BL107	WP_009790495
Synechococcus sp. CC 9605	Cyanobacteria	CATPA_CC9605	YP_382482
Synechococcus sp. WH 8102	Cyanobacteria	CATPA_WH8102	NP_896589
Prochlorococcus marinus MIT 9313	Cyanobacteria	CATPA_MIT9313	NP_895294
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CATPA_CCMP1375	NP_875995
Prochlorococcus marinus MIT 9211	Cyanobacteria	CATPA_MIT9211	YP_001551455
Prochlorococcus marinus MIT 9312	Cyanobacteria	CATPA_MIT9312	637798081*
Prochlorococcus marinus MIT 9215	Cyanobacteria	CATPA_MIT9215	YP_001484918
Prochlorococcus marinus AS 9601	Cyanobacteria	CATPA_AS9601	YP_001010043
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CATPA_MED4	637450477*
Prochlorococcus marinus NATL 2A	Cyanobacteria	CATPA_NATL2A	637687850*
Synechococcus sp. RCC307	Cyanobacteria	CATPA_RCC307	YP_001228134
Crinalium epipsammum PCC 9333	Cyanobacteria	CATPA_PCC9333	YP_007142336
Microcoleus sp. PCC 7113	Cyanobacteria	CATPA_PCC7113	YP_007122386
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CATPA_PCC6712	2505787331*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CATPA_PCC7437	YP_007133702
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CATPA_PCC7202	YP_007163711
Synechococcus sp. PCC 7002	Cyanobacteria	CATPA_PCC7002	YP_001733995
Gloeocapsa sp. PCC 73106	Cyanobacteria	CATPA_PCC73106	WP_006528422
Cyanothece sp. PCC 7424	Cyanobacteria	CATPA_PCC7424	YP_002377901
Microcystis aeruginosa NIES-843	Cyanobacteria	CATPA_NIES843	YP_001660030
Pleurocapsa sp. PCC 7327	Cyanobacteria	CATPA_PCC7327	YP_007080650
Synechocystis sp. PCC 6803	Cyanobacteria	CATPA_PCC6803	NP_440055

Cyanothece sp. PCC 8801	Cyanobacteria	CATPA_PCC8801	YP_002372877
Crocosphaera watsonii WH 8501	Cyanobacteria	CATPA_PCC8501	EAM53206
Cyanothece sp. ATCC 51142	Cyanobacteria	CATPA_ATCC51142	YP_001805902
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CATPA_UCYNA	646529930*
Halothece sp. PCC 7418	Cyanobacteria	CATPA_PCC7418	YP_007166869
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CATPA_PCC7203	YP_007093564
Synechocystis sp. PCC 7509	Cyanobacteria	CATPA_PCC7509	2517696302*
Rivularia sp. PCC 7116	Cyanobacteria	CATPA_PCC7116	YP_007056670
Nostoc punctiforme PCC 73102	Cyanobacteria	CATPA_PCC73102	YP_001868153
Calothrix sp. PCC 7507	Cyanobacteria	CATPA_PCC7507	YP_007063842
Nostoc azollae 0708	Cyanobacteria	CATPA_az0708	YP_003722129
Raphidiopsis brookii D9	Cyanobacteria	CATPA_RaphD9	WP_009344358
Nostoc sp. PCC 7107	Cyanobacteria	CATPA_PCC7107	YP_007049678
Nostoc sp. PCC 7120	Cyanobacteria	CATPA_PCC7120	NP_484049
Calothrix sp. PCC 6303	Cyanobacteria	CATPA_PCC6303	YP_007136596
Mastigocladopsis repens PCC 10914	Cyanobacteria	CATPA_PCC10914	2517241864*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CATPA_PCC7702	2512634515*
Fischerella sp. PCC 9605	Cyanobacteria	CATPA_PCC9605	2516149962*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CATPA_PCC6304	YP_007084830
Oscillatoria sp. PCC 6506	Cyanobacteria	CATPA_PCC6506	648859120*
Microcoleus vaginatus FGP-2	Cyanobacteria	CATPA_FGP2	EGK90133
Arthrospira maxima CS-328	Cyanobacteria	CATPA_CS328	EDZ94049
Trichodesmium erythraeum IMS 101	Cyanobacteria	CATPA_IMS101	P_721901
MEL.A1	Melainabacteria	CATPA_MELA1	MEL_A1_1_175
MEL.B1	Melainabacteria	CATPA_MELB1	MEL_B1_1_170
MEL.B2	Melainabacteria	CATPA_MELB2	MEL_B2_2_47
MEL.C1	Melainabacteria	CATPA_MELC1	MEL_C1_1_1007
MEL.C2	Melainabacteria	CATPA_MELC2	MEL_C2_1_1004
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MATPA_RICPR	NP_221153
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	ATPA_RICTY	Q68VU6^
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	ATPA_CAUCR	Q9A2V7^
Agrobacterium tumefaciens strain C58	α-proteobacteria	ATPA_AGRTU	Q8UC74^
Arabidopsis thaliana	Plastid	CATPA_ARATH	P56757^
Oryza sativa subsp. Japonica	Plastid	CATPA_ORYSJ	P0C2Z6^
Zea mays	Plastid	CATPA_ZMAYS	P05022^
Amborella trichopoda	Plastid	CATPA_AMBTC	Q70XV0^
Pinus thunbergii	Plastid	CATPA_PINTH	P41602^
Cycas taitungensis	Plastid	CATPA_CYCTA	A6H5F1^
Gnetum parvifolium	Plastid	CATPA_GNETU	A6BM08^
Psilotum nudum	Plastid	CATPA_PSINU	Q8WI30^
Anthoceros formosae	Plastid	CATPA_ANTFO	Q85AU2^
Marchantia polymorpha	Plastid	CATPA_MARPO	P06283^
Physcomitrella patens subsp. patens	Plastid	CATPA_PHYPA	Q6YXK3^
Zygnema circumcarinatum	Plastid	CATPA_ZYGCR	Q32RL1^
Staurastrum punctulatum	Plastid	CATPA_STAPU	Q32RS8^
Chaetosphaeridium globosum	Plastid	CATPA_CHAGL	Q8MA05^
Chara vulgaris	Plastid	CATPA_CHAVU	Q1ACM8^
Chlamydomonas reinhardtii	Plastid	CATPA_CHLRE	P26526^
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Nephroselmis olivacea	Plastid	CATPA_NEPOL	Q9TL16^
Euglena gracilis	Plastid	CATPA_EUGLE	P30392^

Mesostigma viride	Plastid	CATPA_MESVI	Q9MUT2^
Chlorokybus atmophyticus	Plastid	CATPA_CHLAT	Q19VA5^
Cyanophora paradoxa	Plastid	CATPA_CYAPA	P48080^
Cyanidioschyzon merolae	Plastid	CATPA_CYAME	Q85FQ8^
Cyanidium caldarium	Plastid	CATPA_CYACA	Q9TM26^
Gracilaria tenuistipitata	Plastid	CATPA_GRATL	Q6B8Q8^
Porphyridium purpureum	Plastid	CATPA_PORPH	YP_008965817
Galdieria sulphuraria	Plastid	CATPA_GALSU	P35009^
Thalassiosira pseudonana	Plastid	CATPA_THAPS	A0T0P4^
Ectocarpus siliculosus	Plastid	CATPA_ECTSI	D1J797^
Phaeodactylum tricornutum	Plastid	CATPA_PHATC	A0T0F1^
Guillardia theta	Plastid	CATPA_GUITH	O78475^
Rhodomonas salina	Plastid	CATPA_RHDSA	A6MVW4^
Vaucheria litorea	Plastid	CATPA_VAULI	B7T1R6^
Heterosigma akashiwo NIES-293	Plastid	CATPA_HETAK	B2XT90^
Odontella sinensis	Plastid	CATPA_ODONT	Q00820^
Emiliania huxleyi	Plastid	CATPA_EMIHU	Q4G397^
Paulinella chromatophora	Plastid	CATPA_PAUCH	B1X3Y6^
Arabidopsis thaliana	Mitochondria	MATPA_ARATH	P92549^
Zea mays	Mitochondria	MATPA_ZMAYS	YP_588408
Oryza sativa	Mitochondria	MATPA_ORYSJ	P0C522^
Amborella trichopoda	Mitochondria	MATPA_AMBTC	Q9T718^
Physcomitrella patens subsp. patens	Mitochondria	MATPA_PHYPA	Q1XGA4^

AtpB

Gloeobacter violaceus PCC 7421	Cyanobacteria	CATPB_PCC7421	NP_925516
Gloeobacter kilaueensis JS1	Cyanobacteria	CATPB_GLOJS1	YP_008712400
Synechococcus sp. PCC 7336	Cyanobacteria	CATPB_PCC7336	WP_017327506
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CATPB_JA33A	YP_473902
Pseudanabaena sp. PCC 7367	Cyanobacteria	CATPB_PCC7367	YP_007101611
Pseudanabaena sp. PCC 6802	Cyanobacteria	CATPB_PCC6802	WP_019502941
Synechococcus sp. PCC 7502	Cyanobacteria	CATPB_PCC7502	YP_007105321
Acaryochloris marina MBIC11017	Cyanobacteria	CATPB_MB11017	YP_001519605
Cyanothece sp. PCC 7425	Cyanobacteria	CATPB_PCC7425	YP_002485676
Thermosynechococcus elongatus BP-1	Cyanobacteria	CATPB_BP1	NP_681315
Geitlerinema sp. PCC 7407	Cyanobacteria	CATPB_PCC7407	YP_007109824
Leptolyngbya sp. PCC 7375	Cyanobacteria	CATPB_PCC7375	WP_006516277
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CATPB_PCC9006	WP_017713442
Synechococcus elongatus PCC 7942	Cyanobacteria	CATPB_PCC7942	YP_401332
Cyanobium sp. PCC 7001	Cyanobacteria	CATPB_PCC7001	WP_006911300
Cyanobium gracile PCC 6307	Cyanobacteria	CATPB_PCC6307	YP_007047576
Synechococcus sp. WH 5701	Cyanobacteria	CATPB_WH5701	WP_006171953
Synechococcus sp. RS 9916	Cyanobacteria	CATPB_RS9916	WP_007098820
Synechococcus sp. CC 9311	Cyanobacteria	CATPB_CC9311	638115872*
Synechococcus sp. WH 7805	Cyanobacteria	CATPB_WH7805	639019643*
Synechococcus sp. BL 107	Cyanobacteria	CATPB_BL107	WP_009790477
Synechococcus sp. CC 9605	Cyanobacteria	CATPB_CC9605	YP_382465
Synechococcus sp. WH 8102	Cyanobacteria	CATPB_WH8102	637444616*
Prochlorococcus marinus MIT 9313	Cyanobacteria	CATPB_MIT9313	637448149*
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CATPB_CCMP1375	NP_875982
Prochlorococcus marinus MIT 9211	Cyanobacteria	CATPB_MIT9211	YP_001551442

Prochlorococcus marinus MIT 9312	Cyanobacteria	CATPB_MIT9312	YP_398027
Prochlorococcus marinus MIT 9215	Cyanobacteria	CATPB_MIT9215	YP_001484905
Prochlorococcus marinus AS 9601	Cyanobacteria	CATPB_AS9601	YP_001010030
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CATPB_MED4	NP_893555
Prochlorococcus marinus NATL 2A	Cyanobacteria	CATPB_NATL2A	YP_292163
Synechococcus sp. RCC307	Cyanobacteria	CATPB_RCC307	YP_001228117
Crinalium epipsammum PCC 9333	Cyanobacteria	CATPB_PCC9333	YP_007142525
Microcoleus sp. PCC 7113	Cyanobacteria	CATPB_PCC7113	YP_007121937
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CATPB_PCC6712	2505787202*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CATPB_PCC7437	YP_007133418
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CATPB_PCC7202	YP_007164296
Synechococcus sp. PCC 7002	Cyanobacteria	CATPB_PCC7002	YP_001734010
Gloeocapsa sp. PCC 73106	Cyanobacteria	CATPB_PCC73106	WP_006528503
Cyanothece sp. PCC 7424	Cyanobacteria	CATPB_PCC7424	YP_002380309
Microcystis aeruginosa NIES-843	Cyanobacteria	CATPB_NIES843	YP_001655106
Pleurocapsa sp. PCC 7327	Cyanobacteria	CATPB_PCC7327	YP_007079346
Synechocystis sp. PCC 6803	Cyanobacteria	CATPB_PCC6803	NP_441407
Cyanothece sp. PCC 8801	Cyanobacteria	CATPB_PCC8801	YP_002373775
Crocosphaera watsonii WH 8501	Cyanobacteria	CATPB_PCC8501	EAM49306
Cyanothece sp. ATCC 51142	Cyanobacteria	CATPB_ATCC51142	YP_001804227
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CATPB_UCYNA	646530058*
Halothece sp. PCC 7418	Cyanobacteria	CATPB_PCC7418	YP_007168346
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CATPB_PCC7203	YP_007091162
Synechocystis sp. PCC 7509	Cyanobacteria	CATPB_PCC7509	2517697914*
Rivularia sp. PCC 7116	Cyanobacteria	CATPB_PCC7116	YP_007055521
Nostoc punctiforme PCC 73102	Cyanobacteria	CATPB_PCC73102	YP_001867730
Calothrix sp. PCC 7507	Cyanobacteria	CATPB_PCC7507	YP_007065902
Nostoc azollae 0708	Cyanobacteria	CATPB_az0708	YP_003721151
Raphidiopsis brookii D9	Cyanobacteria	CATPB_RaphD9	WP_009342625
Nostoc sp. PCC 7107	Cyanobacteria	CATPB_PCC7107	YP_007052145
Nostoc sp. PCC 7120	Cyanobacteria	CATPB_PCC7120	NP_489079
Calothrix sp. PCC 6303	Cyanobacteria	CATPB_PCC6303	YP_007136080
Mastigocladopsis repens PCC 10914	Cyanobacteria	CATPB_PCC10914	2517244238*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CATPB_PCC7702	2512633203*
Fischerella sp. PCC 9605	Cyanobacteria	CATPB_PCC9605	2516145129*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CATPB_PCC6304	YP_007087256
Oscillatoria sp. PCC 6506	Cyanobacteria	CATPB_PCC6506	648857962*
Microcoleus vaginatus FGP-2	Cyanobacteria	CATPB_FGP2	EGK83619
Arthrospira maxima CS-328	Cyanobacteria	CATPB_CS328	EDZ94031
Trichodesmium erythraeum IMS 101	Cyanobacteria	CATPB_IMS101	YP_722959
MEL.A1	Melainabacteria	CATPB_MELA1	MEL_A1_1_803
MEL.B1	Melainabacteria	CATPB_MELB1	MEL_B1_4_115
MEL.B2	Melainabacteria	CATPB_MELB2	MEL_B2_1_230
MEL.C1	Melainabacteria	CATPB_MELC1	MEL_C1_1_327
MEL.C2	Melainabacteria	CATPB_MELC2	MEL_C2_1_409
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MATPB_RICPR	NP_221151
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	ATPB_RICTY	Q68VU8^
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	ATPB_CAUCR	Q9A2V9^
Agrobacterium tumefaciens strain C58	α-proteobacteria	ATPB_AGRTU	Q8UC76^
Arabidopsis thaliana	Plastid	CATPB_ARATH	P19366^
Oryza sativa subsp. japonica	Plastid	CATPB_ORYSJ	P12085^

Zea mays	Plastid	CATPB_ZMAYS	P00827^
Amborella trichopoda	Plastid	CATPB_AMBTC	Q70XZ6^
Pinus thunbergii	Plastid	CATPB_PINTH	P41622^
Cycas taitungensis	Plastid	CATPB_CYCTA	A6H5I4^
Gnetum parvifolium	Plastid	CATPB_GNETU	A6BM09^
Psilotum nudum	Plastid	CATPB_PSINU	O03081^
Anthoceros formosae	Plastid	CATPB_ANTFO	Q31794^
Marchantia polymorpha	Plastid	CATPB_MARPO	P06284^
Physcomitrella patens subsp. patens	Plastid	CATPB_PHYPA	P80658^
Zygnema circumcarinatum	Plastid	CATPB_ZYGCR	Q32RI0^
Staurastrum punctulatum	Plastid	CATPB_STAPU	Q32RY8^
Chaetosphaeridium globosum	Plastid	CATPB_CHAGL	Q8SLY2^
Chara vulgaris	Plastid	CATPB_CHAVU	Q1ACK1^
Chlamydomonas reinhardtii	Plastid	CATPB_CHLRE	P06541^
Chlorella vulgaris	Plastid	CATPB_CHLVU	P32978^
Nephroselmis olivacea	Plastid	CATPB_NEPOL	Q9TL34^
Euglena gracilis	Plastid	CATPB_EUGLE	P31476^
Mesostigma viride	Plastid	CATPB_MESVI	Q9MUT5^
Chlorokybus atmophyticus	Plastid	CATPB_CHLAT	Q19V65^
Cyanophora paradoxa	Plastid	CATPB_CYAPA	P48081^
Cyanidioschyzon merolae	Plastid	CATPB_CYAME	Q85FT2^
Cyanidium caldarium	Plastid	CATPB_CYACA	Q9TM41^
Gracilaria tenuistipitata	Plastid	CATPB_GRATL	Q6B8S4^
Porphyridium purpureum	Plastid	CATPB_PORPH	YP_008965686
Galdieria sulphuraria	Plastid	CATPB_GALSU	Q08807^
Thalassiosira pseudonana	Plastid	CATPB_THAPS	A0T0R6^
Ectocarpus siliculosus	Plastid	CATPB_ECTSI	D1J7B4^
Phaeodactylum tricornutum	Plastid	CATPB_PHATC	A0T0D2^
Guillardia theta	Plastid	CATPB_GUITH	O78491^
Rhodomonas salina	Plastid	CATPB_RHDSA	A6MVY0^
Vaucheria litorea	Plastid	CATPB_VAULI	B7T1R0^
Heterosigma akashiwo NIES-293	Plastid	CATPB_HETAK	B2XTA7^
Odontella sinensis	Plastid	CATPB_ODONT	P49647^
Emiliania huxleyi	Plastid	CATPB_EMIHU	Q4G3C8^
Paulinella chromatophora	Plastid	CATPB_PAUCH	B1X3Z5^
Arabidopsis thaliana	Mitochondria	MATPB_ARATH	P83483^
Zea mays	Mitochondria	MATPB_ZMAYS	NP_001105340
Oryza sativa	Mitochondria	MATPB_ORYSJ	Q01859^
Amborella trichopoda	Mitochondria	MATPB_AMBTC	XP_006843944
Physcomitrella patens subsp. patens	Mitochondria	MATPB_PHYPA	A9T281^

AtpE

Gloeobacter violaceus PCC 7421	Cyanobacteria	CATPE_PCC7421	NP_925514
Gloeobacter kilaueensis JS1	Cyanobacteria	CATPE_GLOJS1	YP_008712398
Synechococcus sp. PCC 7336	Cyanobacteria	CATPE_PCC7336	WP_017324929
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CATPE_JA33A	YP_474970
Pseudanabaena sp. PCC 7367	Cyanobacteria	CATPE_PCC7367	YP_007101612
Pseudanabaena sp. PCC 6802	Cyanobacteria	CATPE_PCC6802	WP_019502942
Synechococcus sp. PCC 7502	Cyanobacteria	CATPE_PCC7502	YP_007105320
Acaryochloris marina MBIC11017	Cyanobacteria	CATPE_MB11017	YP_001519604
Cyanothece sp. PCC 7425	Cyanobacteria	CATPE_PCC7425	YP_002485675
Thermosynechococcus elongatus BP-1	Cyanobacteria	CATPE_BP1	NP_681316

Geitlerinema sp. PCC 7407	Cyanobacteria	CATPE_PCC7407	|YP_007109825
Leptolyngbya sp. PCC 7375	Cyanobacteria	CATPE_PCC7375	WP_006516278
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CATPE_PCC9006	WP_017713443
Synechococcus elongatus PCC 7942	Cyanobacteria	CATPE_PCC7942	YP_401333
Cyanobium sp. PCC 7001	Cyanobacteria	CATPE_PCC7001	647590881*
Cyanobium gracile PCC 6307	Cyanobacteria	CATPE_PCC6307	2508553545*
Synechococcus sp. WH 5701	Cyanobacteria	CATPE_WH5701	WP_006171954
Synechococcus sp. RS 9916	Cyanobacteria	CATPE_RS9916	WP_007098821
Synechococcus sp. CC 9311	Cyanobacteria	CATPE_CC9311	638115873*
Synechococcus sp. WH 7805	Cyanobacteria	CATPE_WH7805	WP_006043321
Synechococcus sp. BL 107	Cyanobacteria	CATPE_BL107	WP_009790478
Synechococcus sp. CC 9605	Cyanobacteria	CATPE_CC9605	YP_382466
Synechococcus sp. WH 8102	Cyanobacteria	CATPE_WH8102	NP_896606
Prochlorococcus marinus MIT 9313	Cyanobacteria	CATPE_MIT9313	NP_895279
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CATPE_CCMP1375	NP_875983
Prochlorococcus marinus MIT 9211	Cyanobacteria	CATPE_MIT9211	YP_001551443
Prochlorococcus marinus MIT 9312	Cyanobacteria	CATPE_MIT9312	637798069*
Prochlorococcus marinus MIT 9215	Cyanobacteria	CATPE_MIT9215	640944324*
Prochlorococcus marinus AS 9601	Cyanobacteria	CATPE_AS9601	640079367*
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CATPE_MED4	637450465*
Prochlorococcus marinus NATL 2A	Cyanobacteria	CATPE_NATL2A	YP_292164
Synechococcus sp. RCC307	Cyanobacteria	CATPE_RCC307	YP_001228118
Crinalium epipsammum PCC 9333	Cyanobacteria	CATPE_PCC9333	YP_007142524
Microcoleus sp. PCC 7113	Cyanobacteria	CATPE_PCC7113	YP_007121938
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CATPE_PCC6712	2505787203*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CATPE_PCC7437	YP_007133419
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CATPE_PCC7202	YP_007164295
Synechococcus sp. PCC 7002	Cyanobacteria	CATPE_PCC7002	YP_001734011
Gloeocapsa sp. PCC 73106	Cyanobacteria	CATPE_PCC73106	WP_006529766
Cyanothece sp. PCC 7424	Cyanobacteria	CATPE_PCC7424	YP_002380308
Microcystis aeruginosa NIES-843	Cyanobacteria	CATPE_NIES843	YP_001655107
Pleurocapsa sp. PCC 7327	Cyanobacteria	CATPE_PCC7327	YP_007079347
Synechocystis sp. PCC 6803	Cyanobacteria	CATPE_PCC6803	NP_441408
Cyanothece sp. PCC 8801	Cyanobacteria	CATPE_PCC8801	YP_002373774
Crocosphaera watsonii WH 8501	Cyanobacteria	CATPE_PCC8501	EAM49307
Cyanothece sp. ATCC 51142	Cyanobacteria	CATPE_ATCC51142	YP_001804226
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CATPE_UCYNA	646530057*
Halothece sp. PCC 7418	Cyanobacteria	CATPE_PCC7418	YP_007168347
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CATPE_PCC7203	YP_007091163
Synechocystis sp. PCC 7509	Cyanobacteria	CATPE_PCC7509	2517697913*
Rivularia sp. PCC 7116	Cyanobacteria	CATPE_PCC7116	YP_007055520
Nostoc punctiforme PCC 73102	Cyanobacteria	CATPE_PCC73102	YP_001867729
Calothrix sp. PCC 7507	Cyanobacteria	CATPE_PCC7507	YP_007065903
Nostoc azollae 0708	Cyanobacteria	CATPE_az0708	YP_003721150
Raphidiopsis brookii D9	Cyanobacteria	CATPE_RaphD9	WP_009342624
Nostoc sp. PCC 7107	Cyanobacteria	CATPE_PCC7107	YP_007052144
Nostoc sp. PCC 7120	Cyanobacteria	CATPE_PCC7120	NP_489078
Calothrix sp. PCC 6303	Cyanobacteria	CATPE_PCC6303	YP_007136079
Mastigocladopsis repens PCC 10914	Cyanobacteria	CATPE_PCC10914	2517244237*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CATPE_PCC7702	2512633204*
Fischerella sp. PCC 9605	Cyanobacteria	CATPE_PCC9605	2516145128*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CATPE_PCC6304	YP_007087257

Oscillatoria sp. PCC 6506	Cyanobacteria	CATPE_PCC6506	648857961*
Microcoleus vaginatus FGP-2	Cyanobacteria	CATPE_FGP2	EGK83620
Arthrospira maxima CS-328	Cyanobacteria	CATPE_CS328	EDZ94030
Trichodesmium erythraeum IMS 101	Cyanobacteria	CATPE_IMS101	YP_722960
MEL.A1	Melainabacteria	CATPE_MELA1	MEL_A1_1_802
MEL.B1	Melainabacteria	CATPE_MELB1	MEL_B1_4_114
MEL.B2	Melainabacteria	CATPE_MELB2	MEL_B2_1_231
MEL.C1	Melainabacteria	CATPE_MELC1	MEL_C1_1_326
MEL.C2	Melainabacteria	CATPE_MELC2	MEL_C2_1_408
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MATPE_RICPR	NP_221150
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MATPE_RICTY	Q68VU9^
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MATPE_CAUCR	Q9A2W1^
Agrobacterium tumefaciens strain C58	α-proteobacteria	MATPE_AGRTU	Q8UC77^
Arabidopsis thaliana	Plastid	CATPE_ARATH	P09468^
Oryza sativa subsp. japonica	Plastid	CATPE_ORYSJ	P0C2Z3^
Zea mays	Plastid	CATPE_ZMAYS	P00835^
Amborella trichopoda	Plastid	CATPE_AMBTC	Q70XZ7^
Pinus thunbergii	Plastid	CATPE_PINTH	P41623^
Cycas taitungensis	Plastid	CATPE_CYCTA	YP_001312208
Gnetum parvifolium	Plastid	CATPE_GNETU	A6BM10^
Psilotum nudum	Plastid	CATPE_PSINU	Q8WI12^
Anthoceros formosae	Plastid	CATPE_ANTFO	Q31793^
Marchantia polymorpha	Plastid	CATPE_MARPO	P06285^
Physcomitrella patens subsp. patens	Plastid	CATPE_PHYPA	Q6YXR2^
Zygnema circumcarinatum	Plastid	CATPE_ZYGCR	Q32RI1^
Staurastrum punctulatum	Plastid	CATPE_STAPU	Q32RY9^
Chaetosphaeridium globosum	Plastid	CATPE_CHAGL	Q8M9X7^
Chara vulgaris	Plastid	CATPE_CHAVU	Q1ACK2^
Chlamydomonas reinhardtii	Plastid	CATPE_CHLRE	P07891^
Chlorella vulgaris	Plastid	CATPE_CHLVU	P32979^
Nephroselmis olivacea	Plastid	CATPE_NEPOL	Q9TL33^
Euglena gracilis	Plastid	CATPE_EUGLE	P31477^
Mesostigma viride	Plastid	CATPE_MESVI	Q9MUT4^
Chlorokybus atmophyticus	Plastid	CATPE_CHLAT	Q19V66^
Cyanophora paradoxa	Plastid	CATPE_CYAPA	P48083^
Cyanidioschyzon merolae	Plastid	CATPE_CYAME	NP_849100
Cyanidium caldarium	Plastid	CATPE_CYACA	Q9TM40^
Gracilaria tenuistipitata	Plastid	CATPE_GRATL	Q6B8S5^
Porphyridium purpureum	Plastid	CATPE_PORPH	P51260^
Galdieria sulphuraria	Plastid	CATPE_GALSU	Q08808^
Thalassiosira pseudonana	Plastid	CATPE_THAPS	A0T0R7^
Ectocarpus siliculosus	Plastid	CATPE_ECTSI	D1J7B3^
Phaeodactylum tricornutum	Plastid	CATPE_PHATC	A0T0D1^
Guillardia theta	Plastid	CATPE_GUITH	O78492^
Rhodomonas salina	Plastid	CATPE_RHDSA	A6MVY1^
Vaucheria litorea	Plastid	CATPE_VAULI	B7T1R1^
Heterosigma akashiwo NIES-293	Plastid	CATPE_HETAK	B2XTA6^
Odontella sinensis	Plastid	CATPE_ODONT	P49648^
Emiliania huxleyi	Plastid	CATPE_EMIHU	Q4G3C9^
Paulinella chromatophora	Plastid	CATPE_PAUCH	YP_002048873
Arabidopsis thaliana	Mitochondria	MATPE_ARATH	Q96253^

Zea mays	Mitochondria	MATPE_ZMAYS	ACG35728
Oryza sativa	Mitochondria	MATPE_ORYSJ	BAD05854
Amborella trichopoda	Mitochondria	MATPE_AMBTC	XP_006845530
Physcomitrella patens subsp. patens	Mitochondria	MATPE_PHYPA	XP_001784277

AtpF

Gloeobacter violaceus PCC 7421	Cyanobacteria	CATPF_PCC7421	NP_925853
Gloeobacter kilaueensis JS1	Cyanobacteria	CATPF_GLOJS1	AGY58479
Synechococcus sp. PCC 7336	Cyanobacteria	CATPF_PCC7336	WP_017324767
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CATPF_JA33A	YP_475518
Pseudanabaena sp. PCC 7367	Cyanobacteria	CATPF_PCC7367	YP_007102992
Pseudanabaena sp. PCC 6802	Cyanobacteria	CATPF_PCC6802	WP_019499099
Synechococcus sp. PCC 7502	Cyanobacteria	CATPF_PCC7502	YP_007106866
Acaryochloris marina MBIC11017	Cyanobacteria	CATPF_MB11017	YP_001515250
Cyanothece sp. PCC 7425	Cyanobacteria	CATPF_PCC7425	YP_002482221
Thermosynechococcus elongatus BP-1	Cyanobacteria	CATPF_BP1	NP_681223
Geitlerinema sp. PCC 7407	Cyanobacteria	CATPF_PCC7407	YP_007109882
Leptolyngbya sp. PCC 7375	Cyanobacteria	CATPF_PCC7375	WP_006516213
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CATPF_PCC9006	WP_016922609
Synechococcus elongatus PCC 7942	Cyanobacteria	CATPF_PCC7942	YP_399353
Cyanobium sp. PCC 7001	Cyanobacteria	CATPF_PCC7001	WP_006910844
Cyanobium gracile PCC 6307	Cyanobacteria	CATPF_PCC6307	YP_007047504
Synechococcus sp. WH 5701	Cyanobacteria	CATPF_WH5701	WP_006171979
Synechococcus sp. RS 9916	Cyanobacteria	CATPF_RS9916	WP_007098846
Synechococcus sp. CC 9311	Cyanobacteria	CATPF_CC9311	YP_731512
Synechococcus sp. WH 7805	Cyanobacteria	CATPF_WH7805	WP_006043303
Synechococcus sp. BL 107	Cyanobacteria	CATPF_BL107	WP_009790497
Synechococcus sp. CC 9605	Cyanobacteria	CATPF_CC9605	YP_382484
Synechococcus sp. WH 8102	Cyanobacteria	CATPF_WH8102	NP_896587
Prochlorococcus marinus MIT 9313	Cyanobacteria	CATPF_MIT9313	NP_895296
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CATPF_CCMP1375	NP_875997
Prochlorococcus marinus MIT 9211	Cyanobacteria	CATPF_MIT9211	YP_001551457
Prochlorococcus marinus MIT 9312	Cyanobacteria	CATPF_MIT9312	YP_398042
Prochlorococcus marinus MIT 9215	Cyanobacteria	CATPF_MIT9215	YP_001484920
Prochlorococcus marinus AS 9601	Cyanobacteria	CATPF_AS9601	YP_001010045
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CATPF_MED4	NP_893570
Prochlorococcus marinus NATL 2A	Cyanobacteria	CATPF_NATL2A	YP_292176
Synechococcus sp. RCC307	Cyanobacteria	CATPF_RCC307	YP_001228136
Crinalium epipsammum PCC 9333	Cyanobacteria	CATPF_PCC9333	YP_007142334
Microcoleus sp. PCC 7113	Cyanobacteria	CATPF_PCC7113	YP_007122388
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CATPF_PCC6712	2505787329*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CATPF_PCC7437	YP_007133704
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CATPF_PCC7202	YP_007163713
Synechococcus sp. PCC 7002	Cyanobacteria	CATPF_PCC7002	YP_001733997
Gloeocapsa sp. PCC 73106	Cyanobacteria	CATPF_PCC73106	WP_006528420
Cyanothece sp. PCC 7424	Cyanobacteria	CATPF_PCC7424	YP_002377903
Microcystis aeruginosa NIES-843	Cyanobacteria	CATPF_NIES843	YP_001660028
Pleurocapsa sp. PCC 7327	Cyanobacteria	CATPF_PCC7327	YP_007080652
Synechocystis sp. PCC 6803	Cyanobacteria	CATPF_PCC6803	YP_005650114
Cyanothece sp. PCC 8801	Cyanobacteria	CATPF_PCC8801	YP_002372875
Crocosphaera watsonii WH 8501	Cyanobacteria	CATPF_PCC8501	EAM53204

Cyanothece sp. ATCC 51142	Cyanobacteria	CATPF_ATCC51142	YP_001805900
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CATPF_UCYNA	646529932*
Halothece sp. PCC 7418	Cyanobacteria	CATPF_PCC7418	YP_007166867
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CATPF_PCC7203	YP_007093566
Synechocystis sp. PCC 7509	Cyanobacteria	CATPF_PCC7509	2517696300*
Rivularia sp. PCC 7116	Cyanobacteria	CATPF_PCC7116	YP_007056668
Nostoc punctiforme PCC 73102	Cyanobacteria	CATPF_PCC73102	YP_001868151
Calothrix sp. PCC 7507	Cyanobacteria	CATPF_PCC7507	YP_007063840
Nostoc azollae 0708	Cyanobacteria	CATPF_az0708	YP_003722127
Raphidiopsis brookii D9	Cyanobacteria	CATPF_RaphD9	WP_009344360
Nostoc sp. PCC 7107	Cyanobacteria	CATPF_PCC7107	YP_007049676
Nostoc sp. PCC 7120	Cyanobacteria	CATPF_PCC7120	NP_484051
Calothrix sp. PCC 6303	Cyanobacteria	CATPF_PCC6303	YP_007136594
Mastigocladopsis repens PCC 10914	Cyanobacteria	CATPF_PCC10914	2517241862*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CATPF_PCC7702	2512634513*
Fischerella sp. PCC 9605	Cyanobacteria	CATPF_PCC9605	2516149960*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CATPF_PCC6304	YP_007084832
Oscillatoria sp. PCC 6506	Cyanobacteria	CATPF_PCC6506	648859122*
Microcoleus vaginatus FGP-2	Cyanobacteria	CATPF_FGP2	EGK90131
Arthrospira maxima CS-328	Cyanobacteria	CATPF_CS328	EDZ94051
Trichodesmium erythraeum IMS 101	Cyanobacteria	CATPF_IMS101	YP_721903
MEL.A1	Melainabacteria	-	-
MEL.B1	Melainabacteria	-	-
MEL.B2	Melainabacteria	-	-
MEL.C1	Melainabacteria	-	-
MEL.C2	Melainabacteria	-	-
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	-	-
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MATPF_RICTY	Q68XP8^
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MATPF_CAUCR	Q9AB66^
Agrobacterium tumefaciens strain C58	α-proteobacteria	MATPF_AGRTU	A9CK01^
Arabidopsis thaliana	Plastid	CATPF_ARATH	P56759^
Oryza sativa subsp. japonica	Plastid	CATPF_ORYSJ	P0C2Z0^
Zea mays	Plastid	CATPF_ZMAYS	P48186^
Amborella trichopoda	Plastid	CATPF_AMBTC	Q70XU9^
Pinus thunbergii	Plastid	CATPF_PINTH	O62939^
Cycas taitungensis	Plastid	CATPF_CYCTA	A6H5F2^
Gnetum parvifolium	Plastid	CATPF_GNETU	A6BM11^
Psilotum nudum	Plastid	CATPF_PSINU	Q8WI29^
Anthoceros formosae	Plastid	CATPF_ANTFO	Q85AL8^
Marchantia polymorpha	Plastid	CATPF_MARPO	P06291^
Physcomitrella patens subsp. patens	Plastid	CATPF_PHYPA	Q6YXK2^
Zygnema circumcarinatum	Plastid	CATPF_ZYGCR	Q32RL0^
Staurastrum punctulatum	Plastid	CATPF_STAPU	Q32RS7^
Chaetosphaeridium globosum	Plastid	CATPF_CHAGL	Q8MA06^
Chara vulgaris	Plastid	CATPF_CHAVU	Q1ACM9^
Chlamydomonas reinhardtii	Plastid	CATPF_CHLRE	Q8HTL5^
Chlorella vulgaris	Plastid	CATPF_CHLVU	P56296^
Nephroselmis olivacea	Plastid	CATPF_NEPOL	Q9TL15^
Euglena gracilis	Plastid	CATPF_EUGLE	P30393^
Mesostigma viride	Plastid	CATPF_MESVI	Q9MUT1^
Chlorokybus atmophyticus	Plastid	CATPF_CHLAT	Q19VA4^

Cyanophora paradoxa	Plastid	CATPF_CYAPA	P48084^
Cyanidioschyzon merolae	Plastid	CATPF_CYAME	NP_849123^
Cyanidium caldarium	Plastid	CATPF_CYACA	Q9TM28^
Gracilaria tenuistipitata	Plastid	CATPF_GRATL	Q6B8R0^
Porphyridium purpureum	Plastid	CATPF_PORPH	P51244^
Galdieria sulphuraria	Plastid	CATPF_GALSU	P35011^
Thalassiosira pseudonana	Plastid	CATPF_THAPS	A0T0P2^
Ectocarpus siliculosus	Plastid	CATPF_ECTSI	D1J795^
Phaeodactylum tricornutum	Plastid	CATPF_PHATC	A0T0E9^
Guillardia theta	Plastid	CATPF_GUITH	O78477^
Rhodomonas salina	Plastid	CATPF_RHDSA	A6MVW6^
Vaucheria litorea	Plastid	CATPF_VAULI	B7T1R8^
Heterosigma akashiwo NIES-293	Plastid	CATPF_HETAK	B2XT88^
Odontella sinensis	Plastid	CATPF_ODONT	Q00822^
Emiliania huxleyi	Plastid	CATPF_EMIHU	Q4G399^
Paulinella chromatophora	Plastid	CATPF_PAUCH	B1X3Y4^
Arabidopsis thaliana	Mitochondria	MATP4_ARATH	AEK01260
Zea mays	Mitochondria	MATP4_ZMAYS	ABE98755
Oryza sativa	Mitochondria	MATP4_ORYSJ	YP_514632
Amborella trichopoda	Mitochondria	MATP4_AMBTC	AHA47106
Physcomitrella patens subsp. patens	Mitochondria	MATP4_PHYPA	YP_539002

AtpH

Gloeobacter violaceus PCC 7421	Cyanobacteria	CATPH_PCC7421	NP_925855
Gloeobacter kilaueensis JS1	Cyanobacteria	CATPH_GLOJS1	YP_008712188
Synechococcus sp. PCC 7336	Cyanobacteria	CATPH_PCC7336	WP_017324769
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CATPH_JA33A	YP_475520
Pseudanabaena sp. PCC 7367	Cyanobacteria	CATPH_PCC7367	YP_007102990
Pseudanabaena sp. PCC 6802	Cyanobacteria	CATPH_PCC6802	WP_019499101
Synechococcus sp. PCC 7502	Cyanobacteria	CATPH_PCC7502	YP_007106868
Acaryochloris marina MBIC11017	Cyanobacteria	CATPH_MB11017	YP_001515248
Cyanothece sp. PCC 7425	Cyanobacteria	CATPH_PCC7425	YP_002482219
Thermosynechococcus elongatus BP-1	Cyanobacteria	CATPH_BP1	NP_681221
Geitlerinema sp. PCC 7407	Cyanobacteria	CATPH_PCC7407	YP_007109884
Leptolyngbya sp. PCC 7375	Cyanobacteria	CATPH_PCC7375	WP_006516215
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CATPH_PCC9006	WP_017712264
Synechococcus elongatus PCC 7942	Cyanobacteria	CATPH_PCC7942	YP_399351
Cyanobium sp. PCC 7001	Cyanobacteria	CATPH_PCC7001	EDY39653
Cyanobium gracile PCC 6307	Cyanobacteria	CATPH_PCC6307	YP_007047502
Synechococcus sp. WH 5701	Cyanobacteria	CATPH_WH5701	WP_006171981
Synechococcus sp. RS 9916	Cyanobacteria	CATPH_RS9916	WP_007098848
Synechococcus sp. CC 9311	Cyanobacteria	CATPH_CC9311	YP_731514
Synechococcus sp. WH 7805	Cyanobacteria	CATPH_WH7805	WP_006043301
Synechococcus sp. BL 107	Cyanobacteria	CATPH_BL107	EAU72470
Synechococcus sp. CC 9605	Cyanobacteria	CATPH_CC9605	YP_382486
Synechococcus sp. WH 8102	Cyanobacteria	CATPH_WH8102	NP_896585
Prochlorococcus marinus MIT 9313	Cyanobacteria	CATPH_MIT9313	NP_895298
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CATPH_CCMP1375	NP_875999
Prochlorococcus marinus MIT 9211	Cyanobacteria	CATPH_MIT9211	YP_001551459
Prochlorococcus marinus MIT 9312	Cyanobacteria	CATPH_MIT9312	YP_398044
Prochlorococcus marinus MIT 9215	Cyanobacteria	CATPH_MIT9215	YP_001484922

Prochlorococcus marinus AS 9601	Cyanobacteria	CATPH_AS9601	YP_001010047
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CATPH_MED4	NP_893572
Prochlorococcus marinus NATL 2A	Cyanobacteria	CATPH_NATL2A	YP_292178
Synechococcus sp. RCC307	Cyanobacteria	CATPH_RCC307	YP_001228138
Crinalium epipsammum PCC 9333	Cyanobacteria	CATPH_PCC9333	YP_007142332
Microcoleus sp. PCC 7113	Cyanobacteria	CATPH_PCC7113	YP_007122390
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CATPH_PCC6712	2505787327*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CATPH_PCC7437	YP_007133706
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CATPH_PCC7202	YP_007163715
Synechococcus sp. PCC 7002	Cyanobacteria	CATPH_PCC7002	YP_001733999
Gloeocapsa sp. PCC 73106	Cyanobacteria	CATPH_PCC73106	WP_006528418
Cyanothece sp. PCC 7424	Cyanobacteria	CATPH_PCC7424	YP_002377905
Microcystis aeruginosa NIES-843	Cyanobacteria	CATPH_NIES843	YP_001660026
Pleurocapsa sp. PCC 7327	Cyanobacteria	CATPH_PCC7327	YP_007080654
Synechocystis sp. PCC 6803	Cyanobacteria	CATPH_PCC6803	NP_440059
Cyanothece sp. PCC 8801	Cyanobacteria	CATPH_PCC8801	YP_002372873
Crocosphaera watsonii WH 8501	Cyanobacteria	CATPH_PCC8501	EAM53202
Cyanothece sp. ATCC 51142	Cyanobacteria	CATPH_ATCC51142	YP_001805898
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CATPH_UCYNA	646529934*
Halothece sp. PCC 7418	Cyanobacteria	CATPH_PCC7418	YP_007166865
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CATPH_PCC7203	YP_007093568
Synechocystis sp. PCC 7509	Cyanobacteria	CATPH_PCC7509	2517696298*
Rivularia sp. PCC 7116	Cyanobacteria	CATPH_PCC7116	YP_007056666
Nostoc punctiforme PCC 73102	Cyanobacteria	CATPH_PCC73102	YP_001868149
Calothrix sp. PCC 7507	Cyanobacteria	CATPH_PCC7507	YP_007063838
Nostoc azollae 0708	Cyanobacteria	CATPH_az0708	YP_003722125
Raphidiopsis brookii D9	Cyanobacteria	CATPH_RaphD9	EFA71631
Nostoc sp. PCC 7107	Cyanobacteria	CATPH_PCC7107	YP_007049674
Nostoc sp. PCC 7120	Cyanobacteria	CATPH_PCC7120	NP_484053
Calothrix sp. PCC 6303	Cyanobacteria	CATPH_PCC6303	YP_007136592
Mastigocladopsis repens PCC 10914	Cyanobacteria	CATPH_PCC10914	2517241860*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CATPH_PCC7702	2512634511*
Fischerella sp. PCC 9605	Cyanobacteria	CATPH_PCC9605	2516149956*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CATPH_PCC6304	YP_007084834
Oscillatoria sp. PCC 6506	Cyanobacteria	CATPH_PCC6506	648859124*
Microcoleus vaginatus FGP-2	Cyanobacteria	CATPH_FGP2	EGK90129
Arthrospira maxima CS-328	Cyanobacteria	CATPH_CS328	EDZ94053
Trichodesmium erythraeum IMS 101	Cyanobacteria	CATPH_IMS101	YP_721905
MEL.A1	Melainabacteria	CATPH_MELA1	MEL_A1_1_179
MEL.B1	Melainabacteria	CATPH_MELB1	MEL_B1_1_174
MEL.B2	Melainabacteria	-	-
MEL.C1	Melainabacteria	CATPH_MELC1	MEL_C1_1_1003
MEL.C2	Melainabacteria	CATPH_MELC2	MEL_C2_1_1000
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MATPH_RICPR	NP_220416
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MATPH_RICTY	YP_067074
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MATPH_CAUCR	NP_419186
Agrobacterium tumefaciens strain C58	α-proteobacteria	MATPH_AGRTU	NP_353740
Arabidopsis thaliana	Plastid	CATPH_ARATH	P56760*
Oryza sativa subsp. japonica	Plastid	CATPH_ORYSJ	P0C301*
Zea mays	Plastid	CATPH_ZMAYS	P69449*
Amborella trichopoda	Plastid	CATPH_AMBTC	Q70Y12*

Pinus thunbergii	Plastid	CATPH_PINTH	P41603*
Cycas taitungensis	Plastid	CATPH_CYCTA	A6H5F3*
Gnetum parvifolium	Plastid	CATPH_GNETU	A6BM12*
Psilotum nudum	Plastid	CATPH_PSINU	Q7HJJ2*
Anthoceros formosae	Plastid	CATPH_ANTFO	P61172*
Marchantia polymorpha	Plastid	CATPH_MARPO	P62481*
Physcomitrella patens subsp. patens	Plastid	CATPH_PHYPA	Q6YXK1*
Zygnema circumcarinatum	Plastid	CATPH_ZYGCR	Q32RK9*
Staurastrum punctulatum	Plastid	CATPH_STAPU	Q32RS6*
Chaetosphaeridium globosum	Plastid	CATPH_CHAGL	Q8MA07*
Chara vulgaris	Plastid	CATPH_CHAVU	Q1ACN0*
Chlamydomonas reinhardtii	Plastid	CATPH_CHLRE	Q37304*
Chlorella vulgaris	Plastid	CATPH_CHLVU	P56297*
Nephroselmis olivacea	Plastid	CATPH_NEPOL	Q9TL14*
Euglena gracilis	Plastid	CATPH_EUGLE	P10603*
Mesostigma viride	Plastid	CATPH_MESVI	Q9MUT0*
Chlorokybus atmophyticus	Plastid	CATPH_CHLAT	Q19VA3*
Cyanophora paradoxa	Plastid	CATPH_CYAPA	P48086*
Cyanidioschyzon merolae	Plastid	CATPH_CYAME	NP_849121
Cyanidium caldarium	Plastid	CATPH_CYACA	Q9TM30*
Gracilaria tenuistipitata	Plastid	CATPH_GRATL	Q6B8R2*
Porphyridium purpureum	Plastid	CATPH_PORPH	P51246*
Galdieria sulphuraria	Plastid	CATPH_GALSU	P35013*
Thalassiosira pseudonana	Plastid	CATPH_THAPS	A0T0P0*
Ectocarpus siliculosus	Plastid	CATPH_ECTSI	D1J793*
Phaeodactylum tricornutum	Plastid	CATPH_PHATC	A0T0E7*
Guillardia theta	Plastid	CATPH_GUITH	O78479*
Rhodomonas salina	Plastid	CATPH_RHDSA	A6MVW8*
Vaucheria litorea	Plastid	CATPH_VAULI	B7T1S0*
Heterosigma akashiwo NIES-293	Plastid	CATPH_HETAK	B2XT86*
Odontella sinensis	Plastid	CATPH_ODONT	Q00824*
Emiliania huxleyi	Plastid	CATPH_EMIHU	Q4G3A1*
Paulinella chromatophora	Plastid	CATPH_PAUCH	YP_002048861
Arabidopsis thaliana	Mitochondria	MATP9_ARATH	P60112*
Zea mays	Mitochondria	MATP9_ZMAYS	YP_588368
Oryza sativa	Mitochondria	MATP9_ORYSJ	YP_002000580
Amborella trichopoda	Mitochondria	MATP9_AMBTC	AHA47119
Physcomitrella patens subsp. patens	Mitochondria	MATP9_PHYPA	YP_539041

AtpI

Gloeobacter violaceus PCC 7421	Cyanobacteria	CATPI_PCC7421	NP_925856
Gloeobacter kilaueensis JS1	Cyanobacteria	CATPI_GLOJS1	AGY58482
Synechococcus sp. PCC 7336	Cyanobacteria	CATPI_PCC7336	WP_017324770
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CATPI_JA33A	YP_475522
Pseudanabaena sp. PCC 7367	Cyanobacteria	CATPI_PCC7367	YP_007102989
Pseudanabaena sp. PCC 6802	Cyanobacteria	CATPI_PCC6802	WP_019499102
Synechococcus sp. PCC 7502	Cyanobacteria	CATPI_PCC7502	YP_007106869
Acaryochloris marina MBIC11017	Cyanobacteria	CATPI_MB11017	YP_001515247
Cyanothece sp. PCC 7425	Cyanobacteria	CATPI_PCC7425	YP_002482218
Thermosynechococcus elongatus BP-1	Cyanobacteria	CATPI_BP1	NP_681220
Geitlerinema sp. PCC 7407	Cyanobacteria	CATPI_PCC7407	YP_007109885
Leptolyngbya sp. PCC 7375	Cyanobacteria	CATPI_PCC7375	WP_006516216

Prochlorothrix hollandica PCC 9006	Cyanobacteria	CATPI_PCC9006	WP_017712265
Synechococcus elongatus PCC 7942	Cyanobacteria	CATPI_PCC7942	YP_399350
Cyanobium sp. PCC 7001	Cyanobacteria	CATPI_PCC7001	WP_006911604
Cyanobium gracile PCC 6307	Cyanobacteria	CATPI_PCC6307	YP_007047501
Synechococcus sp. WH 5701	Cyanobacteria	CATPI_WH5701	WP_006171982
Synechococcus sp. RS 9916	Cyanobacteria	CATPI_RS9916	WP_007098849
Synechococcus sp. CC 9311	Cyanobacteria	CATPI_CC9311	YP_731515
Synechococcus sp. WH 7805	Cyanobacteria	CATPI_WH7805	WP_006043300
Synechococcus sp. BL 107	Cyanobacteria	CATPI_BL107	WP_009790500
Synechococcus sp. CC 9605	Cyanobacteria	CATPI_CC9605	YP_382487
Synechococcus sp. WH 8102	Cyanobacteria	CATPI_WH8102	637444593*
Prochlorococcus marinus MIT 9313	Cyanobacteria	CATPI_MIT9313	NP_895299
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CATPI_CCMP1375	NP_876000
Prochlorococcus marinus MIT 9211	Cyanobacteria	CATPI_MIT9211	YP_001551460
Prochlorococcus marinus MIT 9312	Cyanobacteria	CATPI_MIT9312	YP_398045
Prochlorococcus marinus MIT 9215	Cyanobacteria	CATPI_MIT9215	YP_001484923
Prochlorococcus marinus AS 9601	Cyanobacteria	CATPI_AS9601	YP_001010048
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CATPI_MED4	NP_893573
Prochlorococcus marinus NATL 2A	Cyanobacteria	CATPI_NATL2A	637687855*
Synechococcus sp. RCC307	Cyanobacteria	CATPI_RCC307	YP_001228139
Crinalium epipsammum PCC 9333	Cyanobacteria	CATPI_PCC9333	YP_007142331
Microcoleus sp. PCC 7113	Cyanobacteria	CATPI_PCC7113	YP_007122391
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CATPI_PCC6712	2505787326*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CATPI_PCC7437	YP_007133707
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CATPI_PCC7202	YP_007163716
Synechococcus sp. PCC 7002	Cyanobacteria	CATPI_PCC7002	YP_001734000
Gloeocapsa sp. PCC 73106	Cyanobacteria	CATPI_PCC73106	WP_006528417
Cyanothece sp. PCC 7424	Cyanobacteria	CATPI_PCC7424	YP_002377906
Microcystis aeruginosa NIES-843	Cyanobacteria	CATPI_NIES843	YP_001660025
Pleurocapsa sp. PCC 7327	Cyanobacteria	CATPI_PCC7327	YP_007080655
Synechocystis sp. PCC 6803	Cyanobacteria	CATPI_PCC6803	YP_005650117
Cyanothece sp. PCC 8801	Cyanobacteria	CATPI_PCC8801	YP_002372872
Crocosphaera watsonii WH 8501	Cyanobacteria	CATPI_PCC8501	EAM53201
Cyanothece sp. ATCC 51142	Cyanobacteria	CATPI_ATCC51142	YP_001805897
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CATPI_UCYNA	646529935*
Halothece sp. PCC 7418	Cyanobacteria	CATPI_PCC7418	YP_007166864
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CATPI_PCC7203	YP_007093569
Synechocystis sp. PCC 7509	Cyanobacteria	CATPI_PCC7509	2517696297*
Rivularia sp. PCC 7116	Cyanobacteria	CATPI_PCC7116	YP_007056665
Nostoc punctiforme PCC 73102	Cyanobacteria	CATPI_PCC73102	YP_001868148
Calothrix sp. PCC 7507	Cyanobacteria	CATPI_PCC7507	YP_007063837
Nostoc azollae 0708	Cyanobacteria	CATPI_az0708	YP_003722124
Raphidiopsis brookii D9	Cyanobacteria	CATPI_RaphD9	EFA71632
Nostoc sp. PCC 7107	Cyanobacteria	CATPI_PCC7107	YP_007049673
Nostoc sp. PCC 7120	Cyanobacteria	CATPI_PCC7120	637230365*
Calothrix sp. PCC 6303	Cyanobacteria	CATPI_PCC6303	YP_007136591
Mastigocladopsis repens PCC 10914	Cyanobacteria	CATPI_PCC10914	2517241859*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CATPI_PCC7702	2512634510*
Fischerella sp. PCC 9605	Cyanobacteria	CATPI_PCC9605	2516149955*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CATPI_PCC6304	YP_007084836
Oscillatoria sp. PCC 6506	Cyanobacteria	CATPI_PCC6506	648859125*
Microcoleus vaginatus FGP-2	Cyanobacteria	CATPI_FGP2	EGK90128

Arthrospira maxima CS-328	Cyanobacteria	CATPI_CS328	EDZ94054
Trichodesmium erythraeum IMS 101	Cyanobacteria	CATPI_IMS101	YP_721906
MEL.A1	Melainabacteria	CATPI_MELA1	MEL_A1_1_180
MEL.B1	Melainabacteria	CATPI_MELB1	MEL_B1_1_175
MEL.B2	Melainabacteria	CATPI_MELB2	MEL_B2_2_52
MEL.C1	Melainabacteria	CATPI_MELC1	MEL_C1_1_1002
MEL.C2	Melainabacteria	CATPI_MELC2	MEL_C2_1_999
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MATPI_RICPR	NP_220417
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MATPI_RICTY	YP_067073
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MATPI_CAUCR	NP_419187
Agrobacterium tumefaciens strain C58	α-proteobacteria	MATPI_AGRTU	NP_353739
Arabidopsis thaliana	Plastid	CATPI_ARATH	P56758^
Oryza sativa subsp. japonica	Plastid	CATPH_ORYSJ	P0C2Y7^
Zea mays	Plastid	CATPI_ZMAYS	P17344^
Amborella trichopoda	Plastid	CATPI_AMBTC	Q70XU8^
Pinus thunbergii	Plastid	CATPI_PINTH	P41604^
Cycas taitungensis	Plastid	CATPI_CYCTA	A6H5F5^
Gnetum parvifolium	Plastid	CATPI_GNETU	A6BM13^
Psilotum nudum	Plastid	CATPI_PSINU	Q8WI28^
Anthoceros formosae	Plastid	CATPI_ANTFO	Q85AE6^
Marchantia polymorpha	Plastid	CATPI_MARPO	P06289^
Physcomitrella patens subsp. patens	Plastid	CATPI_PHYPA	Q6YXK0^
Zygnema circumcarinatum	Plastid	CATPI_ZYGCR	Q32RH8^
Staurastrum punctulatum	Plastid	CATPI_STAPU	Q32RY0^
Chaetosphaeridium globosum	Plastid	CATPI_CHAGL	Q8MA08^
Chara vulgaris	Plastid	CATPI_CHAVU	Q1ACN1^
Chlamydomonas reinhardtii	Plastid	CATPI_CHLRE	O63075^
Chlorella vulgaris	Plastid	CATPI_CHLVU	P56295^
Nephroselmis olivacea	Plastid	CATPI_NEPOL	Q9TL13^
Euglena gracilis	Plastid	CATPI_EUGLE	P30391^
Mesostigma viride	Plastid	CATPI_MESVI	Q9MUS9^
Chlorokybus atmophyticus	Plastid	CATPI_CHLAT	Q19VA2^
Cyanophora paradoxa	Plastid	-	-
Cyanidioschyzon merolae	Plastid	CATPI_CYAME	NP_849120
Cyanidium caldarium	Plastid	CATPI_CYACA	Q9TM31^
Gracilaria tenuistipitata	Plastid	CATPI_GRATL	Q6B8R3^
Porphyridium purpureum	Plastid	CATPI_PORPH	P51247^
Galdieria sulphuraria	Plastid	CATPI_GALSU	P35008^
Thalassiosira pseudonana	Plastid	CATPI_THAPS	A0T0N9^
Ectocarpus siliculosus	Plastid	CATPI_ECTSI	D1J792^
Phaeodactylum tricornutum	Plastid	CATPI_PHATC	A0T0E6^
Guillardia theta	Plastid	CATPI_GUITH	O78480^
Rhodomonas salina	Plastid	CATPI_RHDSA	A6MVW9^
Vaucheria litorea	Plastid	CATPI_VAULI	B7T1S1^
Heterosigma akashiwo NIES-293	Plastid	CATPI_HETAK	B2XT85^
Odontella sinensis	Plastid	CATPI_ODONT	Q00825^
Emiliania huxleyi	Plastid	CATPI_EMIHU	Q4G3A2^
Paulinella chromatophora	Plastid	CATPI_PAUCH	B1X3Y1^
Arabidopsis thaliana	Mitochondria	MATP6_ARATH	NP_085569
Zea mays	Mitochondria	MATP6_ZMAYS	CAA77868
Oryza sativa	Mitochondria	MATP6_ORYSJ	YP_002000575

Amborella trichopoda	Mitochondria	MATP6_AMBTC	AHA47100
Physcomitrella patens subsp. patens	Mitochondria	MATP6_PHYPA	YP_539022

Rpl2

Gloeobacter violaceus PCC 7421	Cyanobacteria	CRPL2_PCC7421	NP_923849
Gloeobacter kilaueensis JS1	Cyanobacteria	CRPL2_GLOJS1	YP_008712219
Synechococcus sp. PCC 7336	Cyanobacteria	CRPL2_PCC7336	WP_017325542
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CRPL2_JA33A	YP_474626
Pseudanabaena sp. PCC 7367	Cyanobacteria	CRPL2_PCC7367	YP_007101807
Pseudanabaena sp. PCC 6802	Cyanobacteria	CRPL2_PCC6802	WP_019500665
Synechococcus sp. PCC 7502	Cyanobacteria	CRPL2_PCC7502	YP_007105037
Acaryochloris marina MBIC11017	Cyanobacteria	CRPL2_MB11017	YP_001518989
Cyanothece sp. PCC 7425	Cyanobacteria	CRPL2_PCC7425	YP_002482033
Thermosynechococcus elongatus BP-1	Cyanobacteria	CRPL2_BP1	NP_680875
Geitlerinema sp. PCC 7407	Cyanobacteria	CRPL2_PCC7407	YP_007108335
Leptolyngbya sp. PCC 7375	Cyanobacteria	CRPL2_PCC7375	WP_006515912
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CRPL2_PCC9006	2509500796*
Synechococcus elongatus PCC 7942	Cyanobacteria	CRPL2_PCC7942	YP_401246
Cyanobium sp. PCC 7001	Cyanobacteria	CRPL2_PCC7001	WP_006910666
Cyanobium gracile PCC 6307	Cyanobacteria	CRPL2_PCC6307	YP_007046294
Synechococcus sp. WH 5701	Cyanobacteria	CRPL2_WH5701	WP_006173353
Synechococcus sp. RS 9916	Cyanobacteria	CRPL2_RS9916	WP_007099885
Synechococcus sp. CC 9311	Cyanobacteria	CRPL2_CC9311	YP_729664
Synechococcus sp. WH 7805	Cyanobacteria	CRPL2_WH7805	WP_006042207
Synechococcus sp. BL 107	Cyanobacteria	CRPL2_BL107	WP_009788931
Synechococcus sp. CC 9605	Cyanobacteria	CRPL2_CC9605	YP_380704
Synechococcus sp. WH 8102	Cyanobacteria	CRPL2_WH8102	NP_898161
Prochlorococcus marinus MIT 9313	Cyanobacteria	CRPL2_MIT9313	NP_895562
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CRPL2_CCMP1375	NP_876100
Prochlorococcus marinus MIT 9211	Cyanobacteria	CRPL2_MIT9211	YP_001551560
Prochlorococcus marinus MIT 9312	Cyanobacteria	CRPL2_MIT9312	YP_398144
Prochlorococcus marinus MIT 9215	Cyanobacteria	CRPL2_MIT9215	YP_001485026
Prochlorococcus marinus AS 9601	Cyanobacteria	CRPL2_AS9601	YP_001010152
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CRPL2_MED4	NP_893672
Prochlorococcus marinus NATL 2A	Cyanobacteria	CRPL2_NATL2A	YP_292319
Synechococcus sp. RCC307	Cyanobacteria	CRPL2_RCC307	YP_001228375
Crinalium epipsammum PCC 9333	Cyanobacteria	CRPL2_PCC9333	YP_007142693
Microcoleus sp. PCC 7113	Cyanobacteria	CRPL2_PCC7113	YP_007125313
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CRPL2_PCC6712	2505786660*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CRPL2_PCC7437	YP_007134542
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CRPL2_PCC7202	YP_007165792
Synechococcus sp. PCC 7002	Cyanobacteria	CRPL2_PCC7002	YP_001734320
Gloeocapsa sp. PCC 73106	Cyanobacteria	CRPL2_PCC73106	WP_006528350
Cyanothece sp. PCC 7424	Cyanobacteria	CRPL2_PCC7424	YP_002378955
Microcystis aeruginosa NIES-843	Cyanobacteria	CRPL2_NIES843	YP_001660754
Pleurocapsa sp. PCC 7327	Cyanobacteria	CRPL2_PCC7327	YP_007082244
Synechocystis sp. PCC 6803	Cyanobacteria	CRPL2_PCC6803	NP_440666
Cyanothece sp. PCC 8801	Cyanobacteria	CRPL2_PCC8801	YP_002370508
Crocosphaera watsonii WH 8501	Cyanobacteria	CRPL2_PCC8501	EAM49843
Cyanothece sp. ATCC 51142	Cyanobacteria	CRPL2_ATCC51142	YP_001805431

Unidentified cyanobacterium UCYN-A	Cyanobacteria	CRPL2_UCYNA	646530804*
Halothece sp. PCC 7418	Cyanobacteria	CRPL2_PCC7418	YP_007169471
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CRPL2_PCC7203	YP_007089617
Synechocystis sp. PCC 7509	Cyanobacteria	CRPL2_PCC7509	2517696377*
Rivularia sp. PCC 7116	Cyanobacteria	CRPL2_PCC7116	YP_007055692
Nostoc punctiforme PCC 73102	Cyanobacteria	CRPL2_PCC73102	YP_001867703
Calothrix sp. PCC 7507	Cyanobacteria	CRPL2_PCC7507	YP_007066747
Nostoc azollae 0708	Cyanobacteria	CRPL2_az0708	YP_003721578
Raphidiopsis brookii D9	Cyanobacteria	CRPL2_RaphD9	WP_009344505
Nostoc sp. PCC 7107	Cyanobacteria	CRPL2_PCC7107	YP_007050364
Nostoc sp. PCC 7120	Cyanobacteria	CRPL2_PCC7120	NP_488252
Calothrix sp. PCC 6303	Cyanobacteria	CRPL2_PCC6303	YP_007140242
Mastigocladopsis repens PCC 10914	Cyanobacteria	CRPL2_PCC10914	2517239300*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CRPL2_PCC7702	2512632097*
Fischerella sp. PCC 9605	Cyanobacteria	CRPL2_PCC9605	2516144589*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CRPL2_PCC6304	YP_007086253
Oscillatoria sp. PCC 6506	Cyanobacteria	CRPL2_PCC6506	648856836*
Microcoleus vaginatus FGP-2	Cyanobacteria	CRPL2_FGP2	EGK84843
Arthrospira maxima CS-328	Cyanobacteria	CRPL2_CS328	EDZ91613
Trichodesmium erythraeum IMS 101	Cyanobacteria	CRPL2_IMS101	YP_722637
MEL.A1	Melainabacteria	CRPL2_MELA1	MEL_A1_1_786
MEL.B1	Melainabacteria	CRPL2_MELB1	MEL_B1_2_42
MEL.B2	Melainabacteria	CRPL2_MELB2	MEL_B2_8_190
MEL.C1	Melainabacteria	CRPL2_MELC1	MEL_C1_1_307
MEL.C2	Melainabacteria	CRPL2_MELC2	MEL_C2_9_39
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MRPL2_RICPR	NP_221020
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MRPL2_RICTY	YP_067593
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MRPL2_CAUCR	NP_420064
Agrobacterium tumefaciens strain C58	α-proteobacteria	MRPL2_AGRTU	NP_354920
Arabidopsis thaliana	Plastid	CRK2_ARATH	P56791^
Oryza sativa subsp. japonica	Plastid	CRK2_ORYSJ	P0C497^
Zea mays	Plastid	CRK2_ZMAYS	P17788^
Amborella trichopoda	Plastid	CRK2_AMBTC	P60406^
Pinus thunbergii	Plastid	CRK2_PINTH	O62940^
Cycas taitungensis	Plastid	CRK2_CYCTA	A6H5M3^
Gnetum parvifolium	Plastid	CRK2_GNETU	A6BM43^
Psilotum nudum	Plastid	CRK2_PSINU	Q8WHY1^
Anthoceros formosae	Plastid	CRK2_ANTFO	Q85B65^
Marchantia polymorpha	Plastid	CRK2_MARPO	P06378^
Physcomitrella patens subsp. patens	Plastid	CRK2_PHYPA	P60407^
Zygnema circumcarinatum	Plastid	CRK2_ZYGCR	Q32RN8^
Staurastrum punctulatum	Plastid	CRK2_STAPU	Q32RV7^
Chaetosphaeridium globosum	Plastid	CRK2_CHAGL	Q8M9U7^
Chara vulgaris	Plastid	CRK2_CHAVU	Q1ACF6^
Chlamydomonas reinhardtii	Plastid	CRK2_CHLRE	Q8HTL2^
Chlorella vulgaris	Plastid	CRK2_CHLVU	P56367^
Nephroselmis olivacea	Plastid	CRK2_NEPOL	Q9TL18^
Euglena gracilis	Plastid	CRK2_EUGLE	P19165^
Mesostigma viride	Plastid	CRK2_MESVI	Q9MUT9^
Chlorokybus atmophyticus	Plastid	CRK2_CHLAT	Q19VA8^
Cyanophora paradoxa	Plastid	CRK2_CYAPA	P15764^

Cyanidioschyzon merolae	Plastid	CRK2_CYAME	NP_849072
Cyanidium caldarium	Plastid	CRK2_CYACA	Q9TLT5^
Gracilaria tenuistipitata	Plastid	CRK2_GRATL	Q6B8V6^
Porphyridium purpureum	Plastid	CRK2_PORPH	P51311^
Galdieria sulphuraria	Plastid	CRK2_GALSU	XP_005705013
Thalassiosira pseudonana	Plastid	CRK2_THAPS	A0T0X5^
Ectocarpus siliculosus	Plastid	CRK2_ECTSI	D1J749^
Phaeodactylum tricornutum	Plastid	CRK2_PHATC	A0T0I1^
Guillardia theta	Plastid	CRK2_GUITH	O46897^
Rhodomonas salina	Plastid	CRK2_RHDSA	A6MW04^
Vaucheria litorea	Plastid	CRK2_VAULI	B7T1Y1^
Heterosigma akashiwo NIES-293	Plastid	CRK2_HETAK	B2XTF2^
Odontella sinensis	Plastid	CRK2_ODONT	P49545^
Emiliania huxleyi	Plastid	CRK2_EMIHU	Q4G362^
Paulinella chromatophora	Plastid	CRK2_PAUCH	B1X505^
Arabidopsis thaliana	Mitochondria	MRM2_ARATH	G1C2X5^
Zea mays	Mitochondria	MRM2_ZMAYS	NP_001105558
Oryza sativa	Mitochondria	MRM2_ORYSJ	P92812^
Amborella trichopoda	Mitochondria	MRM2_AMBTC	AHA47111
Physcomitrella patens subsp. patens	Mitochondria	MRM2_PHYPA	YP_539032

Rpl16

Gloeobacter violaceus PCC 7421	Cyanobacteria	CRPL16_PCC7421	NP_926866
Gloeobacter kilaueensis JS1	Cyanobacteria	CRPL16_GLOJS1	YP_008712589
Synechococcus sp. PCC 7336	Cyanobacteria	CRPL16_PCC7336	WP_017325546
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CRPL16_JA33A	YP_474622
Pseudanabaena sp. PCC 7367	Cyanobacteria	CRPL16_PCC7367	YP_007101811
Pseudanabaena sp. PCC 6802	Cyanobacteria	CRPL16_PCC6802	WP_019500661
Synechococcus sp. PCC 7502	Cyanobacteria	CRPL16_PCC7502	YP_007105041
Acaryochloris marina MBIC11017	Cyanobacteria	CRPL16_MB11017	YP_001518993
Cyanothece sp. PCC 7425	Cyanobacteria	CRPL16_PCC7425	YP_002482037
Thermosynechococcus elongatus BP-1	Cyanobacteria	CRPL16_BP1	NP_680879
Geitlerinema sp. PCC 7407	Cyanobacteria	CRPL16_PCC7407	YP_007108339
Leptolyngbya sp. PCC 7375	Cyanobacteria	CRPL16_PCC7375	WP_006515908
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CRPL16_PCC9006	WP_017712307
Synechococcus elongatus PCC 7942	Cyanobacteria	CRPL16_PCC7942	YP_401242
Cyanobium sp. PCC 7001	Cyanobacteria	CRPL16_PCC7001	647589825*
Cyanobium gracile PCC 6307	Cyanobacteria	CRPL16_PCC6307	2508552206*
Synechococcus sp. WH 5701	Cyanobacteria	CRPL16_WH5701	638958129*
Synechococcus sp. RS 9916	Cyanobacteria	CRPL16_RS9916	WP_007099882
Synechococcus sp. CC 9311	Cyanobacteria	CRPL16_CC9311	638114019*
Synechococcus sp. WH 7805	Cyanobacteria	CRPL16_WH7805	WP_006042211
Synechococcus sp. BL 107	Cyanobacteria	CRPL16_BL107	WP_009788927
Synechococcus sp. CC 9605	Cyanobacteria	CRPL16_CC9605	YP_380700
Synechococcus sp. WH 8102	Cyanobacteria	CRPL16_WH8102	637446209*
Prochlorococcus marinus MIT 9313	Cyanobacteria	CRPL16_MIT9313	NP_895566
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CRPL16_CCMP1375	NP_876096
Prochlorococcus marinus MIT 9211	Cyanobacteria	CRPL16_MIT9211	YP_001551556
Prochlorococcus marinus MIT 9312	Cyanobacteria	CRPL16_MIT9312	YP_398140
Prochlorococcus marinus MIT 9215	Cyanobacteria	CRPL16_MIT9215	YP_001485021
Prochlorococcus marinus AS 9601	Cyanobacteria	CRPL16_AS9601	640079486*

Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CRPL16_MED4	NP_893668
Prochlorococcus marinus NATL 2A	Cyanobacteria	CRPL16_NATL2A	YP_292315
Synechococcus sp. RCC307	Cyanobacteria	CRPL16_RCC307	YP_001228379
Crinalium epipsammum PCC 9333	Cyanobacteria	CRPL16_PCC9333	YP_007142689
Microcoleus sp. PCC 7113	Cyanobacteria	CRPL16_PCC7113	YP_007125317
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CRPL16_PCC6712	2505786656*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CRPL16_PCC7437	YP_007134538
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CRPL16_PCC7202	YP_007165788
Synechococcus sp. PCC 7002	Cyanobacteria	CRPL16_PCC7002	YP_001734316
Gloeocapsa sp. PCC 73106	Cyanobacteria	CRPL16_PCC73106	WP_006528346
Cyanothece sp. PCC 7424	Cyanobacteria	CRPL16_PCC7424	YP_002378959
Microcystis aeruginosa NIES-843	Cyanobacteria	CRPL16_NIES843	YP_001660750
Pleurocapsa sp. PCC 7327	Cyanobacteria	CRPL16_PCC7327	YP_007082248
Synechocystis sp. PCC 6803	Cyanobacteria	CRPL16_PCC6803	NP_440662
Cyanothece sp. PCC 8801	Cyanobacteria	CRPL16_PCC8801	YP_002370504
Crocosphaera watsonii WH 8501	Cyanobacteria	CRPL16_PCC8501	EAM49847
Cyanothece sp. ATCC 51142	Cyanobacteria	CRPL16_ATCC51142	YP_001805435
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CRPL16_UCYNA	646530808*
Halothece sp. PCC 7418	Cyanobacteria	CRPL16_PCC7418	YP_007169475
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CRPL16_PCC7203	YP_007089613
Synechocystis sp. PCC 7509	Cyanobacteria	CRPL16_PCC7509	2517696373*
Rivularia sp. PCC 7116	Cyanobacteria	CRPL16_PCC7116	YP_007055696
Nostoc punctiforme PCC 73102	Cyanobacteria	CRPL16_PCC73102	YP_001867699
Calothrix sp. PCC 7507	Cyanobacteria	CRPL16_PCC7507	YP_007066743
Nostoc azollae 0708	Cyanobacteria	CRPL16_az0708	YP_003721582
Raphidiopsis brookii D9	Cyanobacteria	CRPL16_RaphD9	647110672*
Nostoc sp. PCC 7107	Cyanobacteria	CRPL16_PCC7107	YP_007050360
Nostoc sp. PCC 7120	Cyanobacteria	CRPL16_PCC7120	NP_488248
Calothrix sp. PCC 6303	Cyanobacteria	CRPL16_PCC6303	YP_007140238
Mastigocladopsis repens PCC 10914	Cyanobacteria	CRPL16_PCC10914	2517239304*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CRPL16_PCC7702	2512632093*
Fischerella sp. PCC 9605	Cyanobacteria	CRPL16_PCC9605	2516144585*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CRPL16_PCC6304	YP_007086257
Oscillatoria sp. PCC 6506	Cyanobacteria	CRPL16_PCC6506	648856840*
Microcoleus vaginatus FGP-2	Cyanobacteria	CRPL16_FGP2	EGK84839
Arthrospira maxima CS-328	Cyanobacteria	CRPL16_CS328	EDZ92815
Trichodesmium erythraeum IMS 101	Cyanobacteria	CRPL16_IMS101	YP_722633
MEL.A1	Melainabacteria	CRPL16_MELA1	MEL_A1_1_782
MEL.B1	Melainabacteria	CRPL16_MELB1	MEL_B1_2_46
MEL.B2	Melainabacteria	CRPL16_MELB2	MEL_B2_8_186
MEL.C1	Melainabacteria	CRPL16_MELC1	MEL_C1_1_303
MEL.C2	Melainabacteria	CRPL16_MELC2	MEL_C2_9_43
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MRPL16_RICPR	NP_221016
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MRPL16_RICTY	YP_067589
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MRPL16_CAUCR	NP_420068
Agrobacterium tumefaciens strain C58	α-proteobacteria	MRPL16_AGRTU	NP_354916
Arabidopsis thaliana	Plastid	CRK16_ARATH	P56793^
Oryza sativa subsp. japonica	Plastid	CRK16_ORYSJ	P0C443^
Zea mays	Plastid	CRK16_ZMAYS	P08528^
Amborella trichopoda	Plastid	CRK16_AMBTC	Q70XX3^

Pinus thunbergii	Plastid	CRK16_PINTH	P52767^
Cycas taitungensis	Plastid	CRK16_CYCTA	A6H5L9^
Gnetum parvifolium	Plastid	CRK16_GNETU	YP_002519747
Psilotum nudum	Plastid	CRK16_PSINU	Q8WHY5^
Anthoceros formosae	Plastid	CRK16_ANTFO	Q85C49^
Marchantia polymorpha	Plastid	CRK16_MARPO	P06383^
Physcomitrella patens subsp. patens	Plastid	CRK16_PHYPA	Q6YXK9^
Zygnema circumcarinatum	Plastid	CRK16_ZYGCR	Q32RN5^
Staurastrum punctulatum	Plastid	CRK16_STAPU	Q32RV3^
Chaetosphaeridium globosum	Plastid	CRK16_CHAGL	Q8M9V1^
Chara vulgaris	Plastid	CRK16_CHAVU	Q1ACG0^
Chlamydomonas reinhardtii	Plastid	CRK16_CHLRE	P05726^
Chlorella vulgaris	Plastid	CRK16_CHLVU	P56364^
Nephroselmis olivacea	Plastid	CRK16_NEPOL	Q9TL21^
Euglena gracilis	Plastid	CRK16_EUGLE	P21512^
Mesostigma viride	Plastid	CRK16_MESVI	Q9MUU3^
Chlorokybus atmophyticus	Plastid	CRK16_CHLAT	Q19VB1^
Cyanophora paradoxa	Plastid	CRK16_CYAPA	P23406^
Cyanidioschyzon merolae	Plastid	CRK16_CYAME	NP_849076
Cyanidium caldarium	Plastid	CRK16_CYACA	Q9TLT9^
Gracilaria tenuistipitata	Plastid	CRK16_GRATL	Q6B8W0^
Porphyridium purpureum	Plastid	CRK16_PORPH	P51307^
Galdieria sulphuraria	Plastid	CRK16_GALSU	XP_005705012
Thalassiosira pseudonana	Plastid	CRK16_THAPS	A0T0Y0^
Ectocarpus siliculosus	Plastid	CRK16_ECTSI	D1J745^
Phaeodactylum tricornutum	Plastid	CATP16_PHATC	A0T0I6^
Guillardia theta	Plastid	CRK16_GUITH	O46901^
Rhodomonas salina	Plastid	CRK16_RHDSA	A6MW08^
Vaucheria litorea	Plastid	CRK16_VAULI	B7T1X7^
Heterosigma akashiwo NIES-293	Plastid	CRK16_HETAK	B2XTE8^
Odontella sinensis	Plastid	CRK16_ODONT	P49553^
Emiliania huxleyi	Plastid	CRK16_EMIHU	Q4G358^
Paulinella chromatophora	Plastid	CRK16_PAUCH	B1X501^
Arabidopsis thaliana	Mitochondria	MRM16_ARATH	Q95747^
Zea mays	Mitochondria	MRM16_ZMAYS	YP_588319
Oryza sativa	Mitochondria	MRM16_ORYSJ	NP_001066902
Amborella trichopoda	Mitochondria	MRM16_AMBTC	AAW55714
Physcomitrella patens subsp. patens	Mitochondria	MRM16_PHYPA	YP_539035

Rps3

Gloeobacter violaceus PCC 7421	Cyanobacteria	CRPS3_PCC7421	NP_926867
Gloeobacter kilaueensis JS1	Cyanobacteria	CRPS3_GLOJS1	YP_008712590
Synechococcus sp. PCC 7336	Cyanobacteria	CRPS3_PCC7336	WP_017325545
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CRPS3_JA33A	YP_474623
Pseudanabaena sp. PCC 7367	Cyanobacteria	CRPS3_PCC7367	YP_007101810
Pseudanabaena sp. PCC 6802	Cyanobacteria	CRPS3_PCC6802	WP_019500662
Synechococcus sp. PCC 7502	Cyanobacteria	CRPS3_PCC7502	YP_007105040
Acaryochloris marina MBIC11017	Cyanobacteria	CRPS3_MB11017	YP_001518992
Cyanothece sp. PCC 7425	Cyanobacteria	CRPS3_PCC7425	YP_002482036
Thermosynechococcus elongatus BP-1	Cyanobacteria	CRPS3_BP1	NP_680878
Geitlerinema sp. PCC 7407	Cyanobacteria	CRPS3_PCC7407	YP_007108338
Leptolyngbya sp. PCC 7375	Cyanobacteria	CRPS3_PCC7375	WP_006515909

Prochlorothrix hollandica PCC 9006	Cyanobacteria	CRPS3_PCC9006	WP_017712308
Synechococcus elongatus PCC 7942	Cyanobacteria	CRPS3_PCC7942	YP_401243
Cyanobium sp. PCC 7001	Cyanobacteria	CRPS3_PCC7001	WP_006910865
Cyanobium gracile PCC 6307	Cyanobacteria	CRPS3_PCC6307	YP_007046297
Synechococcus sp. WH 5701	Cyanobacteria	CRPS3_WH5701	WP_006173350
Synechococcus sp. RS 9916	Cyanobacteria	CRPS3_RS9916	WP_007099883
Synechococcus sp. CC 9311	Cyanobacteria	CRPS3_CC9311	YP_729661
Synechococcus sp. WH 7805	Cyanobacteria	CRPS3_WH7805	WP_006042210
Synechococcus sp. BL 107	Cyanobacteria	CRPS3_BL107	WP_009788928
Synechococcus sp. CC 9605	Cyanobacteria	CRPS3_CC9605	YP_380701
Synechococcus sp. WH 8102	Cyanobacteria	CRPS3_WH8102	NP_898164
Prochlorococcus marinus MIT 9313	Cyanobacteria	CRPS3_MIT9313	NP_895565
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CRPS3_CCMP1375	NP_876097
Prochlorococcus marinus MIT 9211	Cyanobacteria	CRPS3_MIT9211	YP_001551557
Prochlorococcus marinus MIT 9312	Cyanobacteria	CRPS3_MIT9312	YP_398141
Prochlorococcus marinus MIT 9215	Cyanobacteria	CRPS3_MIT9215	YP_001485023
Prochlorococcus marinus AS 9601	Cyanobacteria	CRPS3_AS9601	YP_001010149
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CRPS3_MED4	NP_893669
Prochlorococcus marinus NATL 2A	Cyanobacteria	CRPS3_NATL2A	YP_292316
Synechococcus sp. RCC307	Cyanobacteria	CRPS3_RCC307	YP_001228378
Crinalium epipsammum PCC 9333	Cyanobacteria	CRPS3_PCC9333	YP_007142690
Microcoleus sp. PCC 7113	Cyanobacteria	CRPS3_PCC7113	YP_007125316
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CRPS3_PCC6712	2505786657*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CRPS3_PCC7437	YP_007134539
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CRPS3_PCC7202	YP_007165789
Synechococcus sp. PCC 7002	Cyanobacteria	CRPS3_PCC7002	YP_001734317
Gloeocapsa sp. PCC 73106	Cyanobacteria	CRPS3_PCC73106	WP_006528347
Cyanothece sp. PCC 7424	Cyanobacteria	CRPS3_PCC7424	YP_002378958
Microcystis aeruginosa NIES-843	Cyanobacteria	CRPS3_NIES843	YP_001660751
Pleurocapsa sp. PCC 7327	Cyanobacteria	CRPS3_PCC7327	YP_007082247
Synechocystis sp. PCC 6803	Cyanobacteria	CRPS3_PCC6803	NP_440663
Cyanothece sp. PCC 8801	Cyanobacteria	CRPS3_PCC8801	YP_002370505
Crocosphaera watsonii WH 8501	Cyanobacteria	CRPS3_PCC8501	WP_007306453
Cyanothece sp. ATCC 51142	Cyanobacteria	CRPS3_ATCC51142	YP_001805434
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CRPS3_UCYNA	646530807*
Halothece sp. PCC 7418	Cyanobacteria	CRPS3_PCC7418	YP_007169474
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CRPS3_PCC7203	YP_007089614
Synechocystis sp. PCC 7509	Cyanobacteria	CRPS3_PCC7509	2517696374*
Rivularia sp. PCC 7116	Cyanobacteria	CRPS3_PCC7116	YP_007055695
Nostoc punctiforme PCC 73102	Cyanobacteria	CRPS3_PCC73102	YP_001867700
Calothrix sp. PCC 7507	Cyanobacteria	CRPS3_PCC7507	YP_007066744
Nostoc azollae 0708	Cyanobacteria	CRPS3_az0708	YP_003721581
Raphidiopsis brookii D9	Cyanobacteria	CRPS3_RaphD9	WP_009344503
Nostoc sp. PCC 7107	Cyanobacteria	CRPS3_PCC7107	YP_007050361
Nostoc sp. PCC 7120	Cyanobacteria	CRPS3_PCC7120	NP_488249
Calothrix sp. PCC 6303	Cyanobacteria	CRPS3_PCC6303	YP_007140239
Mastigocladopsis repens PCC 10914	Cyanobacteria	CRPS3_PCC10914	2517239303*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CRPS3_PCC7702	WP_017321353
Fischerella sp. PCC 9605	Cyanobacteria	CRPS3_PCC9605	2516144586*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CRPS3_PCC6304	YP_007086256
Oscillatoria sp. PCC 6506	Cyanobacteria	CRPS3_PCC6506	648856839*
Microcoleus vaginatus FGP-2	Cyanobacteria	CRPS3_FGP2	EGK84840

Arthrospira maxima CS-328	Cyanobacteria	CRPS3_CS328	643173279*
Trichodesmium erythraeum IMS 101	Cyanobacteria	CRPS3_IMS101	YP_722634
MEL.A1	Melainabacteria	CRPS3_MELA1	MEL_A1_1_783
MEL.B1	Melainabacteria	CRPS3_MELB1	MEL_B1_2_45
MEL.B2	Melainabacteria	CRPS3_MELB2	MEL_B2_8_187
MEL.C1	Melainabacteria	CRPS3_MELC1	MEL_C1_1_304
MEL.C2	Melainabacteria	CRPS3_MELC2	MEL_C2_9_42
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MRPS3_RICPR	NP_221017
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MRPS3_RICTY	YP_067590
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MRPS3_CAUCR	NP_420067
Agrobacterium tumefaciens strain C58	α-proteobacteria	MRPS3_AGRTU	NP_354917
Arabidopsis thaliana	Plastid	CRR3_ARATH	P56798^
Oryza sativa subsp. japonica	Plastid	CRR3_ORYSJ	P0C485^
Zea mays	Plastid	CRR3_ZMAYS	P06586^
Amborella trichopoda	Plastid	CRR3_AMBTC	Q70XX2^
Pinus thunbergii	Plastid	CRR3_PINTH	P41635^
Cycas taitungensis	Plastid	CRR3_CYCTA	A6H5M0^
Gnetum parvifolium	Plastid	CRR3_GNETU	A6BM53^
Psilotum nudum	Plastid	CRR3_PSINU	Q8WHY4^
Anthoceros formosae	Plastid	CRR3_ANTFO	Q85CS9^
Marchantia polymorpha	Plastid	CRR3_MARPO	P06356^
Physcomitrella patens subsp. patens	Plastid	CRR3_PHYPA	Q6YXK8^
Zygnema circumcarinatum	Plastid	CRR3_ZYGCR	Q32RN6^
Staurastrum punctulatum	Plastid	CRR3_STAPU	Q32RV4^
Chaetosphaeridium globosum	Plastid	CRR3_CHAGL	Q8M9V0^
Chara vulgaris	Plastid	CRR3_CHAVU	Q1ACF9^
Chlamydomonas reinhardtii	Plastid	CRR3_CHLRE	Q08365^
Chlorella vulgaris	Plastid	CRR3_CHLVU	P56365^
Nephroselmis olivacea	Plastid	CRR3_NEPOL	Q9TL20^
Euglena gracilis	Plastid	CRR3_EUGLE	P19169^
Mesostigma viride	Plastid	CRR3_MESVI	Q9MUU2^
Chlorokybus atmophyticus	Plastid	CRR3_CHLAT	Q19VB0^
Cyanophora paradoxa	Plastid	CRR3_CYAPA	P23401^
Cyanidioschyzon merolae	Plastid	CRR3_CYAME	NP_849075
Cyanidium caldarium	Plastid	CRR3_CYACA	Q9TLT8^
Gracilaria tenuistipitata	Plastid	CRR3_GRATL	Q6B8V9^
Porphyridium purpureum	Plastid	CRR3_PORPH	P51308^
Galdieria sulphuraria	Plastid	CRR3_GALSU	XP_005705012
Thalassiosira pseudonana	Plastid	CRR3_THAPS	A0T0X9^
Ectocarpus siliculosus	Plastid	CRR3_ECTSI	D1J746^
Phaeodactylum tricornutum	Plastid	CRR3_PHATC	A0T0I5^
Guillardia theta	Plastid	CRR3_GUITH	O46900^
Rhodomonas salina	Plastid	CRR3_RHDSA	A6MW07^
Vaucheria litorea	Plastid	CRR3_VAULI	B7T1X8^
Heterosigma akashiwo NIES-293	Plastid	CRR3_HETAK	B2XTE9^
Odontella sinensis	Plastid	CRR3_ODONT	P49491^
Emiliania huxleyi	Plastid	CRR3_EMIHU	Q4G359^
Paulinella chromatophora	Plastid	CRR3_PAUCH	B1X502^
Arabidopsis thaliana	Mitochondria	MRT03_ARATH	Q95749^
Zea mays	Mitochondria	MRT03_ZMAYS	RT03_MAIZE
Oryza sativa	Mitochondria	MRT03_ORYSJ	YP_514647

Amborella trichopoda	Mitochondria	MRT03_AMBTC	AHA47109
Physcomitrella patens subsp. patens	Mitochondria	MRT03_PHYPA	YP_539034

Rps12

Gloeobacter violaceus PCC 7421	Cyanobacteria	CRPS12_PCC7421	NP_926871
Gloeobacter kilaueensis JS1	Cyanobacteria	CRPS12_GLOJS1	AGY58887
Synechococcus sp. PCC 7336	Cyanobacteria	CRPS12_PCC7336	WP_017326999
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CRPS12_JA33A	YP_474743
Pseudanabaena sp. PCC 7367	Cyanobacteria	CRPS12_PCC7367	YP_007101914
Pseudanabaena sp. PCC 6802	Cyanobacteria	CRPS12_PCC6802	WP_019502049
Synechococcus sp. PCC 7502	Cyanobacteria	CRPS12_PCC7502	YP_007106574
Acaryochloris marina MBIC11017	Cyanobacteria	CRPS12_MB11017	YP_001516132
Cyanothece sp. PCC 7425	Cyanobacteria	CRPS12_PCC7425	|YP_002481459
Thermosynechococcus elongatus BP-1	Cyanobacteria	CRPS12_BP1	NP_682537
Geitlerinema sp. PCC 7407	Cyanobacteria	CRPS12_PCC7407	YP_007110354
Leptolyngbya sp. PCC 7375	Cyanobacteria	CRPS12_PCC7375	EKV01437
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CRPS12_PCC9006	WP_017712398
Synechococcus elongatus PCC 7942	Cyanobacteria	CRPS12_PCC7942	ABB56917
Cyanobium sp. PCC 7001	Cyanobacteria	CRPS12_PCC7001	WP_006911035
Cyanobium gracile PCC 6307	Cyanobacteria	CRPS12_PCC6307	YP_007046340
Synechococcus sp. WH 5701	Cyanobacteria	CRPS12_WH5701	WP_006172306
Synechococcus sp. RS 9916	Cyanobacteria	CRPS12_RS9916	WP_007099836
Synechococcus sp. CC 9311	Cyanobacteria	CRPS12_CC9311	YP_729616
Synechococcus sp. WH 7805	Cyanobacteria	CRPS12_WH7805	EAR19136
Synechococcus sp. BL 107	Cyanobacteria	CRPS12_BL107	WP_009788870
Synechococcus sp. CC 9605	Cyanobacteria	CRPS12_CC9605	YP_380654
Synechococcus sp. WH 8102	Cyanobacteria	CRPS12_WH8102	NP_898226
Prochlorococcus marinus MIT 9313	Cyanobacteria	CRPS12_MIT9313	NP_895606
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CRPS12_CCMP1375	NP_876058
Prochlorococcus marinus MIT 9211	Cyanobacteria	CRPS12_MIT9211	WP_012196186
Prochlorococcus marinus MIT 9312	Cyanobacteria	CRPS12_MIT9312	YP_398099
Prochlorococcus marinus MIT 9215	Cyanobacteria	CRPS12_MIT9215	YP_001484978
Prochlorococcus marinus AS 9601	Cyanobacteria	CRPS12_AS9601	ABM70997
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CRPS12_MED4	CAE19970
Prochlorococcus marinus NATL 2A	Cyanobacteria	CRPS12_NATL2A	YP_292270
Synechococcus sp. RCC307	Cyanobacteria	CRPS12_RCC307	YP_001228423
Crinalium epipsammum PCC 9333	Cyanobacteria	CRPS12_PCC9333	YP_007143368
Microcoleus sp. PCC 7113	Cyanobacteria	CRPS12_PCC7113	YP_007125220
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CRPS12_PCC6712	2505785957*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CRPS12_PCC7437	YP_007132797
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CRPS12_PCC7202	YP_007165638
Synechococcus sp. PCC 7002	Cyanobacteria	CRPS12_PCC7002	YP_001735306
Gloeocapsa sp. PCC 73106	Cyanobacteria	CRPS12_PCC73106	WP_006530853
Cyanothece sp. PCC 7424	Cyanobacteria	CRPS12_PCC7424	ACK68525
Microcystis aeruginosa NIES-843	Cyanobacteria	CRPS12_NIES843	YP_001659293
Pleurocapsa sp. PCC 7327	Cyanobacteria	CRPS12_PCC7327	YP_007081492
Synechocystis sp. PCC 6803	Cyanobacteria	CRPS12_PCC6803	NP_441644
Cyanothece sp. PCC 8801	Cyanobacteria	CRPS12_PCC8801	YP_002371748
Crocosphaera watsonii WH 8501	Cyanobacteria	CRPS12_PCC8501	EAM51548
Cyanothece sp. ATCC 51142	Cyanobacteria	CRPS12_ATCC51142	YP_001805505

Unidentified cyanobacterium UCYN-A	Cyanobacteria	CRPS12_UCYNA	646530605*
Halothece sp. PCC 7418	Cyanobacteria	CRPS12_PCC7418	YP_007167787
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CRPS12_PCC7203	YP_007094039
Synechocystis sp. PCC 7509	Cyanobacteria	CRPS12_PCC7509	2517696110*
Rivularia sp. PCC 7116	Cyanobacteria	CRPS12_PCC7116	YP_007054185
Nostoc punctiforme PCC 73102	Cyanobacteria	CRPS12_PCC73102	YP_001867208
Calothrix sp. PCC 7507	Cyanobacteria	CRPS12_PCC7507	YP_007066177
Nostoc azollae 0708	Cyanobacteria	CRPS12_az0708	YP_003720250
Raphidiopsis brookii D9	Cyanobacteria	CRPS12_RaphD9	WP_009341970
Nostoc sp. PCC 7107	Cyanobacteria	CRPS12_PCC7107	YP_007050430
Nostoc sp. PCC 7120	Cyanobacteria	CRPS12_PCC7120	NP_488380
Calothrix sp. PCC 6303	Cyanobacteria	CRPS12_PCC6303	YP_007136528
Mastigocladopsis repens PCC 10914	Cyanobacteria	CRPS12_PCC10914	2517239883*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CRPS12_PCC7702	WP_017320514
Fischerella sp. PCC 9605	Cyanobacteria	CRPS12_PCC9605	2516143375*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CRPS12_PCC6304	YP_007087629
Oscillatoria sp. PCC 6506	Cyanobacteria	CRPS12_PCC6506	648856581*
Microcoleus vaginatus FGP-2	Cyanobacteria	CRPS12_FGP2	EGK89511
Arthrospira maxima CS-328	Cyanobacteria	CRPS12_CS328	EDZ93699
Trichodesmium erythraeum IMS 101	Cyanobacteria	CRPS12_IMS101	YP_720402
MEL.A1	Melainabacteria	CRPS12_MELA1	MEL_A1_1_230
MEL.B1	Melainabacteria	CRPS12_MELB1	MEL_B1_4_300
MEL.B2	Melainabacteria	CRPS12_MELB2	MEL_B2_3_303
MEL.C1	Melainabacteria	CRPS12_MELC1	MEL_C1_1_951
MEL.C2	Melainabacteria	CRPS12_MELC2	MEL_C2_1_617
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MRPS12_RICPR	NP_220522
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	MRPS12_RICTY	YP_067087
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	MRPS12_CAUCR	NP_421996
Agrobacterium tumefaciens strain C58	α-proteobacteria	MRPS12_AGRTU	NP_354927
Arabidopsis thaliana	Plastid	CRR12_ARATH	P62126
Oryza sativa subsp. japonica	Plastid	CRR12_ORYSJ	P12149
Zea mays	Plastid	CRR12_ZMAYS	P12340
Amborella trichopoda	Plastid	CRR12_AMBTC	Q70XU7
Pinus thunbergii	Plastid	CRR12_PINTH	P52762
Cycas taitungensis	Plastid	CRR12_CYCTA	YP_001312168
Gnetum parvifolium	Plastid	CRR12_GNETU	BAF64903
Psilotum nudum	Plastid	CRR12_PSINU	Q8W8R9^
Anthoceros formosae	Plastid	CRR12_ANTFO	Q85BW6^
Marchantia polymorpha	Plastid	CRR12_MARPO	P06368^
Physcomitrella patens subsp. patens	Plastid	CRR12_PHYPA	Q6YXM6^
Zygnema circumcarinatum	Plastid	CRR12_ZYGCR	Q32RQ9^
Staurastrum punctulatum	Plastid	CRR12_STAPU	Q32S12^
Chaetosphaeridium globosum	Plastid	CRR12_CHAGL	Q8MA18^
Chara vulgaris	Plastid	CRR12_CHAVU	Q1ACP3^
Chlamydomonas reinhardtii	Plastid	CRR12_CHLRE	P14149^
Chlorella vulgaris	Plastid	CRR12_CHLVU	P56354^
Nephroselmis olivacea	Plastid	CRR12_NEPOL	Q9TKZ7^
Euglena gracilis	Plastid	CRR12_EUGLE	P02368^
Mesostigma viride	Plastid	CRR12_MESVI	Q9MUP2^
Chlorokybus atmophyticus	Plastid	CRR12_CHLAT	Q19V72^
Cyanophora paradoxa	Plastid	CRR12_CYAPA	P17294^

Cyanidioschyzon merolae	Plastid	CRR12_CYAME	NP_849094
Cyanidium caldarium	Plastid	CRR12_CYACA	Q9TLV6^
Gracilaria tenuistipitata	Plastid	CRR12_GRATL	Q6B8X8^
Porphyridium purpureum	Plastid	CRR12_PORPH	P51289^
Galdieria sulphuraria	Plastid	CRR12_GALSU	XP_005705006
Thalassiosira pseudonana	Plastid	CRR12_THAPS	A0T0Z8^
Ectocarpus siliculosus	Plastid	CRR12_ECTSI	D1J727^
Phaeodactylum tricornutum	Plastid	CRR12_PHATC	A0T0K4^
Guillardia theta	Plastid	CRR12_GUITH	P19461^
Rhodomonas salina	Plastid	CRR12_RHDSA	YP_001293605
Vaucheria litorea	Plastid	CRR12_VAULI	B7T1V9^
Heterosigma akashiwo NIES-293	Plastid	CRR12_HETAK	B2XTD0^
Odontella sinensis	Plastid	CRR12_ODONT	P49500^
Emiliania huxleyi	Plastid	CRR12_EMIHU	Q4G344^
Paulinella chromatophora	Plastid	CRR12_PAUCH	B1X4W9^
Arabidopsis thaliana	Mitochondria	MRT12_ARATH	P92532^
Zea mays	Mitochondria	MRT12_ZMAYS	YP_588353
Oryza sativa	Mitochondria	MRT12_ORYSJ	YP_514650
Amborella trichopoda	Mitochondria	MRT12_AMBTC	AHA47102
Physcomitrella patens subsp. patens	Mitochondria	MRT12_PHYPA	YP_539020

Elongation factor Tu (Ef-Tu)

Gloeobacter violaceus PCC 7421	Cyanobacteria	CEFTU_PCC7421	NP_926874
Gloeobacter kilaueensis JS1	Cyanobacteria	CEFTU_GLOJS1	YP_008712597
Synechococcus sp. PCC 7336	Cyanobacteria	CEFTU_PCC7336	WP_017327002
Synechococcus sp. JA-3-3Ab	Cyanobacteria	CEFTU_JA33A	YP_474746
Pseudanabaena sp. PCC 7367	Cyanobacteria	CEFTU_PCC7367	YP_007101917
Pseudanabaena sp. PCC 6802	Cyanobacteria	CEFTU_PCC6802	WP_019502052
Synechococcus sp. PCC 7502	Cyanobacteria	CEFTU_PCC7502	YP_007106577
Acaryochloris marina MBIC11017	Cyanobacteria	CEFTU_MB11017	YP_001516129
Cyanothece sp. PCC 7425	Cyanobacteria	CEFTU_PCC7425	YP_002481456
Thermosynechococcus elongatus BP-1	Cyanobacteria	CEFTU_BP1	NP_682540
Geitlerinema sp. PCC 7407	Cyanobacteria	CEFTU_PCC7407	YP_007110357
Leptolyngbya sp. PCC 7375	Cyanobacteria	CEFTU_PCC7375	WP_006515831
Prochlorothrix hollandica PCC 9006	Cyanobacteria	CEFTU_PCC9006	WP_017712396
Synechococcus elongatus PCC 7942	Cyanobacteria	CEFTU_PCC7942	YP_399901
Cyanobium sp. PCC 7001	Cyanobacteria	CEFTU_PCC7001	WP_006910634
Cyanobium gracile PCC 6307	Cyanobacteria	CEFTU_PCC6307	YP_007046343
Synechococcus sp. WH 5701	Cyanobacteria	CEFTU_WH5701	WP_006172310
Synechococcus sp. RS 9916	Cyanobacteria	CEFTU_RS9916	WP_007099833
Synechococcus sp. CC 9311	Cyanobacteria	CEFTU_CC9311	638113970*
Synechococcus sp. WH 7805	Cyanobacteria	CEFTU_WH7805	WP_006042264
Synechococcus sp. BL 107	Cyanobacteria	CEFTU_BL107	WP_009788867
Synechococcus sp. CC 9605	Cyanobacteria	CEFTU_CC9605	YP_380651
Synechococcus sp. WH 8102	Cyanobacteria	CEFTU_WH8102	NP_898229
Prochlorococcus marinus MIT 9313	Cyanobacteria	CEFTU_MIT9313	NP_895609
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	CEFTU_CCMP1375	NP_876055
Prochlorococcus marinus MIT 9211	Cyanobacteria	CEFTU_MIT9211	YP_001551516
Prochlorococcus marinus MIT 9312	Cyanobacteria	CEFTU_MIT9312	YP_398096
Prochlorococcus marinus MIT 9215	Cyanobacteria	CEFTU_MIT9215	YP_001484975
Prochlorococcus marinus AS 9601	Cyanobacteria	CEFTU_AS9601	YP_001010101

Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	CEFTU_MED4	NP_893625
Prochlorococcus marinus NATL 2A	Cyanobacteria	CEFTU_NATL2A	YP_292267
Synechococcus sp. RCC307	Cyanobacteria	CEFTU_RCC307	YP_001228426
Crinalium epipsammum PCC 9333	Cyanobacteria	CEFTU_PCC9333	YP_007143371
Microcoleus sp. PCC 7113	Cyanobacteria	CEFTU_PCC7113	YP_007125217
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	CEFTU_PCC6712	2505785960*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	CEFTU_PCC7437	AFZ35828
Cyanobacterium stanieri PCC 7202	Cyanobacteria	CEFTU_PCC7202	YP_007165641
Synechococcus sp. PCC 7002	Cyanobacteria	CEFTU_PCC7002	YP_001735303
Gloeocapsa sp. PCC 73106	Cyanobacteria	CEFTU_PCC73106	WP_006530856
Cyanothece sp. PCC 7424	Cyanobacteria	CEFTU_PCC7424	YP_002375390
Microcystis aeruginosa NIES-843	Cyanobacteria	CEFTU_NIES843	YP_001659290
Pleurocapsa sp. PCC 7327	Cyanobacteria	CEFTU_PCC7327	YP_007081495
Synechocystis sp. PCC 6803	Cyanobacteria	CEFTU_PCC6803	NP_441641
Cyanothece sp. PCC 8801	Cyanobacteria	CEFTU_PCC8801	YP_002371745
Crocosphaera watsonii WH 8501	Cyanobacteria	CEFTU_PCC8501	EAM51552
Cyanothece sp. ATCC 51142	Cyanobacteria	CEFTU_ATCC51142	YP_001805502
Unidentified cyanobacterium UCYN-A	Cyanobacteria	CEFTU_UCYNA	646530608*
Halothece sp. PCC 7418	Cyanobacteria	CEFTU_PCC7418	YP_007167784
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	CEFTU_PCC7203	YP_007094036
Synechocystis sp. PCC 7509	Cyanobacteria	CEFTU_PCC7509	2517696113*
Rivularia sp. PCC 7116	Cyanobacteria	CEFTU_PCC7116	YP_007054182
Nostoc punctiforme PCC 73102	Cyanobacteria	CEFTU_PCC73102	YP_001867211
Calothrix sp. PCC 7507	Cyanobacteria	CEFTU_PCC7507	YP_007066180
Nostoc azollae 0708	Cyanobacteria	CEFTU_az0708	YP_003720253
Raphidiopsis brookii D9	Cyanobacteria	CEFTU_RaphD9	WP_009341973
Nostoc sp. PCC 7107	Cyanobacteria	CEFTU_PCC7107	YP_007050433
Nostoc sp. PCC 7120	Cyanobacteria	CEFTU_PCC7120	NP_488377
Calothrix sp. PCC 6303	Cyanobacteria	CEFTU_PCC6303	YP_007136531
Mastigocladopsis repens PCC 10914	Cyanobacteria	CEFTU_PCC10914	2517239887*
unidentified cyanobacterium PCC 7702	Cyanobacteria	CEFTU_PCC7702	2512632926*
Fischerella sp. PCC 9605	Cyanobacteria	CEFTU_PCC9605	2516143372*
Oscillatoria acuminata PCC 6304	Cyanobacteria	CEFTU_PCC6304	YP_007087632
Oscillatoria sp. PCC 6506	Cyanobacteria	CEFTU_PCC6506	648856584*
Microcoleus vaginatus FGP-2	Cyanobacteria	CEFTU_FGP2	EGK85641
Arthrospira maxima CS-328	Cyanobacteria	CEFTU_CS328	EDZ92394
Trichodesmium erythraeum IMS 101	Cyanobacteria	CEFTU_IMS101	YP_720405
MEL.A1	Melainabacteria	CEFTU_MELA1	MEL_A1_1_1612
MEL.B1	Melainabacteria	CEFTU_MELB1	MEL_B1_1_233
MEL.B2	Melainabacteria	CEFTU_MELB2	MEL_B2_1_87
MEL.C1	Melainabacteria	CEFTU_MELC1	MEL_C1_1_1437
MEL.C2	Melainabacteria	CEFTU_MELC2	MEL_C2_1_944
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	MEFTU_RICPR	NP_221025
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	EFTU _RICTY	Q8KT95
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	EFTU _CAUCR	Q99QM0
Agrobacterium tumefaciens strain C58	α-proteobacteria	EFTU _AGRTU	Q8UE16
Arabidopsis thaliana	Plastid	CEFTU _ARATH	P17745
Oryza sativa subsp. japonica	Plastid	CEFTU _ORYSJ	Q6ZI53
Zea mays	Plastid	CEFTU _ZMAYS	NP_001150410
Amborella trichopoda	Plastid	CEFTU _AMBTC	XP_006852378
Pinus thunbergii	Plastid	-	-

Cycas taitungensis	Plastid	-	-
Gnetum parvifolium	Plastid	-	-
Psilotum nudum	Plastid	-	-
Anthoceros formosae	Plastid	-	-
Marchantia polymorpha	Plastid	-	-
Physcomitrella patens subsp. patens	Plastid	CEFTU _PHYPA	A9T0S0
Zygnema circumcarinatum	Plastid	-	-
Staurastrum punctulatum	Plastid	-	-
Chaetosphaeridium globosum	Plastid	CEFTU_CHAGL	Q8M9W7
Chara vulgaris	Plastid	CEFTU_CHAVU	Q1ACI3
Chlamydomonas reinhardtii	Plastid	CEFTU _CHLRE	P17746
Chlorella vulgaris	Plastid	CEFTU_CHLVU	P56292
Nephroselmis olivacea	Plastid	CEFTU_NEPOL	Q9TKZ5
Euglena gracilis	Plastid	CEFTU _EUGLE	P02991
Mesostigma viride	Plastid	CEFTU_MESVI	Q9MUP0
Chlorokybus atmophyticus	Plastid	CEFTU_CHLAT	A2CI56
Cyanophora paradoxa	Plastid	CEFTU_CYAPA	P17245
Cyanidioschyzon merolae	Plastid	CEFTU _CYAME	Q85FT7
Cyanidium caldarium	Plastid	CEFTU _CYACA	Q9TLV8
Gracilaria tenuistipitata	Plastid	CEFTU_GRATL	Q6B8Y0
Porphyridium purpureum	Plastid	CEFTU_PORPH	YP_008965715
Galdieria sulphuraria	Plastid	CEFTU_GALSU	XP_005705004
Thalassiosira pseudonana	Plastid	CEFTU _THAPS	A0T100
Ectocarpus siliculosus	Plastid	CEFTU _ECTSI	D1J725
Phaeodactylum tricornutum	Plastid	CEFTU _PHATC	A0T0K6
Guillardia theta	Plastid	CEFTU_GUITH	P19457
Rhodomonas salina	Plastid	CEFTU_RHDSA	A6MW28
Vaucheria litorea	Plastid	CEFTU_VAULI	B7T1V7
Heterosigma akashiwo NIES-293	Plastid	CEFTU_HETAK	B2XTC8
Odontella sinensis	Plastid	CEFTU_ODONT	P49462
Emiliania huxleyi	Plastid	CEFTU_EMIHU	Q4G342
Paulinella chromatophora	Plastid	CEFTU_PAUCH	B1X4W6
Arabidopsis thaliana	Mitochondria	MEFTU _ARATH	Q9ZT91
Zea mays	Mitochondria	MEFTU_ZMAYS	NP_001132561
Oryza sativa	Mitochondria	MEFTU _ORYSJ	Q851Y8
Amborella trichopoda	Mitochondria	MEFTU _AMBTC	XP_006850810
Physcomitrella patens subsp. patens	Mitochondria	MEFTU _PHYPA	A9T9Z0

16S rRNA

Gloeobacter violaceus PCC 7421	Cyanobacteria	*C16S_PCC7421*	640702702*
Gloeobacter kilaueensis JS1	Cyanobacteria	*C16S_GLOJS1*	2558547284*
Synechococcus sp. PCC 7336	Cyanobacteria	*C16S_PCC7336*	2506747183*
Synechococcus sp. JA-3-3Ab	Cyanobacteria	*C16S_JA33A*	640712358*
Pseudanabaena sp. PCC 7367	Cyanobacteria	*C16S_PCC7367*	2504679805*
Pseudanabaena sp. PCC 6802	Cyanobacteria	*C16S_PCC6802*	2507085377*
Synechococcus sp. PCC 7502	Cyanobacteria	*C16S_PCC7502*	2508688641*
Acaryochloris marina MBIC11017	Cyanobacteria	*C16S_MB11017*	641250527*
Cyanothece sp. PCC 7425	Cyanobacteria	*C16S_PCC7425*	643583731*
Thermosynechococcus elongatus BP-1	Cyanobacteria	*C16S_BP1*	640699160*
Geitlerinema sp. PCC 7407	Cyanobacteria	*C16S_PCC7407*	2503606178*
Leptolyngbya sp. PCC 7375	Cyanobacteria	*C16S_PCC7375*	2509844872*
Prochlorothrix hollandica PCC 9006	Cyanobacteria	*C16S_PCC9006*	2509500491*

Synechococcus elongatus PCC 7942	Cyanobacteria	*C16S_PCC7942*	640711024*
Cyanobium sp. PCC 7001	Cyanobacteria	*C16S_PCC7001*	650637419*
Cyanobium gracile PCC 6307	Cyanobacteria	*C16S_PCC6307*	2508551987*
Synechococcus sp. WH 5701	Cyanobacteria	*C16S_WH5701*	642973163*
Synechococcus sp. RS 9916	Cyanobacteria	*C16S_RS9916*	642973299*
Synechococcus sp. CC 9311	Cyanobacteria	*C16S_CC9311*	640717164*
Synechococcus sp. WH 7805	Cyanobacteria	*C16S_WH7805*	642511096*
Synechococcus sp. BL 107	Cyanobacteria	*C16S_BL107*	642973298*
Synechococcus sp. CC 9605	Cyanobacteria	*C16S_CC9605*	640710466*
Synechococcus sp. WH 8102	Cyanobacteria	*C16S_WH8102*	640702396*
Prochlorococcus marinus MIT 9313	Cyanobacteria	*C16S_MIT9313*	640702415*
Prochlorococcus marinus, subsp. marinus CCMP 1375	Cyanobacteria	*C16S_CCMP1375*	640702236*
Prochlorococcus marinus MIT 9211	Cyanobacteria	*C16S_MIT9211*	641284713*
Prochlorococcus marinus MIT 9312	Cyanobacteria	*C16S_MIT9312*	640710979*
Prochlorococcus marinus MIT 9215	Cyanobacteria	*C16S_MIT9215*	640942947*
Prochlorococcus marinus AS 9601	Cyanobacteria	*C16S_AS9601*	640722728*
Prochlorococcus marinus, subsp. pastoris CCMP 1986	Cyanobacteria	*C16S_MED4*	640702476*
Prochlorococcus marinus NATL 2A	Cyanobacteria	*C16S_NATL2A*	640708773*
Synechococcus sp. RCC307	Cyanobacteria	*C16S_RCC307*	640545287*
Crinalium epipsammum PCC 9333	Cyanobacteria	*C16S_PCC9333*	2504685343*
Microcoleus sp. PCC 7113	Cyanobacteria	*C16S_PCC7113*	2509431865*
Chroococcidiopsis sp. PCC 6712	Cyanobacteria	*C16S_PCC6712*	2505788198*
Stanieria cyanosphaera PCC 7437	Cyanobacteria	*C16S_PCC7437*	2503798462*
Cyanobacterium stanieri PCC 7202	Cyanobacteria	*C16S_PCC7202*	2503368306*
Synechococcus sp. PCC 7002	Cyanobacteria	*C16S_PCC7002*	641611405*
Gloeocapsa sp. PCC 73106	Cyanobacteria	*C16S_PCC73106*	2508647884*
Cyanothece sp. PCC 7424	Cyanobacteria	*C16S_PCC7424*	643479478*
Microcystis aeruginosa NIES-843	Cyanobacteria	*C16S_NIES843*	641536100*
Pleurocapsa sp. PCC 7327	Cyanobacteria	*C16S_PCC7327*	2509572285*
Synechocystis sp. PCC 6803	Cyanobacteria	*C16S_PCC6803*	640691548*
Cyanothece sp. PCC 8801	Cyanobacteria	*C16S_PCC8801*	643475451*
Crocosphaera watsonii WH 8501	Cyanobacteria	*C16S_PCC8501*	638430232*
Cyanothece sp. ATCC 51142	Cyanobacteria	*C16S_ATCC51142*	641678317*
Unidentified cyanobacterium UCYN-A	Cyanobacteria	*C16S_UCYNA*	646529810*
Halothece sp. PCC 7418	Cyanobacteria	*C16S_PCC7418*	2503634863*
Chroococcidiopsis thermalis PCC 7203	Cyanobacteria	*C16S_PCC7203*	2503615230*
Synechocystis sp. PCC 7509	Cyanobacteria	*C16S_PCC7509*	2508657921*
Rivularia sp. PCC 7116	Cyanobacteria	*C16S_PCC7116*	2510090402*
Nostoc punctiforme PCC 73102	Cyanobacteria	*C16S_PCC73102*	642600875*
Calothrix sp. PCC 7507	Cyanobacteria	*C16S_PCC7507*	2505800025*
Nostoc azollae 0708	Cyanobacteria	*C16S_az0708*	648049172*
Raphidiopsis brookii D9	Cyanobacteria	*C16S_RaphD9*	647108819*
Nostoc sp. PCC 7107	Cyanobacteria	*C16S_PCC7107*	2503738781*
Nostoc sp. PCC 7120	Cyanobacteria	*C16S_PCC7120*	640697071*
Calothrix sp. PCC 6303	Cyanobacteria	*C16S_PCC6303*	2504094582*
Mastigocladopsis repens PCC 10914	Cyanobacteria	*C16S_PCC10914*	2509766026*
unidentified cyanobacterium PCC 7702	Cyanobacteria	*C16S_PCC7702*	2510067751*
Fischerella sp. PCC 9605	Cyanobacteria	*C16S_PCC9605*	2509466994*
Oscillatoria acuminata PCC 6304	Cyanobacteria	*C16S_PCC6304*	2509421008*
Oscillatoria sp. PCC 6506	Cyanobacteria	*C16S_PCC6506*	648855648*
Microcoleus vaginatus FGP-2	Cyanobacteria	*C16S_FGP2*	2506350421*
Arthrospira maxima CS-328	Cyanobacteria	*C16S_CS328*	643170170*

Trichodesmium erythraeum IMS 101	Cyanobacteria	*C16S_IMS101*	640717042*
MEL.A1	Melainabacteria	*C16S_MELA1*	MEL.A1:1475143-1476620
MEL.B1	Melainabacteria	*C16S_MELB1*	MEL.B1.014:69-1548
MEL.B2	Melainabacteria	*C16S_MELB2*	MEL.B2.006:106631-108110
MEL.C1	Melainabacteria	*C16S_MEL.C1*	MEL.C1.001:1614960-1616437
MEL.C2	Melainabacteria	*C16S_MEL.C2*	MEL.C2.004:3589-4880
Rickettsia prowazekii strain, Madrid E	α-proteobacteria	M16S_RICPR	CP004889
Rickettsia typhi strain ATCC VR-144	α-proteobacteria	M16S_RICTY	AE017197
Caulobacter crescentus strain ATCC 19089	α-proteobacteria	M16S_CAUCR	640693787*
Agrobacterium tumefaciens strain C58	α-proteobacteria	M16S_AGRTU	640697261*
Arabidopsis thaliana	Plastid	C16S_ARATH	AP000423
Oryza sativa subsp. Japonica	Plastid	C16S_ORYSJ	AY522331
Zea mays	Plastid	C16S_ZMAYS	X86563
Amborella trichopoda	Plastid	C16S_AMBTC	DQ629447
Pinus thunbergii	Plastid	C16S_PINTH	D17510
Cycas taitungensis	Plastid	C16S_CYCTA	AP009339
Gnetum leyboldii	Plastid	C16S_GNETU	AF244555
Psilotum nudum	Plastid	C16S_PSINU	PNU24590
Anthoceros formosae	Plastid	C16S_ANTFO	AB087477
Marchantia polymorpha	Plastid	C16S_MARPO	X04465
Physcomitrella patens subsp. patens	Plastid	C16S_PHYPA	AP005672
Zygnema circumcarinatum	Plastid	C16S_ZYGCR	AY958086
Staurastrum punctulatum	Plastid	C16S_STAPU	AY958085
Chaetosphaeridium globosum	Plastid	C16S_CHAGL	AF393583
Chara vulgaris	Plastid	C16S_CHAVU	DQ229107
Chlamydomonas reinhardtii	Plastid	C16S_CHLRE	BK000554
Chlorella vulgaris	Plastid	C16S_CHLVU	D11347
Nephroselmis olivacea	Plastid	C16S_NEPOL	AF137379
Euglena gracilis	Plastid	C16S_EUGLE	X70810
Mesostigma viride	Plastid	C16S_MESVI	AF166114
Chlorokybus atmophyticus	Plastid	C16S_CHLAT	DQ629495
Cyanophora paradoxa	Plastid	C16S_CYAPA	X81840
Cyanidioschyzon merolae	Plastid	C16S_CYAME	AF545617
Cyanidium caldarium	Plastid	C16S_CYACA	X52985
Gracilaria tenuistipitata	Plastid	C16S_GRATL	AY673996
Porphyridium purpureum	Plastid	C16S_PORPH	AP012987
Galdieria sulphuraria	Plastid	C16S_GALSU	AF170718
Thalassiosira pseudonana	Plastid	C16S_THAPS	EF067921
Ectocarpus siliculosus	Plastid	C16S_ECTSI	FP102296
Phaeodactylum tricornutum	Plastid	C16S_PHATC	EF067920
Guillardia theta	Plastid	C16S_GUITH	AF041468
Rhodomonas salina	Plastid	C16S_RHDSA	EF508371
Vaucheria litorea	Plastid	C16S_VAULI	EU912438
Heterosigma akashiwo NIES-293	Plastid	C16S_HETAK	M34370
Odontella sinensis	Plastid	C16S_ODONT	AJ536457
Emiliania huxleyi	Plastid	C16S_EMIHU	X82156
Paulinella chromatophora	Plastid	C16S_PAUCH	CP000815
Arabidopsis thaliana	Mitochondria	M16S_ARATH	Y08501
Zea mays	Mitochondria	M16S_ZMAYS	DQ490951
Oryza sativa	Mitochondria	M16S_ORYSJ	BA000029
Amborella trichopoda	Mitochondria	M16S_AMBTC	AF193987

Physcomitrella patens subsp. patens	Mitochondria	M16S_PHYPA	AB251495

*IMG Gene Object ID

^ Uniprot Accession

Melainabacteria Accessions are from ggKbase

Table S2. Time estimates for major divergence events. All runs utilize all land plant calibration priors as described in the Materials and Methods section. Description column provides the 'later' priors that were used in each specific run used in the study. Dates are in Ma, and parentheses denote the 95% highest posterior density. 'n/a' signifies the inability of the recovered topology to support the divergence of a monophyletic clade between Melainabacteria and Oxyphotobacteria. Consistent with the lateral acquisition of the C-family O_2 reductase into specific Melainabacteria for aerobic respiration, all molecular clock analyses support the divergence of Obscuribacter after the rise of oxygen. *prior was set on just the Oxyphotobacterial clade.

Run	"Rise of Oxygen" prior	Bangiomorpha prior	Melainabacteria/ Oxyphotobacteria split	Crown Oxyphotobacteria	Mitochondrial Endosymbiosis	Plastid Endosymbiosis	Obscuribacter divergence
T64	yes	yes	2630 (2400-2930)	2071 (1805-2393)	1520 (1107-2071)	1623 (1441-1825)	1699 (1075-2216)
T65	yes	no	2536 (2400-2853)	1909 (1556-2254)	1456 (1035-1931)	1396 (1236-1760)	1616 (1075-2177)
T68	no	yes	2541 (2090-3066)	2024 (1723-2374)	1551 (1104-2165)	1607 (1414-1819)	1610 (922-2240)
T69	no	no	2238 (1750-2790)	1741 (1361-2161)	1385 (1000-1872)	1364 (1204-1853)	1435 (886-2039)
T72	yes*	yes	n/a	2494 (2400-2761)	1346 (963-1979)	1683 (1475-1882)	1706 (1117-2444)
T73	yes*	no	n/a	2488 (2400-2749)	1563 (1064-2150)	1634 (1350-1922)	1801 (1159-2580)