

Supplemental information

Common origin of Ornithine-Urea Cycle in opisthokonts and stramenopiles.

Aleš Horák^{1,2}, Andrew Allen^{3,4}, Miroslav Oborník^{1,2}

¹ Biology Centre, Czech Academy of Sciences, Institute of Parasitology, Branišovská 31, 37005 České Budějovice, Czech Republic

² University of South Bohemia, Faculty of Science, Department of Molecular Biology, Branišovská 31, 37005 České Budějovice, Czech Republic

³J. Craig Venter Institute, San Diego, 10355 Science Center Drive, California 92121, USA

⁴Scripps Institution of Oceanography, 9500 Gilman Drive, La Jolla, California 92093, USA

Address for correspondence: obornik@paru.cas.cz

Supplemental Figure legends:

Supplemental Figure S1. Unsimplified maximum likelihood phylogeny of Carbamoyl Phosphate Synthetase (CPS) based on the alignment of 1283 aminoacids from 171 taxa. The tree was inferred using the LG+C40 model in IQTree 1.5. Numbers at nodes represent ultrafast bootstrap support estimated from 10000 replication in IQTree under the above-specified model as well as the Bayesian Posterior Probabilities computed in Phylobayes 4.1 (details described in Methods). Only bootstrap support over 84/posterior probabilities of 0.95 and higher are shown. Dash symbol indicates the topology in one of the methods used did not meet the support values described above, d.t. stands for different topology.

Supplemental Figure S2. Unsimplified maximum likelihood phylogeny of Argininosuccinate Lyase (ASL) based on the alignment of 436 aminoacids from 94 taxa. The tree was inferred using the LG+C40 model in IQTree 1.5. Numbers at nodes represent ultrafast bootstrap support estimated from 10000 replication in IQTree under the above-specified model as well as the Bayesian Posterior probabilities computed in Phylobayes 4.1 (details described in Methods). Only bootstrap support over 84/posterior probabilities of 0.95 and higher are shown. Dash symbol indicates the topology in one of the methods used did not meet the support values described above, d.t. stands for different topology.

Supplemental Figure S3. Unsimplified maximum likelihood phylogeny of Ornithine Transcarbamoylase (OTC) based on the alignment of 269 aminoacids from 161 taxa. The tree was inferred using the LG+C40 model in IQTree 1.5. Numbers at nodes represent ultrafast bootstrap support estimated from 10000 replication in IQTree under the above-specified model as well as the Bayesian Posterior probabilities computed in Phylobayes 4.1 (details described in Methods). OTC sequences are rooted with the aspartate transcarbamoylase

(ATC), which is an OTC paralog stemming from an ancient duplication event. Only bootstrap support over 84/posterior probabilities of 0.95 and higher are shown. Dash symbol indicates the topology in one of the methods used did not meet the support values described above, d.t. stands for different topology.

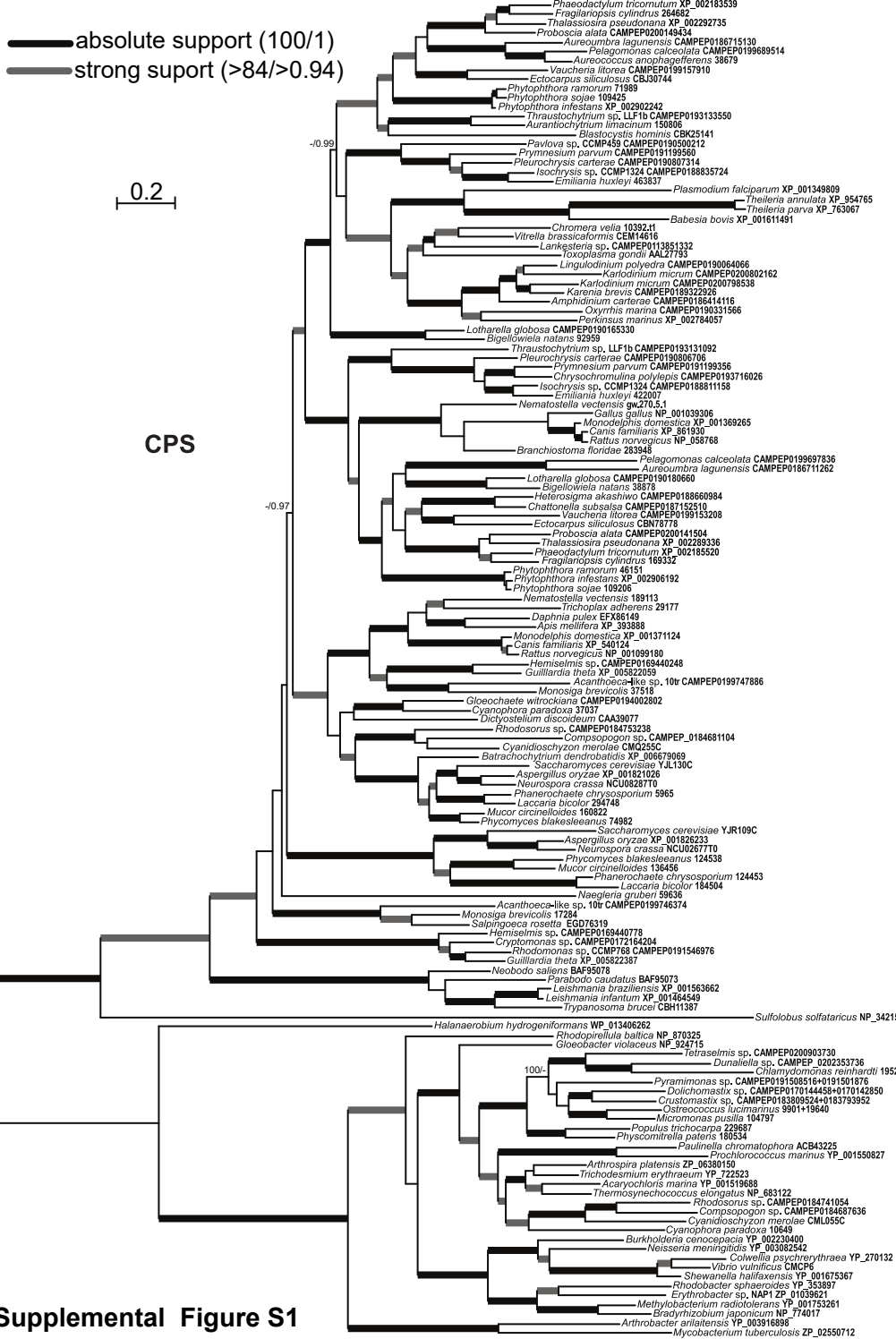
Supplemental Figure S4. Unsimplified maximum likelihood phylogeny of Argininosuccinate Synthase (ASuS) based on the alignment of 374 aminoacids from 118 taxa. The tree was inferred using the LG+C40 model in IQTree 1.5. Numbers at nodes represent ultrafast bootstrap support estimated from 10000 replication in IQTree under the above-specified model as well as the Bayesian Posterior probabilities computed in Phylobayes 4.1 (details described in Methods). Only bootstrap support over 84/posterior probabilities of 0.95 and higher are shown. Dash symbol indicates the topology in one of the methods used did not meet the support values described above, d.t. stands for different topology.

Supplemental Figure S5. Unsimplified maximum likelihood phylogeny of Arginase (ARG) based on the alignment of 257 aminoacids from 114 taxa. The tree was inferred using the LG4X model in IQTree 1.5. Numbers at nodes represent ultrafast bootstrap support estimated from 10000 replication in IQTree under the above-specified model as well as the Bayesian Posterior probabilities computed in Phylobayes 4.1 (details described in Methods). ARG sequences are rooted with the agmatinase (AGM), which is an ARG paralog stemming from an ancient duplication event. Only bootstrap support over 84/posterior probabilities of 0.95 and higher are shown. Dash symbol indicates the topology in one of the methods used did not meet the support values described above, d.t. stands for different topology.

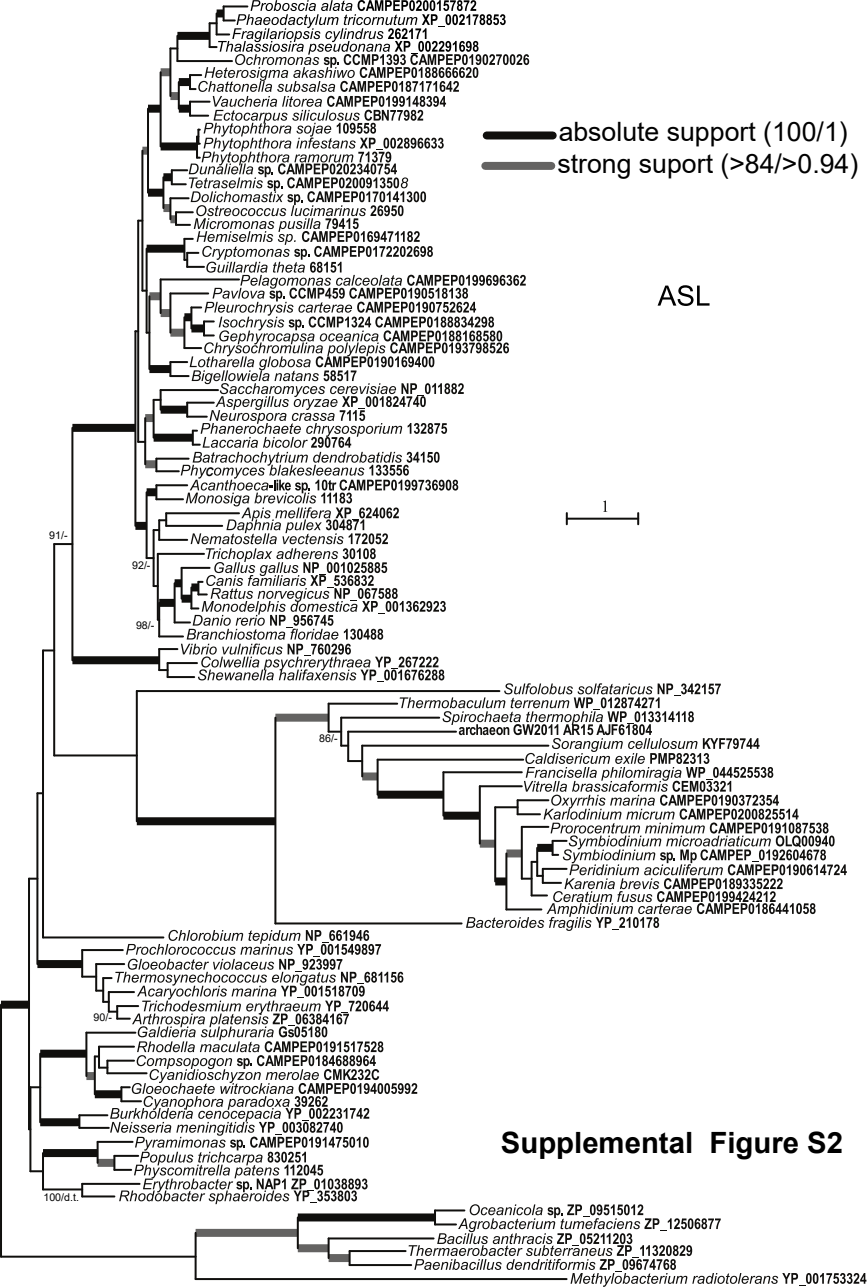
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 — strong suport (>84/>0.94)

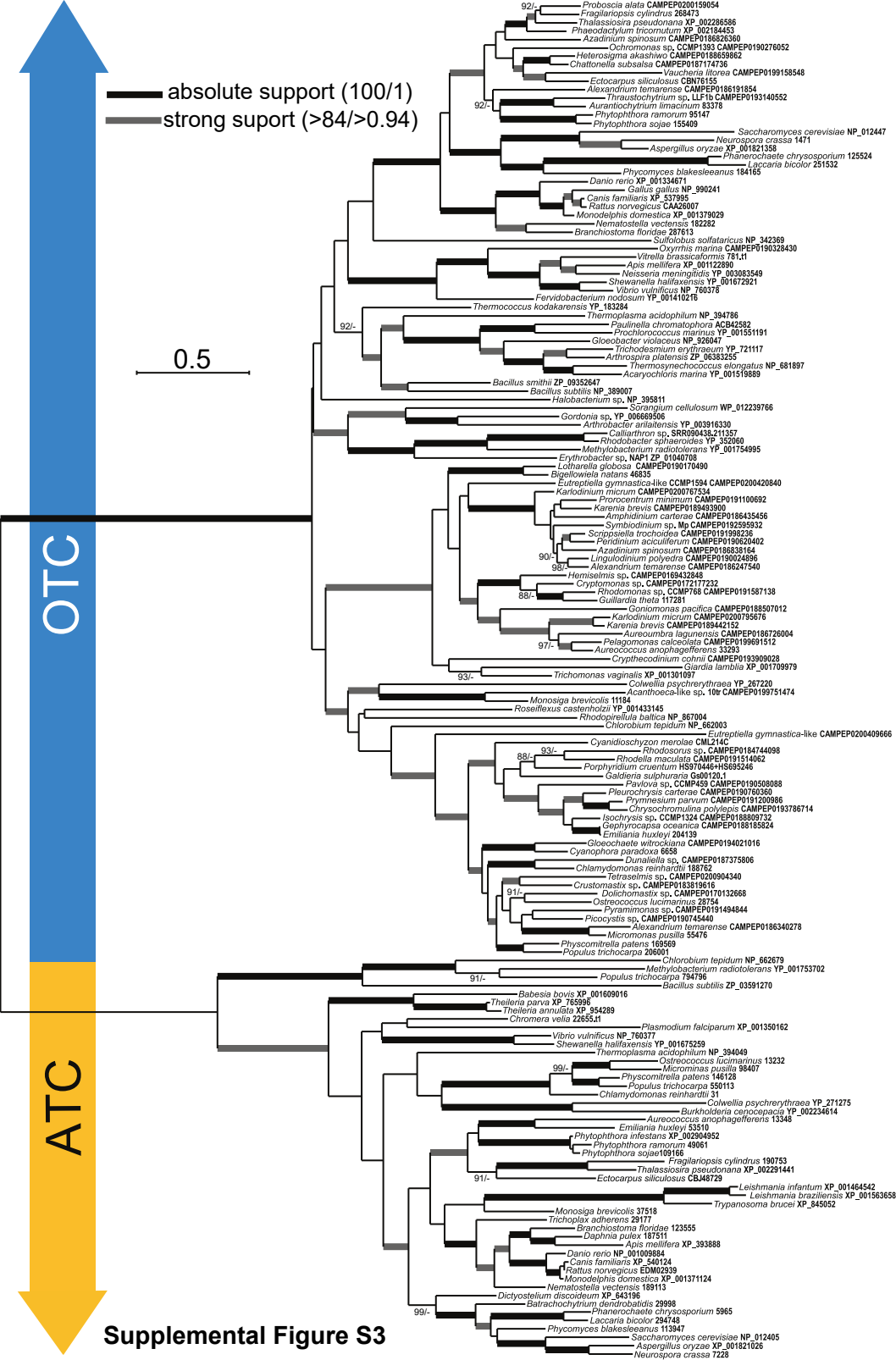
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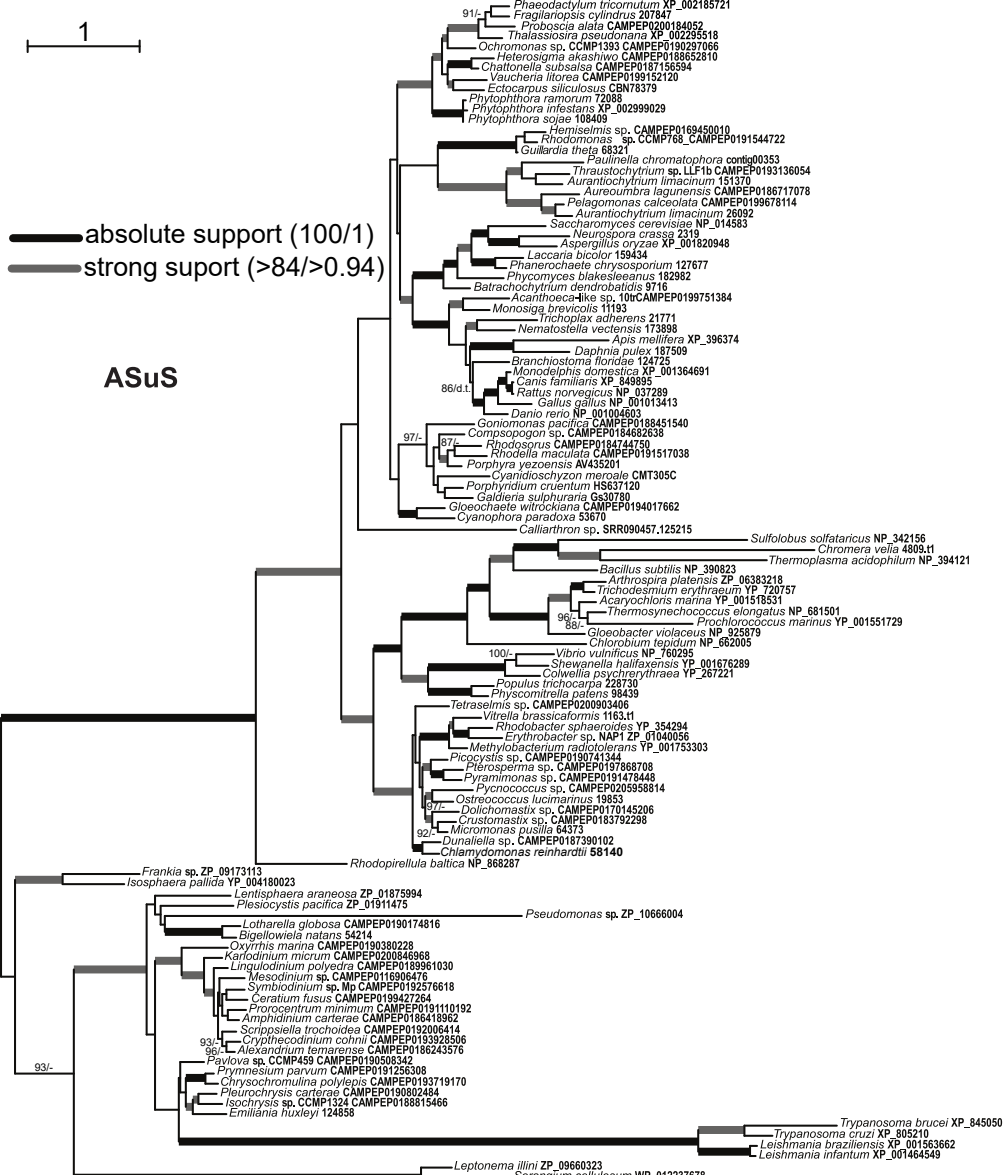
CPS



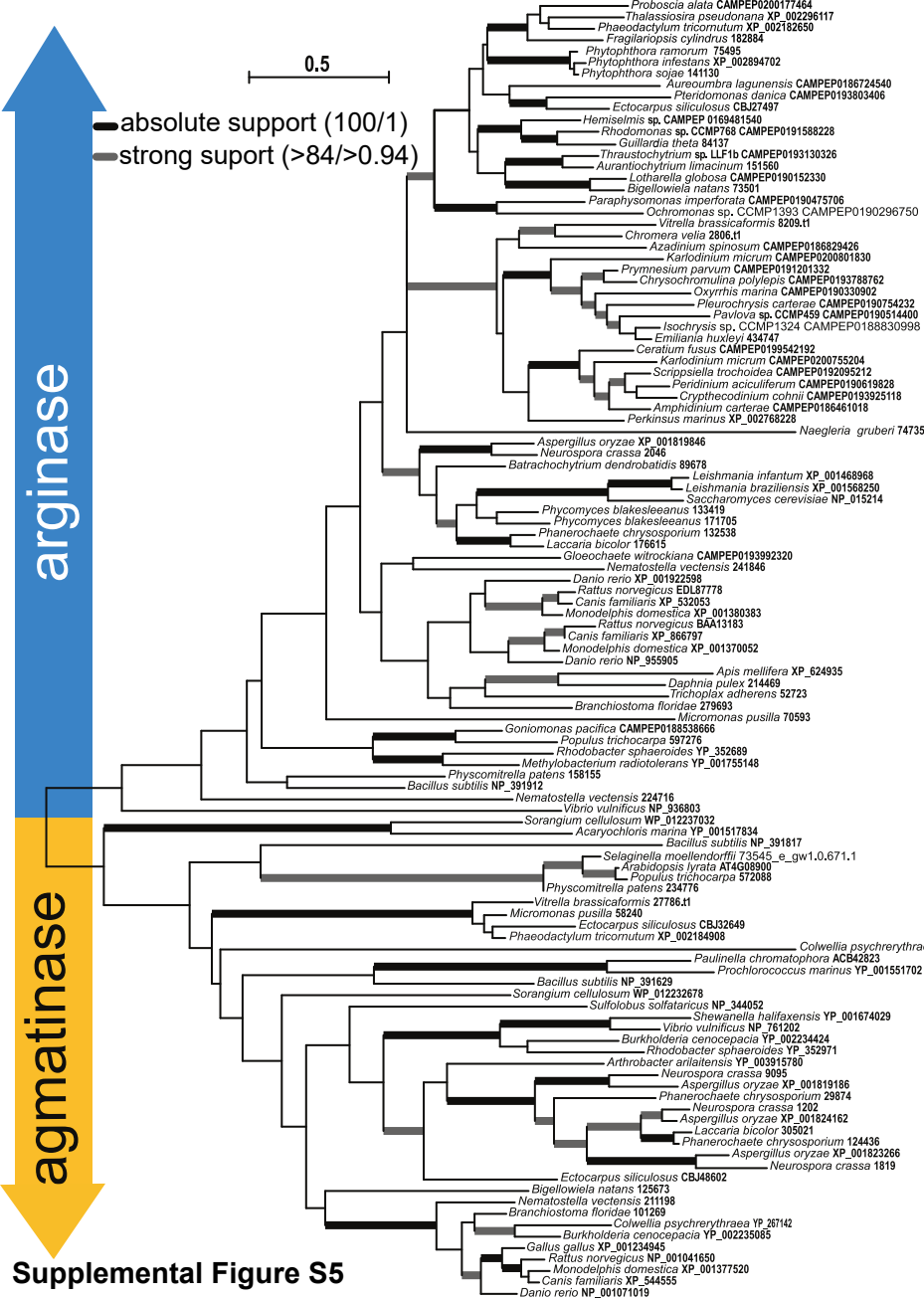
Supplemental Figure S1







Supplemental Figure S4



Supplemental Figure S5

Supplemental Table S1. Accension numbers of sequences used as query for Blast search

	<i>Phaeodactylum tricornutum</i>	<i>Populus trichocarpa</i> *
CPS	XP_002183539	229687
OTC	XP_002184453	206001
ASuS	XP_002185721	228730
ASL	XP_002178853	830251
ARG	XP_002184453	597276

* JGI genome portal database

Supplemental Table S2.

List of taxa including sequence ID's used in phylogenetic analyses of OUC genes (Figures 2-6).

CPS	ASL	OCT	ASuS	ARG
Acanthoeca-like sp. 10tr CAMPEP0199746374	Acanthoeca-like sp. 10tr CAMPEP0199736908	Acanthoeca-like sp. 10tr CAMPEP0199751474	Acanthoeca-like sp. 10tr CAMPEP0199751384	Acaryochloris marina YP_001517834
Acanthoeca-like sp. 10tr CAMPEP0199747886	Acaryochloris marina YP_001518709	Acaryochloris marina YP_001519889	Acaryochloris marina YP_001518531	Amphidinium carterae CAMPEP0186461018
Acaryochloris marina YP_001519688	Agrobacterium tumefaciens ZP_12506877	Alexandrium temarense CAMPEP0186191854	Alexandrium temarense CAMPEP0186243576	Apis mellifera XP_624935
Amphidinium carterae CAMPEP0186414116	Amphidinium carterae CAMPEP0186441058	Alexandrium temarense CAMPEP0186247540	Amphidinium carterae CAMPEP0186418962	Arabidopsis lyrata AT4G08900
Apis mellifera XP_393888	Apis mellifera XP_624062	Alexandrium temarense CAMPEP0186340278	Apis mellifera XP_396374	Arthrobacter arilaitensis YP_003915780
Arthrobacter arilaitensis YP_003916898	archaeon GW2011 AR15 AJF61804	Amphidinium carterae CAMPEP0186435456	Arthrobacter arilaitensis YP_003917181	Aspergillus oryzae XP_001819186
Arthrospira platensis ZP_06380150	Arthrospira platensis ZP_06384167	Apis mellifera XP_001122890	Arthrospira platensis ZP_06383218	Aspergillus oryzae XP_001823266
Aspergillus oryzae XP_001821026	Aspergillus oryzae XP_001824740	Apis mellifera XP_393888	Aurantiochytrium limacinum 26092	Aspergillus oryzae XP_001824162
Aspergillus oryzae XP_001826233	Bacillus anthracis ZP_05211203	Arthrobacter arilaitensis YP_003916330	Aureococcus anophagefferens 151370	Aspergillus_oryzae XP_001819846
Aurantiochytrium limacinum 150806	Bacteroides fragilis YP_210178	Arthrospira platensis ZP_06383255	Aureoumbra lagunensis CAMPEP0186717078	Aurantiochytrium limacinum 151560
Aureococcus anophagefferens 38679	Batrachochytrium dendrobatidis 34150	Aspergillus oryzae XP_001821026	Bacillus subtilis NP_390823	Aureoumbra lagunensis CAMPEP0186724540
Aureoumbra lagunensis CAMPEP0186711262	Bigellowiella natans 58517	Aspergillus oryzae XP_001821358	Batrachochytrium dendrobatidis 9716	Azadinium spinosum CAMPEP0186829426
Aureoumbra lagunensis CAMPEP0186715130	Branchiostoma floridae 130488	Aurantiochytrium limacinum 83378	Bigellowiella natans 54214	Bacillus subtilis NP_391629
Babesia bovis XP_001611491	Burkholderia cenocepacia YP_002231742	Aureococcus anophagefferens 13348	Branchiostoma floridae 124725	Bacillus subtilis NP_391817
Batrachochytrium dendrobatidis XP_006679069	Caldisericum exile PMP82313	Aureococcus anophagefferens 33293	Burkholderia cenocepacia YP_002233369	Bacillus subtilis NP_391912
Bigellowiella natans 38878	Canis familiaris XP_536832	Aureoumbra lagunensis CAMPEP0186726004	Calliarthron sp. SRR090457.125215	Batrachochytrium dendrobatidis 89678
Bigellowiella natans 92959	Ceratium fuscum CAMPEP0199424212	Azadinium spinosum CAMPEP0186826360	Canis familiaris XP_849895	Bigellowiella natans 125673
Blastocystis hominis CBK25141	Colwellia psychrerythraea YP_267222	Azadinium spinosum CAMPEP0186838164	Ceratium fuscum CAMPEP0199427264	Bigellowiella natans 73501
Bradyrhizobium japonicum NP_774017	Compsopogon sp. CAMPEP0184688964	Babesia bovis XP_001609016	Colwellia psychrerythraea YP_267221	Branchiostoma floridae 101269
Branchiostoma floridae 283948	Cryptomonas sp. CAMPEP0172202698	Bacillus smithii ZP_09352647	Compsopogon sp. CAMPEP0184682638	Branchiostoma floridae 279693
Burkholderia cenocepacia YP_002230400	Cyanidioschyzon merolae CMK232C	Bacillus subtilis NP_389007	Crustomastix sp. CAMPEP0183792298	Burkholderia cenocepacia YP_002234424
Canis familiaris XP_540124	Cyanophora paradoxa 39262	Bacillus subtilis ZP_03591270	Cryptothecodinium cohnii CAMPEP0193928506	Burkholderia cenocepacia YP_002235085
Canis familiaris XP_861930	Danio rerio NP_956745	Batrachochytrium dendrobatidis 29998	Cyanidioschyzon merolae CMT305C	Canis familiaris XP_532053
Colwellia psychrerythraea YP_270132	Daphnia pulex 304871	Bigellowiella natans 46835	Cyanophora paradoxa 53670	Canis familiaris XP_544555
Compsopogon sp. CAMPEP_0184681104	Dolichomastix sp. CAMPEP0170141300	Branchiostoma floridae 123555	Danio rerio NP_001004603	Canis familiaris XP_866797
Compsopogon sp. CAMPEP0184687636	Dunaliella sp. CAMPEP0202340754	Branchiostoma floridae 287613	Daphnia pulex 187509	Ceratium fuscum CAMPEP0199542192
Crustomastix sp. CAMPEP0183809524+0183793952	Ectocarpus siliculosus CBN77982	Burkholderia cenocepacia YP_002234614	Dolichomastix sp. CAMPEP0170145206	Colwellia psychrerythraea YP_267142
Cryptomonas sp. CAMPEP0172164204	Erythrobacter sp. NAP1 ZP_01038893	Calliarthron sp. SRR090438.211357	Dunaliella sp. CAMPEP0187390102	Colwellia psychrerythraea YP_267939
Cyanidioschyzon merolae CML055C	Fragilariopsis cylindrus 262171	Canis familiaris XP_537995	Ectocarpus siliculosus CBN78379	Cryptothecodinium cohnii CAMPEP0193925118
Cyanidioschyzon merolae CMQ255C	Francisella philomiragia WP_044525538	Canis familiaris XP_540124	Emiliania huxleyi 124858	Danio rerio NP_001071019
Cyanophora paradoxa 10649	Galdieria sulphuraria Gs05180	Colwellia psychrerythraea YP_267220	Erythrobacter sp. NAP1 ZP_01040056	Danio rerio NP_955905
Cyanophora paradoxa 37037	Gallus gallus NP_001025885	Colwellia psychrerythraea YP_271275	Fragilariopsis cylindrus 207847	Danio rerio XP_001922598
Daphnia pulex EFX86149	Gephyrocapsa oceanica CAMPEP0188168580	Crustomastix sp. CAMPEP0183819616	Frankia sp. ZP_09173113	Daphnia pulex 214469
Dictyostelium discoideum CAA39077	Gloeobacter violaceus NP_923997	Cryptothecodinium cohnii CAMPEP0193909028	Galdieria sulphuraria Gs30780	Ectocarpus siliculosus CBJ27497
Dolichomastix sp. CAMPEP0170144458+0170142850	Gloeochaete wtrockiana CAMPEP0194005992	Cryptomonas sp. CAMPEP0172177232	Gallus gallus NP_001013413	Ectocarpus siliculosus CBJ48602
Dunaliella sp. CAMPEP_0202353736	Guillardia theta 68151	Cyanidioschyzon merolae CML214C	Gloeobacter violaceus NP_925879	Emiliania huxleyi 434747
Ectocarpus siliculosus CBJ30744	Hemiselmis sp. CAMPEP0169471182	Cyanophora paradoxa 6658	Gloeochaete wtrockiana CAMPEP0194017662	Fragilariopsis cylindrus 182884
Ectocarpus siliculosus CBN78778	Heterosigma akashiwo CAMPEP0188666620	Danio rerio NP_001009884	Goniomonas pacifica CAMPEP0188451540	Gallus gallus XP_001234945
Emiliania huxleyi 422007	Chattonella subsalsa CAMPEP0187171642	Danio rerio XP_001334671	Guillardia theta 68321	Gloeochaete wtrockiana CAMPEP0193992320
Emiliania huxleyi 463837	Chlorobium tepidum NP_661946	Daphnia pulex 187511	Hemiselmis sp. CAMPEP0169450010	Goniomonas pacifica CAMPEP0188538666
Erythrobacter sp. NAP1 ZP_01039621	Chrysochromulina polylepis CAMPEP0193798526	Dictyostelium discoideum XP_643196	Heterosigma akashiwo CAMPEP0188652810	Guillardia theta 84137
Fragilariopsis cylindrus 169332	Isochrysis sp. CCMP1324 CAMPEP0188834298	Dolichomastix sp. CAMPEP0170132668	Chattonella subsalsa CAMPEP0187156594	Hemiselmis sp. CAMPEP_0169481540
Fragilariopsis cylindrus 264682	Karenia brevis CAMPEP0189335222	Dunaliella sp. CAMPEP0187375806	Chlamydomonas reinhardtii 458140	Chromera velia 2806.t1
Gallus gallus NP_001039306	Karlodinium micrum CAMPEP0200825514	Ectocarpus siliculosus CBJ48729	Chlorobium tepidum NP_662005	Chrysochromulina polylepis CAMPEP0193788762
Gloeobacter violaceus NP_924715	Laccaria bicolor 290764	Ectocarpus siliculosus CBN76155	Chromera velia 4809.t1	Isochrysis sp. CCMP1324 CAMPEP0188830998
Gloeochaete wtrockiana CAMPEP0194002802	Lotharella globosa CAMPEP0190169400	Emiliania huxleyi 204139	Chrysochromulina polylepis CAMPEP0193719170	

Guillardia theta XP_005822059	Methylobacterium radiotolerans YP_001753324	Emiliania huxleyi 53510	Isochrysa sp. CCMP1324 CAMPEP0188815466	Karlodinium micrum CAMPEP0200755204
Guillardia theta XP_005822387	Micromonas pusilla 79415	Erythrobaacter sp. NAP1_ZP_01040708	Isochrysa pallida YP_004180023	Karlodinium micrum CAMPEP0200801830
Halanaerobium hydrogeniformans WP_013406262	Monodelphis domestica XP_001362923	Eutreptiella gymnastica-like CAMPEP0200409666	Karlodinium micrum CAMPEP0200846968	Laccaria bicolor 176615
Hemiselmis sp. CAMPEP0169440248	Monosiga brevicolis 11183	Eutreptiella gymnastica-like CCMP1594 CAMPEP0200420	Laccaria bicolor 159434	Laccaria bicolor 305021
Hemiselmis sp. CAMPEP0169440778	Neisseria meningitidis YP_003082740	Fervidobacterium nodosum YP_001410216	Leishmania braziliensis XP_001563662	Leishmania braziliensis XP_001568250
Heterosigma akashiwo CAMPEP0188660984	Nematostella vectensis 172052	Fragilariopsis cylindrus 190753	Leishmania infantum XP_001464549	Leishmania infantum XP_001468968
Chattonella subsalsa CAMPEP0187152510	Neurospora crassa 7115	Fragilariopsis cylindrus 268473	Lentisphaera a raneosa ZP_01875994	Lotharella globosa CAMPEP0190152330
Chlamydomonas reinhardtii 195255	Oceanicola sp. ZP_09515012	Galdieria sulphuraria Gs00120.1	Leptonema illini ZP_09660323	Methylobacterium radiotolerans YP_001755148
Chromera velia 10392.t1	Ochromonas sp. CCMP1393 CAMPEP0190270026	Gallus gallus NP_990241	Lingulodinium polyedra CAMPEP0189961030	Micromonas pusilla 58240
Chrysochromulina polylepis CAMPEP0193716026	Ostreococcus lucimarinus 26950	Gephyrocapsa oceanica CAMPEP0188185824	Lotharella globosa CAMPEP0190174816	Micromonas pusilla 70593
Isochrysis sp. CCMP1324 CAMPEP0188811158	Oxyrrhis marina CAMPEP0190372354	Giardia lamblia XP_001709979	Mesodinium sp. CAMPEP0116906476	Monodelphis domestica XP_001370052
Isochrysis sp. CCMP1324 CAMPEP0188835724	Paenibacillus dendritiformis ZP_09674768	Gloeobacter violaceus NP_926047	Methylobacterium radiotolerans YP_001753303	Monodelphis domestica XP_001377520
Karenia brevis CAMPEP0189322926	Pavlova sp. CCMP459 CAMPEP0190518138	Gloeochaete wittrockiana CAMPEP0194021016	Micromonas pusilla 64373	Monodelphis domestica XP_001380383
Karlodinium micrum CAMPEP0200798538	Pelagomonas calceolata CAMPEP0199696362	Goniomonas pacifica CAMPEP0188507012	Monodelphis domestica XP_001364691	Naegleria gruberi 74735
Karlodinium micrum CAMPEP0200802162	Peridinium aciculiferum CAMPEP0190614724	Gordonia sp. YP_006669506	Monosiga brevicolis 11193	Nematostella vectensis 211198
Laccaria bicolor 184504	Phaeodactylum tricornutum XP_002178853	Guillardia theta 117281	Neisseria meningitidis YP_003082294	Nematostella vectensis 224716
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Lotharella globosa CAMPEP0190165330	Phytophthora sojae 109558	Chlamydomonas reinhardtii 31	Paulinella chromatophora contig00353	Ochromonas sp. CCMP1393 CAMPEP0190296750
Lotharella globosa CAMPEP0190180660	Pleurochrysis carterae CAMPEP0190752624	Chlorobium tepidum NP_662003	Pavlova sp. CCMP459 CAMPEP0190508342	Oxyrrhis marina CAMPEP0190330902
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Monodelphis domestica XP_001369265	Prochlorococcus marinus YP_001549897	Chrysochromulina polylepis CAMPEP0193786714	Phanerochaete chrysosporium 127677	Pavlova sp. CCMP459 CAMPEP0190514400
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Monosiga brevicolis 17284	Pyramimonas sp. CAMPEP0191475010	Karenia brevis CAMPEP0189442152	Physcomitrella patens 98439	Perkinsus marinus XP_002768228
Monosiga brevicolis 37518	Rattus norvegicus NP_067588	Karenia brevis CAMPEP0189493900	Phytophthora infestans XP_002999029	Phaeodactylum tricornutum XP_002182650
Mucor circinelloides 136456	Rhodella maculata CAMPEP0191517528	Karlodinium micrum CAMPEP0200767534	Phytophthora ramorum 72088	Phaeodactylum tricornutum XP_002184908
Mucor circinelloides 160822	Rhodobacter sphaeroides YP_353803	Karlodinium micrum CAMPEP0200795676	Phytophthora sojae 108409	Phanerochaete chrysosporium 124436
Mycobacterium tuberculosis ZP_02550712	Saccharomyces cerevisiae NP_011882	Laccaria bicolor 251532	Picocystis sp. CAMPEP0190741344	Phanerochaete chrysosporium 132538
Naegleria gruberi 59636	Shewanella halifaxensis YP_001676288	Laccaria bicolor 294748	Plesiocystis pacifica ZP_01911475	Phanerochaete chrysosporium 29874
Neisseria meningitidis YP_003082542	Sorangium cellulosum KYF79744	Leishmania braziliensis XP_001563658	Pleurochrysis carterae CAMPEP0190802484	Phycomyces blakesleeanus 133419
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Nematostella vectensis gw.270.5.1	Sulfolobus solfataricus NP_342157	Lingulodinium polyedra CAMPEP0190024896	Populus trichocarpa 579188	Physcomitrella patens 158155
Neobodo saliens BAF95078	Symbiodinium microadriaticum OLQ00940	Lotharella globosa CAMPEP0190170490	Porphyra yezoensis AV435201	Physcomitrella patens 234776
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Neurospora crassa NCU0828770	Tetraselmis sp. CAMPEP0200913508	Methylobacterium radiotolerans YP_001754995	Proboscia alata CAMPEP0200184052	Phytophthora ramorum 75495
Ostreococcus lucimarinus 9901+19640	Thalassiosira pseudonana XP_002291698	Micromonas pusilla 98407	Prochlorococcus marinus YP_001551729	Phytophthora sojae 141130
Oxyrrhis marina CAMPEP0190331566	Thermaerobacter subterraneus ZP_11320829	Micromonas pusilla 55476	Prorocentrum minimum CAMPEP0191110192	Pleurochrysis carterae CAMPEP0190754232
Parabodo caudatus BAF95073	Thermobaculum terrenum WP_012874271	Monodelphis domestica XP_001371124	Prymnesium parvum CAMPEP0191256308	Populus trichocarpa 572088
Paulinella chromatophora ACB43225	Thermosynechococcus elongatus NP_681156	Monodelphis domestica XP_001379029	Pseudomonas sp. ZP_10666004	Populus trichocarpa 597276
Pavlova sp. CCMP459 CAMPEP0190500212	Trichodesmium erythraeum YP_720644	Monosiga brevicolis 11184	Pterosperma sp. CAMPEP0197868708	Proboscia alata CAMPEP0200177464
Pelagomonas calceolata CAMPEP0199689514	Trichoplax adherens 30108	Monosiga brevicolis 37518	Pycnococcus sp. CAMPEP0205958814	Prochlorococcus marinus YP_001551702
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Perkinsus marinus XP_002784057	Vibrio vulnificus NP_760296	Nematostella vectensis 182282	Rattus norvegicus NP_037289	Pteridomonas danica CAMPEP0193803406
Phaeodactylum tricornutum XP_002183539	Vitrella brassicaformis CEM03321	Nematostella vectensis 189113	Rhodella maculata CAMPEP0191517038	Rattus norvegicus BAA13183
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Phanerochaete chrysosporium 124453		Neurospora crassa 7228	Rhodomonas sp. CCMP768_CAMPEP0191544722	Rattus norvegicus NP_001041650

Phanerochaete chrysosporium 5965
Phycomyces blakesleeanus 124538
Phycomyces blakesleeanus 74982
Physcomitrella patens 180534
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Phytophthora infestans XP_002906192
Phytophthora ramorum 46151
Phytophthora ramorum 71989
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Phytophthora sojae 109425
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Prymnesium parvum CAMPEP0191199560
Pyramimonas sp. CAMPEP0191508516+0191501876
Rattus norvegicus NP_001099180
Rattus norvegicus NP_058768
Rhodobacter sphaeroides YP_353897
Rhodomonas sp. CCMP768 CAMPEP0191546976
Rhodopirellula baltica NP_870325
Rhodosorus sp. CAMPEP0184741054
Rhodosorus sp. CAMPEP0184753238
Saccharomyces cerevisiae YJL130C
Saccharomyces cerevisiae YJR109C
Salpingoeca rosetta EGD76319
Shewanella halifaxensis YP_001675367
Sulfolobus solfataricus NP_342159
Tetraselmis sp. CAMPEP0200903730
Thalassiosira pseudonana XP_002289336
Thalassiosira pseudonana XP_002292735
Theileria annulata XP_954765
Theileria parva XP_763067
Thermosynechococcus elongatus NP_683122
Thraustochytrium sp. LLF1b CAMPEP0193131092
Thraustochytrium sp. LLF1b CAMPEP0193133550
Toxoplasma gondii AAL27793
Trichodesmium erythraeum YP_722523
Trichoplax adherens 29177
Trypanosoma brucei CBH11387
Vaucheria litorea CAMPEP0199153208
Vaucheria litorea CAMPEP0199157910
Vibrio vulnificus CMCP6
Vitrella brassicaformis CEM14616
Ochromonas sp. CCMP1393 CAMPEP0190276052
Ostreococcus lucimarinus 13232
Ostreococcus lucimarinus 28754
Oxyrrhis marina CAMPEP0190328430
Paulinella chromatophora ACB42582
Pavlova sp. CCMP459 CAMPEP0190508088
Pelagomonas calceolata CAMPEP0199691512
Peridinium aciculiferum CAMPEP0190620402
Phaeodactylum tricornutum XP_002184453
Phanerochaete chrysosporium 125524
Phanerochaete chrysosporium 5965
Phycomyces blakesleeanus 113947
Phycomyces blakesleeanus 184165
Physcomitrella patens 146128
Physcomitrella patens 169569
Phytophthora infestans XP_002904952
Phytophthora ramorum 49061
Phytophthora ramorum 95147
Phytophthora sojae 109166
Phytophthora sojae 155409
Picocystis sp. CAMPEP0190745440
Plasmodium falciparum XP_001350162
Pleurochrysis carterae CAMPEP0190760360
Populus trichocarpa 206001
Populus trichocarpa 550113
Populus trichocarpa 794796
Porphyridium cruentum HS970446+HS695246
Proboscia alata CAMPEP0200159054
Prochlorococcus marinus YP_001551191
Prorocentrum minimum CAMPEP0191100692
Prymnesium parvum CAMPEP0191200986
Pyramimonas sp. CAMPEP0191494844
Rattus norvegicus CAA26007
Rattus norvegicus EDM02939
Rhodella maculata CAMPEP0191514062
Rhodobacter sphaeroides YP_352060
Rhodomonas sp. CCMP768 CAMPEP0191587138
Rhodopirellula baltica NP_867004
Rhodosorus sp. CAMPEP0184744098
Roseiflexus castenholzii YP_001433145
Saccharomyces cerevisiae NP_012405
Saccharomyces cerevisiae NP_012447
Scrippsiella trochoidea CAMPEP0191998236
Shewanella halifaxensis YP_001672921
Shewanella halifaxensis YP_001675259
Sorangium cellulosum WP_012239766
Sulfolobus solfataricus NP_342369
Symbiodinium sp. Mp CAMPEP0192595932
Tetraselmis sp. CAMPEP0200904340
Thalassiosira pseudonana XP_002286586
Rhodobacter sphaeroides YP_352689
Rhodobacter sphaeroides YP_352971
Rhodomonas sp. CCMP768 CAMPEP0191588228
Saccharomyces cerevisiae NP_015214
Scrippsiella trochoidea CAMPEP0192095212
Selaginella moellendorffii 73545_e_gw1.0.671.1
Shewanella halifaxensis YP_001674029
Sorangium cellulosum WP_012232678
Sorangium cellulosum WP_012237032
Sulfolobus solfataricus NP_344052
Thalassiosira pseudonana XP_002296117
Thraustochytrium sp. LLF1b CAMPEP0193130326
Trichoplax adherens 52723
Vibrio vulnificus NP_761202
Vibrio vulnificus NP_936803
Vitrella brassicaformis 27786.t1
Vitrella brassicaformis 8209.t1

Thalassiosira pseudonana XP_002291441
Theileria annulata XP_954289
Theileria parva XP_765996
Thermococcus kodakarensis YP_183284
Thermoplasma acidophilum NP_394049
Thermoplasma acidophilum NP_394786
Thermosynechococcus elongatus NP_681897
Thraustochytrium sp. LLF1b CAMPEP0193140552
Trichodesmium erythraeum YP_721117
Trichomonas vaginalis XP_001301097
Trichoplax adherens 29177
Trypanosoma brucei XP_845052
Vaucheria litorea CAMPEP0199158548
Vibrio vulnificus NP_760377
Vibrio vulnificus NP_760378
Vitrella brassicaformis 781.t1