

Association of the stramenopilan protists, the aplanochytrids, with zooplankton of the equatorial Indian Ocean

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Supplement 1. Phylogenetic trees and multiple alignment file of aplanochytrids and other stramenopiles

Fig. S1. Minimum evolution (ME) tree of 18S rDNA of aplanochytrids of the present study (**bold**) with *Bacillaria paxillifer* (Accession no. M87325) and *Ochromonas danica* (Accession no. M32704 J02950) as outgroups

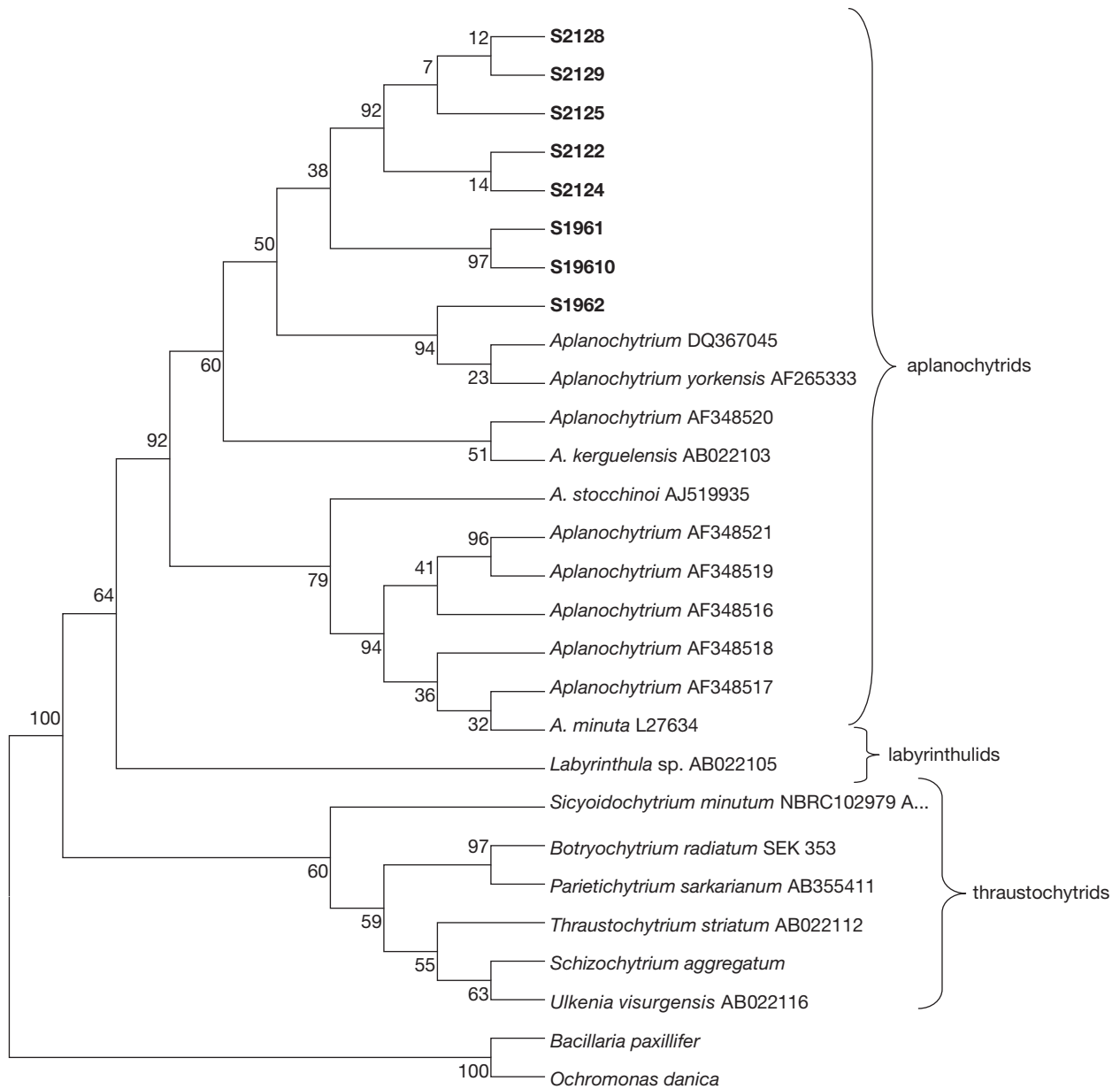


Fig. S2. Maximum parsimony (MP) tree of 18S rDNA of aplanochytrids of the present study (**bold**) with *Bacillaria paxillifer* (Accession no. M87325) and *Ochromonas danica* (Accession no. M32704 J02950) as outgroups

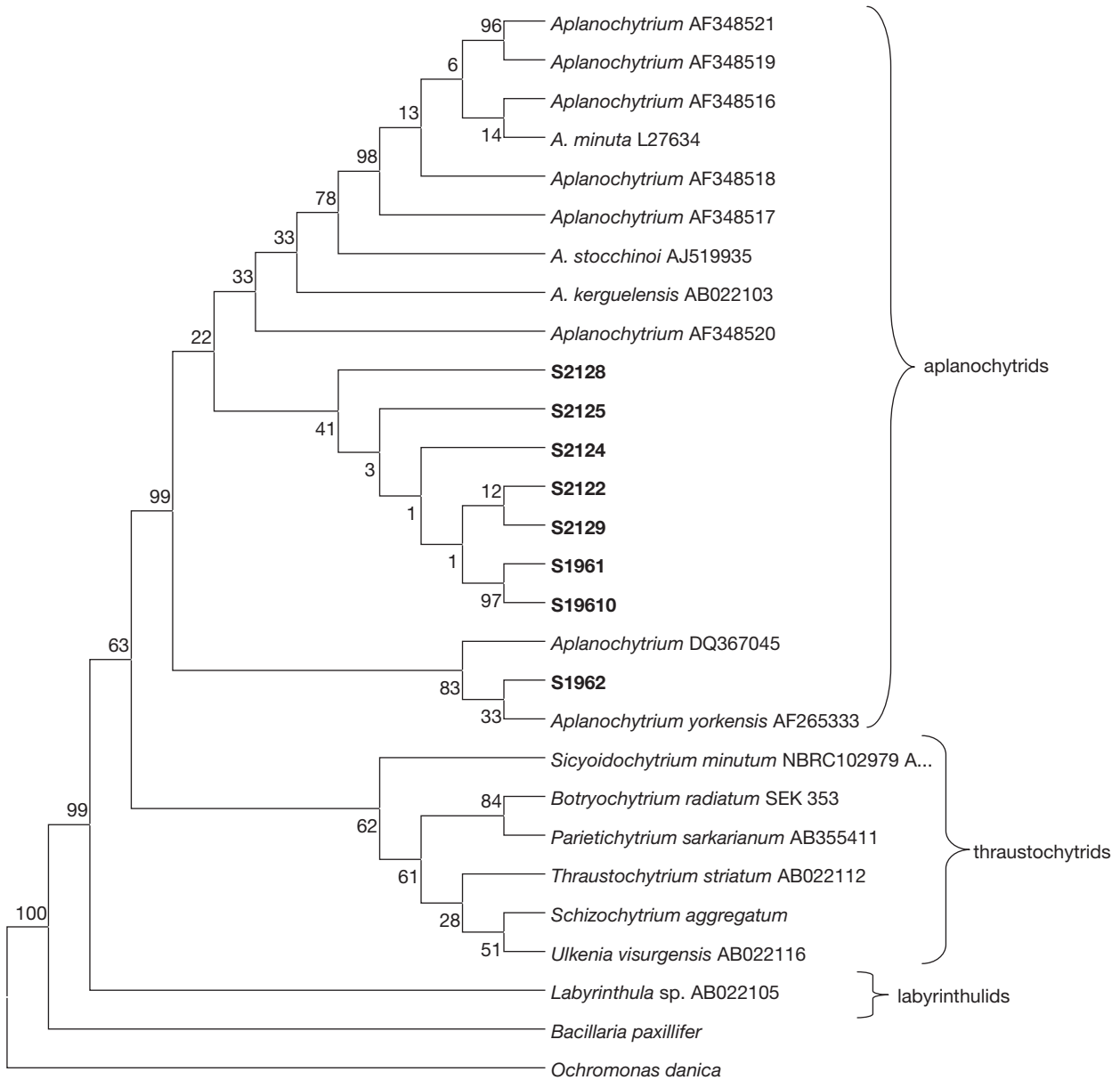


Fig. S3. Multiple alignment of internal transcribed spacer (ITS) sequences of aplanochytrid isolates from the present study and 7 organisms belonging to the Kingdom Stramenopila. Letters in red are the regions of the probe design

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S2128 -----CTTCCGTAG-GTGAACCTGCGGAAGGATCATTACTG
S2129 -----GTAG-GTGAACCTGCGGAAGGATCATTACTG
TA-3_Thraustochytrium_aureum_c
_TA-1_Thraustochytrium_aureum_
S19610 -----GGATCATTACCA
S1961 -----GTAG-GTGAACCTGCGGAAGGATCATTACCA
S1963 -----CGTAG-GTGAACCTGCGGAAGGATCATTACCA
S2122 -----CCGTAG-GTGAACCTGCGGAGGGATCATNACAA
Labyrinthulid_quahog_parasite_
S2124 -----CCTCCGTAG-GTGAACCTGCGGAAGGATCNTTACCN
Sellaphora GGAGAGTTATTTTTATTGTTGTAGTGTGTTATTTTTCTACTGCCGCAGTGTA
Hyaloperonospora_parasitica TACCACACCTAAAAAAGTTTCCACGTGAACCGTATTAACAATTATAATTG
Peronospora_tribulina -----CTAAAAAAGTTTCCACGTGAACCGTATTAACAATTATAATTG
Nitzschia -----CTTACCACACCGATCCAGATCTTCTTTACTGTGAATTTGGTAGTT

S2128 AGTNCGGGCTGCCTCCGGGCGCCCAACCTCCCACCGTGCAATACCTAAC
S2129 AGTGCGGGCTGCCTCCGGGCGCCCAACCTCCCACCGTG-AATACCTAAC
TA-3_Thraustochytrium_aureum_c -----GTAGG-TGAACCTGCA
_TA-1_Thraustochytrium_aureum_ -----GTAGG-TGAACCTGCA
S19610 CAAATTAATCCATTTCTAATTCCGGTGAAACACTTTATA-AATGTCTGCT
S1961 CAAATTAATCCATTTCTAATTCCGGTGAAACACTTTATA-AATGTCTGCT
S1963 CAAATTAATCCATTTCTAATTCCGGTGAAACACTTTATA-AATGTCTGCT
S2122 GTGACC--CCGGTTTACCACCGGGATGTTTATAACCTATGTTGTCGGAC
Labyrinthulid_quahog_parasite_ -----GTAGG-TGAACCTGCG
S2124 CAAAT--ATCTCTTTTATATCTCCGTGAACC---TTTTAAAAACTCTGCT
Sellaphora TGATTTTCCCAAATCCCACCCAAACAAACAGGATATTCAAAAACAATT
Hyaloperonospora_parasitica GAGGTGACCTTAATGGAGGCTACTAGTCATTTTGGCTGGAGGCTACTATC
Peronospora_tribulina GAGGTGACCTTAATGGAGGCTACTAGTCATTTTGGCTGGAGGCTACTATC
Nitzschia GGCTGGATGCTAACGGTGCACATCACGTGTCCCGGTCCA-GCCGGCAACC
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S2128 ACTGTGTGCTTCGGCGGGGAAA-CCNCTCGGGGGCGAGCCGCCGG---G
S2129 ACTGT-TGCTTCGGCGGGGAA--CCCCCTCGGGGGCGAGCCGCCGG---G
TA-3_Thraustochytrium_aureum_c GAAGGATCACTGCCACAAACAA-CTATTTGATTGGGAAGATTTTTGT--G
_TA-1_Thraustochytrium_aureum_ GAAGGATCATTGCCACATTTAG--TATTTGATTGGGAAGATTTTTG----
S19610 GTCATTTCTTTTTTTTATATGA-AGATTTGAATAGCGCCCTTTTTTT----
S1961 GTCATTTCTTTTTTTTATATGA-AGATTTGAATAGCGCCCTTTTTTT----
S1963 GTCATTTCTTTTTTTTATATGA-AGATTTGAATAGCGCCCTTTTTTT----
S2122 TCTGTTGCCTCCGGGGCGACCC-TGCCTTCGGGGGGGGCTCCGGGT--G
Labyrinthulid_quahog_parasite_ GAGGATCATTACCACATCTTT-TACTTTTTTTTGTGTTCTTATT----
S2124 GTGCGCTGTTCTGATTGTGGAATAGGTTTATTGCGCTTTTTTTATC--A
Sellaphora ATTTTTTTGGACGCAACCGGCAAGAACCACATAAACTGAATTAGAACCAA
Hyaloperonospora_parasitica GAGTGAACCTCATCATGGCGAA-AAATTAGGCTTCGGTCTAGTGAAGTAG
Peronospora_tribulina GAGTGAACCTCATCATGGCGAA-ACATTAGGCTTCGGTCTAGTGAAGTAG
Nitzschia GCTATTTTTTCTACTAGTAACTTGCTAGAGCTCGTTTATCTAAAGTGA

S2128 GACTACTGAA---CTTCATGCCTG-AGAGTGATGCAGTCTGAGTCTGAAT
S2129 GACTACTGAA---CTTCATGCCTG-AGAGTGATGCAGTCTGAGTCTGAAT
TA-3_Thraustochytrium_aureum_c AGAAGAAGCA---GCTTATTTTAT-TGAACAGAAAACACATCAATGAATG
_TA-1_Thraustochytrium_aureum_ AGAAGA-----TTTATTTTAC--GAACAGAAAACACAACAATGAAAA
S19610 --AAATCCTT---TTTTATTTTAT-T--TCGAAAGTTTCATCAACGAACA
S1961 --AAATCCTT---TTTTATTTTAT-T--TCGAAAGTTTCATCAACGAACA
S1963 --AAATCCTT---TTTTATTTTAT-T--TCGAAAGTTTCATCAACGAACA
S2122 GACACTTCAAAC-TCTTGCGTAAC-TTTGCAGTAATGAGTAAACTTAATT
Labyrinthulid_quahog_parasite_ -----TTATTTTTTAT-CATTTTCAAATTTTTTCAA-AAATT
S2124 TTCAACCAAA-----ATAGTTTTTAT-----NGAAAAATTCANGA---AAAN
Sellaphora GGCGGTCTCGGCATATTACTATAA-TATCCAGGGAAGCTGCGGTCCGAAA
Hyaloperonospora_parasitica TGAAAAATGTTAAACCTTACTTAAA-TACTGATTATACTGTGGGGACGAAA
Peronospora_tribulina TGAAAAATTTAAACCTTACTTAAA-TACTGATTATACTGTGGGGACGAAA
Nitzschia AAAGAGGGTGCGGGTGTAGCTAGTGCCCTCACCGGTGTTAGCTGTGCCCC

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Fig. S3 (continued)

S2128 CCGGCTTGTGTG----TTGGGTCGTCGTCCCCCGGGGGACGGGCCCGA
 S2129 CCGGCTTGTGTG----TTGGGTCGTCGTCCCCCGGGGGACGGGCCCGA
 TA-3 *Thraustochytrium aureum* c GTTGGTTCGTTA----GTTGTTCCA-GCACAGGTGTTTGGGTCTGATCAT
 TA-1 *Thraustochytrium aureum* GTTGGTTCGTTA----GTTGTTCCA-GCACAGGTGTTTGGGTCTGATCAT
 S19610 GA-ATTTTCAGTG----GAT-TTTGG-GTTTTTATGTATGTGTGCGCGCAA
 S1961 GA-ATTTTCAGTG----GAT-TTTGG-GTTTTTATGTATGTGTGCGCGCAA
 S1963 GA-ATTTTCAGTG----GAT-TTTGG-GTTTTTATGTATGTGTGCGCGCAA
 S2122 CTCGCTTGGTAT----TGGGCAACGCGGTCCGCCGCGTGCCTCAAATCGA
 Labyrinthulid quahog parasite_ ----TTTTATAG----AGCAGCTTGTGGGCTGTTTTCTTGTTCCTCTT
 S2124 GA-ATTTTCAGTG----GAC-TTTGGGTTTTTTCAATATGTACGCAAGTAT
 Sellaphora GTTACGTATGCGT---GACAGCCGGAATAAAAATTATACTTTGGCCGTGC
 Hyaloperonospora parasitica TTTCTTTTCATCGTGTATTCGATAAAGGATATGCCAGATGTGAAGTGTCTT
 Peronospora tribulina TTTCTTTTCATCGTGTATTCGATAAAGGATATGCCAGATGTGAAGTGTCTT
 Nitzschia GTCGGTGTCTGCC-----CTTGTGGTGTACCGGTTGCTGGACTTTGCTAG

S2128 AAGGCAG-CGGCGGCACCGTGTCCGGTCCCTNG---AGCGTATGGGGCTTT
 S2129 AAGGCAG-CGGCGGCACCGTGTCCGGTCCCTCG---AGCGTATGGGGCTTT
 TA-3 *Thraustochytrium aureum* c TTGATT--TGCTTGCTTGATTTGCTTGCTTGATT-GCTTTGCTTGATTGC
 TA-1 *Thraustochytrium aureum* TTGATT--TGCTTG-----CTTGATT-GCTTTGCTTGATTGC
 S19610 GTGGCA--TGTTGA-----CCTAA---AACCTGTTTGTA--
 S1961 GTGGCA--TGTTGA-----CCTAA---AACCTGTTTGTA--
 S1963 GTGGCA--TGTTGA-----CCTAA---AACCTGTTTGTA--
 S2122 CCGGNTG-GGTC TTC-----TGTCCTTA---AGCGTTGTGGAAA--
 Labyrinthulid quahog parasite_ TTGGGAA-TAGGTG-----GCCTTGAGAAATAGT
 S2124 GTTAACC-TGAAAAA-----AAGT-TACAAGCTAACGATC
 Sellaphora GCAC TAC-TAAAAC TAGTGTGCTTGGTCGAAATG-CACGTTATGGCGGAC
 Hyaloperonospora parasitica GCGGTTGATTTTCGAATTGGCTGCGAGTCCTTTT-AAATAAATGACTGCA
 Peronospora tribulina GCGGTTGATTTTCGAATTGGCTGCGAGTCCTTTT-AAATATATGACTGCA
 Nitzschia TGAGTTTGC GTTATGCGAACCTCTGGCTTAATTTGACCCAAC TGGGTTT

S2128 GTCACCCGCTCGACTAGGGCCGGCCG-----GGCGCCAGCCGACGTCTC
 S2129 GTCACCCGCTCGACTAGGGCCGGCCG-----GGCGCCAGCCGACGTCTC
 TA-3 *Thraustochytrium aureum* c TCGTGAAATCATGGCCTGAAGAACAT-----CGAGACAAACACCGATTT
 TA-1 *Thraustochytrium aureum* TAGTGAAATCATGGCCTGAAGAACAT-----CGAGACAAACACCGATTT
 S19610 -TGCTAAGCC----TCACAAAAACTT-----TGGATAATCTACTTTTTT
 S1961 -TGCTAAGCC----TCACAAAAACTT-----TGGATAATCTACTTTTTT
 S1963 -TGCTAAGCC----TCACAAAAACTT-----TGGATAATCTACTTTTTT
 S2122 -CTATTGCT-----AAAGGGTGACTA-----CGGGAGACTACGCGGTA
 Labyrinthulid quahog parasite_ ATTTCAAC-----AAATAATCC-----TAGCAATTATTTAACTTT
 S2124 ATATCAATTT-----GGATAATTT-----
 Sellaphora GCACCTTGCAATCATTTGGCGGACCCGCTCTCTGTAGAAGAAATACTATT
 Hyaloperonospora parasitica CTTCTCATGCTAGAAAAGCGTGACAATACTAATTATAAGGCTGTCCGTGC
 Peronospora tribulina CTTCTCATGCTAGAAAAGCGTGACAATACTAATTATAAGGCTGTCCGTGC
 Nitzschia GCTAGGAGGCCGTGGGATTCACCCCGGTTGAAGGGCTACGTCAACTAGCT

S2128 CAACCATTTTTCTTC--AGGTTGACCTCGGATCAGGTAGGGATACCCGCT
 S2129 CAACCATTTTTCTTC--AGGTTGACCTCGGATCAGGTAGGGATACCCGCT
 TA-3 *Thraustochytrium aureum* c TGACAAGAAGAATCG--GGCT-GTTTTTCGGA-CAGCAAGGATTCACAGCG
 TA-1 *Thraustochytrium aureum* TGACAAGAAGAATCG--GGCT-GTTTTTCGGA-CAGCAAGGATTCACAGCG
 S19610 CAAAGAAAAAGGTGC--AGGT-GTTTTTACG-CATAAAAACAACATTACA
 S1961 CAAAGAAAAAGGTGC--AGGT-GTTTTTACG-CATAAAAACAACATTACA
 S1963 CAAAGAAAAAGGTGC--AGGT-GTTTTTACG-CATAAAAACAACATTACA
 S2122 AAACAACCCCATTTCTAAGGTTGACCTCGGATCAGGTAGGGATACCCGCT
 Labyrinthulid quahog parasite_ TTACAACATCAAACC-----TCAAATCAGGAAAGAGGACCCGCT
 S2124 -----
 Sellaphora TTTTCGAAGGAGAGTACACAGTCGTCGTCATAAGTGTCTGCAATTGTTGCA
 Hyaloperonospora parasitica TGACCAGTCGGCGACT-AGTTTGTAACTGTGACTATATGAAGAAGTATT
 Peronospora tribulina GGACCAGTCGGCGACT-AGTTTGTAACTGTGACTATATGAAGAAGTATT
 Nitzschia CCTCGTCTATCTCTGGTAGCAGTGTTCGGCCTTGTGCCGGTCTATTATT

Fig. S3 (continued)

S2128	GAACTTA-AGCATATCAATAAGCGGAGG-----
S2129	GAACTTA-AGCATATCAATAAGCGGA-----
TA-3 <i>Thraustochytrium aureum</i> _c	AAACGAATAGGCTGGTTGTT-----AACTA
_TA-1 <i>Thraustochytrium aureum</i> _	AAACGAATAGGCTGGTTGTTGTTGTTGTCGTTTGATGACACTCTTAACTC
S19610	AATCAGACCTCAAATCAGGAAA-----
S1961	AATCAGACCTCAAATCAGGAAAAGAAGACCCCTGAATTTAAGCATATCAA
S1963	AAT-----
S2122	GAACTTA-AGCATATCAATAAGCGGAGG-----
Labyrinthulid_quahog_parasite_	GAACTTA-AGCATAT-----
S2124	-----
Sellaphora	TCCTTTTTTCAATTCTGATCTCAGATCAAGCAAGAAGACCCGCCGAATT
<i>Hyaloperonospora parasitica</i>	CGATTTCGCGGTATGATTGGCTTTTCGGGCTGAACTACGTTTATTGGATCTT
<i>Peronospora tribulina</i>	CGATTTCGCGGTATGATTGGCTTTTCGGGCTGAACTACGTTTATTGGATCTT
<i>Nitzschia</i>	GGAGTTGCGGGACAGATGGGGAGCTGAACGGCTAGAAGCTGAAGCCAGGTG
S2128	-----
S2129	-----
TA-3 <i>Thraustochytrium aureum</i> _c	ACTCTAGATCGCTTTGCCGTAAATCAAAAACAAAGCTTCAA--CCTCAA
_TA-1 <i>Thraustochytrium aureum</i> _	ACTCTAGATCGCTTTGCCGTAAATCAAAAACAGAGCTTCAA--CCTCAA
S19610	-----
S1961	TAAGCGG-----
S1963	-----
S2122	-----
Labyrinthulid_quahog_parasite_	-----
S2124	-----
Sellaphora	TAAGCATATCAATAAGCGGAGGA-----
<i>Hyaloperonospora parasitica</i>	TTTTTGTTTATGGTAGATGAACAGGTGAACCGTAGTTGCATG--AGACTT
<i>Peronospora tribulina</i>	TTTTTGTTTATGGTAGATGAACAGGTGAACCGTAGTTGCATGTGAGGCTT
<i>Nitzschia</i>	TGAGTTTGTAAGCGACTTCCCGCAGCTAGTTGGTCTCAGACCGCTAGTTG