Supplementary Information

Horizontal gene transfer of a bacterial insect toxin into the *Epichloë* fungal symbionts of grasses

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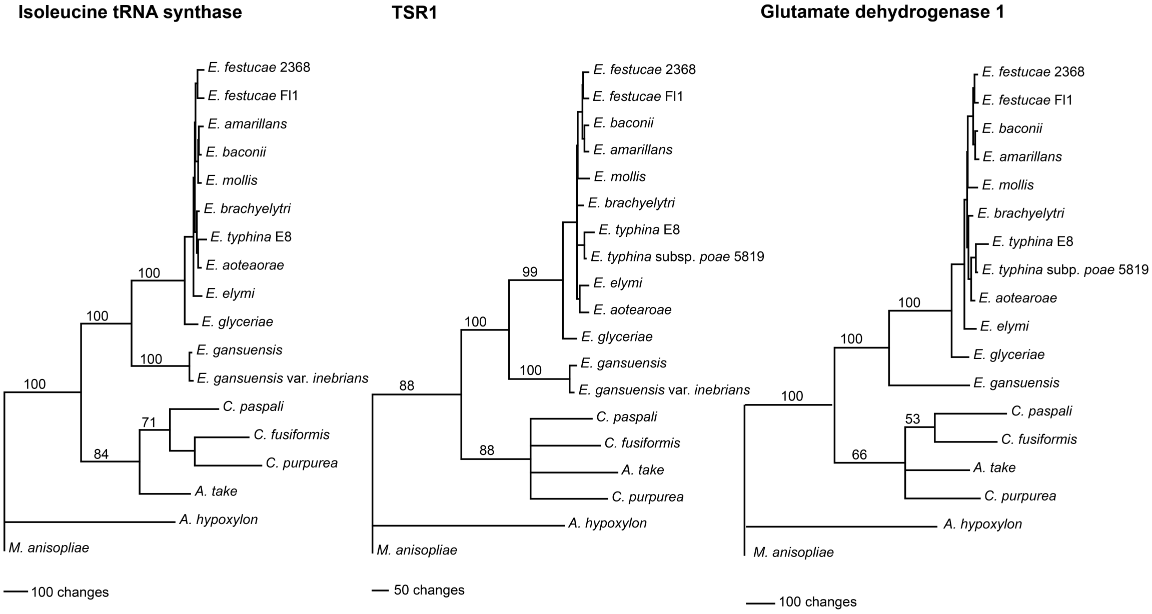
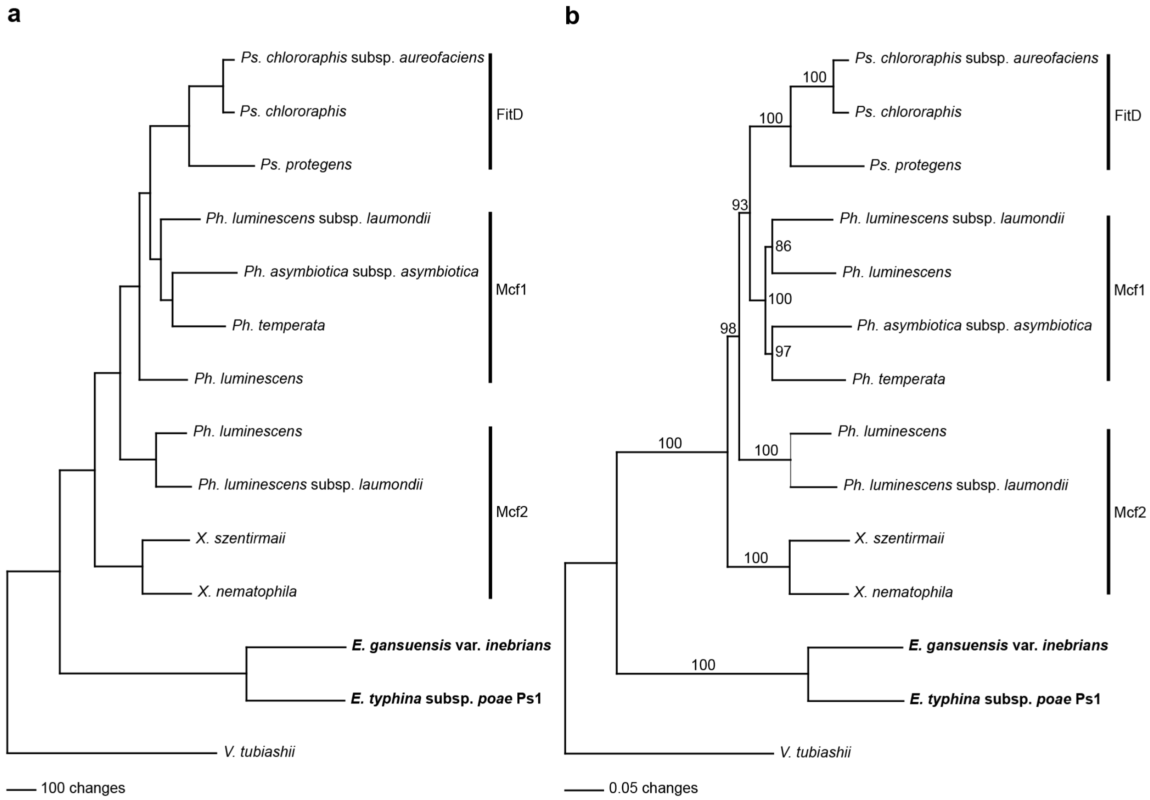
Supplementary Figures



Supplementary Figure 1. Rooted 50% majority rule maximum parsimony phylogenetic trees of the glutamate dehydrogenase, isoleucine tRNA synthase, and TSR1 DNA coding sequences. The *Metarhizium anisopliae* sequences were designated as the outgroup for rooting the trees. The numbers at the nodes are the bootstrap percentages based on 1,000 replications. The TSR1 tree was based upon 2,538 total characters, of which 1,433 were constant, 478 variable characters were parsimony uninformative, and 627 variable characters were parsimony informative. The unmarked nodes all had bootstrap support of 53 or higher. The glutamate dehydrogenase tree was based upon 3,225 total characters, of which 1,967 were constant, 493 variable characters were parsimony uninformative, and 765 variable characters were parsimony informative. The glutamate dehydrogenase sequence from *E. gansuensis* var *inebrians* was not included, since the gene sequence was split between two contigs, which introduced a gap into the alignment. The unmarked nodes all had bootstrap support of 66 or higher. The isoleucine tRNA synthase tree was based upon 3,228 total characters, of which 1,884 were constant, 517 variable characters were parsimony uninformative, and 827 variable characters were parsimony informative. The isoleucine tRNA synthase gene from *E. typhina* subsp. *poae* 5819 was not included since the gene was split between two contigs, which introduced a gap into the alignment. The unmarked nodes all had bootstrap support of 70 or higher.



Supplementary Figure 2. Mcf phylogenetic trees generated by the branch and bound (a) and, neighbor joining (b) methods. The *Vibrio tubiashii* sequence was designated as the outgroup for rooting the trees. The numbers at the nodes of the neighbor joining tree are the bootstrap percentages based on 1,000 replications. The trees were based upon 1,983 total characters, of which 391 were constant, 404 variable characters were parsimony uninformative, and 1,188 variable characters were parsimony informative.

Supplementary Figure 3. Sequence alignment of the Mcf proteins used to generate the phylogenetic trees in Figure 4 and Supplementary Figure 2.

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CLUSTAL X (1.83) multiple sequence alignment

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Ph.luminescensMcf2AAR21118.1        VVTSLDANTYRVYHDGRVNSSLLYDNVVMAVDYKDYQAAATTENLAVAYM
Ph.l.laumondiiMcf2NP_930360.1       VVTSLDANTYRVYHDGRVNSSLLYDNVVMAVDDKDYRVAATTDSLAVAYM
Ph.temperataWP_023045049            IVTNLDANTYRVYHDGRINSSLLYDNVVMAVDYKDYQVSGTVEGLAAAYM
X.szentirmaiiMcf2CDL84642           VVTHLDDNTYRVYHDGRVNSSLLYDNVVMAVDYQDYQVAGTAEGLAAAYM
X.nematophilaMcf2YP_003712268.      VVTNLDDNTYRVYHDGRVNSSLLYDNVVMAVDYQDYQVAGTAEGLAAAYM
E.g.inebrians                       IVTKLNDNQYRVYHDSRMDSSMLYDNVIMAVDWRDYKLREDGGGLACAFM
E.t.poae                            IVTNLNDDQYRVYHDSRQDSSLLYDDVVMAVDYRDYKHRDASTGFASTFM
V.tubiashiiEIF01430.1               IVTDLNDTHYRVFHDGRVGSSVLYDNVVMAVDYADYQGQGVSDEVAGAYM
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Ph.a.asymbioticaYP_003042199.1      QYVDGEWQLAFQRQEYQQDGQ----RVWPKLRD----GGEPLSILVADSQ
Ph.luminescensMcf2AAR21118.1        QYVNDQWQLALQRQEYQQDGQ----TLRLKLRG----GEEPLSIQIADSQ
Ph.l.laumondiiMcf2NP_930360.1       QYVNDEWQLVFQRQEYQQDGQ----RLRLKLRG----DEEPLSIQIADSQ
Ph.temperataWP_023045049            QFVNDKWQLVFQRQEYQRDGQ----RIWLKLRD----GAESLSIRDAGSQ
X.szentirmaiiMcf2CDL84642           QYVDGEWQLVFQRQEYQREGH----MLWPKLRN----GEEPLSIQVADSQ
X.nematophilaMcf2YP_003712268.      QYVNGEWQLVFQRQEYQRDGH----TLWPKLRS----NEEPLSIKTADSQ
E.g.inebrians                       HYREGIWSLYFQRQNQTKNGAFRTLYNARPKDTVYIIGAEPLIKLAPKSY
E.t.poae                            HYREGRWSLCFQRQTIVAN-ARIVLYEPAPRDGPSILGAEPLIEMVPGSY
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E.t.poae                            QWLVSLLGDQLFLN-ERFVGRAV---ASSRNYDFTYLWLKQKEERGFTAV
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E.t.poae                            PGYEHDMTLSEIVQLFDRSSTSLTQTEQGALLRRIDLARKKLFNESIWQM
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Ps.protegensABY91230.1              TATLSEDFRGAGSVFGQLAPQDFYLSLVGDRSGGRCYPLVRAMAVALARG
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E.g.inebrians                       TNDVIAMFQEMGGSTKPMPQDILLRAVPDEHGGGRCYPLVYAMSVALASS
E.t.poae                            TNDVVAMFQEMGGYTKPMPQDILLNAIPDKYGGGRCYPLVYAMSVALASS
V.tubiashiiEIF01430.1               SAEVSRYMTAQGAFVTQLVPQDFVLLGRP----GRCLPLSRVMATAIAQK
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Ps.protegensABY91230.1              G---EAGVNSLVQKLFLASADPQA--GISTLLKNSLIRLHSN-VDAVHAS
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Ph.luminescensAAM88787.1            G---EAGINSLVQKLFFASADPQA--GSSTLLRNSLIKLHSN-VEAVQAS
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Ph.temperataWP_023045049            G---EAGIDSLVQKLFFASADPQA--GSSTLLKNSLLRLHAN-VEAVQAS
X.szentirmaiiMcf2CDL84642           G---EVGVNSLVEKLFSAAASPQE--GSSTLLKNSLARLHSN-VEAVQAS
X.nematophilaMcf2YP_003712268.      G---EAGINSLVEKLFLAAASPQE--GSSTLLKNSLVRLHSN-VEAVQAS
E.g.inebrians                       DFAIDFVIDQLCAKLVALSPNNKSDMMNAELLKRCLEDLHTS-YPAAEAS
E.t.poae                            ----NFAIDALCAKLVGLSPNNAADMKNAELLKRCLEDLHTS-YPAAEAS
V.tubiashiiEIF01430.1               G---EPGANQFASVLFDAAAHPDS--QIATNVYTTVGQLHSN-TDAGLAE
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Ph.luminescensAAM88787.1            TELGQFGLSEVVSRLAA----TTGTSMFALNTQNHSMMVGSTVTTEGRRY
Ph.a.asymbioticaYP_003042199.1      TKLGLSNLSEVVSRLTT----TAHTAMFALNTQNHSMMVGITVTAEGRRY
Ph.luminescensMcf2AAR21118.1        TARGQVKLSEVVSLLKG----ATKTSMFALNTPNHSMMVGNTIGLEGRRY
Ph.l.laumondiiMcf2NP_930360.1       TTRGQVTLSEVVSLLKK----ATKTSTFALNTPNHSMMVGSMVGLEGRRY
Ph.temperataWP_023045049            TDLGQFNLSEVVSRLDT----TTSTSMFALNTQNHSMMVGRAVTTKGRRY
X.szentirmaiiMcf2CDL84642           TARGQVTLPEVSSLLKE----SAGTSTFALNTRNHAMMVGVTVGAEGRRY
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E.g.inebrians                       RPIGNMTLEEAVSILEK----STETTTLAMHTEVHAMLLGVTRTGNSTLW
E.t.poae                            RPIGNMTLAEAVSVLEK----STETTTLAMHTEVHAMLLGVRKTRNSTSW
V.tubiashiiEIF01430.1               TDAGRLSIKGIVSNLEKESLTNGSSKFMLMNTRAHSMLVGKRQFEGKSRY
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Ps.chlororaphisAFD97974.1           YFYDPNVGIFAFDSTKALTKAMQQHLVERKLAAHYGSFGSQSQPAFNLIE
Ps.protegensABY91230.1              YFYDPNVGIFAFDSSKGLAKAMEQHLVRRKLAAHYGSFGSQSQPAFNLVE
Ph.l.laumondiiNP_931332.1           YFYDPNVGIFAFDNTKSLSRAMEQHLVVRGLAAHYGSFGSKSVPAFNLIE
Ph.luminescensAAM88787.1            YFYDPNVGIFAFDNTKSLSRAMEQHLVGRRLAVHYGSFGSKSAPAFNLIE
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Ph.luminescensMcf2AAR21118.1        YFYDPNVGIFAFNDAVSFFRAMKNHLVGRKLAAHYGSLGDELTPIFNLVE
Ph.l.laumondiiMcf2NP_930360.1       YFYDPNVGIFAFNNTSRFLEAMKHHLVGRKLAAHYGSLGDKLTPIFNLVE
Ph.temperataWP_023045049            YFYDPNVGIFAFDNPKSLFRAMEQHLVESNLTAHYGLFGSNSAPAFNLIE
X.szentirmaiiMcf2CDL84642           YFYDPNVGIFAFDNVENFSHAMEKHLVTRKLAVHYGAFGSKSTPAFNLVE
X.nematophilaMcf2YP_003712268.      YFYDPNVGIFAFDNMKNFSRAMEKHLVERKLAVHYGALGSKSTPVFNLVE
E.g.inebrians                       HFYDPNFAIATFNSGEALLEATTKFFEESGFAKVYEAQG--QTPSFDIFQ
E.t.poae                            HFYDPNFAIVTFNSGEALLEAATKFFEESGFAKVYEAQG--QTPSFDFFQ
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Ps.c.aureofaciensAFD97973.1         IDTGKMAEVPVGNGLNVADLSRPEELAGVIGQRRQVEQAVDAQQRVSEDL
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Ph.luminescensAAM88787.1            IDTGKMAEVPVGNGLNVADLTRFEELSSVIGQRRQVEQVMSAQERITEDL
Ph.a.asymbioticaYP_003042199.1      IDTGKMAEVPVGNGLNVADLTRFEELASVIGQRRQVEQAVRAPERVTEDL
Ph.luminescensMcf2AAR21118.1        IDTGKMAKVPVGNDLNVADLTRPDELTTVIEQRRQVEQAVNAQVRIAKDA
Ph.l.laumondiiMcf2NP_930360.1       IDASKMAKVPVGNDLNVADLTRPDELTTVIEQRRQVEQAVNTQVRIAKDT
Ph.temperataWP_023045049            IDTGKMAEVPVSNGLNVADLTRFEELASVIGQRRQVEQTVSTQERVTEDL
X.szentirmaiiMcf2CDL84642           IDPAKMAKVPVGNGLDVADLTRPDELATVIEQRQWAKQVVNTQEKVAEST
X.nematophilaMcf2YP_003712268.      IDPVKMARVPVGNGLDVADLTRPDELATVIEQRQWVKQTINAQEKIAKDV
E.g.inebrians                       IDAERVSGIILDYNLTVADLVRPETLLETVASQQQTATFLQDPAQLTASD
E.t.poae                            IDAERVSRIGFDHNLTVADLVEPDTLLETITADRKTVTLYHDPAQLTSSR
V.tubiashiiEIF01430.1               LDTAKMAEVRLSTGLSVQDLASPSDRVANLATADHAARLAQASDSLSTDL
                                    :*. ::: : .. .* * **   .     :     .         :  .

Ps.c.aureofaciensAFD97973.1         RLGAALTTFDAEQWG-ARFEVASTRLAREHQLGSQWIPIIANIEEQKE-G
Ps.chlororaphisAFD97974.1           RLGAALTTFDAEQWG-ARFEVASTRLAQEHQLGSQWIPIIANTEELKD-G
Ps.protegensABY91230.1              RLGAALTTFDAEQWG-ARFDAASTRLAREHQLSSQWIPIIANTERQPE-G
Ph.l.laumondiiNP_931332.1           RLSPALKTFDAEQWG-ARFEVASARLAQEHQLDSRWLPIIATTEDQGE-G
Ph.luminescensAAM88787.1            QLSTALQAFDAEQWG-ARFEAASTRLAQEHQLDSRWLPIIATTEEQGE-G
Ph.a.asymbioticaYP_003042199.1      RLSTLLKTLDAEQLG-GRFEVASTQLAQEYQLDSHWLPIIATTEELGE-G
Ph.luminescensMcf2AAR21118.1        RLHTALATLDAEQWG-ARFAEASTRLAQENNLDQRWMPVISNTEDQGE-G
Ph.l.laumondiiMcf2NP_930360.1       RLHTALATLDAEQWG-SRFAEASTRIAQENNLDQRWMPVIGNTEDQGK-G
Ph.temperataWP_023045049            PLGTALKTFDAEQWG-ARFEAASTRLAQKYQLDNHWLPIIATTKDLGE-G
X.szentirmaiiMcf2CDL84642           QLRTALVTLDAELWG-ERFDNAITELARENGLDQRWMPVIDNIKEQDE-G
X.nematophilaMcf2YP_003712268.      QLHTALVTLDAEQWG-EKFDKAITELAGEHKLDQRWVPVIDNIKEKSE-G
E.g.inebrians                       AFSAQTELLETLGLGEAAWRDATARLEESTGMGEHWMPILETMREGDEKG
E.t.poae                            TFSAQTELLETLRLGEAAWRDATARLEESLGIGEHWMPILETLKEGGEEG
V.tubiashiiEIF01430.1               QLKSALSVLQGANLA-QDFFAAAQDVYRRHRLDHAWVPVFENIEKTPS-G
                                     : .    ::    .   :  *   :     :.  *:*:: . .   . *

Ps.c.aureofaciensAFD97973.1         GYRVQFINREQPE-QTRWLATDDGTFVEFRRFVDEHMRVFNQHFTLEHGQ
Ps.chlororaphisAFD97974.1           GYRVQFINRDQPELQPRWLDTRDGTFVEFRRFVDEHMRVFNEHFTLEHGQ
Ps.protegensABY91230.1              GYRVQFINRDQPD-QTRWLSTDDGTFVEFRRFVDEHMSVLNEHFTLEHGQ
Ph.l.laumondiiNP_931332.1           RYRVQFINRDQPE-QTRWLITSDSTFVEFRRFIDEHMAVLNEHFTLEHGR
Ph.luminescensAAM88787.1            RYRVQFINRDQPE-QTRWLDTDDSTFVEFRRFVDEHMSVLNEHFTLESGR
Ph.a.asymbioticaYP_003042199.1      HYRVQFINSDQPE-QTLWLTTDDSTFVEFRRFVDEHMRVLNEHFTLENGR
Ph.luminescensMcf2AAR21118.1        RYRVQFINRDQPE-ETRWVSSGDTTFIEFRRFVDEHMLTLSQHFTFEHGQ
Ph.l.laumondiiMcf2NP_930360.1       HYRIQFINRDQPE-ETRWVSSGDATFIEFRRFVDEHVLTLGQHFTFEHGQ
Ph.temperataWP_023045049            RYQIQFINRDHPE-QTRSLDTNDSTFVEFRRFVDKHMSVLNEHFTLEHGR
X.szentirmaiiMcf2CDL84642           PYRIQFINRDNLE-EM-WINSSDDTFIKFRHFIDEHMRTLGQHFTLERGQ
X.nematophilaMcf2YP_003712268.      GYRVQFINRDNLE-EK-WVNSNDGTFVKFRHFIDEHMRTLSQHFTLERGQ
E.g.inebrians                       SYEVQFINLKNKN-ETKWLSTKSPAIKDFKARLDKHLKSLSETYEFESGS
E.t.poae                            SYEVQFINLKNMN-ETKWISTESSAIKDFKARLDEHLETLSKTHEFESGS
V.tubiashiiEIF01430.1               QYRIPLIHREDNR-EISVLTSDE-RIWKFKHYYEDALGRLKKSYNFSHGE
                                     *.: :*: ..   :   : : .  : .*:   :. :  : : . :. *

Ps.c.aureofaciensAFD97973.1         IRPRAGVSEASPVDGLNAGFAVQTLIQWFADKNRKDTAQGTVSPDLATAL
Ps.chlororaphisAFD97974.1           IRPRAGVSEASPVDGLNAGFAVQTLIQWFADKNRKDTAQGTVSPDLATAL
Ps.protegensABY91230.1              IRPRGGVGEVAHVDGLNAGFAVQTLIQWFADKNRKDAAQGVVSPDLATAL
Ph.l.laumondiiNP_931332.1           MRLRGGVGEAAPVDGLNAGFAVQTLIQWFADKNRHDAASGVISPDLATAL
Ph.luminescensAAM88787.1            MRPRGGVGEAAPVDGLNAGFAVQALIQWFSDKNRHDAANGMASPDLATAL
Ph.a.asymbioticaYP_003042199.1      MQLRRGVSEVAPVDGLNAGFTVQTLIQWFADKNRHDAASGVASPDLATAL
Ph.luminescensMcf2AAR21118.1        IRPKSGISEAAPVDGLNAGFAIQTLIQWFADKNRNDAARGIASPDLATAL
Ph.l.laumondiiMcf2NP_930360.1       IQPKGGIGEAAPVDGLNAGFAIQSLIQWFTDKNRNDAARGIASPDLATAL
Ph.temperataWP_023045049            MRPRGGVSEAMPVDGLNAGFAVQTLIQWFADKNRHNVASGVASPDLATAL
X.szentirmaiiMcf2CDL84642           IQHNGGVGEAAPVDGLNAGFAVQTLIQWFANKNRNDAAQGISSPDLATAL
X.nematophilaMcf2YP_003712268.      MRHKGGVGEAAPIDGLNAGFAVQTLIQWFANKNRNDAAHGISSPDLATAL
E.g.inebrians                       FMRKENLPHAEAIDGLNAMSIVQTLIEHFSSK---ETEESKTNVQLADAL
E.t.poae                            FMREENLAHAEAIDGLNAMFIMRTLIEHFAGK---KTEESKTNAELADAL
V.tubiashiiEIF01430.1               LTRHASITDVEHVDGLNAAFAVQAILSWFNNHSRTAAAGDPLPQGLNTAL
                                    :  . .: ..  :*****   :::::. * .:    .  .     *  **
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Ps.c.aureofaciensAFD97973.1         KIHSYLGLAQIGHGTLQDVVKVTELVQTALRGEAMAAETSLKDFASTLGH
Ps.chlororaphisAFD97974.1           KIHSYLGLAQIGHGTLQDVVKVTELVQTALRGEAMAAETSLKDFASTLGH
Ps.protegensABY91230.1              KIHSYLGLAQIGHGTVQDVANITQLVQTALRGEALAAESSLKDFASTLGH
Ph.l.laumondiiNP_931332.1           KVHSYLNLVQMAHGGVQDIAKVTALVRTALRGEVVAAETSLKDFASNLGH
Ph.luminescensAAM88787.1            KVHSYLNFVQMVHGGVQDVIKVTALVRTALRGEVVAAQTSFKEFALSLGH
Ph.a.asymbioticaYP_003042199.1      KIHSYLGLTQMAHGSLQDVVKITELVRTALRGEVKAAETSFKDFALSLGH
Ph.luminescensMcf2AAR21118.1        KVHSYLNFVQMAHGGVQDVTKITALVRTALRGEVMAAETSLKDFTSILGH
Ph.l.laumondiiMcf2NP_930360.1       KVHSYLNLVQMAHGGVQDVTKVTELVRTALRGEVVAAETSLKDFTSILGH
Ph.temperataWP_023045049            KVHSYLGLAQIAHSSLQDITKVTELVRTALRGEVVAAGTSFKDFASNLGH
X.szentirmaiiMcf2CDL84642           KIHSYLNYAQMAHSSINDVVKVTELVRTALRGEVVGAETSLKEFSSALAH
X.nematophilaMcf2YP_003712268.      KIHSYLNYAQMTHSSINDVMKVTELVHTALRGEVVGAETSLKEFSSALAH
E.g.inebrians                       KIHSYLNLTQMGHQTLGDVGKIVNLVKTMLETGEVAKKS-LQTLVRGLGN
E.t.poae                            KIHSYLNLTQMGQQTLGDVGKMVNLVKDMLETGQVAKSS-LTTLVERLGN
V.tubiashiiEIF01430.1               QVHTYINLAQIAHGTVMDASKIVGLYRAALQ----EGQSVTSSTLSAVGH
                                    ::*:*:. .*: :  : *  ::. * :  *.       :        :.:

Ps.c.aureofaciensAFD97973.1         TVNEGAGVLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGAA
Ps.chlororaphisAFD97974.1           TVNEGAGVLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGAA
Ps.protegensABY91230.1              TVNEGAGVLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVSGAA
Ph.l.laumondiiNP_931332.1           TVNEGAGVLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGAA
Ph.luminescensAAM88787.1            TVNEGVGVLFGGAMIGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGAA
Ph.a.asymbioticaYP_003042199.1      TVNEGAGVLFGGVMVGLDAYELAHAENDVQKAVFGTQLAFDSASLVTGVA
Ph.luminescensMcf2AAR21118.1        TVNEGAGVLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGTA
Ph.l.laumondiiMcf2NP_930360.1       TVNEGAGVLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGTA
Ph.temperataWP_023045049            TVNEGAGLLFGGAMVGLDAYELAHAENDVQKAVFGTQLAFDSASFVTGVA
X.szentirmaiiMcf2CDL84642           TANEGIGLLFGGAFVGLDAYELAHAETDTQKAVFGTQLAFDSASFVTGAA
X.nematophilaMcf2YP_003712268.      TANEGIGLLFGGAFIGLDAYELTHAETDTQKAVFGTQLAFDSASFVTGAA
E.g.inebrians                       -ASEGFGVLLGGASVILDAFELAHVDNSAQRAVLGTQLAFDSATFLASVG
E.t.poae                            -VSEGFGVLLGGANVVLDAYELAHTDNDAQKAVFGTQLAFDSVTFLASAG
V.tubiashiiEIF01430.1               VANEGIGLGLGFASVVLDSYELAHAQNEVQKAVFGTQLAFDSASFVTTSA
                                     ..** *: :* . : **::**:*.:...*:**:********.::::  .

Ps.c.aureofaciensAFD97973.1         GVGAGLLGASTAAAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ps.chlororaphisAFD97974.1           GVGAGLLGASTAAAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ps.protegensABY91230.1              GIGAGLIGASTTAAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ph.l.laumondiiNP_931332.1           GVGAGLVGASTAGAVLGGASVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ph.luminescensAAM88787.1            GIGAGLVGASTAGAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ph.a.asymbioticaYP_003042199.1      GVGAGLVGASTTAAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ph.luminescensMcf2AAR21118.1        GVGAGLMGASTAGAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
Ph.l.laumondiiMcf2NP_930360.1       GVGAGLVGASTAGAVLGSGGVILGGLAVGFTALAQAFGVVAEDAKAVGRY
Ph.temperataWP_023045049            GVGAGLVGASTASAVLGAGGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
X.szentirmaiiMcf2CDL84642           GFGAGMVGASTTAAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGRY
X.nematophilaMcf2YP_003712268.      GVGAGMVGASTTAAVLGGAGVILGGLAVGFTALAQAFGAVAEDAKAVGHY
E.g.inebrians                       TIGAGLIGATTAVAVLGGVSVIFGGLAFGVGALSSNYARIAEDAKAVGSY
E.t.poae                            TIGAGLIGATTAVAVMGGVSVILGGLAVGVGALASGFAQIAEKAKYVGRY
V.tubiashiiEIF01430.1               GIGAGLAGAGTASAVLGGAGVILGGLAVGFTALAQAFGEVAEDAKAVGRY
                                     .***: ** *: **:*. .**:****.*. **:. :. :**.** ** *

Ps.c.aureofaciensAFD97973.1         FDTLDKAYKGNGYRYDAEK-------KVLVPLAGAVVKRLDLRNNQIGFD
Ps.chlororaphisAFD97974.1           FDTVDKAYKGNGYRYDAEK-------KVLVPLAGAVVKRLDLRNNQIGFD
Ps.protegensABY91230.1              FDTLDKAYQGNGYRYDEKQQ-------VLVPLAGAVVKRLDLRSNEVGFD
Ph.l.laumondiiNP_931332.1           FDTVDKAYKGNGYRYDNKN-------KVLVPLAGAVIKSLDLRKHQISFD
Ph.luminescensAAM88787.1            FDTVDKAYKGNGYRYDNEK-------QVLVPLAGAVIKTLDLSKNQIDFD
Ph.a.asymbioticaYP_003042199.1      FDTVDYAYGHNGYDHKVENEK-----KVLVSLPGAVVKCLDLQKNQIVFD
Ph.luminescensMcf2AAR21118.1        FNTLDDAYKGNGYRYDNEK-------KVLVPLPGAVIKTLDLRKNQIDFD
Ph.l.laumondiiMcf2NP_930360.1       FDTIDKAYKGNGYRYDNEK-------KVLVPLAGAVIKTLDLRKHQIDFD
Ph.temperataWP_023045049            FDIVDKAYKGNGYRYDDKN-------KVLVPLPGAVVKSLDLRNSQISFD
X.szentirmaiiMcf2CDL84642           FDLLDKAYAGNGYRYDSGQ-------DVLVPLAGAVIKTLDLRNKQVGFD
X.nematophilaMcf2YP_003712268.      FDMLDKAYEGNGYRYDSKQ-------DVLVPLAGAVIKTLDLRNKQVGFD
E.g.inebrians                       FGDVDHAYRHGGFDHDEKN-------KILVPLRGAVITEIDVAG-DVKFD
E.t.poae                            FGDADEAYKAGGFKYDRDH-------GILVPLFGAVISEIDAAG-NVKFD
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V.tubiashiiEIF01430.1                FAAVDSAYHSGGYALVDKTLDDGSRYHALEPKDGAVINQIDLQTGQVHFD
                                     *   * **  .*:               * .  ***:. :*    :: **

Ps.c.aureofaciensAFD97973.1          SQYIYRTHHGST-GSGAINYFFWAGDFPRMIHDRGQAIEVRSGIGYKDAT
Ps.chlororaphisAFD97974.1            SQYIYRTHHGST-GSGAINYFFWAGDFPRMIHDRGQAIEVRSGIGYKDAT
Ps.protegensABY91230.1               SQYIYRTHHGST-GSGAINYFFWVGDFPRMIHDRAQAIEVRSGIGHGAKP
Ph.l.laumondiiNP_931332.1            SQYIYRTHSGST-GSGEINYFFWVGDFPRMVHDRGQAIEVRSGIGYKDIS
Ph.luminescensAAM88787.1             SQYIYRTHSGST-GSGKINYFFWVGDFPRMVHDRGQAIEVRSGIGYKDVS
Ph.a.asymbioticaYP_003042199.1       SQYIYRTHSGST-GSGEINYFFWIGDFPQMVHDRDQAIEVRSGIGYKEAS
Ph.luminescensMcf2AAR21118.1         SQYIYRTHSGST-GSGRINYFFWIGDFPKMVHDRSQAIEVRSGIGYKDAS
Ph.l.laumondiiMcf2NP_930360.1        SQYIYRTHSGST-GSGRINYFFWIGDFPKMVRDRSQAIEVRSGIGYKDVS
Ph.temperataWP_023045049             SQYIYRTHSGST-GSGKINYFFWVGDFPRMVHDRSQAIEVRSGIGYKDAS
X.szentirmaiiMcf2CDL84642            SQYIYRTHSGPT-GSGKINYFFWVGDSPRMVHDRSQAIEVRSGIGHKEAS
X.nematophilaMcf2YP_003712268.       SQYIYRTHSGST-GSGEINYFFWIGDFPRMVHDRSQAIEVRSGIGHKKAS
E.g.inebrians                        TQYIYRTWHGSTRWSGRDNYFFWAGDFPKLIHDKSQAINVREGIGAPASG
E.t.poae                             SQRIYRTWHGST-GSGRINYFFWVGDKPRMIQDKSQAINVREGIGAPASG
V.tubiashiiEIF01430.1                SQYIYRTHHGST-GSGAINYFFWAGDFPRMIRDKSQAINVRAGIGYNETT
                                     :* ****  *.*  **  ***** ** *::::*: ***:** ***

Ps.c.aureofaciensAFD97973.1          RTLEHGDSTAVILPGTPKSYISYEYMILPGSTTRHDTGFDVIRRLEEDRR
Ps.chlororaphisAFD97974.1            RTLEHGDSTAVILPGTPKSYISYEYMILPGSTTRHDTGFDVIRRLEEDRR
Ps.protegensABY91230.1               PRLDHGDSRTVILPGTPKSYISYEYMILPGATTRHDTGFDVIRKLEQDRR
Ph.l.laumondiiNP_931332.1            RPLEHSDSNVVILPGTPKSYISYEYMLLPGATTRHDAGFDVIRRLEEDKR
Ph.luminescensAAM88787.1             RPLEHGDSNVVILPGTPKSYISYEYMLLPGATTRHDAGFDVIRRLEEDKR
Ph.a.asymbioticaYP_003042199.1       KSLEYGDS-AIILPGTPKSYIRYEYMLLPGATTRHDTGFDVIRRLEEDKR
Ph.luminescensMcf2AAR21118.1         RSLEHGDSNVVILPGTPKSYINYEYMQLPGATTRHDAGFDVIRRLEEDKR
Ph.l.laumondiiMcf2NP_930360.1        HKLDHSDSNVLILPGTPKSFISYEYIQLPSATTRHDAGFDVIRRLEEDKR
Ph.temperataWP_023045049             KSLEHSDSNVVILPGTPKSYISYEYMLLPGATTRHDAGFDVIRKLEEDKR
X.szentirmaiiMcf2CDL84642            HKLDHNDSNVLILPGTPKSFIKYEYMILPGATTRGDTGFDVIRKLEDDKR
X.nematophilaMcf2YP_003712268.       RDLEHSDSNVLILPGTPKSFINYEYMQLPGATTRHDAGFDVIRRLEEDKR
E.g.inebrians                        KLANTQDYTAIILPATPKSYISYSWQTFPGCTTRHDYGFDVIRRLEEDKR
E.t.poae                             KLANTGDYTTIVLPATPKSFISYEWQILPFCTGRHDYGFDVIRRLEEDER
V.tubiashiiEIF01430.1                N--INASDRALILPATPKSYISYQYQILPGSTTRHDSGFSVIRRLEEDRR
                                           .  .::**.****:* *.:  :* .* * * **.***:**:*.*

Ps.c.aureofaciensAFD97973.1          FDYDFYIFPSEETIRRIRQEYVETPIEVLLDSRDRQLVIPELPKELHGYL
Ps.chlororaphisAFD97974.1            FDYDFYIFPSEETIRRIRQEYVDTPIEVLLDSRDRQLVIPELPKELYGYL
Ps.protegensABY91230.1               FDYDFYIFPSEETIRRIHQEYVETPVEVLLDGHNRQLVVPQLPKELYGYL
Ph.l.laumondiiNP_931332.1            FDYDFYIFPGEETIRRIHHEYVDTPIEVVLDQRNRQLVVPELPKELHSFL
Ph.luminescensAAM88787.1             FDYDFYIFPGEETIRRIHHEYVDTPIEVVLDQRNRQLVAPELPKELHGFL
Ph.a.asymbioticaYP_003042199.1       FDYDFYIFPGEQTIRRIHHEYVDTSIEVVLDQRDRQLVVPKLPKELHGYL
Ph.luminescensMcf2AAR21118.1         FDYDFYIFPGEVTIRRIHQEYVATPIEVVLDQRNRQLIVPELPKELHGYL
Ph.l.laumondiiMcf2NP_930360.1        FDYDFYIFPGEVTIRRIHQEYMATPIEVVLDQRNRQLIVPELPKELHGYL
Ph.temperataWP_023045049             FDYDFYIFPGEETIRRIRHEYVDTPIEVVLDQRNWQLVVPELPKALHKHL
X.szentirmaiiMcf2CDL84642            FDYDFYVFPSEYTIRRIHQEYVATPVEVILDQRSRKLIVPELPKELRGYL
X.nematophilaMcf2YP_003712268.       FDYDFYIFPGEVTIRRIHQEYVATPIEVMLDQSSRKLIVPDLPKELHGYL
E.g.inebrians                        FDYDFYIFPSEYAIHKITHEFVKTPIVVKLDSRSVRVQVAELDQSLHNVL
E.t.poae                             FDYDFYIFPSEYIIHQITHEFVKTPIAVRLGNRSVRVQVAELDESLHNVL
V.tubiashiiEIF01430.1                FDYDFYIFPSEYTIRKITQEYVHTNINVNLDAQNRQILMRKLGKELSGKL
                                     ******:**.*  *::* :*:: * : * *.  . ::   .* : *   *

Ps.c.aureofaciensAFD97973.1          NYQIKGAGGRYLVGLNEGARVDLAS---------EAGT--PSRWIIDTSQ
Ps.chlororaphisAFD97974.1            NYQIKGAGGRYLVGLNEGTRVDLSS---------EAGT--PSRWIIDSSQ
Ps.protegensABY91230.1               RYDIQGAGGEYLIGLNEGTEVRLSN---------EAGR-QPSRWIIDSSQ
Ph.l.laumondiiNP_931332.1            RYEIKGAGGEYLIGLNEGTQVKLT----------SDSASALSRWIIDSSQ
Ph.luminescensAAM88787.1             CYEIKGAGGEYLIGLNEGAKVNLTS-------------DVASTWIIDSSQ
Ph.a.asymbioticaYP_003042199.1       HYEIKGNGGKYQIGLNEGTRVKLT----------NVAA---SEWIIDLSQ
Ph.luminescensMcf2AAR21118.1         HYEIKGAGGEYLIGLNEGASVKLTS----DAP-HNLVGSTPSRWIIDSSQ
Ph.l.laumondiiMcf2NP_930360.1        HYEIKGAGGEYLIGLNESASVKLTS----DVP-HNLVGSAPSRWIIDSSQ
Ph.temperataWP_023045049             HYEIKGAGGRYQIGLNKGTWVKLT----------NHVANELSDWIIDSSQ
X.szentirmaiiMcf2CDL84642            HYEIKGAGGEYLIGLNEGASVKLMS----DVIKPDGT----SRWIIDSSQ
X.nematophilaMcf2YP_003712268.       HYEIKGAGGEYLIGLNEGTSVKLMS----DVPKPDGSGNIPSRWIIDSSQ
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E.g.inebrians                       EYNIHGVGANYTIGLNPGVAMTLSS------------NKSSTRWVLDCGK
E.t.poae                            EYTIHGAGANYTIGLNPGVAITLSS------------GWSNTCWVLDCGK
V.tubiashiiEIF01430.1               HYAFNGKGGEYHISLQSGASLSLQV-----TSRRDRS----TRWILDARQ
                                     * ::* *..* :.*: .. : *                  : *::*  :

Ps.c.aureofaciensAFD97973.1         LESDSISVSKD----QMVVGG----VVVKLDPASNGQVLVVNAKGEVREV
Ps.chlororaphisAFD97974.1           LASESISVSKG----QLVVGG----VVVKLDPESNGQVLVVNAKGEVREV
Ps.protegensABY91230.1              LESDSITVAKD----HLLVGG----VKVRLDPAQSGQVLLVNAKGEVRAA
Ph.l.laumondiiNP_931332.1           LASDSISVSKN----QLVVGG----VVVELDPTQNGQVLVVNGKGEVREV
Ph.luminescensAAM88787.1            LASDSISVSKD----QLLVGEKGKEVVVKLYLAQNSQVLVVNGKGEVRKV
Ph.a.asymbioticaYP_003042199.1      LASNGISVSKN----QLVFGG----VVVELDPVKNKSVSVVN-KGEMHVV
Ph.luminescensMcf2AAR21118.1        LASDSISVSKN----RLVVGG----MAVELDSDWKEQVLVVNRKGEVREV
Ph.l.laumondiiMcf2NP_930360.1       LASDSISVSKN----RLVVGG----VVVELDSDRKEQVLVVNCKGEVREV
Ph.temperataWP_023045049            LDNDNIKVSKNPLENQLEIGG----VVVKLDLTQNRQVSVVNGKGELRKV
X.szentirmaiiMcf2CDL84642           LDSDTIKVTKN----RLEIGG----VVVELDPSQNGQVLLVNSNNEVREI
X.nematophilaMcf2YP_003712268.      LDNGTIKVLEN----RLEIGG----VVVEIDPSRNGQVLVVNSKNEVHEI
E.g.inebrians                       LDGEDIMVEAQ----AVSILG----FRVNLADRNFESMFICKPNGEILQV
E.t.poae                            LDGENIVIEAR----AVSISG----FRVNLADTLFSSMLIYKPNGEILEV
V.tubiashiiEIF01430.1               LSSDHLEVTRD----HLNIGG----VRVNLPGLSWGSIAVINKHNEVLVV
                                    * .  : :        : .      . *.:      .: : : :.*:

Ps.c.aureofaciensAFD97973.1         DFA---GMSARVVEEDASKWQLPGQRIEQHLSELAKAHQLHGQYVVVDNY
Ps.chlororaphisAFD97974.1           DFA---GMSARVVEEDASKWQLPGQRIEQHLSELAKAHQLHGQYVVVDNY
Ps.protegensABY91230.1              DFA---GQTTYVVKEDASQWQVSGQRIEQHLKELAQAHQLHGQYVVVENY
Ph.l.laumondiiNP_931332.1           DFA---GLTTQVVSEDAGKWQVPGQQIEQHLSDLAKAHQLHGQYVVVENY
Ph.luminescensAAM88787.1            DFT---SLTAQVISEDASKWQVPGQQIEQHLSDLAKAHQLHGQYVVVENY
Ph.a.asymbioticaYP_003042199.1      DFS-NSQPIVNLVSVDADGWQGPDQQIEQHLKKLNKAHQLHGHYVVVENY
Ph.luminescensMcf2AAR21118.1        DFA---SLTAQVVSEDASKWQVPGQQIEQHLNDLAKAHQLHGQYVVVENY
Ph.l.laumondiiMcf2NP_930360.1       DFS---NLTTQVVSEDASKWQVPGYSIEQHLSDLAKAHQLHGQYAVVENY
Ph.temperataWP_023045049            DFTGQLNQTPKVVAVDAS----KQQQIEQHLSELAKAHQLHGQYVVVENY
X.szentirmaiiMcf2CDL84642           NFS---TLTADVIKEDASKWQVPGQQIEQHLSDLAKAHQLHGQYVVVENY
X.nematophilaMcf2YP_003712268.      NFS---AQTADVVREDASKWQVSGQQIEQHLKDLAKAHQLHGQYVVVENY
E.g.inebrians                       DFD---KKTTFPIEEDGAKYQGGSQNLKEHLDDLNDKHLLAAELIVVNEY
E.t.poae                            DFA---NKTTFPIKEDGDKYQGGSQKLTDHLNDLSDKHLLGTALIVVDKY
V.tubiashiiEIF01430.1               DPE---NSRYQITSEDASSWQN-AEQLHQHIQSEVAKHHLDSAFVAVENF
                                    :              *.         : :*:..    * *     .*:::

Ps.c.aureofaciensAFD97973.1         RHEGR--NVGRAFYDVANKRMLFTDT-QVEQAR-NAQLGAVIGEHAYFVD
Ps.chlororaphisAFD97974.1           SHEGR--NVGRAFYDVAKDRMLFTDT-QVEQAR-NAQLGAVIGEHAYFVD
Ps.protegensABY91230.1              KHGER--NVGRAYYEVAKDRMLFTDTDVQQ--ARNAQFGAVIGEHAYFVD
Ph.l.laumondiiNP_931332.1           SHNGR--DVGRAFYDVGKERMLFTNT-THEQTR-HAQLGAVMGDHAYFYD
Ph.luminescensAAM88787.1            RHQGR--DVGRAFYDVTKDRMLFTDT-TNEQAK-RAQLGAVMGDYAYFYD
Ph.a.asymbioticaYP_003042199.1      RHNGR--DVGRAFYDVVKDRMLFTDT-SQKQAR-HAQLGAVIDDYAYFYD
Ph.luminescensMcf2AAR21118.1        SHNGR--DVGRAFYDVTNKRMLFTDT-THEQTK-HAQLGAVMGNHAYFYD
Ph.l.laumondiiMcf2NP_930360.1       RYNER--NVGRAFYDVAKDRMLFTDT-PHKQAR-HAQLGAVMGDHAYFYD
Ph.temperataWP_023045049            RHYG------RAFYDVAKDRMLFTDT-SQEQAK-HAQLGAVIGDHAYFYD
X.szentirmaiiMcf2CDL84642           SHNGH--DVGQAFYDVAKDRMIFTDT-TQEQAK-HAQLGAVMGDHAYFYD
X.nematophilaMcf2YP_003712268.      KHNGR--DVGQAFYDVAKERMIFTDT-TQEQAKHHAQLGAVMGDHAYFYD
E.g.inebrians                       TTPAG-QSVGRAFYEPTNKRLLYTIDAPEELTKSVQVGVLTAGGKVFFYN
E.t.poae                            TTPAG-QSVGRAFYEPTSKRLLYTIDAPEELTNSAQVGALTAEGKVFFYN
V.tubiashiiEIF01430.1               VPQDQDHSVGLAYYQVDQQRFIYTPSPAHSDFLSDAKLVAQTGDLAWFNK
                                               *:*:  ..*:::*     .               .:* .

Ps.c.aureofaciensAFD97973.1         AENAAAWRVEIATGKVDAQFAPS-LNQSAG--RISRFWQEGE-AVYLARR
Ps.chlororaphisAFD97974.1           AENSAAWRVEIATGKVDAQFAPS-FNQSAG--RISRFWQEGD-AVYLARR
Ps.protegensABY91230.1              AENAAAWRVDIASGKVDAQFAPA-FNQSAG--QISRFWQEGD-AVYLARR
Ph.l.laumondiiNP_931332.1           ADNAAAWRVDIATGQVDAQFEPW-FNQNAG--QISRLWQEGD-AVYLARR
Ph.luminescensAAM88787.1            ADNAVAWRVDIATGQVDAQFEPW-FNQNAG--HISRFWQEGD-VVYLARR
Ph.a.asymbioticaYP_003042199.1      ADNVAVWRVDIATGQVDAQFELW-FNQCDG--KISRLWQEGD-AVYLARH
Ph.luminescensMcf2AAR21118.1        ADNAAAWRVDIATGQIDAQFEPW-FNQSAG--QISRLWQEGD-AVYLARR
Ph.l.laumondiiMcf2NP_930360.1       ADNAAAWRVDIATGQVDAQFEPW-FNQSAG--QICRLWQEGN-AVYLARR
Ph.temperataWP_023045049            ADNAVAWRVDIATGQVDAQFEPW-FNRNAG--NISRFWQEGD-VVYLARR
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X.szentirmaiiMcf2CDL84642           ADNAAAWRVDIATGQVDAQFMPW-FNHNAG--KISRLWQEGN-AVYLARH
X.nematophilaMcf2YP_003712268.      ANNAVAWRVEIATGQVDAQFMPW-FNYNAG--KISRLWQEGD-AVYLARH
E.g.inebrians                       TEHCAIWRVDVSTGVCEVKYHALCPSNKI---TLQRVWADADNHIHAVFL
E.t.poae                            TEHSAIWRVDVSTGVCEAKYHALCPFSKR---TLQRVWVDADNQIHALFR
V.tubiashiiEIF01430.1               DN--QVWLVNIAESRIVAQYRAFGWDYAHG-KAASRVWQENQ-RLYWSIE
                                     :    * *::: .   .::               *.* : :  ::

Ps.c.aureofaciensAFD97973.1         YQLKERE------------------------------AELNFRILGDRME
Ps.chlororaphisAFD97974.1           YQLKERE------------------------------AELNFRIIGDRME
Ps.protegensABY91230.1              YQLKE-R-----------------------------EAELSFRILGDRME
Ph.l.laumondiiNP_931332.1           YRLKEKE------------------------AELEKEAELCYRILSDRME
Ph.luminescensAAM88787.1            YRLKERE------------------------------AELGYRIIGDRME
Ph.a.asymbioticaYP_003042199.1      YWLKVKEQPEKRLEEQLKDWPEEQAEELLKQRPEKRGAELGYKILGDRME
Ph.luminescensMcf2AAR21118.1        YQLKGKE------------------------------AELSYRLLGDRME
Ph.l.laumondiiMcf2NP_930360.1       YQLKGKE------------------------------AELSYRLLGDRME
Ph.temperataWP_023045049            YQLKERE------------------------------SELSYQILGDRME
X.szentirmaiiMcf2CDL84642           YQLKERA------------------------------AELGYRIVGDRME
X.nematophilaMcf2YP_003712268.      YQLKERE------------------------------AELSYRIVGDRME
E.g.inebrians                       HQLSEDYFG-----------------------------HLNYILTADSMN
E.t.poae                            HQLSENHFG-----------------------------TLNYILTADSMN
V.tubiashiiEIF01430.1               QQTNAGH-----------------------------PAKWTYVLDENSMK
                                       .                                     : :  : *:

Ps.c.aureofaciensAFD97973.1         LVGVVGDDALLQ-LSARTDQH----GDALKTLLQGYQSQATQRATPVYS-
Ps.chlororaphisAFD97974.1           LVGVVGDDALLQ-LSARTGQH----GDALKAMLQGYESQATQRATPVYS-
Ps.protegensABY91230.1              LVGVVGDESLLQ-LSASNSQHGKDAKTLLNTLLKGYETQATQRDTPVYS-
Ph.l.laumondiiNP_931332.1           LVSAVGDDALIQ-LLARTSQH----SDVLKAILQGYESKSIQRETPMYT-
Ph.luminescensAAM88787.1            LVSAVGDDALLQ-LSARIGRH----GDELEAILQGYRSNSTQRGTLMYT-
Ph.a.asymbioticaYP_003042199.1      LVSAVGDDELLQ-LSAGTNRH----NDELQVIRKGYESDGIPRKTPTYT-
Ph.luminescensMcf2AAR21118.1        LVSAVGDDALLQ-LSARTGRH----GDELKTILQGYESNSTQRETPTYM-
Ph.l.laumondiiMcf2NP_930360.1       LVSAVGDDALLQ-LSARTGLH----SDELKTILQGYENNSIQRETPMYT-
Ph.temperataWP_023045049            LVSVVGDDALLR-FSARTDRH----NDELKVMLQDYESNSTQRVTPMYT-
X.szentirmaiiMcf2CDL84642           LVSVVGDHELLQ-QLANTDRH----GDVLGAIRQSYESNSTRGELSTYT-
X.nematophilaMcf2YP_003712268.      LVSAVGSDEVLQ-HLASTDQH----ADALDTLLESYENNSTQGVISAYT-
E.g.inebrians                       LVSMAGSPALLEKLNGLDKWTG-----EATLLLED-YTDTREVMLMHNPF
E.t.poae                            LVGMVGGPALLAKLHQEDKWTG-----EVRLLLEDYYTGPSELLPKLKLF
V.tubiashiiEIF01430.1               LVDVNGDLQLLDNLMADTAPN----RATTNYFFQSFQAG-VEGEIDLR--
                                    **.  *.  ::                    : :.

Ps.c.aureofaciensAFD97973.1         ----LGAPMMEPSAAALVTVFGLDSAK--VAHRYWVRTSDG---------
Ps.chlororaphisAFD97974.1           ----LGAPMMEPSAAALVTVFGLDNAK--VAHRYWVRTSDG---------
Ps.protegensABY91230.1              ----LGAPVLEPTAAELITVFGLDNAK--VAHRYWVRSSDG---------
Ph.l.laumondiiNP_931332.1           ----LGTRLLQPTSAALVTVFGVDAAG--VAHRYWIRTGDG---------
Ph.luminescensAAM88787.1            ----LGARLIQPTSAALVTVFGVDAAG--VPHRYWIRTSDG---------
Ph.a.asymbioticaYP_003042199.1      ----LGARLIQPTSAELITVFGLDAAN--VPHRYWIRTSDR---------
Ph.luminescensMcf2AAR21118.1        ----LGARLIQPTSAALVTVFGVDTAG--VAHRYWIRTSDG---------
Ph.l.laumondiiMcf2NP_930360.1       ----LGARLIQPTSAALVTVFGVDAAG--VAHRYWIRTGDG---------
Ph.temperataWP_023045049            ----LSARLIKPTSAALVTVFGVDAAN--VPHRYWIRTSDG---------
X.szentirmaiiMcf2CDL84642           ----LGTQQVQPTGADLITVFGVDADN--VKHRYWIRTNDG---------
X.nematophilaMcf2YP_003712268.      ----LGTRQIKPTSADLITVFGIDAND--VKHRYWIRTSDG---------
E.g.inebrians                       GS-LAGADIDAAIDSHMILVLGPKPDDESIHHRFWIRMSDR---------
E.t.poae                            ES-LAGADIDAAIDPHLIFVLGPKGKDHYFYHQFWIRMSDR---------
V.tubiashiiEIF01430.1               -----ADRWIEASLSDVISVS-ANKQG--QKHRYWVLAEQ----------
                                         .     .  . :: *   .       *::*:   :

Ps.c.aureofaciensAFD97973.1         ---TVIKPNLAPPAGQQPPVDAQGKPQSAWPIPADLVFAGSMPQPAG--Q
Ps.chlororaphisAFD97974.1           ---TVIKPNLAPPAGQQPPVDAQGKPQSAWPIPADLVFAGSMPQPAG--Q
Ps.protegensABY91230.1              ---IVIKPNLAPPAGQAPRADAPGQAQSAWQIPADLVLAGSQAQPGG--Q
Ph.l.laumondiiNP_931332.1           ---TLIKPNLAPPADQTPHFKENEQTRSAWPIPADLVLAGSMPQPGG--K
Ph.luminescensAAM88787.1            ---TLIKPNLAPPADQTLHFEAHEQTRSAWQIPADLVLAGSMPLLGG--K
Ph.a.asymbioticaYP_003042199.1      ---TLIKPNLAPPADQAWNLKEGKQTRSAWKIPSDLVLAGSMPQPGG--K
Ph.luminescensMcf2AAR21118.1        ---TLIKPNLAPPADWTLHFEAHEQTRSAWPIPADLVLAGSIPRPAG--T
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Ph.l.laumondiiMcf2NP_930360.1       ---TLIKPNLAPPADRTLHFEAHEQAHSAWPIPADLVLAGSMPQPGGKEV
Ph.temperataWP_023045049            ---TLIKPNLALPADKPRYFKEHEQTRSAWEIPVDLVLAGSIPQPGD--K
X.szentirmaiiMcf2CDL84642           ---TLIKPNLAPPADNTLSLEELKQARSHWQIPADLVLAGSITTPAG--K
X.nematophilaMcf2YP_003712268.      ---TLIKPNLAPPADNTLYFEAHKQTRSNWQIPADLVLAGSIFDLSG--K
E.g.inebrians                       ---TVIKAHP--------------------DIHLDYLLVGILNSTDGS-G
E.t.poae                            ---TVIKPHP--------------------DIHLNYLLVGTIASTGDS-G
V.tubiashiiEIF01430.1               ------RGDLG-----VIHANLNTQ-------PDDLILALVQNKGET--D
                                          : .                         : ::.

Ps.c.aureofaciensAFD97973.1         EVFFFYSQKQKVLFRQEGPGQKVLDGSQPSALRLATPTLANVLELNGHLL
Ps.chlororaphisAFD97974.1           EVFFFYSQKEKVLFRQEGPGQQVLDGSQPSALRLATPTLANVLELNGHLV
Ps.protegensABY91230.1              EVFYFYSKAQQVLFRQEGPGQKVLDAGQPSALRLSTPPLANVLNLNGHLL
Ph.l.laumondiiNP_931332.1           EVFFFYSKEQKVLFRQEGPGQAVLDASHPTALRISTPALANLVNLNGSLL
Ph.luminescensAAM88787.1            EVFFFYSKEQKTLFRQEGPGQEVLDANQPSALRVTTPALTNVINLNGHLV
Ph.a.asymbioticaYP_003042199.1      EVFFFYSKKEKALFRQEGPGQAVLDASQPSALRVTTPALSNVINVNGHLI
Ph.luminescensMcf2AAR21118.1        EVFFFYSKEQKALFRQEGPGQTVLDANHPSALRISTPELANLVNLNGSLL
Ph.l.laumondiiMcf2NP_930360.1       EVFFFYSKEQKVLFRQEGPGQMVLDANHPSALRINTPALANLVNLNGSLL
Ph.temperataWP_023045049            EVFFFYSREQKALFRQEGPGQAVLNANQPSALRVTTPALANVINVNGHLI
X.szentirmaiiMcf2CDL84642           EVFFFYSHEQKVLFRQEGPGQTELDASHPTALRVSTPPLANVVNLNGGLL
X.nematophilaMcf2YP_003712268.      EVFFFYSNELKLLFRQEGSGQTVLDASHPTALRVSTPSLANVVNLNGSLL
E.g.inebrians                       EQFCFFSHKEHKLVIQQGNGKQAKE-PRPVTMSSEFGTISNFFCVNNNLF
E.t.poae                            ELFCFFSYNQHKLVVQRGNGTQAEK-PRPVTISPELGTISNFFSANNNLF
V.tubiashiiEIF01430.1               QHYFFYSHSQQRLYYQASNRSQARSVSLP----EFSGGLRNVLDNQHQLF
                                    : : *:*   : *  * .      .   *         : *..  :  *.

Ps.c.aureofaciensAFD97973.1         AVTEDGRVARIEATGRLSYEAVNEHWLKGRST------WWQDLAS-VNGS
Ps.chlororaphisAFD97974.1           AVTEDGRVARIEATGRLSYEAVNEHWLKGRST------WWKDLAS-VNGS
Ps.protegensABY91230.1              AVTNDGRMARIEATGRLSYEAVNEHWLKAHSN------WWKNLAE-VAGS
Ph.l.laumondiiNP_931332.1           AITEDGRVARLDALGQLNYEAVNEHWLKGRTH------WWQDLAS-VADG
Ph.luminescensAAM88787.1            VVTEDGRVARLDALGQLSYAAVNEHWLKGRIH------WWQDLTS-VTDG
Ph.a.asymbioticaYP_003042199.1      AITEDGYVARLDAQGQLNYAAVNEHWLKKHIH------WWQDLAG-VAGF
Ph.luminescensMcf2AAR21118.1        AITEDGRVARLDAQGQLNYEAVNEHWLKGRTH------WWRDLAN-ITD-
Ph.l.laumondiiMcf2NP_930360.1       AITEDGRVARLDAQGQLNYEAVNEHWLKGRTH------WWQDLAN-ITDS
Ph.temperataWP_023045049            AMTEDGCVAQLDALGQLSYGAVNEHWLKRHTH------WWKDLAD-VTGF
X.szentirmaiiMcf2CDL84642           AITEDGRVAQLNASGQLNYEAVNEHWLKERTH------WWQDLAG-VAGS
X.nematophilaMcf2YP_003712268.      AITKDGRVAQLNAQGQLNYEAVNEHWLKGHPQ------WWQDLAS-VTGS
E.g.inebrians                       SITTTGFILRLTTHYTLALEAVNHQWLEHFEKDVDG-PWWTALPKLAKDH
E.t.poae                            SITDAGFILRLTTHCTLALEAVNHQWLEHREKDVDGGPWWTALSKLAKDH
V.tubiashiiEIF01430.1               AIANDQTLWLADQTPRL--AGVTSHWLQSHHQQVLP--QLKALSEKAAAK
                                     ::    :        *   .*. :**:              *.

Ps.c.aureofaciensAFD97973.1         N-ATLAVFGAKAADGKSALPVWYHN--GQVVVAASSLQGKPLQFLGFDSA
Ps.chlororaphisAFD97974.1           N-ATLAVFGAKAADGKSALPVWYHN--GQVIVAASSLQGKPLQFLGFDSA
Ps.protegensABY91230.1              N-ATLAVFGVKAADGKSALPVWYHN--GQVVVASSALQGKPLQFLGFDSA
Ph.l.laumondiiNP_931332.1           R-ATLAVFGIKGTDGKSLLPVWYHK--GQVIVASAPLQDKRLQFLGFEVD
Ph.luminescensAAM88787.1            R-ATLAVFGVKDTDGKSLLPVWYHN--GQVVVASAALQDKHPQFLGFEVD
Ph.a.asymbioticaYP_003042199.1      R-ATLAVFGVKGTN-DNLLPVWYHN--GQVVVASAPLQDKHLQFLGFEAD
Ph.luminescensMcf2AAR21118.1        T-TTLAVFGIKGSDGKSLLPVWYHN--GQVVAASAALSDKSLQFLGFEMD
Ph.l.laumondiiMcf2NP_930360.1       T-TTLAVFGVKGTDGNSLLPVWYHN--GQVVVASAALQGKSLQFLGFETD
Ph.temperataWP_023045049            S-ATLAVFGVKGADGKSVLPVWYHN--GQVVVAS--LQDKHLQFLGFDAD
X.szentirmaiiMcf2CDL84642           G-ATLAVFGVKGTDGKSQLPVWYHN--GQVVVASAELQGKPLQFLGFEAG
X.nematophilaMcf2YP_003712268.      G-ATLAVFGVKGTDGESPLPVWYHN--GQVVVASAALQGKSLQFLGFEAG
E.g.inebrians                       AAATVSIVGLCDAKGSPVQAWLCN---GRFVVAGPSLRGKPWHIAGLTEG
E.t.poae                            GAAIVSIVGLSDAEGSPVQAWLCS---DRFVVAGPSLRGKPRHMAGLTEG
V.tubiashiiEIF01430.1               L-AQLVLLGMTDSQGE-TVNLWYDNQSATLIRAGSNLNGQHLNFLGLTAD
                                      : : :.*   :. .             .: *.  * .:  :: *:

Ps.c.aureofaciensAFD97973.1         SSSARLFEPESG----------------------KLYLQAPMTSEALATA
Ps.chlororaphisAFD97974.1           SSSARLFEPESG----------------------KLYLQAPMTPEALAAA
Ps.protegensABY91230.1              SASARLFEPESG----------------------KLYLQPPLTAQALATA
Ph.l.laumondiiNP_931332.1           GSGARLFEPASG----------------------KLYRQPPMTADALAAA
Ph.luminescensAAM88787.1            GSSARLFEPASG----------------------KLYRQPAMTADALAAA
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Ph.a.asymbioticaYP_003042199.1      GSSARLFELANG----------------------KLYRQPPMTADALAAA
Ph.luminescensMcf2AAR21118.1        GTSARLFEPESG----------------------KLYRQPAMTANALAAA
Ph.l.laumondiiMcf2NP_930360.1       GASARLFEPESG----------------------KLYRQPAMTANALAAA
Ph.temperataWP_023045049            GSSARLFEPASG----------------------KLYLQPPMTADALAAA
X.szentirmaiiMcf2CDL84642           STSARFFEPESG----------------------KLYYQPAMTASELAAA
X.nematophilaMcf2YP_003712268.      GTSARLFEPESG----------------------KLYHQPAMTANALAVA
E.g.inebrians                       GTKAWLWYIESKGSGHLEVEPIVRVQELETVDSGHLYAQPTVRDEELETV
E.t.poae                            GSKAWLWHMETE-------------------DSGHLYAQPTVRGKELETV
V.tubiashiiEIF01430.1               QQWAWLYNHDDA----------------------SLYRQAVVNDDLIL--
                                       * ::                            ** *. :  . :

Ps.c.aureofaciensAFD97973.1         FG-GDEVLEASAQLPAATLPMPEV-QLRSAVQVDAGLRLTTVQGEILLRA
Ps.chlororaphisAFD97974.1           FG-GDEVLEASAQLPAATLPMPEV-QLRSAVQVDAGLRLTTVQGEVLLRT
Ps.protegensABY91230.1              FG-NDEVLEASAQLPAAIDWMPKL-QLRSAVQVDAGLRLTTVQGEVLLRS
Ph.l.laumondiiNP_931332.1           FG-TDEVLEVSSQLPAAGELASGL-HLKAVEQVDVGLRLTTVKGEILLQT
Ph.luminescensAAM88787.1            FG-TDEVLEASAQLPAANELEPEL-HLKAAEQVDAGLRLTTVKGEILLRT
Ph.a.asymbioticaYP_003042199.1      FG-SEAVLKASAQLPAVSELMPEL-HLKAAEQVDAGLRLTTVKGEILLRT
Ph.luminescensMcf2AAR21118.1        FG-ADQVLDDSAQLPAASELTPEL-HLKSAQQVDVGMRLITVKGEILLRT
Ph.l.laumondiiMcf2NP_930360.1       FGGTGQILSASAQLPSASELTPEL-HLKAAQQVDTGMRLITVKGEILLRT
Ph.temperataWP_023045049            FG-TDEVLDASAQLPAASELIPEL-HLKAAEQVDAGLRLTTVKGEILLRT
X.szentirmaiiMcf2CDL84642           FG-SDQVLDTSAQIPVASELTPEL-SLKEVQLVDVGMRLTTTKGEILFRA
X.nematophilaMcf2YP_003712268.      FG-SDHVLDASAQLPVASELTPEL-SLKEVQQVDVGMRLITTKGEILLRS
E.g.inebrians                       FCPKAPFVKAEALPDGRSVPELHP-FKTVALMTDGGLRYTTKDGVVLTLS
E.t.poae                            FRLKAPFVNAEAVPDGRGVLVKHP-FKTVALT-EGGLRYTTKEGVVLILA
V.tubiashiiEIF01430.1               ----DDKLVLQGEVADAEQFATLAGELTHAAWQGQSLQLSTRDGLVVELS
                                           :  ..                 .     .::  * .* ::  :

Ps.c.aureofaciensAFD97973.1         NKG----DVQLVALDKGWQQQHLGNLSQALAQVAEQWRAKGVLTLQGAES
Ps.chlororaphisAFD97974.1           NSG----DVQLVAVDKGWQQQHLGNLPQALAQVTAQWGAKGVLTLQGADS
Ps.protegensABY91230.1              NNG----DVQLVAVDKGWQQARLGNLPQALATVAGQWGAKGVLSLQDGDT
Ph.l.laumondiiNP_931332.1           NDG----KLQLVAVDKGWQQDNFARLPQALAEVADKWRTKGVLTLQGDDT
Ph.luminescensAAM88787.1            HDG----KLQLVAVDKDWQQDNLVRLSQALAEVAGQWRVKGVLTLQGDDT
Ph.a.asymbioticaYP_003042199.1      NDG----KLQLVAVDKDWQQVNLARLPQALAEVAGQWPTKGVLTLQGDES
Ph.luminescensMcf2AAR21118.1        NNG----ELQLVGVDKGWQQNNLAQLSQALTKLADQWQAKGILTLQDNKE
Ph.l.laumondiiMcf2NP_930360.1       NNG----ELQLVGVDKGWRQNNLTHLPQALAKLADQWQAKGVLTLQDNKE
Ph.temperataWP_023045049            NGG----KLQLVAVDKGWQQDNRTHLPQALAKVAGQWHTKGVLTLQDDGI
X.szentirmaiiMcf2CDL84642           NNG----KLQLIGVDEVWQSNNKTDQAQALSELASQWHAQGALTLQSHNT
X.nematophilaMcf2YP_003712268.      NNG----KLQLVGVDKAWLQNNKTDQIQALTKLADQWHAEGTLTLQSSSI
E.g.inebrians                       SER----SARLYGVDKVWQ-QNQSDVNAALATLVNTWSHGEIVVMLGSEP
E.t.poae                            SER----SARLYGVDKVWQ-QNRSDLSGEIATLVKTWDHGESVVMLGSEP
V.tubiashiiEIF01430.1               ANAGPMDKPILRAVTMEWQTHHQ-YRHQAIDALESEYQLPKQVRLLG-SV
                                           .  * .:   *   .       :  :   :     : : .

Ps.c.aureofaciensAFD97973.1         LGWFDVASGRMFASTGIP-AASDLRFIGVAAESQRSAYVYSPTEQVLYKV
Ps.chlororaphisAFD97974.1           QGWFDVASGQMFASTGIP-AASDLRFIGVAAESQRSAYVYSPTEQALYKV
Ps.protegensABY91230.1              RGWFDIASGQMFASNGIP-GGSDLRFIGVAAGTPNSAYVYSPTAQALYQV
Ph.l.laumondiiNP_931332.1           QGWFDVGSGQVFSYGSIQ-AKDNLRFIGIAAG-KKGAYVYSPTDQALYRV
Ph.luminescensAAM88787.1            QGWFDVGSGQVFSIGGIP-ATDNLRFIGIAVG-KKGAYVYNPTDQMLYQV
Ph.a.asymbioticaYP_003042199.1      RGWFDVDSGQLFSVGGILAAADNLRFVGVDAG-KKGAYVYSPTDQALYRI
Ph.luminescensMcf2AAR21118.1        PGWFDIGSGQIFSGNGIP-VSDNLRFVGIAAG-EKAAYVYSPTTQALYQI
Ph.l.laumondiiMcf2NP_930360.1       LGWFDIGSGQVFWSNGIP-VSHNLRFVGIAAG-EKAAYVYSPMTQALYQI
Ph.temperataWP_023045049            QGWFDVGSGQTFSLGGIP-AADNLRFIGVAVG-NKGAYAYSPTDQTLYWI
X.szentirmaiiMcf2CDL84642           PSWFDVGSGQKFVGNGIR-TSDHLSFIGADAK-NKTAYVYDQTNQKLYCL
X.nematophilaMcf2YP_003712268.      PSWFDIGSGQIFAGNEIP-ASDHLSFVGTNAK-NKTAYVYNQTTQELYQL
E.g.inebrians                       PQWYLTSSGKILAATNATFTWLDAPTWLGADLSGAKGYAYVSAHRKIYEL
E.t.poae                            PQWYLTSSGNIVSAAKATFTWLDAPTWLGADPSGARGYAYVAGQGRIYEL
V.tubiashiiEIF01430.1               PSWYLHESGRTVTAPGLD-VQHNLTYLGQSVDGGD--YVFDVDAQTLYQQ
                                      *:   **. .          .              *.:      :*

Ps.c.aureofaciensAFD97973.1         KEGAAQKLGHYANVERIG-SSLLLQGG--DGRQDELAP---PLIAGLDSV
Ps.chlororaphisAFD97974.1           KQGAAQKLGHYGDVERIG-SSLLLQGGGVGGRQDELAP---PLIAGVDSV
Ps.protegensABY91230.1              KDGKALQLGHYANVERIG-SSLLLQGASGNARQDDLAP---PLIAGVDSV
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Ph.l.laumondiiNP_931332.1           KDDSVQKLNHYTSVERIG-SSLLIRGGGTGGRRDDLTP---PLITGVDSV
Ph.luminescensAAM88787.1            KESGAQKLNHYADVERIG-SSLLLQDG----GKGDLSP---MLIAGVDSV
Ph.a.asymbioticaYP_003042199.1      QGGGV----HYTSVERIG-SSLLLQGGEMSGRQDELTP---PLIAGVDSV
Ph.luminescensMcf2AAR21118.1        KDGNAQMLNKFTAVERIG-SSLLLQGGGVGGSKDDLTP---PIIAGVDSV
Ph.l.laumondiiMcf2NP_930360.1       KDGNAQMLNKFTGVERIG-SSLLLQGGGVDGSKDDLTP---PLIDGVDSV
Ph.temperataWP_023045049            KDGGVQKINHYTSVERIG-SSLLLQGG---WGQDDLTP---PLIVGVDSV
X.szentirmaiiMcf2CDL84642           NDDKTLTINKLNDVERIN-SSLLLQGG---EADDNLTP---PLIDGVDSL
X.nematophilaMcf2YP_003712268.      NNYKDKILNKINGVERVN-SSLLLQGG---RSADTLMP---PIIDGVDSL
E.g.inebrians                       RQSSAEET-SAASREDAFASRLHDVLAVEPSPGASFRP---FALENVLYT
E.t.poae                            GEGSAEEKKSAASQEVAFASRFQDVLAVKPSPGASFRQ---FALENVHYT
V.tubiashiiEIF01430.1               HLTDHSPLGHFSMALTEGGTHLVLQGS---EGSKIQT---LPRLKGVRSL
                                                       : :    .                : .:

Ps.c.aureofaciensAFD97973.1         VLH---GGGASDTYRFSPAMWAHYRTVVIDNDDPG-QALDRLILPVADGK
Ps.chlororaphisAFD97974.1           VLH---GGGASDTYRFSPAMWAHYRTVVIDNDDPG-QALDRLILPVADGK
Ps.protegensABY91230.1              VLH---GGAGDDTYRFSPAMWAHYRSVVIDNDDPG-LALDRVILPVADGK
Ph.l.laumondiiNP_931332.1           VLH---GGADNDTYRLSQEMWSHYRTVIIDNDDPG-QALDRLIMPMVDAE
Ph.luminescensAAM88787.1            VLH---GGAGSDTYRLSQTMWSYYRTVVIDNDDPN-QVLDRLIILAVDAE
Ph.a.asymbioticaYP_003042199.1      VLH---GGADSDTYRLSEAMWSHYRTIVIDNDDLS-QALDHLIIPVADAE
Ph.luminescensMcf2AAR21118.1        VLH---GGADDDTYRLNKAMWSHYRTVIIDNDDRG-QALDRLILPLADPQ
Ph.l.laumondiiMcf2NP_930360.1       VLH---GGADNDIYRLSKAMWSHYHTIVIDNDDRS-QALDRLILPLADPE
Ph.temperataWP_023045049            VLH---GGADDDTYRLSQEMWSHYRTIIIDNDDPG-QVLDRLIMLVTDAE
X.szentirmaiiMcf2CDL84642           LLY---GGANHDSYNFTREAWDHYRTVIIDNNDPA-QKLDRLILPIANPE
X.nematophilaMcf2YP_003712268.      VLY---GGANHDTYKFTKEMWDHYRTVIIDNNDPA-QALDRLILPIANPQ
E.g.inebrians                       ILSQVEGDTSFMEYVIPSSSWESLDGLVVKWNDQGRVEIEGSTRHPRRAG
E.t.poae                            ILSQFEGDTSFMDYSVPSASWESLSGLVIEWKDQGRVEMEGSTMHPGPLG
V.tubiashiiEIF01430.1               LWS---GNSRDYHYSLDENDLAHYQQVLIQSHRVG-ETLK---LALENPN
                                    :     *.     * .          :::. .      :.

Ps.c.aureofaciensAFD97973.1         NILVSRRGEDVLL
Ps.chlororaphisAFD97974.1           NILVSRQGENVLL
Ps.protegensABY91230.1              NILVSRRGEDVQL
Ph.l.laumondiiNP_931332.1           KILVSRHEDNLML
Ph.luminescensAAM88787.1            KIFVSRHEDDLML
Ph.a.asymbioticaYP_003042199.1      KILVSRHEDDLIL
Ph.luminescensMcf2AAR21118.1        SILVNRHDDDLVL
Ph.l.laumondiiMcf2NP_930360.1       SILVNRRDDDLML
Ph.temperataWP_023045049            KILVSRHEDDLML
X.szentirmaiiMcf2CDL84642           SILVSQHNDDLML
X.nematophilaMcf2YP_003712268.      SILVSQHNNDLML
E.g.inebrians                       SFLGNRLDDDLIM
E.t.poae                            WYLAKRLGDDLII
V.tubiashiiEIF01430.1               ALLLQRRGDDLAL
                                      : .:  ::: :
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Supplementary Tables

Supplementary Table 1: Comparison of *Epichloë* Mcf-like amino acid sequences with those of the bacterial Mcf1, FitD, and Mcf2 sequences.

Species	**Identity**		
	Mcf 1 (AAM88787.1) 2,929 aa	**fitD (AFD97974.1) 2,996 aa**	**Mcf2 (AAR21118.1) 2,388 aa**
E. amarillans 1,994 aa	673/2,032 (33%)	673/1,922 (35%)	649/1,856 (35%)
E. aotearoae 1,986 aa	676/2,037 (33%)	660/1,909 (35%)	629/1,846 (34%)
E. baconii 2, 044 aa	662/1,924 (34%)	672/1,915 (35%)	652/1,861 (35%)
E. brachyelytri 1,988 aa	636/1,839 (35%)	658/1,912 (34%)	638/1,836 (35%)
E. festucae 2368 1,844 aa	619/1,883 (33%)	611/1,766 (35%)	631/1,881 (34%)
E. festucae Fl1 1,844 aa	617/1,883 (33%)	611/1,766 (35%)	631/1,881 (34%)
E. gansuensis var. *inebrians* 1,983 aa	669/1,991 (34%)	671/1,883 (36%)	677/1,997 (34%)
E. glyceriae 2,009 aa	655/1,924 (34%)	663/1,865 (36%)	639/1,842 (35%)
E. mollis 2,012 aa	644/1,870 (34%)	682/1,922 (35%)	657/1,850 (36%)
E. typhina subsp. *poae* Ps1 1,997 aa	652/1,899 (34%)	669/1,921 (35%)	673/1,985 (34%)
E. typhina E8 2,004 aa	673/2,023 (33%)	667/1,944 (34%)	660/1,955 (34%)

Supplementary Table 2: Sources of DNA sequences used in this study.

Species	**Source**
Aciculosporium take	AFQZ00000000.1
Atkinsonella hypoxylon	http://www.endophyte.uky.edu/
Claviceps fusiformis	AFRA00000000.1
C. paspali	AFRC00000000.1
C. purpurea	CAGA00000000
Metarhizium anisopliae	ADNJ00000000.1
Epichloë amarillans	AFRF00000000.1
E. aotearoae	http://www.endophyte.uky.edu/
E. baconii	http://www.endophyte.uky.edu/
E. brachyelytri	AFRB00000000.1
E. elymi	AMDJ00000000.1
E. festucae E2368	ADFL00000000.2
E. festucae Fl1	AFRX00000000.1
E. gansuensis	AFRE00000000.1
E. gansuensis var. *inebrians*	AMDK00000000.1
E. glyceriae E277	AFRG00000000.1
E. mollis	http://www.endophyte.uky.edu/
E. typhina E8	AMDI00000000.1
E. typhina subsp. *poae* E5819	AFSE00000000.1
E. typhina subsp. *poae* Ps.1	KJ502561 (This study)
Photorhabdus asymbiotica subsp. *asymbiotica* Mcf1	YP_003042199
Ph. luminescens Mcf1	AAM88787
Ph. luminescens Mcf2	AAR21118
Ph. luminescens subsp. *laumondii* Mcf1	NP_931332
Ph. luminescens subsp. *laumondii* Mcf2	NP_930360
Ph. temperata Mcf1	WP_023045049
Pseudomonas chlororaphis subsp. *aureofaciens* FitD	AFD97973
Ps. chlororaphis FitD	AFD97974
Ps. protegens FitD	ABY91230
Xenorhabdus szentirmaii Mcf2	CDL84642
X. nematophila Mcf2	YP_003712268
Vibrio tubiashii	EIF01430

Supplementary Table 3: Estimation of the divergence rate of the basal *Epichloë* spp. relative to *Atkinsonella hypoxylon*.

Gene	**Length, nt**	**Species**	K_s	K_a	**Average** K_s	**Divergence rate**
Glutamate dehydrogenase	3,204	*E. gansuensis*	1.290	0.042	1.251	7.72 x 10^{-9}
		E. glyceriae	1.211	0.042		
Isoleucine tRNA synthase	3,216	*E. gansuensis*	1.236	0.048	1.243	7.67 x 10^{-9}
		E. gansuensis var *inebrians*	1.243	0.049		
		E. glyceriae	1.249	0.050		
MCM7	2,441	*E. gansuensis*	0.957	0.040	0.961	5.93 x 10^{-9}
		E. gansuensis var *inebrians*	0.943	0.040		
		E. glyceriae	0.983	0.040		
TSR1	2,487	*E. gansuensis*	1.080	0.075	1.050	6.48 x 10^{-9}
		E. gansuensis var *inebrians*	1.037	0.073		
		E. glyceriae	1.033	0.070		

Supplementary Table 4: Estimation of the divergence times between the basal *Epichloë* spp. and *Claviceps purpurea*.

Gene	**Species**	**K_s**	**K_a**	**Average K_s**	**Divergence time, Mya**
Glutamate dehydrogenase	*E. gansuensis*	0.841	0.048	0.830	53.7
	E. glyceriae	0.818	0.049		
Isoleucine tRNA synthase	*E. gansuensis*	0.918	0.058	0.939	61.2
	E. gansuensis var *inebrians*	0.927	0.061		
	E. glyceriae	0.971	0.059		
MCM7	*E. gansuensis*	0.749	0.052	0.766	64.6
	E. gansuensis var *inebrians*	0.786	0.051		
	E. glyceriae	0.764	0.052		
TSR1	*E. gansuensis*	0.735	0.073	0.720	55.6
	E. gansuensis var *inebrians*	0.705	0.074		
	E. glyceriae	0.720	0.070		

Mean divergence time, Mya: 58.8 ± 2.5

Supplementary Table 5: Estimation of the divergence time between *E. gansuensis* and *E. glyceriae*.

Gene	**Species**	K_s	K_a	**Average** K_s	**Divergence time, Mya**
Glutamate dehydrogenase	*E. gansuensis*	0.108	0.017	0.108	6.99
Isoleucine tRNA synthase	*E. gansuensis*	0.080	0.009	0.080	5.22
	E. gansuensis var *inebrians*	0.080	0.011		
MCM7	*E. gansuensis*	0.117	0.010	0.117	9.87
	E. gansuensis var *inebrians*	0.117	0.010		
TSR1	*E. gansuensis*	0.094	0.017	0.087	6.71
	E. gansuensis var *inebrians*	0.080	0.016		

Mean divergence time, Mya: 7.2 ± 0.97