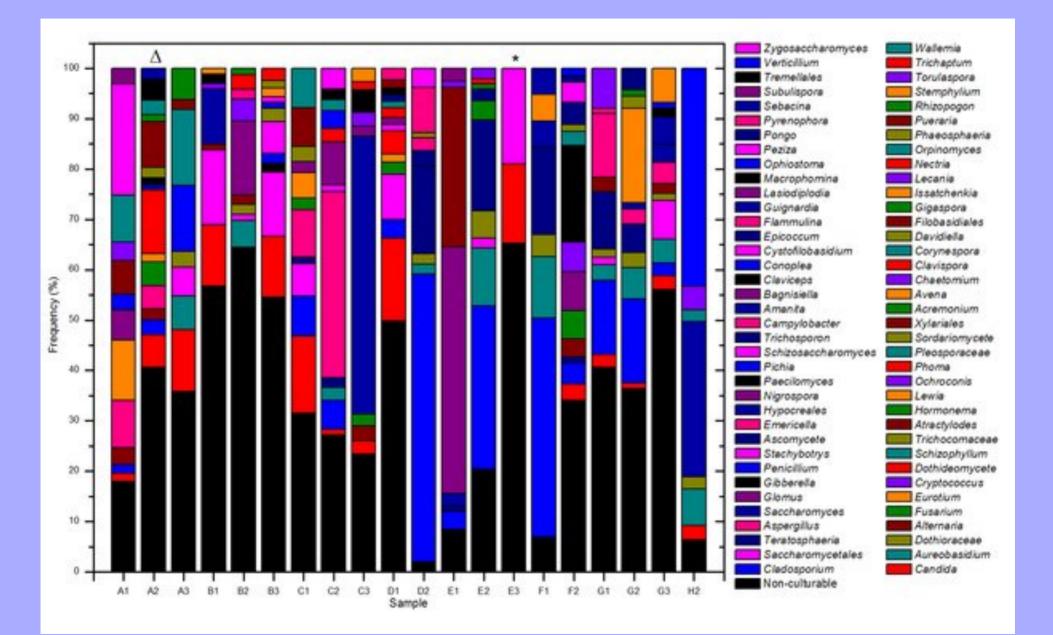
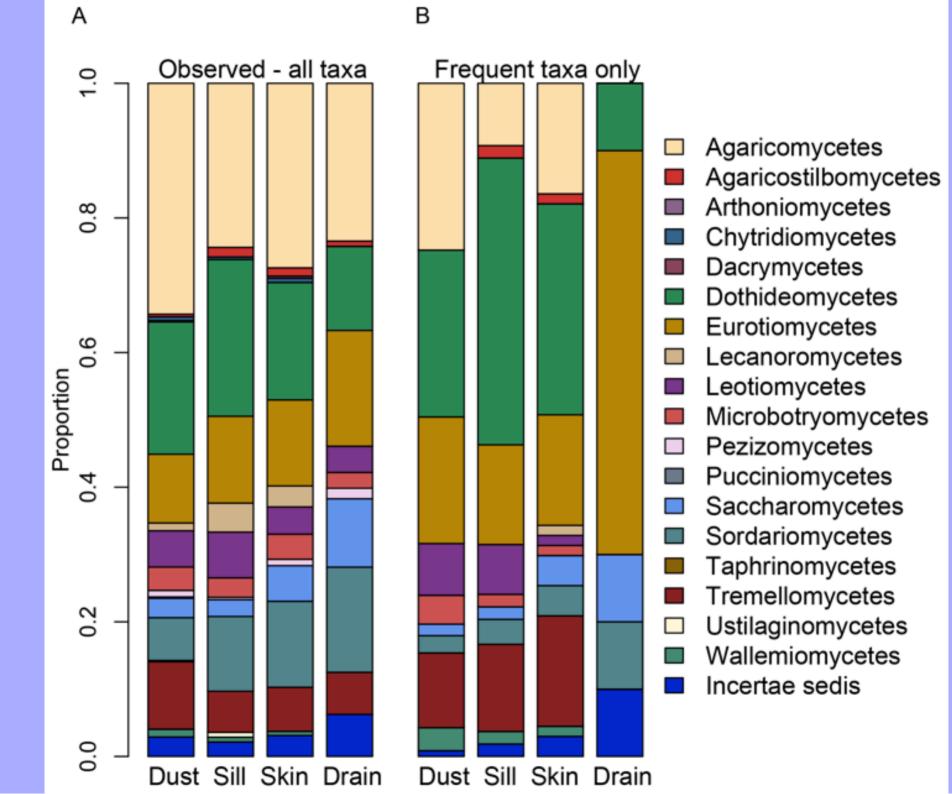
NGS and molecular identification of fungi

Henrik Nilsson, University of Gothenburg





High proportion of incorrectly identified fungi

Uncultured Basidiomycota clone 6Bart1173S internal transcribed spacer 1, partial sequence; 5.8S r	715	715	100%	0.0	100%	HQ022034.1
Ascomycota sp. UP606 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene,	715	715	100%	0.0	100%	EF493313.1
Uncultured ectomycorrhizal fungus clone 1042/19 internal transcribed spacer 1, partial sequence; 5	715	715	100%	0.0	100%	DQ233781.1
Ectomycorrhizal root tip 93-sepA_Ny1.EB-23.5 internal transcribed spacer 1, partial sequence; 5.85	715	715	100%	0.0	100%	AF476985.1
Ascomycota sp. UP605 internal transcribed spacer 1, partial sequence; 5.8S ribosomal RNA gene,	712	712	99%	0.0	100%	EF493312.1
Uncultured fungus clone 3268K22 18S ribosomal RNA gene, partial sequence; internal transcribed	658	658	99%	0.0	97%	KF617614.1
Uncultured Pezizomycotina clone d331_1_13 18S ribosomal RNA gene, partial sequence; internal t	636	636	99%	5e-179	96%	<u>JQ346868.1</u>
Uncultured Pezizomycotina clone d330a_1_6 18S ribosomal RNA gene, partial sequence; internal t	630	630	99%	3e-177	96%	<u>JQ346852.1</u>
Uncultured fungus clone c67 18S ribosomal RNA gene, partial sequence; internal transcribed space	627	627	100%	3e-176	96%	HM030615.1

Correct identification: Archaeorhizomycetes

Science 12 August 2011: Vol. 333 no. 6044 pp. 876-879 DOI: 10.1126/science.1206958

< Prev | Table of Contents | Next >

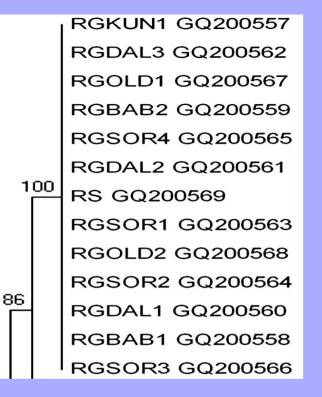
REPORT

Archaeorhizomycetes: Unearthing an Ancient Class of Ubiquitous Soil Fungi

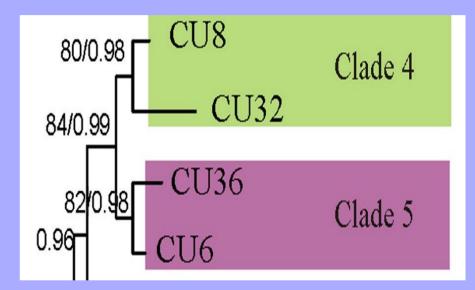
Anna Rosling^{1,2,*}, Filipa Cox³, Karelyn Cruz-Martinez¹, Katarina Ihrmark¹, Gwen-Aëlle Grelet⁴,

Björn D. Lindahl¹, Audrius Menkis¹, Timothy Y. James^{5,*}

No name – no communication



	ITS1	5.8S	ITS2	Total	Percentage
RG1ITS					
Number of bases	193	154	243	590	
Number of substitution sites within isolates	2	0	10	12	2.03
RG2ITS					
Number of bases	192	154	243	589	
Number of substitution sites within isolates	2	0	4	6	1.02



CU 24	NRRL 58537	Eugenia jumbos (Rose apple)	Chanthaburi (January 2006)
CU 25	NRRL 58538	Lansium domesticum Corr.	Chanthaburi (January 2006)
CU 26	NRRL 58539	Cerbera odollum Gaertn.	Nakhonratchasima (January 2006)
CU 27	NRRL 58540	Kerriodoxa elegans (Palm)	Prachuapkhirikhan (February 2006)
CU 28	NRRL 58541	Pinus merkusii Jungh. & de Vriese (Needle pine)	Prachuapkhirikhan (February 2006)
CU 29	NRRL 58542	Pinus merkusii Jungh. & de Vriese (Needle pine)	Prachuapkhirikhan (February 2006)
CU 30	NRRL 58543	Wood surface	Prachuapkhirikhan (February 2006)
CU 31	NRRL 58544	Pinus merkusii Jungh. & de Vriese (Needle pine)	Prachuapkhirikhan (February 2006)
CU 32	NRRL 58545	Mangifera indica L. (Mango)	Trat (March 2006)
CU 33	NRRL 58546	Pandanus odoratissimus (Screw pine)	Prachuapkhirikhan (March 2006)
CU 35	NRRL 58547	Hopea ferrea Laness.	Patumthani (March 2006)

The UNITE database (http://unite.ut.ee)

- All fungal ITS sequences in GenBank
- ...clustered to ~species level (95%-100% similarity in 0.5% steps) species hypotheses

more	JINUIZUOD Archaeornizomyces	rungi (unculturea lungus)	Canada				G <mark>AAT</mark> GG <mark>C</mark>
more	JN889799 Archaeorhizomyces	Fungi (uncultured fungus)	USA				<mark>C</mark> GG <mark>A</mark> GGG <mark>ATCATTAAT</mark> GAAT <mark>GGC</mark>
more	JN032573 Archaeorhizomyces	Fungi (uncultured fungus)				[]	CT <mark>GAAT</mark> GGC
more	FJ152542 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		<mark>AT</mark> G <mark>AAT</mark> GGC
more	DQ481984 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		<mark>AT</mark> G <mark>AAT</mark> GGC
more	DQ481985 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		<mark>AT</mark> G <mark>AAT</mark> GGC
more	EU057084 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		<mark>AT</mark> G <mark>AAT</mark> GGC
more	AY394904 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Living culture	Tsuga heterophylla		<mark>AT</mark> G <mark>AAT</mark> GGC
more	<u>JQ989336</u> Archaeorhizomyces	Fungi (uncultured fungus)					<mark>AT</mark> G <mark>AAT</mark> GGC
more	HM030615 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA			<mark>AC</mark> G <mark>AAT</mark> GGC

• ...unique names of all such species hypotheses:

Archaeorhizomyces|AY394904|SH197124.06FU

Or in short: SH197124.06FU

http://unite.ut.ee/sh/SH197124.06FU

- - - - -

🗯 Firefox File Edit View History Bookmarks Tools Window Help	🔂 🕙 🕴 🛜 🌒 98 % 🖅 tis 02:06	ç Q	Ξ
\varTheta 🔿 🗿 Outlook Web App 🛪 🛠 UNITE - Species Hypotheses 🗙 🕂			R _M
(€) → @ unite.ut.ee/sh/SH197124.06FU ▼ C 8 ▼ Googl	le Q 👌 🔒 🖡	· 俞	≡
🔽 Most Visited 🔻 📋 Save to Mendeley 🛛 🙀 stats.distributed 🙀 The rc5 Archives 🧖 R. Henrik Nilsson 🚯 ResearchGate 📋 ftp://ftp.ncbi.nih			
Unified system for the DNA based fungal species linked to the classification ver.			
Species Hypothesis pages version 6 (release date: pre-release)			- 1
Archaeorhizomyces SH197124.06FU			
Distance to the closest SH (read more): 1.5% No of sequences in SH: 6 Placement in the fungal classification (read more): Fungi; Ascomycota; Taphrinomycotina; Archaeorhizomycetes; Incertae sedis; Archaeorhizomycetales; Archaeorhizomycetaceae Links to taxon name in: Index Fungorum; NCBI Representative sequence (selected automatically by the program): AY394904 Large map (incl. map info) Terms of Use			
Sequence ID UNITE taxon name INSD taxon name Country DNA source Interacting taxa 🗸 Clustering based on: Full ITS			
more EU057084 Archaeorhizomyces Pezizomycotina (uncultured Pezizomycotina) Canada Ectomycorrhiza Tsuga heterophylla Image: State of the state of	50 caaccatcaacccetggaagcaagcaggettttggcgctccgac caaccatcaacccetggaagcaagcaggtttggcgctccgac caaccatcaacccetggaagcaagcaggttttggcgctccgac caaccatcaacccetggaagcaaggttttggcgctccgac caaccatcaacccetggaagcaaggtttggctttggcgctccgac caaccatcaacccetggaagcaaggtttggcgtttggcgctccgac caaccatcaacccetggaagcaaggtttggcgctccgac lso	CGCCACG CGCCACG CGCCACG CGCCACG CGCCACG CGCCACG	TTTA' TTTA' TTTA' TTTA'
low quality UNITE core sequence			
automatically chosen SH representative sequence			

-- - -- -----

. Ex = sequence to be excluded from the next version of global key

- ...named as far as possible (phylum, class, order...)
- ...with ecological/geographical metadata
 - ...with substandard sequences pruned

...web-based, third-party sequence annotation style!

Sequer	nce ID	UNITE taxon name	INSD taxon name	Country	DNA source	Interacting taxa	97% ÷	Alignment based on: Full ITS
							•	Send clusters to clipboard
more	EF434026	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA			
more	<u>GQ223472</u>	Archaeorhizomyces	Fungi (uncultured fungus)	Germany	Orchid mycorrhiza	Gymnadenia conopsea		
more	KC965637	Archaeorhizomyces	Fungi (uncultured fungus)	Canada				
more	AB828010	Archaeorhizomyces	Fungi (uncultured ectomycorrhi					ATG
more	FJ152543	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		ATG
more	<u>AY702735</u>	Archaeorhizomyces	Fungi (uncultured fungus from	USA	Ectomycorrhiza	Abies		TCATTAACG
more	KC876142	Archaeorhizomycetales	Taphrinomycotina (uncultured A					ACG
more	<u>KC876143</u>	Archaeorhizomycetales	Taphrinomycotina (uncultured A					ACG
more	<u> JQ346852</u>	Archaeorhizomycetales	Pezizomycotina (uncultured Pez					ACG
more	<u> JQ346868</u>	Archaeorhizomycetales	Pezizomycotina (uncultured Pez					ACG
more	DQ069012	Archaeorhizomyces	Ascomycota (uncultured Ascomyc	Lithuania	Ectomycorrhiza	Picea abies		ATG
more	FR877526	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Denmark	Ectomycorrhiza	Picea abies		G <mark>ATCATTAA</mark> TG
more	FM992983	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Sweden	Ectomycorrhiza	Picea abies		G <mark>ATCATTAA</mark> TG
more	AF481369	Archaeorhizomyces	Fungi (ectomycorrhizal root ti	Sweden	Ectomycorrhiza	Pinaceae		
more	HQ212270	Archaeorhizomyces	Ascomycota (uncultured Ascomyc	USA	Plant root	Betula nana		CTG
more	FJ440895	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Pyrola picta		<mark>CT</mark> G
more	<u>HM164555</u>	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Betula papyrifera		CTG
more	FJ626930	Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Soil fungal DNA			CATTACTG
more	EU554708	Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Ectomycorrhiza	Populus		CATTACTG
more	DQ233843	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea abies		ATG
more	<u>HM164554</u>	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana		ATG
more	<u>HM164553</u>	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana		<mark>AT</mark> G
more	<u>JN012085</u>	Archaeorhizomyces	Fungi (uncultured fungus)	Canada				G
more	<u>JN889799</u>	Archaeorhizomyces	Fungi (uncultured fungus)	USA				<mark>C</mark> GG <mark>A</mark> GGG <mark>ATC</mark> ATTAATG
more	<u>JN032573</u>	Archaeorhizomyces	Fungi (uncultured fungus)					CTG
more	FJ152542	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		<mark>AT</mark> G
more	DQ481984	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		ATG
more	<u>DQ481985</u>	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		<mark>AT</mark> G
more	EU057084	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		ATG
more	AY394904	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Living culture	Tsuga heterophylla		ATG
more	<u>JQ989336</u>	Archaeorhizomyces	Fungi (uncultured fungus)					<mark>AT</mark> G
more	HM030615	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA			ACG

...and circumscribed as well as possible

Some SHs are best circumscribed at 97%:

						/ · · · ·
more JF911350		Colletotrichum (Colletotrichum	USA			
more HQ433226		Colletotrichum (Colletotrichum	Australia			
more JF911349		Colletotrichum (Colletotrichum	USA			
more KC790947	Colletotrichum sansevieriae	Colletotrichum (Colletotrichum	Japan	Living culture (Ex-type)		
more KC847065		Colletotrichum (Colletotrichum				
		<u> </u>	C 1 1		 100 Aug. 100	

Many others require tighter clustering, here 98.5% and 99%:

more <u>KC842385</u>	Colletotrichum (Colletotrichum			
more KC297079 Colletotrichum proteae	Colletotrichum (Colletotrichum		Living culture (Ex-type)	
more <u>JX010187</u> Colletotrichum nupharicola	Colletotrichum (Colletotrichum	USA	Living culture (Ex-holotype)	
more <u>JX010188</u>	Colletotrichum (Colletotrichum	USA		
more <u>JX145174</u>	Colletotrichum (Colletotrichum	USA		
		Descal		

Others require 99.5% or 100%:

more	<u>JX014404</u>		Colletotrichum (Colletotrichum			
more	FJ981603		Colletotrichum (Colletotrichum	Brazil		
more	FJ981604		Colletotrichum (Colletotrichum	Brazil		
more	<u> JQ005235</u>	Colletotrichum brasiliense	Colletotrichum (Colletotrichum	Brazil	Living culture (Ex-type)	
more	<u>JQ005234</u>		Colletotrichum (Colletotrichum	Brazil		
	1/5405640			~		

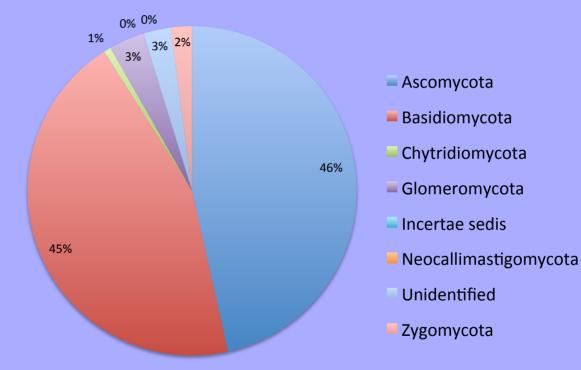
Some species have mutually fully conserved ITS regions:

more <u>JX145159</u> Colletotrichum temperatum	Colletotrichum (Colletotrichum	USA	Living culture (Ex-type)	Vaccinium macrocarpon	
more <u>JX145135</u>	Colletotrichum (Colletotrichum	USA			
more KC297057	Colletotrichum (Colletotrichum	USA			
more KC297058	Colletotrichum (Colletotrichum	USA			
more KF242093	Colletotrichum (Colletotrichum	Thailand			
more KF242094 Colletotrichum syzygicola	Colletotrichum (Colletotrichum	Thailand	Living culture (Ex-type)	Syzygium samarangense	

%	SHs	Singleton SHs
97	17 432	22 157
97.5	18 536	24 796
98	19 558	27 915
98.5	20 885	32 618
99	22 396	40 973
99.5	26 397	63 881
Dynamic	4 403 RefS 16 783 RepS	

At a default of 98.5% similarity:

20,885 non-singleton SHs 32,618 singleton SHs



Latest version:

<1% of SH unassigned at phylum level

http://unite.ut.ee/repository.php



UNITE - fungal identification with rDNA ITS sequences | Version 6 | date: 2013-11-19 | Cluster code: UCL6_000601

This set of sequences contains genera: Archaeorhizomyces Total number of sequences in cluster: 75

- chimeric
- low quality
- UNITE core sequence
- automatically chosen 98.5% SH representative sequence

• Ex = sequence to be excluded from the next version of global key

(filled, coloured circle) manually chosen SH reference sequence, overrides automatically chosen representative sequence

						SH	
Sequence ID	UNITE taxon name	INSD taxon name	Country	DNA source	Interacting taxa	97% ÷	Alignment based on: Full ITS + Order sequences by: combi
						•	Send clusters to clipboard [50
more EF434026	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA			TTC<mark>GGCC</mark>-TTCAACCTT-
more GQ223472	2 Archaeorhizomyces	Fungi (uncultured fungus)	Germany	Orchid mycorrhiza	Gymnadenia conopsea		TTCGGCC-TTCAACCTT-
more KC965637	Archaeorhizomyces	Fungi (uncultured fungus)	Canada				TTTGGCC-TTCAACCTT-
more AB828010	Archaeorhizomyces	Fungi (uncultured ectomycorrhi					CTC <mark>GGCC</mark> -TTC <mark>AACCTT</mark> C
more FJ152543	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		CTCGGCC- <mark>ATGAACGGC</mark> CTCGGCC-TTCAACCTTC
more AY702735	Archaeorhizomyces	Fungi (uncultured fungus from	USA	Ectomycorrhiza	Abies	[]	TCATTAACGAATGGCCTTTGGCC-TTCGACCTTC
more KC876142	Archaeorhizomycetales	Taphrinomycotina (uncultured A					CTTTGGCC- <mark>ACGAAT</mark> GGCCTTTGGCC-TTCGACCTTC
more KC876143	Archaeorhizomycetales	Taphrinomycotina (uncultured A					CTTTGGCC- <mark>ACGAAT</mark> GGCCTTTGGCC-TCGACCTTC
more JQ346852	Archaeorhizomycetales	Pezizomycotina (uncultured Pez					CTTTGGCCTTTCGACCTTC
more JQ346868	Archaeorhizomycetales	Pezizomycotina (uncultured Pez					CTTTGGCC- <mark>ACGAAT</mark> GGCCTTTGGCCC- <mark>TTCGACCTT</mark> C
more DQ069012	2 Archaeorhizomyces	Ascomycota (uncultured Ascomyc	Lithuania	Ectomycorrhiza	Picea abies		TTTTGCC-TTCAACCCT C
more FR877526	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Denmark	Ectomycorrhiza	Picea abies		Gatcattaatgaat ggg ttttgcc-ttcaaccct g
more FM992983	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Sweden	Ectomycorrhiza	Picea abies		<mark>GATCATTAATGAAT</mark> GGC <mark>TTTT</mark> GCC- <mark>TTC-ACGCT</mark> C
more AF481369	Archaeorhizomyces	Fungi (ectomycorrhizal root ti	Sweden	Ectomycorrhiza	Pinaceae		<mark>AAT</mark> GCC <mark>TTTT</mark> GCC- <mark>TTCAAC</mark> GCTC
more HQ212270		Ascomycota (uncultured Ascomyc	USA	Plant root	Betula nana	[]	TTCGGCC - TTCAACCTT -
more FJ440895	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Pyrola picta		TTCGGCC - TTCAACCTT -
more HM164555	5 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Betula papyrifera		TTTGGCC-<mark>TTCAACCTT</mark>-
more FJ626930	Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Soil fungal DNA			Cattactgaat ggc Ttt ggcc- TtCaacctt -
more EU554708	Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Ectomycorrhiza	Populus		CATT<mark>ACT</mark>GAATGGC<mark>TTT</mark>GGCC-TTCAACCTT-
more DQ233843	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea abies		TTTTGCC-TTCAACTCTC
more HM164554	4 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana		TTTTGCC- TTCAACTCTC
more HM164553	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana		<mark>ATGAAT</mark> GGC <mark>TTTT</mark> GCC- TTCAACTCT C
more JN012085	Archaeorhizomyces	Fungi (uncultured fungus)	Canada				<mark>GAAT</mark> GGC <mark>TTTT</mark> GCC- <mark>TTCAACTCT</mark> C
more JN889799		Fungi (uncultured fungus)	USA				CGG <mark>A</mark> GGG <mark>ATCATTAATGAAT</mark> GGC <mark>TTTT</mark> GCC- <mark>TTCAACTCT</mark> G
more JN032573	Archaeorhizomyces	Fungi (uncultured fungus)				[]	CTCGGCC- <mark>TTCAACCTT</mark> C
more FJ152542	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		TTTGG<mark>CC</mark>-TTCAACCA
more DQ481984	4 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		NICAAIGGONIIGGOO-IICAACCA

more LINE LEG (NT	A solve o e shi so su co o fi n lavi	hungi (uncultured ectomycorrhi	Finland	hotomy corrector	Hices abies	
more DQ233781	Archaeornizomyces nniayi	Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea abies	CATTAACGAATGGCCTTTGGCC-TTCGACCTTG
more AF476985	Archaeorhizomyces finlayi	Fungi (ectomycorrhizal root ti	Sweden	Ectomycorrhiza	Pinaceae	CTTT <mark>GGCC</mark> - TTC<mark>GACCTTG</mark>
		Ascomycota (Ascomycota sp UP60				CTTTGGCC-TCGATCATTAACGAATGGCCTTTGGCC-TCGACCTTG
		Basidiomycota (uncultured Basi		Soil fungal DNA		GGAGGGATCATTAACGAATGGCCTTTGGCC-TTCGACCTTG
more EF493312	Archaeorhizomyces finlayi	Ascomycota (Ascomycota sp UP60	Sweden			CTTTGGCC-TTCGACCTTG
more JF836021	Archaeorhizomyces finlayi	Archaeorhizomyces (Archaeorhiz	Sweden	Living culture (Ex-holotype)		CTTT <mark>GGCC</mark> - <mark>ACGAAT</mark> GGC <mark>CTTT</mark> GGCC- <mark>TTCGACCTTG</mark>
more JQ912673		Archaeorhizomyces (Archaeorhiz				CTTT <mark>GGCC</mark> - TTC<mark>GACCTTG</mark>
more EF619847	Archaeorhizomyces	Ascomycota (uncultured Ascomyc	USA	Fungal mycelium (ingrowth bag)	Pinus taeda	CATT<mark>AAT</mark>GAA<mark>TGGC</mark><mark>TTTTGGCC</mark>-TTCAACTT
more JQ711841	Archaeorhizomycetales	Ascomycota (Ascomycota sp RT_2	Canada	Ectomycorrhiza	Pinus contorta	AT<mark>GAAT</mark>GGC<mark>TTTT</mark>GG<mark>CC</mark>-TTCAACTT
more HM146849	Archaeorhizomvces	Ascomvcota (uncultured Ascomvc	Great Britain	Ectomvcorrhiza	Pinus svlvestris	acigacigogogogocattaatgaatggoItttggco-Itcagotti

INSD taxon name

Fungi (uncultured fungus) Fungi (uncultured fungus) Fungi (uncultured fungus) Fungi (uncultured ectomycorrhi... Pezizomycotina (uncultured Pez... Fungi (uncultured fungus from ... Taphrinomycotina (uncultured A... Taphrinomycotina (uncultured A... Pezizomycotina (uncultured Pez... Pezizomycotina (uncultured Pez... Ascomycota (uncultured Ascomyc... Fungi (uncultured ectomycorrhi... Fungi (uncultured ectomycorrhi... Fungi (ectomycorrhizal root ti... Ascomycota (uncultured Ascomyc... Fungi (uncultured fungus) Fungi (uncultured fungus) Fungi (uncultured fungus) Fungi (uncultured fungus) Fungi (uncultured ectomycorrhi... Fungi (uncultured fungus) Pezizomycotina (uncultured Pez... Fungi (uncultured fungus) Fungi (uncultured fungus) Fungi (uncultured ectomycorrhi... Fungi (ectomycorrhizal root ti...

Original names

Largely uninformative or misleading

UNITE taxon name INSD taxon name

Archaeorhizomyces	Fungi (uncultured fungus)
Archaeorhizomyces	Fungi (uncultured fungus)
Archaeorhizomyces	Fungi (uncultured fungus)
Archaeorhizomyces	Fungi (uncultured ectomycorrhi
Archaeorhizomyces	Pezizomycotina (uncultured Pez
Archaeorhizomyces	Fungi (uncultured fungus from
Archaeorhizomycetales	Taphrinomycotina (uncultured A
Archaeorhizomycetales	Taphrinomycotina (uncultured A
Archaeorhizomycetales	Pezizomycotina (uncultured Pez
Archaeorhizomycetales	Pezizomycotina (uncultured Pez
Archaeorhizomyces	Ascomycota (uncultured Ascomyc.
Archaeorhizomyces	Fungi (uncultured ectomycorrhi
Archaeorhizomyces	Fungi (uncultured ectomycorrhi
Archaeorhizomyces	Fungi (ectomycorrhizal root ti
Archaeorhizomyces	Ascomycota (uncultured Ascomyc.
Archaeorhizomyces	Fungi (uncultured fungus)
Archaeorhizomyces	Fungi (uncultured ectomycorrhi
Archaeorhizomyces	Fungi (uncultured fungus)
Archaeorhizomyces	Pezizomycotina (uncultured Pez
Archaeorhizomyces	Fungi (uncultured fungus)
Archaeorhizomyces	Fungi (uncultured fungus)
	Fungi (uncultured ectomycorrhi
Archaeorhizomyces finlayi	Fungi (ectomycorrhizal root ti

But improvement is easy

...and must be easy

Plutof

Main menu	Add determination Comment?							
Add taxon occurrence								
Add	Fields marked * are compulsory.							
Search and edit	Kingdom *	Kingdom * Fungi +						
Add and edit taxon names	Species name (drop-down list)	Archaeo info? Clear species name						
UNITE Species Hypotheses	Species name (if not in the list)	Archaeorhizomyces Rosling & T.Y. James (gen) Archaeorhizomyces finlayi Rosling & T.Y. James (spe)						
Clipboard	Lock determination	Archaeorhizomycetaceae Rosling and T. James (fam)						
Workgroups		Archaeorhizomycetales Rosling and T. James (ord)						
Profile	Patrania di sul	Archaeorhizomycetes (cls)						
	Determined by	Archaeospora J.B. Morton & D. Redecker (gen)						
ଗର	Start by typing in family name or Add r	1 Archaeospora schenckii Sieverd. & S. Toro (spe)						
00	Determined by	Archaeospora trappei (R.N. Ames & Linderman) J.B. Mo Redecker (spe)	orton & D.					
NATARC	Date determined	Archaeosporaceae (fam)						
		Archaeosporales (ord)						
unite	Add determination Reset Exit							
ou are adding determination o sequence: F434026								
t updated: 2014-02-22. Webmaster: k	essy.abarenkov[at]ut.ee		There are 6 users logged in at the mome					

Taxonomic re-annotation powered by Index Fungorum

Country	Interacting taxa
USA	
Germany	Gymnadenia conopsea
Canada	
Canada	Tsuga heterophylla
USA	Abies
Lithuania	Picea abies
Denmark	Picea abies
Sweden	Picea abies
Sweden	Pinaceae
USA	Betula nana
USA	Pyrola picta
USA	Betula papyrifera
Canada	
Canada	Populus
Finland	Picea abies
USA	Picea mariana
USA	Picea mariana
Canada	
USA	
Canada	Tsuga heterophylla
USA	
Finland	Picea abies
Sweden	Pinaceae
Sweden	
USA	
Sweden	

~40% of all public ITS sequences are annotated with country of collection.

<25% of all public ITS sequences are annotated with a host.

 Lifestyle, Substrate and Interacting t 	taxon					
Hide form						
Specimen lifestyle						
Lifestyle Unspecified	•					
Nutritional group Unspecified	•					
Specimen substrate						
Kingdom	Choose +					
Species name (drop-down list) info? Clear species name						
Species name (if not in the list)	info?					
Substrate type	Unspecified +					
Substrate text						
Interacting taxon						
Name of taxon Choose	Se Clear species name					
Type of interacting taxon Unspect	ecified 🗘					
	ecified == + info?					
Interacting taxon text Unspecified neutralism competition antagonism commensalism amensalism						
+ Add another interacting taxon						
Save Reset Exit						

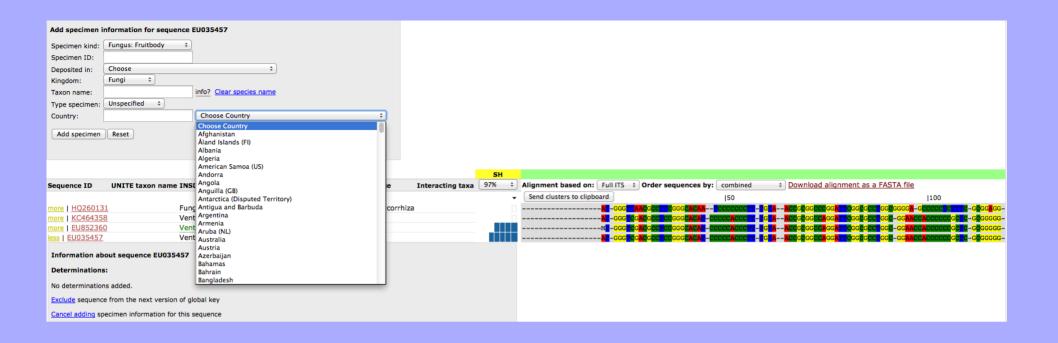
Addition of geo/ecological metadata easy, standardscompliant (ISO / Darwin Core)

	Edit sequence Comment?		
irrence	Fields marked * are compute	sory.	
dit		TTGGTCATTTAGAGGAAGTAAAAGTCGTAACAAGGT	
taxon	Sequence *	TTCCGTAGGTAACCTGCGGAAGGATCATTAATGGGT TAACGCCTTCGGGCACAATCCCCCCCTTTGTAACCG	
Caxon	(only IUPAC characters)	CGGCCCGGATTCGCCGCCTGCCGGGAGCCCCCTCT TTCGCCGGAGGGCCCCGCCTGCCGGAATTAGCCAACC	
s		ITS1	
		5.85	
	Sequence type	ITS2 LSU rDNA	
		mitochondrial * hold down the Ctrl key to select multiple options	
	Sequence completedness	Choose 💠	
	Sequence availability *	Public sequence annotation locked	
	Sequence isolated from	Fungus: Ericoid mycorrhiza +	
nite	Remarks	Urspecified Bacterium Fungus: Air Fungus: Air	
equence:	Sequence id *	Fungus: DNA from wood Fungus: Dtx frungal DNA Fungus: Extonycorrhiza Fungus: Fritolody Fungus: Fundal mycelium (ingrowth bag) Fungus: Lichen Fungus: Lichen Fungus: Lichen	
	PCR primers	Fungus: Orchid mycorrhiza Bequence (5' -> 3') Fungus: Plant bark Fungus: Plant fruit Fungus: Plant leaf Fungus: Plant not	
	Iow sequence quality (Fungus: Plant seed will be excluded from the analysis)	
		l be excluded from the analysis)	
	EcM lineage (Tedersoo et al	. 2010. Mycorrhiza 20: 217-263.)	
		Clear name Info?	

Main mi Add tax Add Cax Add Search Add and names UNITE S Hypothe Clipboa Workgre

H026013

Plutof- Cloud detabase and computing s	ervices for the	biologist			You ar	e logged in as hnilsson Log out here			
Main menu	Crous,P.W.	, Groenewald,J.Z., Su	mmerell,E	B.A., Wingfield,B.D.	and Wingfield,M.J.; Co-occurring species	of Teratosphaeria			
Add taxon occurrence	on Eucalyp	tus; Persoonia 22, 38-	-48 (2009)					
Add	Study availability								
	Available for	IN	SD, (!) Stu	dy downloaded from 1	INSD				
Search and edit	Study is ann	otated N/	Α						
Add and edit taxon	Inserted by	Ke	Kessy Abarenkov, 2010-01-24						
names	View all seq	uences (27) under this	study.						
UNITE Species Hypotheses	Sequence 1	D Taxon name		Isolated from Inte	eracting taxa Locality	Plot name			
	FJ023537			Plant leaf	Australia	Plot, Change			
Clipboard	FJ023538			Plant leaf	Australia	Plot, Change			
Workgroups	FJ023539	Teratosphaeria velo	oci	Living culture	Australia, 13.68028° S 131.951	39° E			
	FJ023540				Republic of South Africa	Plot, Change			
ଗର	FJ493182				Australia	Plot, Change			
	FJ493183				Australia	Plot, Change			
$\bigcirc \bigcirc$	FJ493184				Australia	Plot, Change			
NATARC	FJ493185				Australia	Plot, Change			
	FJ493186				Australia	Plot, Change			
W/E	FJ493187				Kenya	Plot, Change			
	FJ493188				Brazil	Plot, Change			
🥣 unite	FJ493189				Brazil	Plot, Change			
10	FJ493190				Unspecified	Plot, Change			
	FJ493191	Phaeophleospora e	ugeniicol	Living culture	Brazil				
	FJ493192	Readeriella mirabili	is	Living culture	Australia				
	FJ493193				Australia	Plot, Change			
	FJ493194				Colombia	Plot, Change			
	FJ493195				Australia	Plot, Change			
	FJ493196	Teratosphaeria pro	fusa	Living culture	Australia				
	FJ493197	Teratosphaeria albo	oconidia	Living culture	Australia, 13.68028° S 131.984	72° E			
	FJ493198				Spain	Plot, Change			
	FJ493199				Republic of South Africa	Plot, Change			
	FJ493208				Unspecified	Plot, Change			
	FJ493209				Unspecified	Plot, Change			
	FJ493217				Republic of South Africa	Plot, Change			
	FJ493222				Bolivia	Plot, Change			
	FJ493225				Spain	Plot, Change			
						close the list			
	Specimens l	inked to this study: CBS	H-20262	PREM 56551 CBS 125	004 CBS 125007 CBS 124061				
	Plots linked	to this study: select plo	ot	\$					
	Search studi	es							
Last updated: 2014-02-22. Webmaster: k	essy.abarenkov[at]ut.ee			There are 9 users lo	gged in at the moment.			



If specimen/culture data are not provided with the INSDC entry, they can be associated with sequences through a single click.

Sequences from type material are particularly useful.

more DQ233781	Archaeorhizomyces finlayi	Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea abies	L.	CATTAACGAATGGCCTTTGGCC-TTCGACCTTG
more AF476985	Archaeorhizomyces finlayi	i Fungi (ectomycorrhizal root ti	Sweden	Ectomycorrhiza	Pinaceae		CTTT <mark>GGCC</mark> - <mark>ACGAATGGC</mark> <mark>CTTT</mark> GGCC- <mark>TTC</mark> G <mark>ACCTT</mark> G
more EF493313	Archaeorhizomyces finlayi	i Ascomycota (Ascomycota sp UP60	Sweden				<mark>ggatcattaac</mark> g <mark>aat</mark> gg <mark>c</mark> <mark>ctttggcc</mark> - <mark>ttcgacctt</mark> g
more HQ022034	Archaeorhizomyces finlayi	i Basidiomycota (uncultured Basi	USA	Soil fungal DNA			<mark>ggagggatcattaac</mark> g <mark>aat</mark> gg <mark>c</mark> <mark>Cttt</mark> gg <mark>cc</mark> - <mark>ttcgacctt</mark> g
more EF493312	Archaeorhizomyces finlayi	i Ascomycota (Ascomycota sp UP60	Sweden				CTTT <mark>GGCC</mark> - <mark>GAA</mark> T <mark>GGC</mark> <mark>CTTT</mark> GG <mark>CC</mark> - <mark>TTCGACCTT</mark> G
more JF836021	Archaeorhizomyces finlayi	i Archaeorhizomyces (Archaeorhiz	Sweden	Living culture (Ex-holotype)			CTTT <mark>GGCC</mark> -TTC <mark>GA</mark> CCTTG
more JQ912673	Archaeorhizomyces finlayi	i Archaeorhizomyces (Archaeorhiz					CTTTGGCC-TTCGACCTTG
more EF619847	Archaeorhizomyces	Ascomycota (uncultured Ascomyc	USA	Fungal mycelium (ingrowth bag)	Pinus taeda		TTTTGGCC-TTCAACTT
more JQ711841	Archaeorhizomycetales	Ascomycota (Ascomycota sp RT_2	Canada	Ectomycorrhiza	Pinus contorta		ATG<mark>AA</mark>T<mark>GGC</mark><mark>TTTT</mark>GGCC-TTCAACTT
more HM146849	Archaeorhizomvces	Ascomvcota (uncultured Ascomvc	Great Britain	1 Ectomycorrhiza	Pinus svlvestris		ACTCACTCCCCCACCACTAATCAATCAATCCACTCTTTTCCCC-TTCACCTT

DATABASE The Journal of Biological Databases and Curation

ABOUT THIS JOURNAL CONTACT THIS JOURNAL SUI

NAL SUBSCRIPTIONS

CURRENTISSUE ARCHIVE SEARCH

Oxford Journals > Science & Mathematics > Database > Volume 2014 > 10.1093/database/bau061

Finding needles in haystacks: linking scientific names, reference specimens and molecular data for Fungi

Conrad L. Schoch^{1,*,†}, Barbara Robbertse¹, Vincent Robert², Duong Vu², Gianluigi Cardinali³, Laszlo Irinyi⁴, Wieland Meyer⁴, R. Henrik Nilsson⁵, Karen Hughes⁶, Andrew N. Miller⁷, Paul M. Kirk⁸, Kessy Abarenkov⁹, M. Catherine Aime¹⁰, Hiran A. Ariyawansa¹¹, Martin Bidartondo¹², Teun Boekhout², Bart Buyck¹³, Qing Cai¹⁴, Jie Chen¹¹, Ana Crespo¹⁵, Pedro W. Crous², Ulrike Damm¹⁶, Z. Wilhelm De Beer¹⁷, Bryn T. M. Dentinger⁸, Pradeep K. Divakar¹⁵, Margarita Dueñas¹⁸, Nicolas Feau¹⁹, Katerina Fliegerova²⁰, Miguel A. García²¹, Zai-Wei Ge¹⁴, Gareth W. Griffith²², Johannes Z. Groenewald², Marizeth Groenewald², Martin Grube²³, Marieka Gryzenhout²⁴, Cécile Gueidan²⁵, Liangdong Guo²⁶, Sarah Hambleton²⁷, Richard Hamelin¹⁹, Karen Hansen²⁸, Valérie Hofstetter²⁹, Seung-Beom Hong³⁰, Jos Houbraken², Kevin D. Hyde¹¹, Patrik Inderbitzin³¹, Peter R. Johnston³², Samantha C. Karunarathna¹¹, Urmas Kõljalg⁹, Gábor M. Kovács^{33,34}, Ekaphan Kraichak³⁵, Krisztina Krizsan³⁶, Cletus P. Kurtzman³⁷, Karl-Henrik Larsson³⁸, Steven Leavitt³⁵, Peter M. Letcher³⁹, Kare Liimatainen⁴⁰, Jian-Kui Liu¹¹, D. Jean Lodge⁴¹, Janet Jennifer Luangsa-ard⁴², H. Thorsten Lumbsch³⁵, Sajeewa S.N. Maharachchikumbura¹¹, Dimuthu Manamgoda¹¹, María P. Martín¹⁸, Andrew M. Minnis⁴³, Jean-Marc Moncalvo⁴⁴, Giuseppina Mulè⁴⁵, Karen K. Nakasone⁴⁶, Tuula Niskanen⁴⁰, Ibai Olariaga²⁸, Tamás Papp³⁶, Tamás Petkovits³⁶, Raguel Pino-Bodas⁴⁷, Martha J. Powell³⁹, Huzefa A. Raja⁴⁸, Dirk Redecker⁴⁹, J. M. Sarmiento-Ramirez¹⁸, Keith A. Seifert²⁷, Bhushan Shrestha⁵⁰, Soili Stenroos⁴⁷, Benjamin Stielow², Sung-Oui Suh⁵¹, Kazuaki Tanaka⁵², Leho Tedersoo⁹, M. Teresa Telleria¹⁸, Dhanushka Udayanga¹¹, Wendy A. Untereiner⁵³, Javier Diéguez Uribeondo¹⁸, Krishna V. Subbarao³¹, Csaba Vágvölgyi³⁶, Cobus Visagie², Kerstin Voigt⁵⁴, Donald M. Walker⁵⁵, Bevan S. Weir³², Michael Weiß⁵⁶, Nalin N. Wijayawardene¹¹, Michael J. Wingfield¹⁷, J. P. Xu⁵⁷, Zhu L. Yang¹⁴, Ning Zhang⁵⁸, Wen-Ying Zhuang²⁶ and Scott Federhen¹ + Author Affiliations

L *Corresponding author: Tel: 301-402-1502; Fax: 301-480-2918; Email: schoch2@ncbi.nlm.nih.gov

« Previous | Next Article » Table of Contents

This Article

⇒

Database (2014) 2014 : bau061 doi: 10.1093/database/bau061

Abstract Free

» Full Text (HTML) Free Full Text (PDF) Free Supplementary Data

- Classifications

Original Article

Services

Alert me when cited Alert me if corrected Alert me if commented Find similar articles Similar articles in PubMed Add to my archive Download citation Request Permissions

- + Responses
- + Citing Articles
- + Google Scholar
- + PubMed
- Share

What's this?

Navigate This Article Top Abstract

Introduction Materials and Methods



GO

Advanced »

Current Content

Volume 2014



Alert me to new content

The Journal

About the journal Rights & permissions Recent Comments We are mobile – find out more

This journal is a member of the Committee on Publication Ethics (COPE)



BIOCURATION VIRTUAL ISSUE



The official journal of

The International Society for Biocuration

Impact Factor: 4.200

Annotation efforts

Tidying Up International Nucleotide Sequence Databases: Ecological, Geographical and Sequence Quality Annotation of ITS Sequences of Mycorrhizal Fungi

Leho Tedersoo ⊠, Kessy Abarenkov, R. Henrik Nilsson, Arthur Schüssler, Gwen-Aëlle Grelet, Petr Kohout, Jane Oja, Gregory M. Bonit Teele Jairus, Martin Ryberg, Karl-Henrik Larsson, Urmas Kõljalg

Towards a unified paradigm for sequence-based identification of fungi

Urmas Kõljalg^{1,2,*}, R. Henrik Nilsson³, Kessy Abarenkov², Leho Tedersoo², Andv F. S. Taylor^{4,5}, Mohammad Bahram¹, Scott T. Bates⁶, Thomas D. Bruns⁷, Johan Bengtsson-Palme⁸, Tony M. Callaghan⁹, Brian Douglas⁹, Tila Drenkhan¹⁰, Ursula Eberhardt¹¹, Margarita Dueñas¹², Tine Grebenc¹³, Gareth W. Griffith⁹, Martin Hartmann^{14,15}, Paul M. Kirk¹⁶, Petr Kohout ^{1,17}, Ellen Larsson³, Björn D. Lindahl¹⁸, Robert Lücking¹⁹, María P. Martín¹², P. Brandon Matheny²⁰, Nhu H. Nguyen⁷, Tuula Niskanen²¹, Jane Oja¹, Kabir G. Peav²², Ursula Peintner²³, Marko Peterson 1, Kadri Põldmaa1, Lauri Saag1, Irja Saar1 , Arthur Schüßler²⁴, James A. Scott²⁵, Carolina Senés²⁴, Matthew E. Smith²⁶, Ave Suija^{1,2}, D. Lee Taylor²⁷, M. Teresa Telleria¹², Michael Weiss²⁸ and Karl-Henrik Larsson²⁹



Molecular Ecology Volume 22, Issue 21, pages 5271–5277, November 2013

EREE

CrossMark

click for updates

Mycorrhizal fungi

Various Dikarya

Improving ITS sequence data for identification of plant pathogenic fungi

R. Henrik Nilsson • Kevin D. Hyde • Julia Pawłowska • Martin Ryberg • Leho Tedersoo • Anders Bjørnsgard Aas • Siti A. Alias • Artur Alves • Cajsa Lisa Anderson • Alexandre Antonelli • A. Elizabeth Arnold • Barbara Bahnmann • Mohammad Bahram • Johan Bengtsson-Palme • Anna Berlin • Sara Branco • Putarak Chomnunti • Asha Dissanayake • Rein Drenkhan • Hanna Friberg • Tobias Guldberg Frøslev • Bettina Halwachs • Martin Hartmann • Beatrice Henricot • Ruvishika Jayawardena • Ari Jumpponen • Håvard Kauserud • Sonja Koskela • Tomasz Kulik • Kare Liimatainen • Björn D. Lindahl • Daniel Lindner • Jian-Kui Liu • Sajeewa Maharachchikumbura • Dimuthu Manamgoda • Svante Martinsson • Maria Alice Neves • Tuula Niskanen • Stephan Nylinder • Olinto Liparini Pereira • Danilo Batista Pinho • Teresita M. Porter • Valentin Queloz • Taavi Riit • Marisol Sánchez-García • Filipe de Sousa • Emil Stefańczyk • Mariusz Tadych • Susumu Takamatsu • Qing Tian • Dhanushka Udayanga • Martin Unterseher • Zheng Wang • Saowanee Wikee • Jiye Yan • Ellen Larsson • Karl-Henrik Larsson • Urmas Kõljalg • Kessy Abarenkov

Plant pathogenic fungi

31,954 changes implemented

- 5,135 taxonomic re-annotations
- 25,028 additions of geographical/host data
- 1,368 specifications of reference sequences (~1,000 types)
- 401 broken sequences removed

- 1 A comprehensive, automatically updated fungal ITS sequence dataset for
- 2 reference-based chimera control in environmental sequencing efforts ¶
- 3

T

- 4 R. Henrik Nilsson^{1*}, Leho Tedersoo², Martin Ryberg³, Erik Kristiansson⁴, Martin
- 5 Hartmann^{5,6}, Martin Unterseher⁷, <u>Teresita</u> M. Porter⁸, Johan Bengtsson-Palme⁹,
- 6 Donald M. Walker¹⁰, Filipe de Sousa¹, Hannes Andres Gamper¹¹, Ellen Larsson¹,
- 7 Karl-Henrik Larsson¹², <u>Urmas</u> Kõljalg^{2,13}, Robert Edgar¹⁴, <u>Kessy</u> Abarenkov¹³

Chimeras (1,000 removed)

	PlutoF - Search Pages		¥ 000			Pluo	F - UNITE Species Hypotheses		
H A State Of Trance #553 v	rith 🗵 💏 🛛 PlutoF - Search Pages 🛛 🛛 🥳 PlutoF - UNITE Species Hypothe 🗵 🙆 wh	ere did technology slow toda × 🛛 🔯 An open source chimera checke × 🗍 +	O Outlook Wel	App × 🖸 🕨 A State Of	Trance #553 with H 🥳 Plutof - Search	Pages H	* PlatoF - UNITE Species Hypothe.	× S where did technology slow toda	X An open source chi
arch_insd.php		🗇 🕆 🕑 🚼 * iource chimera checker for the fungal ITS region. 9. 🔯 * 🔳	(a) (b) units at sector	np/pluto@/ek_cluster.php?cluster_i	1=28626\$version=6				* source chimera checker fr
ieley 🔮 stats.distributed 😵 1	the rc5 Archives 🛛 🧖 R. Henrik Nilsso 🔟 ResearchGate		Most Visited -	Save to Mendeley 😫 stats-distri	nated 😫 The rcS Archives 🔽 R. Henrik Nilss	o 🕅 Researd	KGate		
									SH
Plutof			Sequence ID	UNITE taxon name	INSD taxon name	Country	DNA source	Interacting taxa	97% : Align
loud database and computin	g services for the blologist	You are logged in as hnilsson Log out here							- Seni
			more EF434026	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA		0
Main menu	This search form is designed to find INSD sequences by their original data (d		more GQ22347	Archaeorhizomyces	Fungi (uncultured fungus)	Germany	Orchid mycorrhiza	Gymnadenia conopsea	
Add taxon occurrence	their annotated meta-data we recommend using regular sequence search for		more KC965637	Archaeorhizomyces	Fungi (uncultured fungus)	Canada			
	» Search by INSD original data:	Go Clear fields	more AB828010	Archaeorhizomyces	Fungi (uncultured ectomycorrhi				
Add	Accession number IN LIST :	AND ‡	more E1152543	Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla	
Search and edit	Locality LIKE :	AND 1	more AY702735	Archaeorhizomyces	Fungi (uncultured fungus from	USA	Ectomycorrhiza	Ables	
Add and edit taxon			more KC876142	Archaeorhizomycetales	Taphrinomycotina (uncultured A				
names	Organism LIKE :	AND : Sequence length between	more KC876143	Archaeorhizomycetales	Taphrinomycotina (uncultured A				
UNITE Species	Lineage LIKE :	AND 0 and bp		Archaeorhizomycetales	Pezizomycotina (uncultured Pez				
Hypotheses	Host LIKE :	AND :	more 3Q346868	Archaeorhizomycetales	Pezizomycotina (uncultured Pez				
Clipboard				Archaeorhizomyces	Ascomycota (uncultured Ascomyc	Lithuania	Ectomycorrhiza	Picea abies	
		AND \$		Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Denmark	Ectomycorrhiza	Picea abies	
Workgroups	Tissue type LIKE :	AND \$	more EM992983	Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Sweden	Ectomycorrhiza	Picea abies	
Profile	Culture collection LIKE :	AND ÷		Archaeorhizomyces	Fungi (ectomycorrhizal root ti	Sweden	Ectomycorrhiza	Pinaceae	
	Specimen voucher	AND \$		Archaeorhizomyces	Ascomycota (uncultured Ascomyc		Plant root	Betula nana	
30				Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Pyrola picta	
	Biomaterial LIKE :	AND 0		Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Betula papyrifera	
00	Study name			Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Soll fungal DNA		
ATARC	* use comma to			Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Ectomycorrhiza	Populus	
IATARC	separate search strings			Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea ables	
				Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana	
				Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana	
Lunita	» OR by their corresponding values in UNITE database:			Archaeorhizomyces	Fungi (uncultured fungus)	Canada			
쾟 unite 🚽	Country Afghanistan	1		Archaeorhizomyces	Fungi (uncultured fungus)	USA			
	Algeria			Archaeorhizomyces	Fungi (uncultured fungus)	Ground	Esta an	Warran Instances I 17	
	American Samoa (US)			Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla	
	Taxon name LIKE :	AND : search within lineage		Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada Canada	Ectomycorrhiza	Tsuga heterophylla	
	Host name LIKE :	AND : search within lineape		Archaeorhizomyces	Pezizomycotina (uncultured Pez		Ectomycorrhiza	Tsuga heterophylla	
				Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla	
				Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Living culture	Tsuga heterophylla	
	Include Schimeric Include			Archaeorhizomyces	Fungi (uncultured fungus)				
			more HM03061	Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA	Disco abias	
t updated: 2014-02-22. Webmaste	r: kessy.abarenkov[at]ut.ee	There are 2 users logged in at the moment.			yi Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea abies Pinaceae	
					yi Fungi (ectomycorrhizal root ti yi Ascomycota (Ascomycota sp UP60)	Sweden	Ectomycorrhiza	Pinaceae	
					yi Ascomycota (Ascomycota sp UP60 vi Basidiomycota (uncultured Basi	USA	Soil fungal DNA		
					yi Ascomycota (Ascomycota sp UP60		aon rungal DNA		
			more EF493312	Archaeornizomyces finla	VI ASCOMYCOLA (ASCOMYCOLA SP UPOL	oweden			

- 29,956 taxonomic re-annotations
- 50,442 specifications of country of collection
- 52,801 specifications of host
- 2,553 chimeric sequences found
- 7,105 low read quality sequences found
- 4,948 specifications of reference sequences
- 12,142 sequences connected to specimens/cultures

Why do I get "Unidentified fungus"?

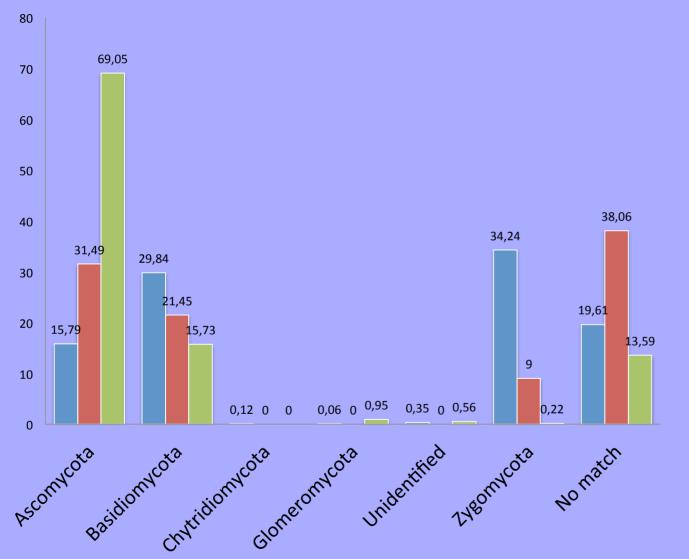
- Reference sequences poorly annotated ("fixed", now less than 1% "Unidentified fungus")
- Type material not sequenced



 NGS-bases studies recover fungi that Sangerbased studies don't – not so easy to "fix"

UNITE - new developments

Implementing Next Generation Sequences (NGS) into Sangerbased species hypotheses



3 NGS datasets:

Papua New Guinea 2 448 RepS

Colombia 454 RepS

Estonia 2 730 RepS

							SH	
Seque	nce ID	UNITE taxon nam	e INSD taxon name	Country	DNA source	Interacting taxa	97% ‡	Alignment based on: Full ITS 💠
							-	Send clusters to clipboard
more	<u>HQ260234</u>		Fungi (uncultured fungus)	USA	Ericoid mycorrhiza		[]	
more	<u>HQ260254</u>		Fungi (uncultured fungus)	USA	Ericoid mycorrhiza			
more	<u>GU256950</u>	Ascomycota	Fungi (uncultured fungus)	China	Ericoid mycorrhiza	Rhododendron argyrophyllum		
	KC965698		Fungi (uncultured fungus)	USA				
more	<u>HQ212173</u>		Pezizales (uncultured Phialea)	USA	Soil fungal DNA			
more	UDB003032 Link ou	<u>It</u> Mollisia solani		Lithuania	Fruitbody (Isotype))		Locked sequence
more	AM999567	Helotiales	Fungi (uncultured fungus)	Norway	Plant leaf	Bryophyta		
more	KC965215		Fungi (uncultured fungus)	Canada				
	<u>UDB463174</u>			Papua New Guine	ea Soil fungal DNA			
	UDB463092			Papua New Guine	ea Soil fungal DNA			
	UDB465238			Papua New Guine	ea Soil fungal DNA			
more	UDB462602			Papua New Guine	ea Soil fungal DNA			
	UDB462095			Papua New Guine	ea Soil fungal DNA			
more	<u>UDB463443</u>			Papua New Guine	ea Soil fungal DNA			
more	UDB463032			Papua New Guine	ea Soil fungal DNA			
more	UDB463165			Papua New Guine	ea Soil fungal DNA			
more	UDB463060			Papua New Guine	ea Soil fungal DNA			
more	<u>UDB464721</u>			Papua New Guine	ea Soil fungal DNA			
more	UDB463066			Papua New Guine	ea Soil fungal DNA			
more	FN298700		Fungi (uncultured fungus)	Australia	Ectomycorrhiza			
more	UDB004118 Link ou	t Helotiales		Australia	Ectomycorrhiza			
	UDB463839			Papua New Guine	ea Soil fungal DNA			
more	UDB463182				ea Soil fungal DNA			
more	UDB462915				ea Soil fungal DNA			
more	HQ850141	Helotiales	Fungi (uncultured fungus)	China				
	UDB463394			Papua New Guine	ea Soil fungal DNA			
	UDB462920				ea Soil fungal DNA			
more	UDB461902				ea Soil fungal DNA			
	UDB463333				ea Soil fungal DNA			
	HM230879		Leotiomycetes (uncultured Leot.		5			
	UDB464837				ea Soil fungal DNA			
	UDB464686				ea Soil fungal DNA			
	UDB464687				ea Soil fungal DNA			
	UDB465674				ea Soil fungal DNA			
	UDB462067				ea Soil fungal DNA			
	JF519187		Helotiales (uncultured Helotia	Austria	Plant root	Fagus sylvatica		
	HQ022264		Pezizales (uncultured Pezizale	USA				
	FM172821		Fungi (Calluna vulgaris root a	Germany	Living culture	Calluna vulgaris		
	FM172822		Fungi (Calluna vulgaris root a	Germany	Living culture	Calluna vulgaris		
	FM172836		Fungi (Calluna vulgaris root a	Germany	Living culture	Calluna vulgaris		
	FM172809		Fungi (Calluna vulgaris root a	Germany	Living culture	Calluna vulgaris		
	FM172837	Leotiomycetes	Fungi (Calluna vulgaris root a	Germany	Living culture	Calluna vulgaris		
	FM172770		Fungi (Calluna vulgaris root a	Germany	Living culture	Calluna vulgaris		
	JQ347011		Pezizales (uncultured Phialea)		g calcare			
	HQ260181		Fungi (uncultured fungus)	USA	Ericoid mycorrhiza			C
more	114200101		rangi (uncultureu lungus)	JUN				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Improving identification success of indoor fungi

- Relevant taxonomists to go through "their" fungi in UNITE
 - Correct bad/missing names
 - Designate reference sequences for SHs
 - Add metadata on, e.g., country of collection
 - Remove broken sequences
- Sequences from type/authentic material
- Report *nomenclatural* issues to Index Fungorum or MycoBank

…annotation effort for indoor fungi?

UNITE - fungal identification with rDNA ITS sequences | Version 6 | date: 2013-11-19 | Cluster code: UCL6_000601

This set of sequences contains genera: Archaeorhizomyces Total number of sequences in cluster: 75

- chimeric
- low quality
- UNITE core sequence
- automatically chosen 98.5% SH representative sequence
- Ex = sequence to be excluded from the next version of global key

(filled, coloured circle) manually chosen SH reference sequence, overrides automatically chosen representative sequence

						SH			
Sequence ID	UNITE taxon name	INSD taxon name	Country	DNA source	Interacting taxa	97% ÷	Alignment based on: Full ITS + Order sequences by: combi		
						-	Send clusters to clipboard [50		
more EF4340	026 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Soil fungal DNA			TTC <mark>GGCC</mark> -TTC <mark>AA</mark> CCTT-		
more GQ223	3472 Archaeorhizomyces	Fungi (uncultured fungus)	Germany	Orchid mycorrhiza	Gymnadenia conopsea		TTCGGCC - <mark>TTCAA</mark> CCTT-		
more KC965	637 Archaeorhizomyces	Fungi (uncultured fungus)	Canada				TTTGGCC-<mark>TTCAA</mark>CCTT-		
more AB828	010 Archaeorhizomyces	Fungi (uncultured ectomycorrhi					CTCGGCC- <mark>ATGAAC</mark> GGCCTCGGCC-TTCAACCTTC		
more FJ1525	543 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		CTCGGCC- <mark>ATGAAC</mark> GGCCTCGGCC-TTCAACCTTC		
more AY702	735 Archaeorhizomyces	Fungi (uncultured fungus from	USA	Ectomycorrhiza	Abies		TC<mark>ATTAAC</mark>GAATGGCCTTT<mark>GGCC-TTCGACCTT</mark>C		
more KC876	142 Archaeorhizomycetales	Taphrinomycotina (uncultured A					ACGARI GGC <mark>CTTT</mark> GGCC- TTC G <mark>ACCTT</mark> C		
more KC876	143 Archaeorhizomycetales	Taphrinomycotina (uncultured A					CTTTGGCC- <mark>ACGAA</mark> IGGCCTTTGGCC- <mark>TTCGACCTT</mark> C		
more JQ346	852 Archaeorhizomycetales	Pezizomycotina (uncultured Pez					CTTT <mark>GGCCTTC</mark> GACTTC		
more JQ346	868 Archaeorhizomycetales	Pezizomycotina (uncultured Pez					CTTTGGCC- <mark>ACGAA</mark> IGGCCTTTGGCCC- <mark>TTC</mark> GACCTTC		
more DQ069	0012 Archaeorhizomyces	Ascomycota (uncultured Ascomyc	Lithuania	Ectomycorrhiza	Picea abies		ITTTGCC-<mark>ITCAR</mark>CCCTC		
more FR877	526 Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Denmark	Ectomycorrhiza	Picea abies		Gatcattaatgaatggcttttgcc-ttcaaccctg		
more FM992	983 Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Sweden	Ectomycorrhiza	Picea abies		TTT G CC - TTC - AC G CT C		
more AF4813	369 Archaeorhizomyces	Fungi (ectomycorrhizal root ti	Sweden	Ectomycorrhiza	Pinaceae		AAIGGC<mark>TTTI</mark>GCC-<mark>TTCAAC</mark>GCTC		
more HQ212	2270 Archaeorhizomyces	Ascomycota (uncultured Ascomyc		Plant root	Betula nana		TTCGGCC - <mark>TTCAACCTT</mark> -		
more FJ4408	395 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Pyrola picta		TTCGGCC - TTCAACCTT -		
more HM164	1555 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Betula papyrifera		TTTGGCC-TTCAACCTT-		
more FJ6269	30 Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Soil fungal DNA			TTTGGCC - TTCAACCTT -		
more EU554	708 Archaeorhizomyces	Fungi (uncultured fungus)	Canada	Ectomycorrhiza	Populus		TTTGGCC - <mark>TTCAACCTT</mark> -		
more DQ233	843 Archaeorhizomyces	Fungi (uncultured ectomycorrhi	Finland	Ectomycorrhiza	Picea abies		TTT GCC- <mark>TTCAACTCT</mark> C		
more HM164	1554 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana		TTTIGCC-TTCAACTCTG		
more HM164	1553 Archaeorhizomyces	Fungi (uncultured fungus)	USA	Ectomycorrhiza	Picea mariana		ATGAA TGGC TTTTGCC - TTCAACTCT C		
more JN0120	085 Archaeorhizomyces	Fungi (uncultured fungus)	Canada				TTTTGCC-TTCAACTCTC		
more JN8893	799 Archaeorhizomyces	Fungi (uncultured fungus)	USA				<mark>CGGA</mark> GGG <mark>ATCATTAAT</mark> GAAT <mark>GGCTTTT</mark> GCC- TTCAACTCT C		
more JN032	573 Archaeorhizomyces	Fungi (uncultured fungus)				[]	CTCGGCC-TTCAACCTTC		
more FJ1525	542 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		ATGAAI GGC <mark>TTT</mark> GG <mark>CC</mark> - TTCAACCA		
more DQ481	984 Archaeorhizomyces	Pezizomycotina (uncultured Pez	Canada	Ectomycorrhiza	Tsuga heterophylla		NI GANI GGQ IVVI GGQQ- VICAACCA		

Uncultured Archaeorhizomycetes clone QF3.2 18S ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S

3. ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and 28S ribosomal RNA gene, partial sequence

464 bp linear DNA

Accession: KC876142.1 GI: 526840446 GenBank FASTA Graphics PopSet

- Uncultured Archaeorhizomycetes clone CBB3.21 18S ribosomal RNA gene, partial sequence; internal transcribed spacer 1, 5.8S
- 4. ribosomal RNA gene, and internal transcribed spacer 2, complete sequence; and 28S ribosomal RNA gene, partial sequence

449 bp linear DNA

Accession: KC876141.1 GI: 526840445 GenBank FASTA Graphics PopSet