

Supplementary Material

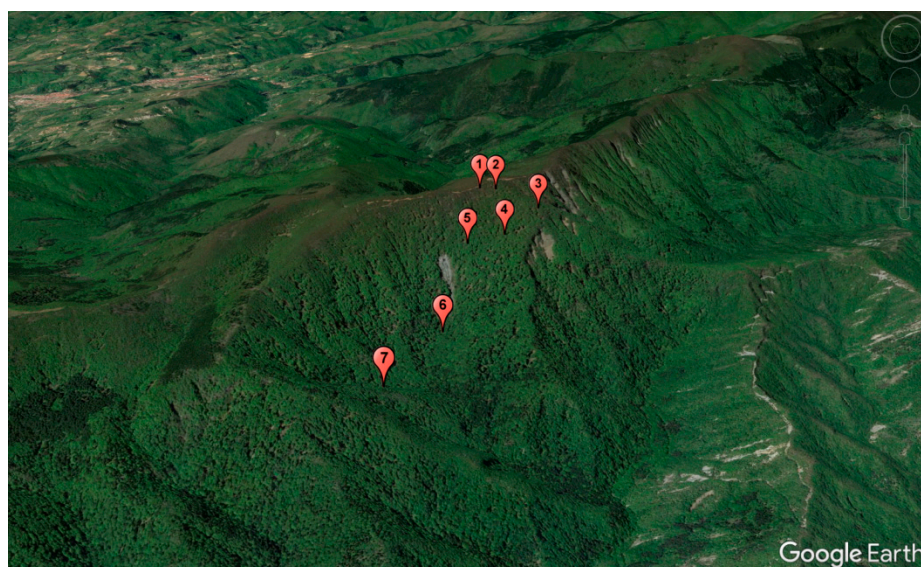


Figure S1 Map of the sampling points

Table S1 Soil samples chemical parameters measured, and methods used

Parameter	Method
Cr	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Zn	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Pb	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Cd	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Ni	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Cu	UNI EN 13657:2004 + UNI EN ISO 11885:2009
As	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Fe	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Mn	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Se	UNI EN 13657:2004 + UNI EN ISO 11885:2009
B	UNI EN 13657:2004 + UNI EN ISO 11885:2009
Al	UNI EN 13657:2004 + UNI EN ISO 11885:2009
TOC	UNI EN 13137:2002
SO ₄ ²⁻	APAT CNR IRSA 4020 Man 29 2003
NO ₃ ⁻	APAT CNR IRSA 4020 Man 29 2003
F ⁻	APAT CNR IRSA 4020 Man 29 2003
Nitrous N	APAT CNR IRSA 4050 Man 29 2003
COD	ISPRA Man 117 2014

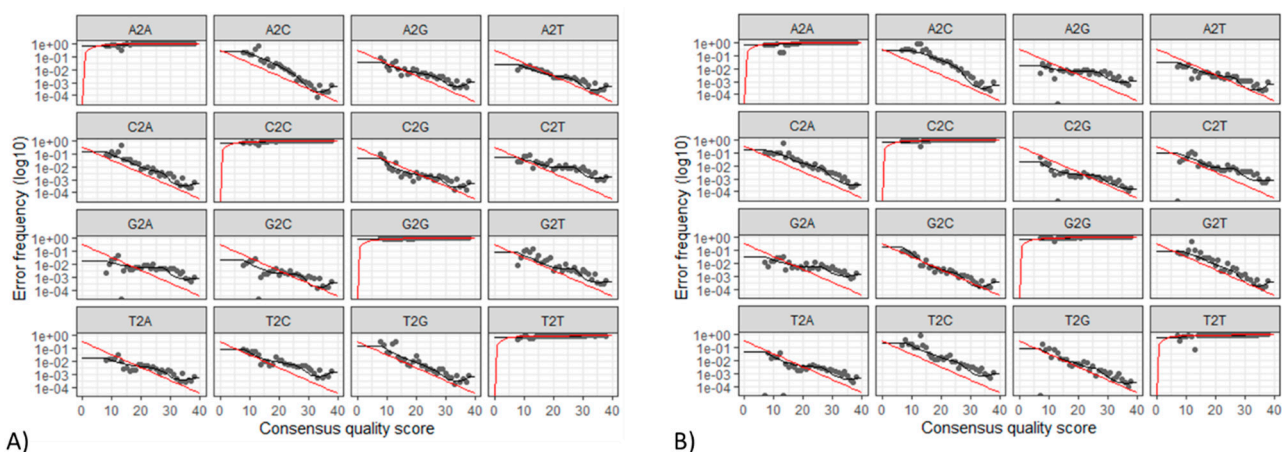


Figure S2 Plots of the estimated error rates of the amplicon dataset. **A)** error rates of the forward reads; **B)** error rates of the reverse reads

Table S2 Reads pair processing throughout the filtering steps

Sample	raw	noadapt	filtered	denoisedF	denoisedR	merged	nonchim	bacteria
SF1S	97581	96272	75943	73840	74493	70239	68997	68995
SF2S	70921	69751	54674	53775	54062	52406	51682	51682
SF3S	82249	81086	64504	62277	62885	58521	57304	57301
SF4S	79420	78383	60912	59723	60115	57834	57017	56980
SF5S	90546	89389	69563	68749	69026	67204	66188	66150
SF6S	81604	80438	62668	61916	62176	60808	60160	60160
SF7S	73920	72637	57642	57264	57448	56923	56297	56297

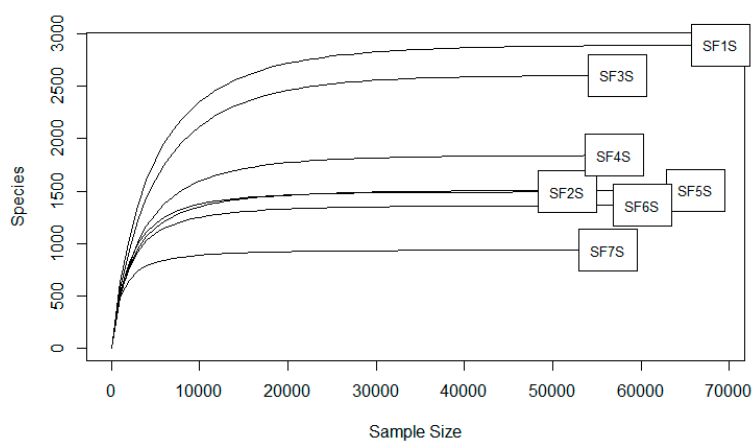
Table S3 Accession numbers of 16S rRNA gene sequences submitted to Gene Bank

Strain	Accession number	Strain	Accession number
SF1S1	MW181140	SF5S14	MW181183
SF1S2	MW181141	SF5S16	MW181184
SF1S3	MW181142	SF5S17	MW181185
SF1S4	MW181143	SF5S18	MW181186
SF1S8	MW181144	SF5S19	MW181187
SF1S10	MW181144	SF5S20	MW181188
SFS11	MW181145	SF5S22	MW181189
SF2S1	MW181146	SF5S23	MW181190
SF2S2	MW181147	SF5S24	MW181191
SF2S6	MW181148	SF5S25a	MW181192
SF2S9	MW181149	SF5S25b	MW181193
SF2S10	MW181150	SF6S1	MW181194
SF2S14	MW181151	SF6S2	MW181195

SF2S24	MW181152	SF6S5	MW181196
SF3S1	MW181153	SF6S7	MW181195
SF3S3	MW181154	SF6S11	MW181197
SF3S4	MW181155	SF6S12	MW181198
SF3S5	MW181156	SF6S13	MW181199
SF3S6	MW181157	SF6S14	MW181200
SF3S7	MW181158	SF6S16	MW181201
SF3S9	MW181159	SF6S17	MW181202
SF3S11	MW181160	SF6S21	MW181203
SF3S20	MW181161	SF6S22	MW181204
SF3S21	MW181162	SF6S23	MW181205
SF3S25	MW181163	SF6S24	MW181206
SF4S1	MW181164	SF6S25	MW181207
SF4S2	MW181165	SF7S2	MW181208
SF4S3	MW181166	SF7S3	MW181209
SF4S4	MW181167	SF7S5	MW181210
SF4S5	MW181168	SF7S7	MW181211
SF4S8	MW181169	SF7S8	MW181212
SF4S11	MW181170	SF7S9	MW181213
SF4S16	MW181171	SF7S10	MW181214
SF4S19	MW181172	SF7S11	MW181215
SF4S21a	MW181165	SF7S12	MW181216
SF4S23	MW181173	SFS713	MW181217
SF5S5	MW181174	SF7S14	MW181218
SF5S6	MW181175	SF7S15	MW181219
SF5S7	MW181176	SF7S17	MW181220
SF5S8	MW181177	SF7S18	MW181221
SF5S9	MW181178	SF7S20	MW181222
SF5S10	MW181179	SF7S21	MW181223
SF5S11	MW181180	SF7S22	MW181224
SF5S12	MW181181	SF7S23	MW181225
SF5S13	MW181182		

Table S4 Values of measured soil chemical compounds

Parameter	Unit	Sample						
		SF1S	SF2S	SF3S	SF4S	SF5S	SF6S	SF7S
Cr	mg/K g s.s.	31 ± 12	28 ± 11	36 ± 14	36 ± 14	14 ± 6	30 ± 12	38 ± 15
Zn	mg/K g s.s.	75 ± 23	105 ± 32	82 ± 25	91 ± 27	46 ± 14	89 ± 27	84 ± 25
Pb	mg/K g s.s.	22 ± 7	59 ± 18	31 ± 9	46 ± 14	34 ± 10	35 ± 11	30 ± 9
Cd	mg/K g s.s.	<1	<1	<1	<1	<1	<1	<1
Ni	mg/K g s.s.	23 ± 7	18 ± 5	32 ± 10	31 ± 9	13 ± 4	26 ± 8	32 ± 10
Cu	mg/K g s.s.	13 ± 4	18 ± 5	20 ± 6	20 ± 6	20 ± 6	21 ± 6	21 ± 6
As	mg/K g s.s.	5 ± 2	6 ± 2	6 ± 2	7 ± 2	2 ± 1	5 ± 2	6 ± 2
Fe	mg/K g s.s.	21247 ± 6374	17437 ± 5231	23404 ± 7021	27101 ± 8130	4197 ± 1259	19586 ± 5876	24547 ± 7364
Mn	mg/K g s.s.	387 ± 116	270 ± 81	583 ± 175	553 ± 166	114 ± 34	378 ± 113	366 ± 110
Se	mg/K g s.s.	<1	<1	<1	<1	<1	<1	4 ± 1
B	mg/K g s.s.	12 ± 4	10 ± 3	13 ± 4	10 ± 3	17 ± 5	19 ± 6	19 ± 6
Al	mg/K g s.s.	17979	14693	17553	19319	3520	14914	18605
TOC	%C	5.1	25.4	9.8	6.0	39.3	16.9	10.6
SO ₄ ²⁻	mg/l	24 ± 4	59 ± 9	23 ± 3	24 ± 4	66 ± 10	25 ± 4	70 ± 11
NO ₃ ⁻	mg/l	194 ± 29	290 ± 44	268 ± 40	194 ± 29	386 ± 58	2.0 ± 0.3	252 ± 38
F ⁻	mg/l	0.1 ± 0.1	0.2 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	0.4 ± 0.1	0.1 ± 0.1	0.1 ± 0.1
Nitrous N	mg/l N	1.14 ± 0.18	0.05 ± 0.01	5.09 ± 0.81	2.97 ± 0.48	<0.02	<0.02	3.38 ± 0.54
COD	mg/l O ₂	81 ± 24	336 ± 67	234 ± 47	153 ± 31	360 ± 72	390 ± 78	219 ± 44

**Figure S3** Rarefaction curves for the samples

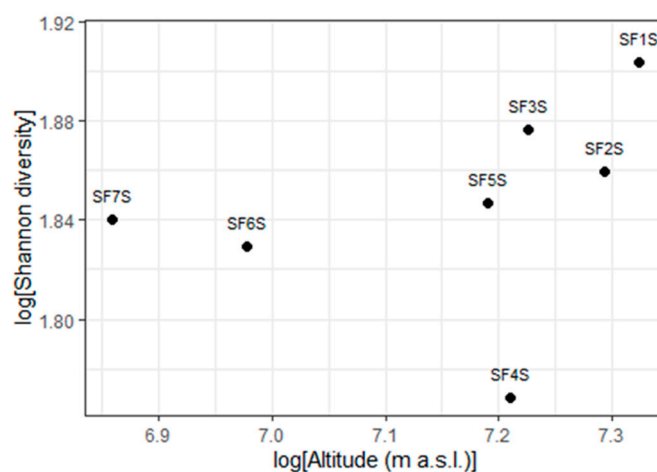


Figure S4 Absence of correlation between soil sample bacterial diversity and altitude of samples collection points. Log transformation of data has been performed

Table S5 Fitting of chemical composition on the ordination analysis of soil samples based on bacterial community composition

Compound	CA1	CA2	r2	Pr(>r)
Cr	-0.99970	0.02464	0.2550	0.429
Zn	-0.79602	0.60527	0.0917	0.685
Pb	0.98310	-0.18308	0.0868	0.777
Ni	-0.98823	0.15297	0.3437	0.419
Cu	-0.98796	0.15471	0.2155	0.396
As	-0.99765	0.06851	0.0742	0.713
Fe	-0.98399	0.17823	0.1705	0.555
Mn	-0.52459	0.85135	0.1100	0.761
Se	-0.79208	-0.61041	0.9985	0.145
B	-0.99099	0.13391	0.5225	0.150
Al	-0.98774	0.15613	0.1393	0.546
TOC	0.93770	-0.34744	0.1103	0.814
SO ₄ ²⁻	-0.21261	-0.97714	0.5416	0.104
NO ₃ ⁻	0.53118	-0.84726	0.7816	0.079
F ⁻	0.86333	-0.50464	0.2973	0.330
Nitrous N	-0.76832	-0.64007	0.1082	0.877
COD	-0.32046	0.94726	0.1020	0.891

Table S6 Distribution of the RAPD haplotypes and taxonomy of bacteria associated to the soil samples in Sasso Fratino

RAPD haplotype	SF1S	SF2S	SF3S	SF4S	SF5S	SF6S	SF7S	Taxonomy
1	4							<i>Agrobacterium</i>
2	5;7;9;11;12;16;17;21	2;3;4;5;8;12	3;8;10;14;17;22	11;17;18	11;15		2	<i>Agrobacterium</i>
3							17	<i>Agrococcus</i>
4		6;7;11;17;18						<i>Agromyces</i>
5			9;12;13;15;16;18;23					<i>Agromyces</i>
6				2;21b;22	9			<i>Agromyces</i>
7				8;20				<i>Agromyces</i>
8				21a				<i>Agromyces</i>
9					10			<i>Agromyces</i>
10					12			<i>Agromyces</i>
11					19			<i>Agromyces</i>
12					23			<i>Agromyces</i>
13					24			<i>Agromyces</i>
14							13	<i>Arthrobacter</i>
15	1							<i>Bacillus</i>
16	2							<i>Bacillus</i>
17	3							<i>Bacillus</i>
18			1;2					<i>Bacillus</i>
19			5					<i>Bacillus</i>
20				19				<i>Bacillus</i>
21				23				<i>Bacillus</i>
22					22			<i>Bacillus</i>
23					25a			<i>Bacillus</i>
24					25b			<i>Bacillus</i>
25						2;10		<i>Bacillus</i>

26					7		<i>Bacillus</i>
27					14		<i>Bacillus</i>
28						3	<i>Bacillus</i>
29						10	<i>Bacillus</i>
30		1					<i>Bacillus</i>
31					25		<i>Cedecea</i>
32						14	<i>Chryseobacterium</i>
33			6				<i>Chryseobacterium</i>
34						1;5;24	<i>Chryseobacterium</i>
35						4;6;18	<i>Chryseobacterium</i>
36						8	<i>Chryseobacterium</i>
37					1		<i>Ewingella/Rahnella</i>
38			11				<i>Flavobacterium</i>
39					12		<i>Klebsiella</i>
40	6;8;14;19;22						<i>Kokuria</i>
41	10;13;15;18;20;23;24;25						<i>Kokuria</i>
42					22		<i>Kokuria</i>
43					23		<i>Kokuria</i>
44						20	<i>Kokuria</i>
45					13		<i>Microbacterium</i>
46					14		<i>Microbacterium</i>
47					16		<i>Microbacterium</i>
48					24		<i>Microbacterium</i>
49		9;13;15;20;21;22;23					<i>Micrococcus</i>
50		10;19					<i>Micrococcus</i>
51		24					<i>Micrococcus</i>
52				3;7;10;14;15			<i>Micrococcus</i>
53					5		<i>Micrococcus</i>
54					7		<i>Micrococcus</i>
55					17		<i>Micrococcus</i>
56					18		<i>Micrococcus</i>

57					20			<i>Micrococcus</i>
58							12	<i>Micrococcus</i>
59							23	<i>Micrococcus</i>
60					8			<i>Moraxella</i>
61		14;16						<i>Pantoea</i>
62				5;6;9;13;24				<i>Pantoea</i>
63						17		<i>Pantoea</i>
64			7					<i>Pseudomonas</i>
65					6			<i>Pseudomonas</i>
66						5; 9		<i>Pseudomonas</i>
67						16		<i>Pseudomonas</i>
68						21		<i>Pseudomonas</i>
69							11	<i>Pseudomonas</i>
70							21	<i>Pseudomonas</i>
71							22	<i>Pseudomonas</i>
72						11		<i>Rhodococcus</i>
73			25					<i>Serratia</i>
74							7;19	<i>Serratia</i>
75			4	1				<i>Staphylococcus</i>
76			20					<i>Staphylococcus</i>
77			21					<i>Staphylococcus</i>
78				4;12				<i>Staphylococcus</i>
79				16				<i>Staphylococcus</i>
80							15	<i>Staphylococcus</i>
81							9	<i>Stenotrophomonas</i>
82						13		<i>Streptomyces</i>
N° isolates	25	24	23	25	21	17	23	

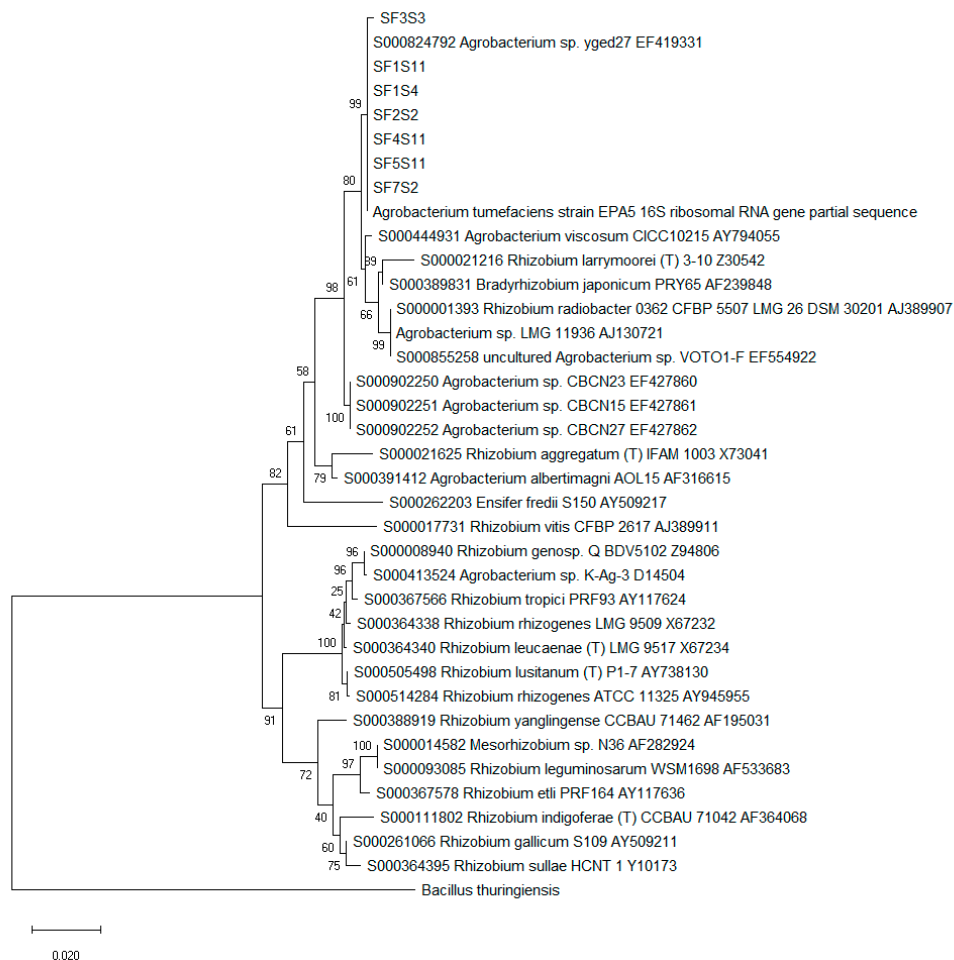


Figure S5 Phylogenetic tree for the genera *Rhizobium* and *Agrobacterium*

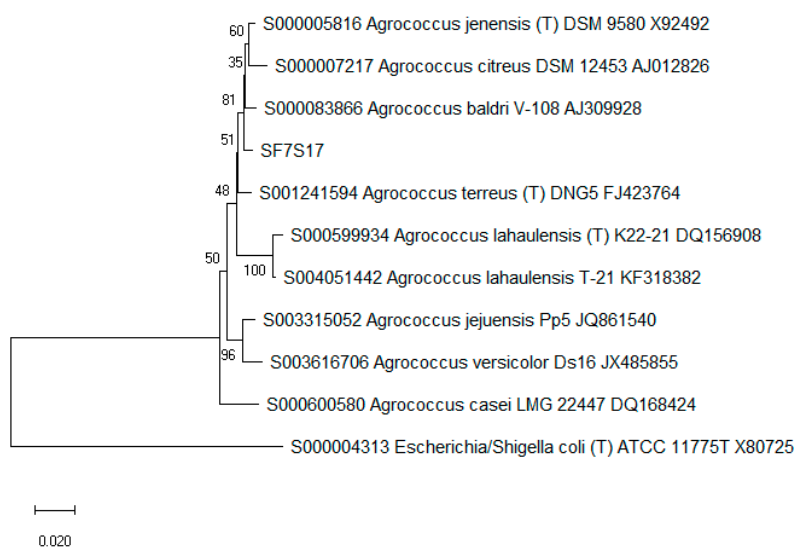


Figure S6 Phylogenetic tree for the genus *Agrococcus*

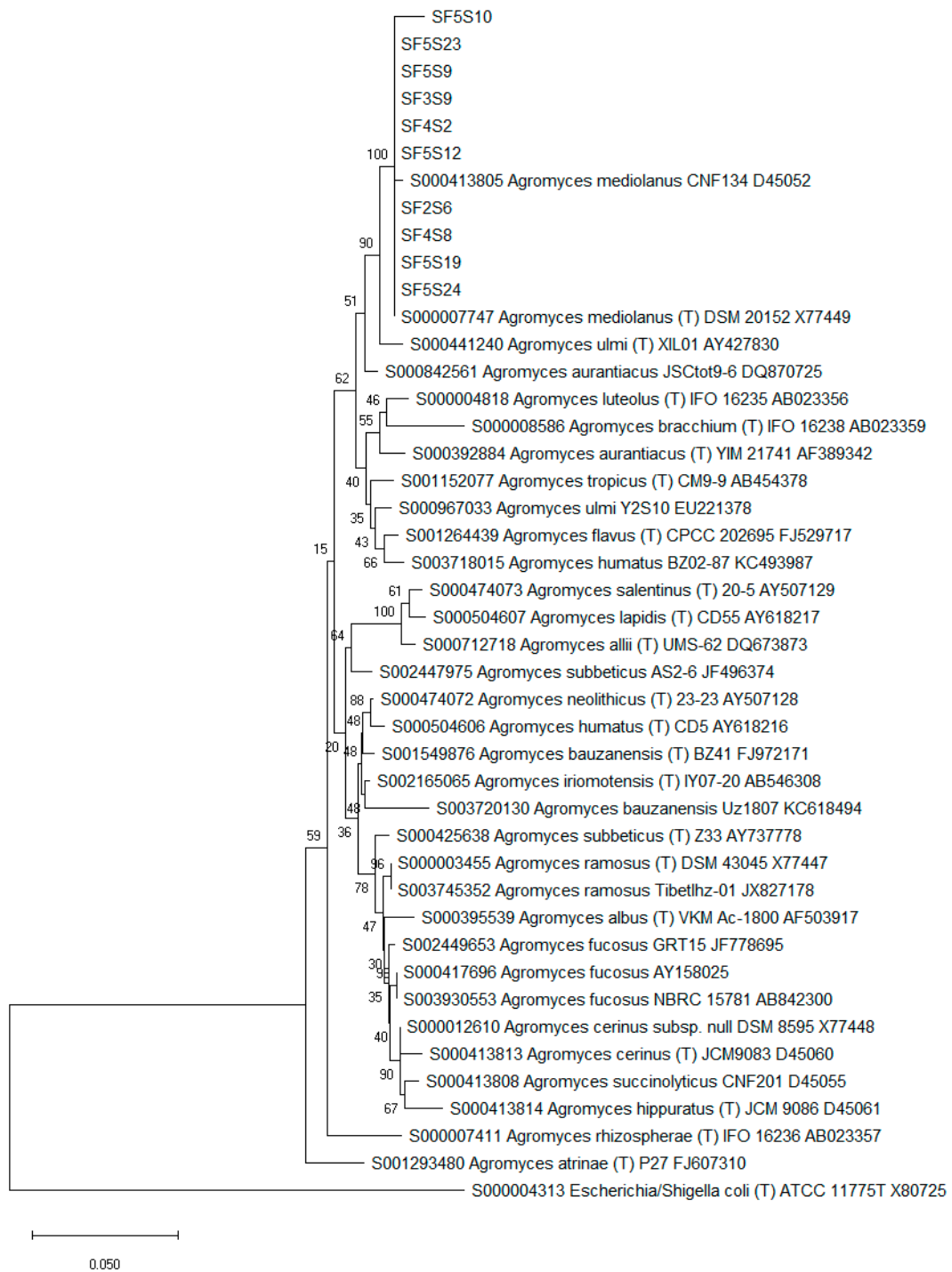


Figure S7 Phylogenetic tree for the genus *Agromyces*

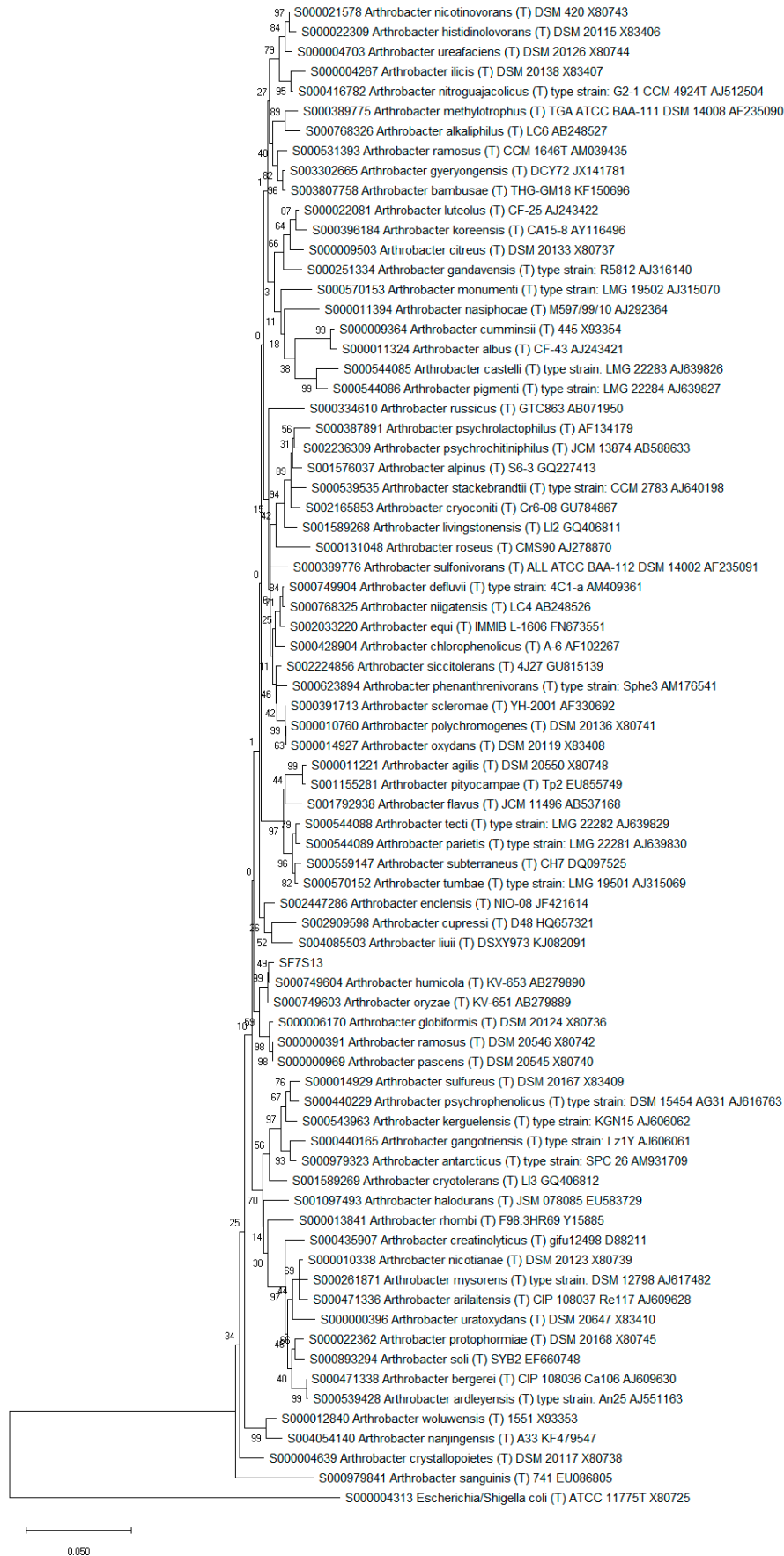
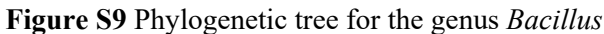


Figure S8 Phylogenetic tree for the genus *Arthrobacter*



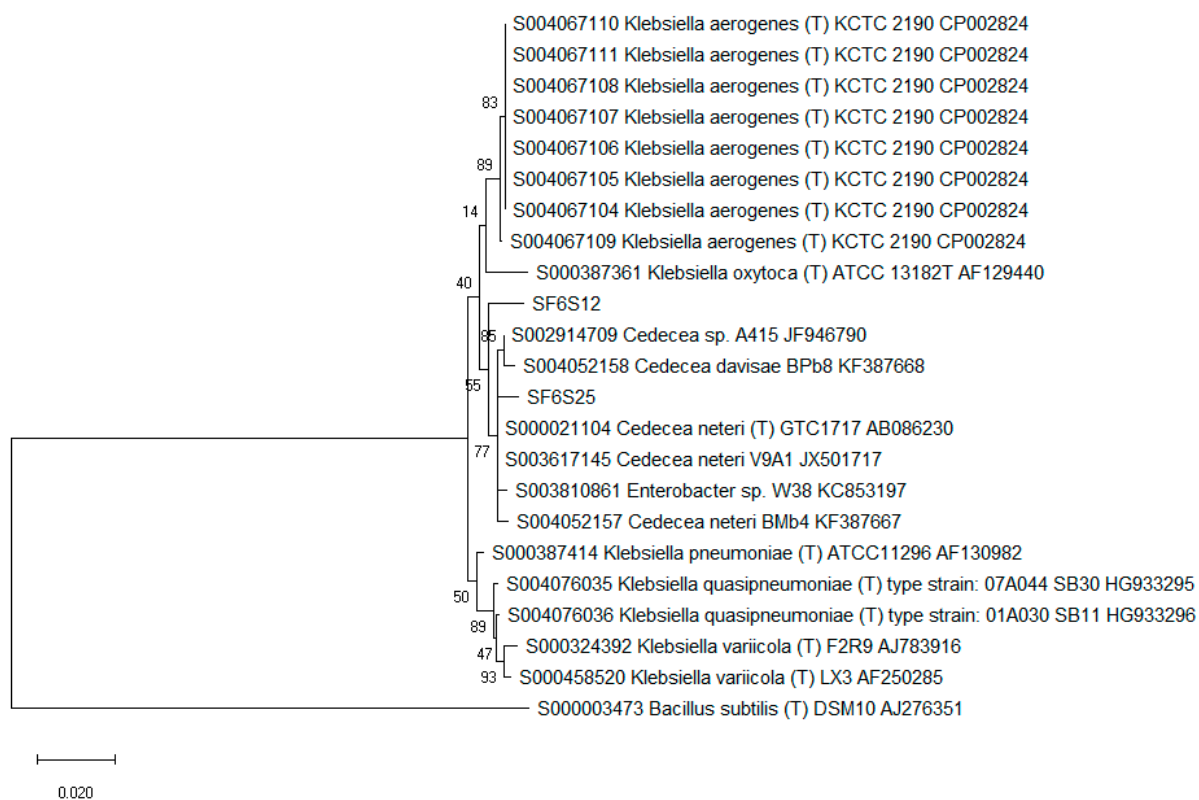


Figure S10 Phylogenetic tree for the genera *Cedecea* and *Klebsiella*

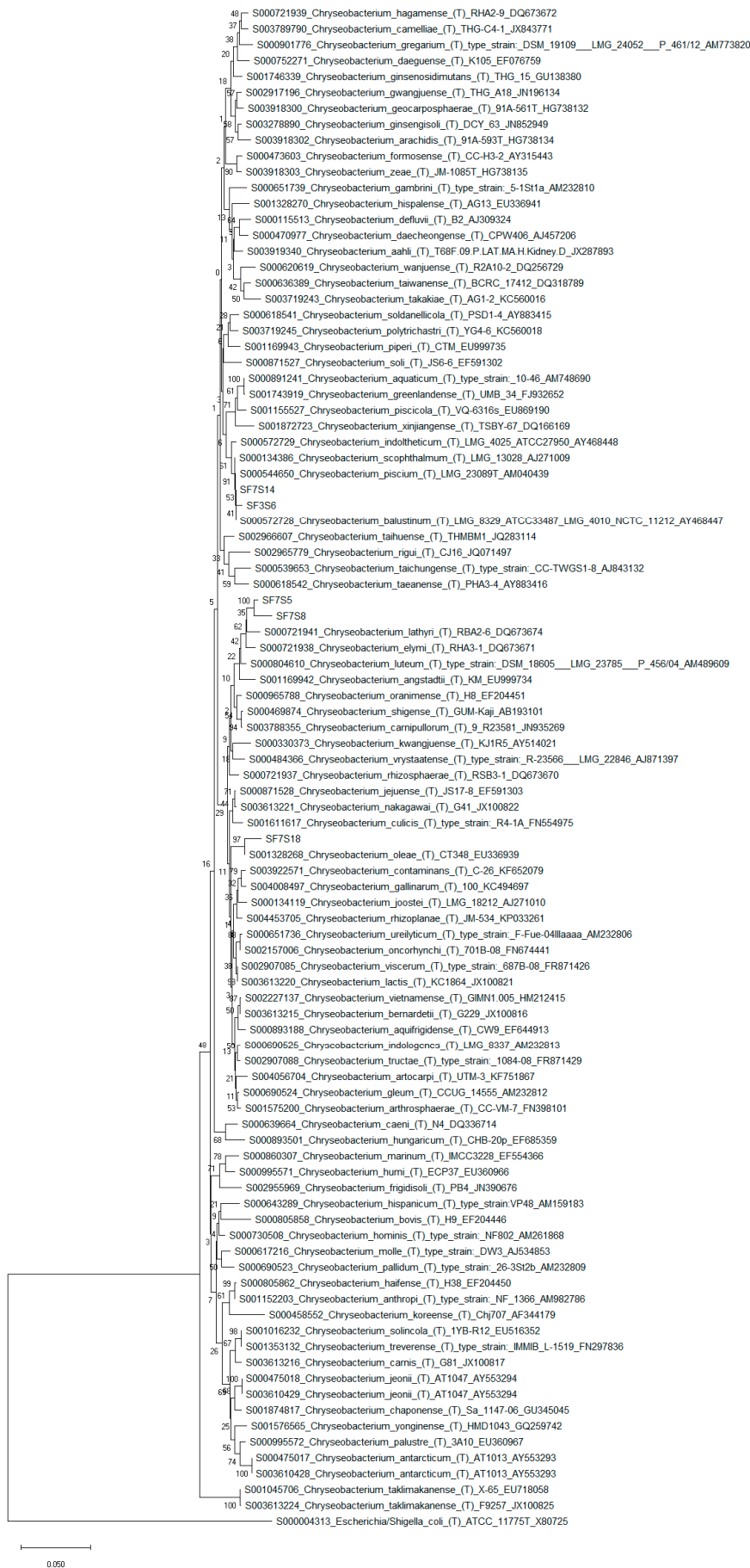
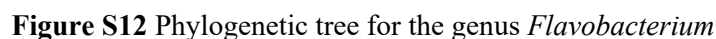


Figure S11 Phylogenetic tree for the genus *Chryseobacterium*



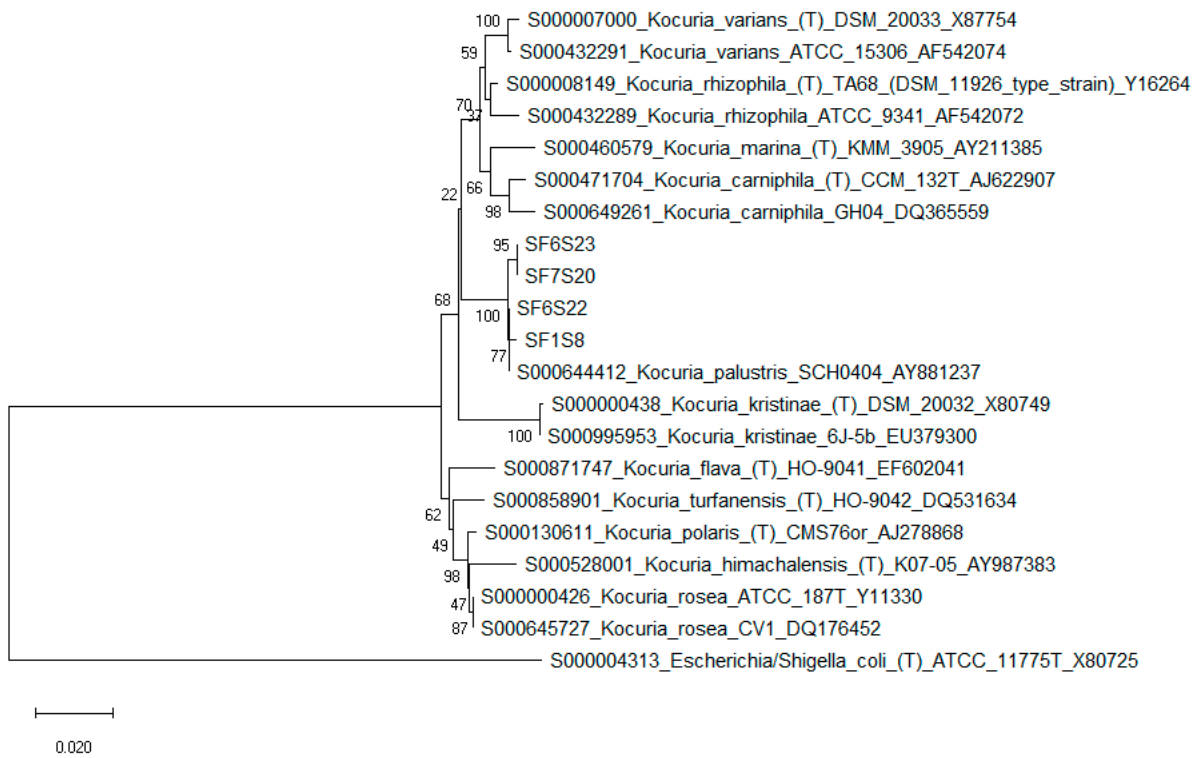


Figure S13 Phylogenetic tree for the genus *Kocuria*



Figure S14 Phylogenetic tree for the genus *Microbacterium*

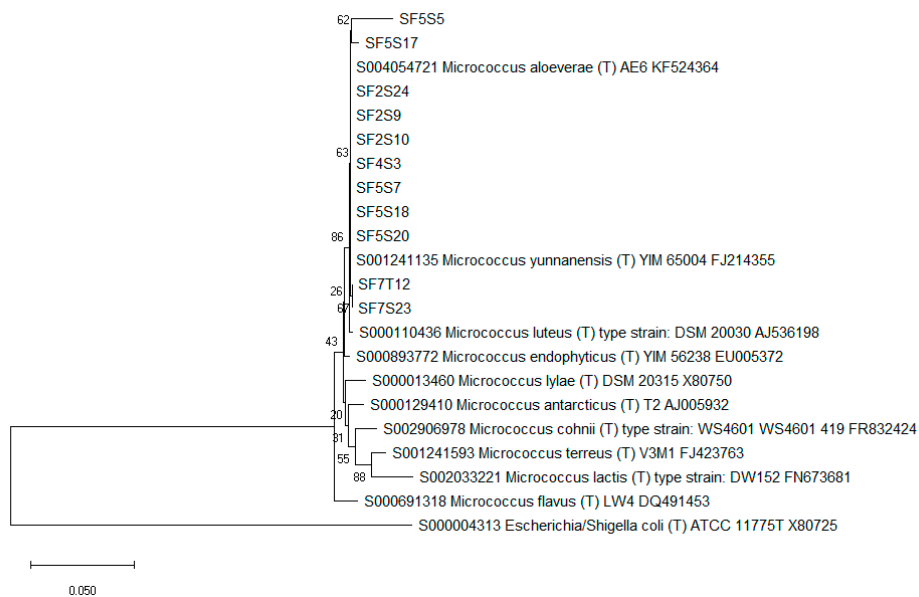


Figure S15 Phylogenetic tree for the genus *Micrococcus*

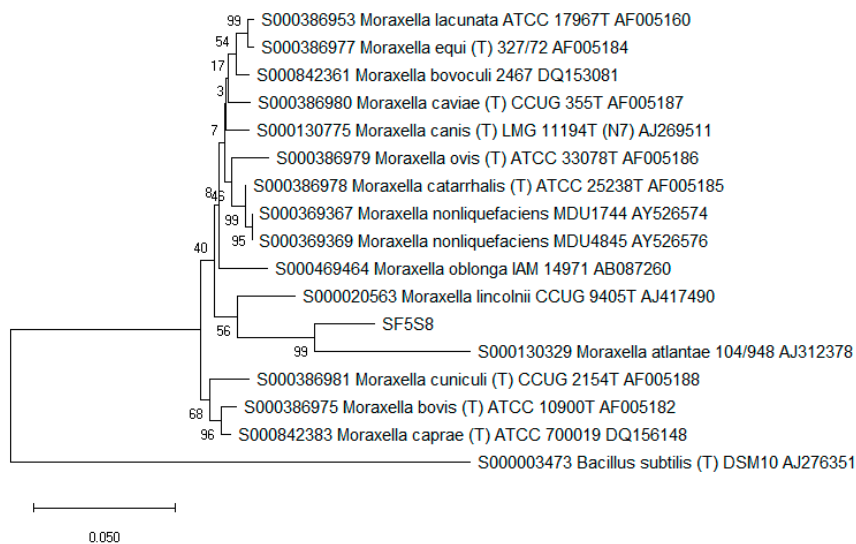


Figure S16 Phylogenetic tree for the genus *Moraxella*

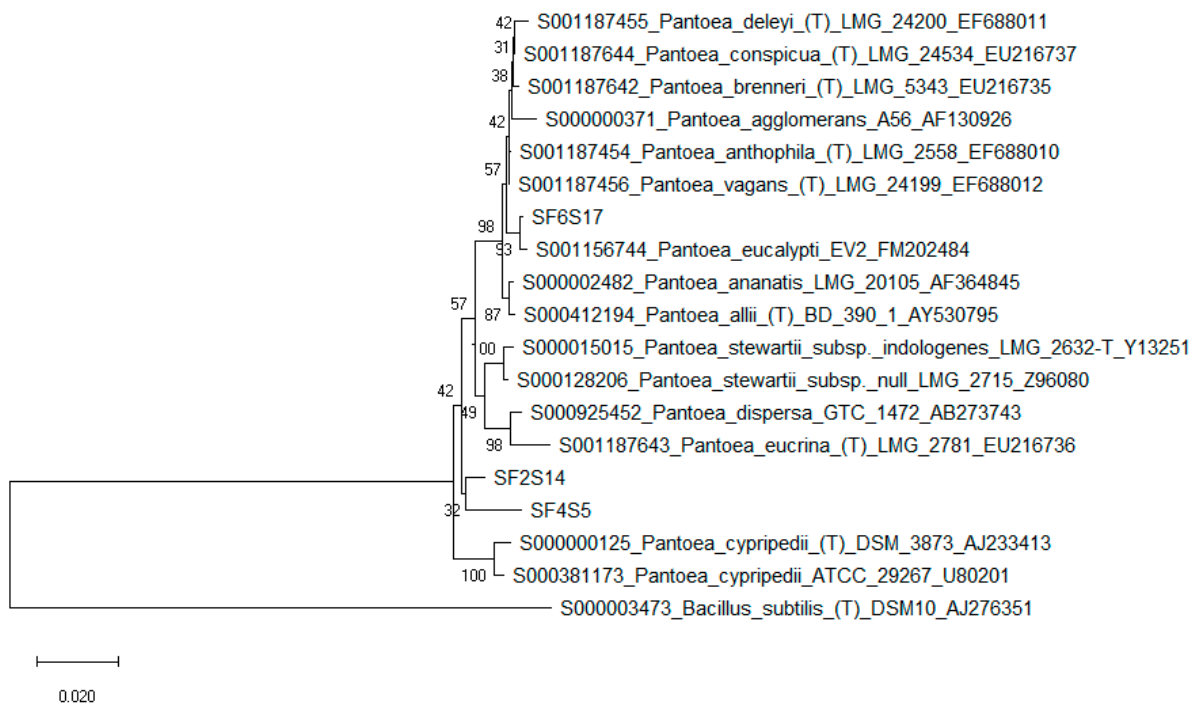


Figure S17 Phylogenetic tree for the genus *Pantoea*



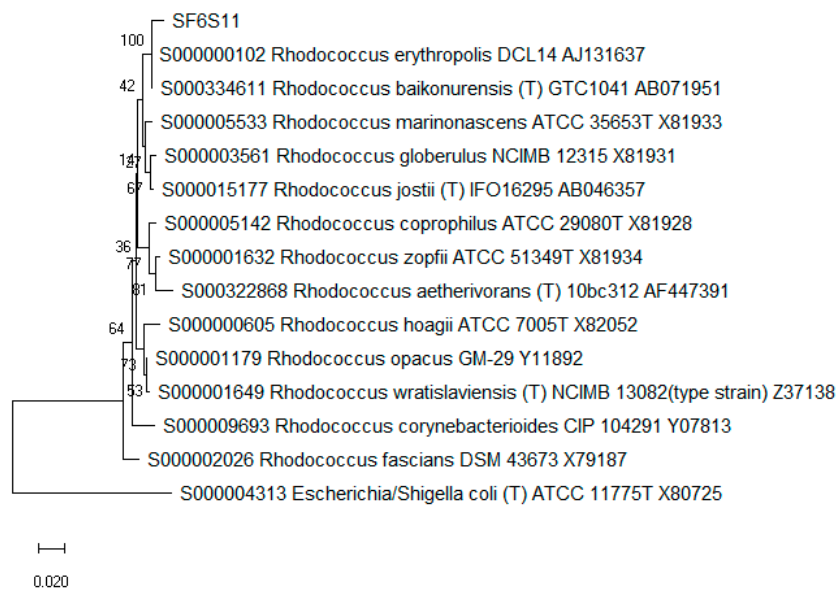


Figure S19 Phylogenetic tree for the genus *Rhodococcus*

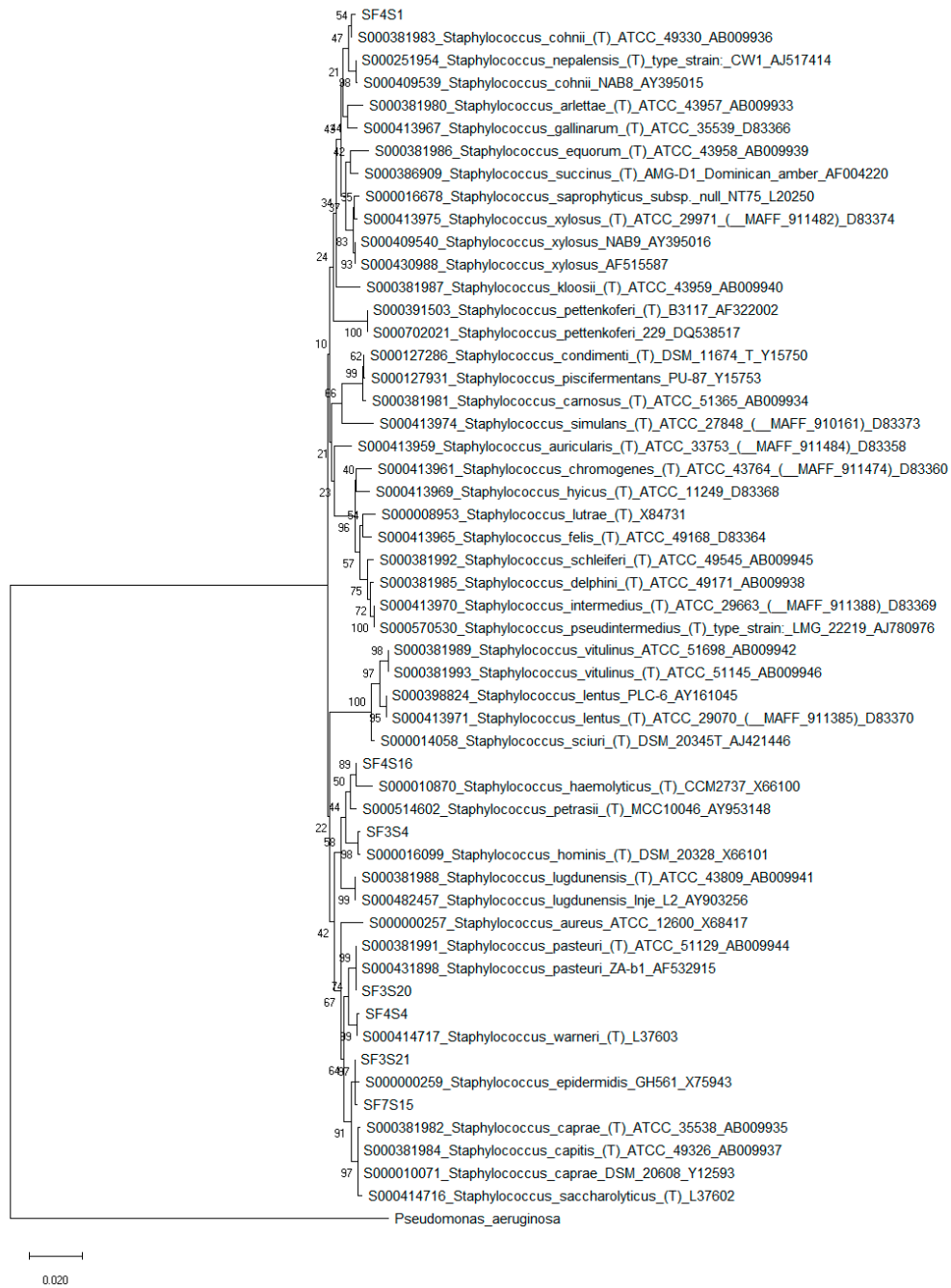


Figure S20 Phylogenetic tree for the genus *Staphylococcus*

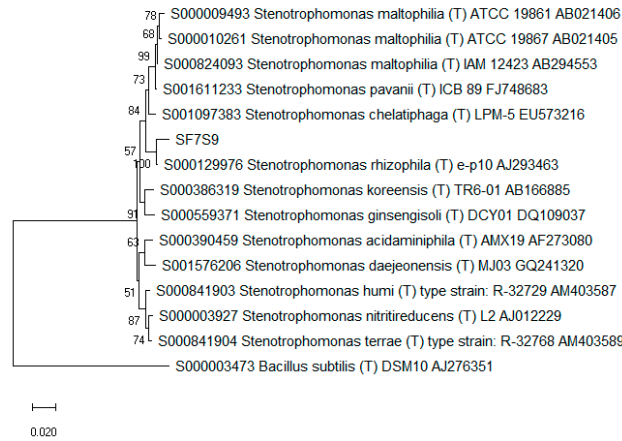


Figure S21 Phylogenetic tree for the genus *Stenotrophomonas*

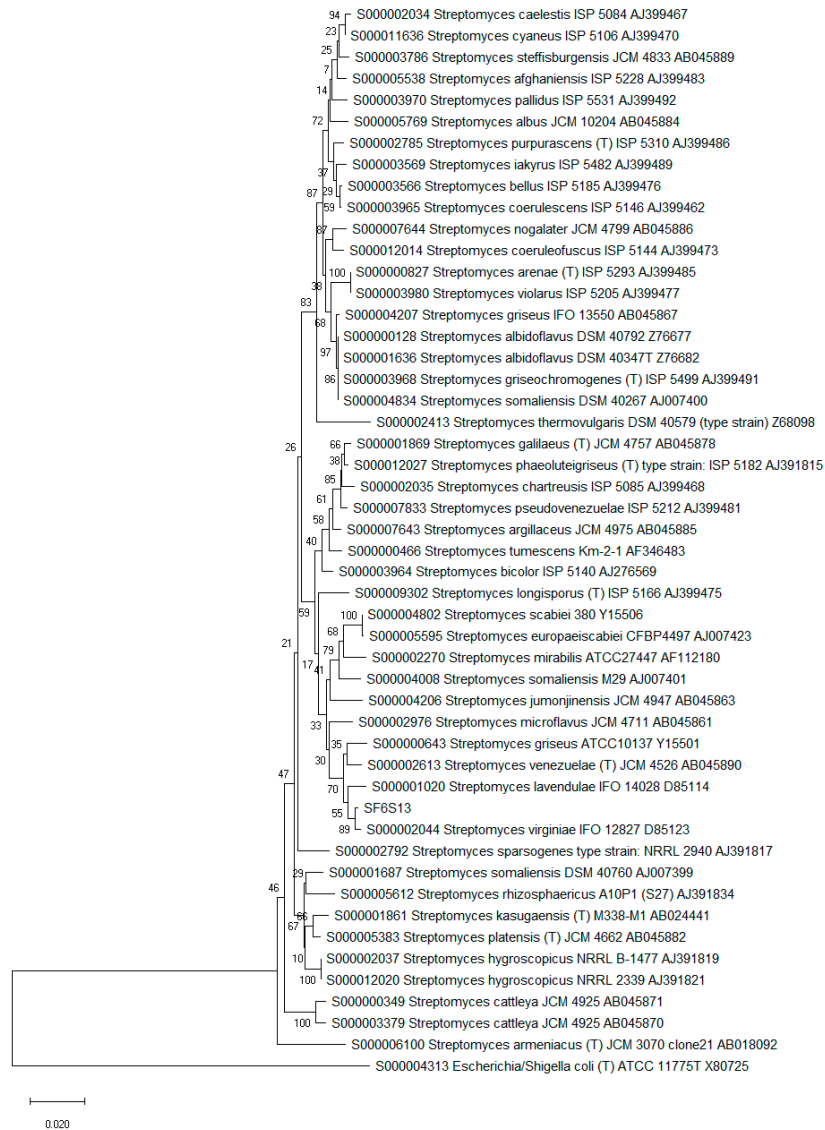


Figure S22 Phylogenetic tree for the genus *Streptomyces*

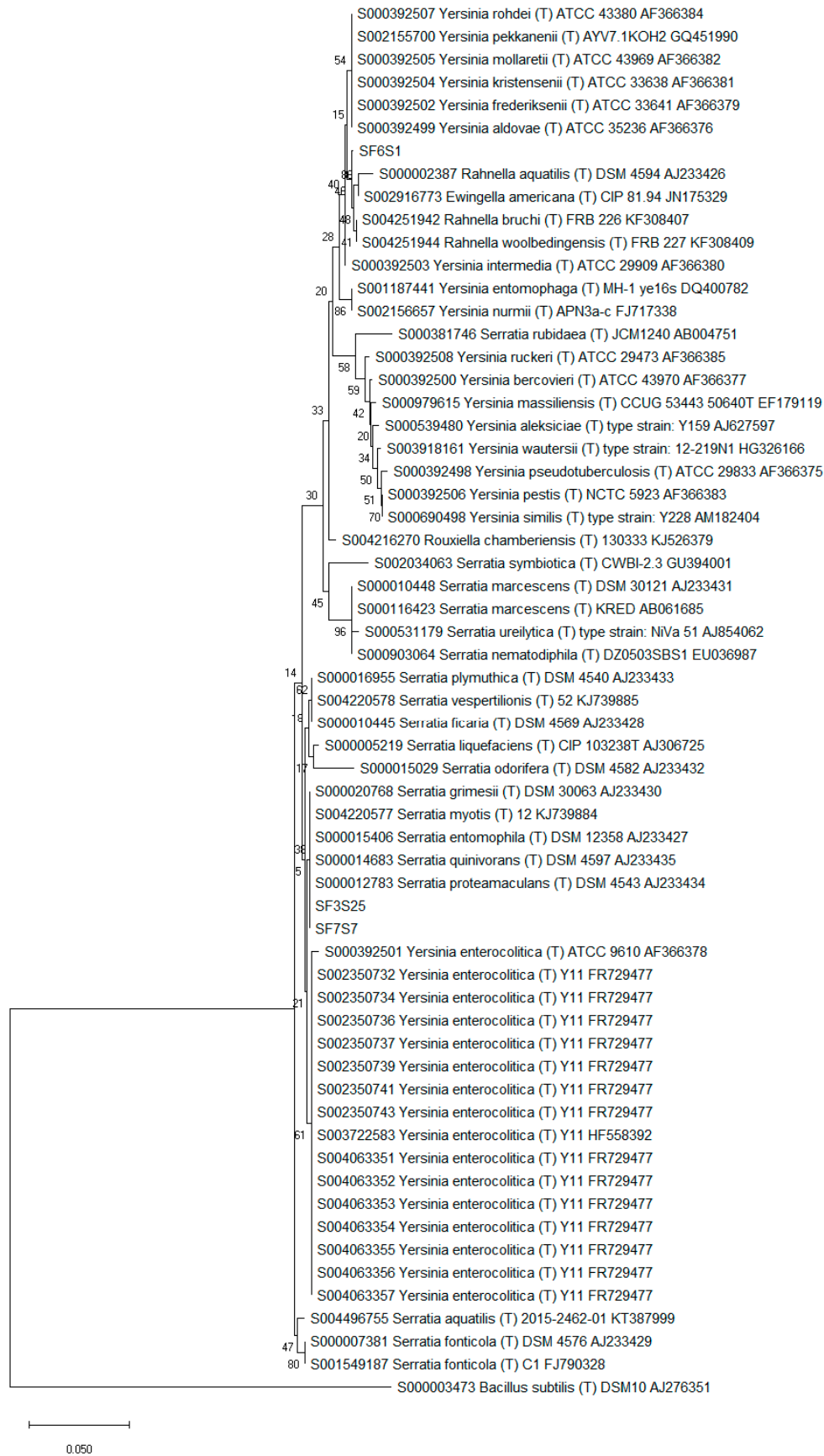


Figure S23 Phylogenetic tree for the family *Yersiniaceae*