

Supplemental Data

Integrated Heat Extraction and Characterization of Bioactive Antibiotic–Anticancer Compounds from *Streptomyces* UP Strains

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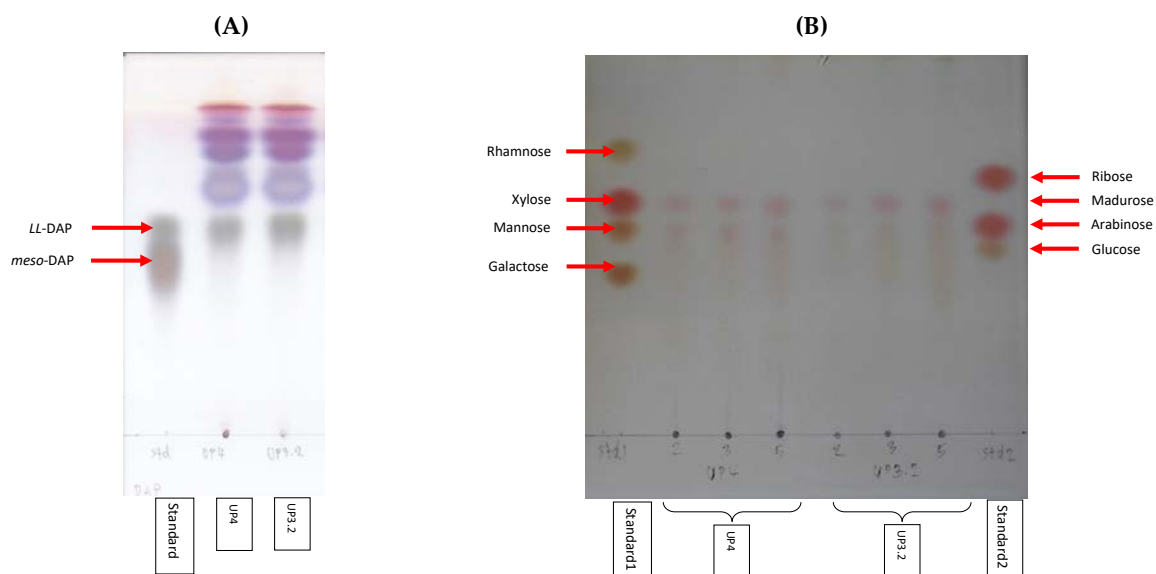


Figure S1. Chemotaxonomic analysis of cell wall composition in strains UP-AC4 and UP-3.2. (A) Whole-cell diaminopimelic acid (DAP) analysis. (B) Thin-layer chromatography (TLC) of whole-cell hydrolysates.

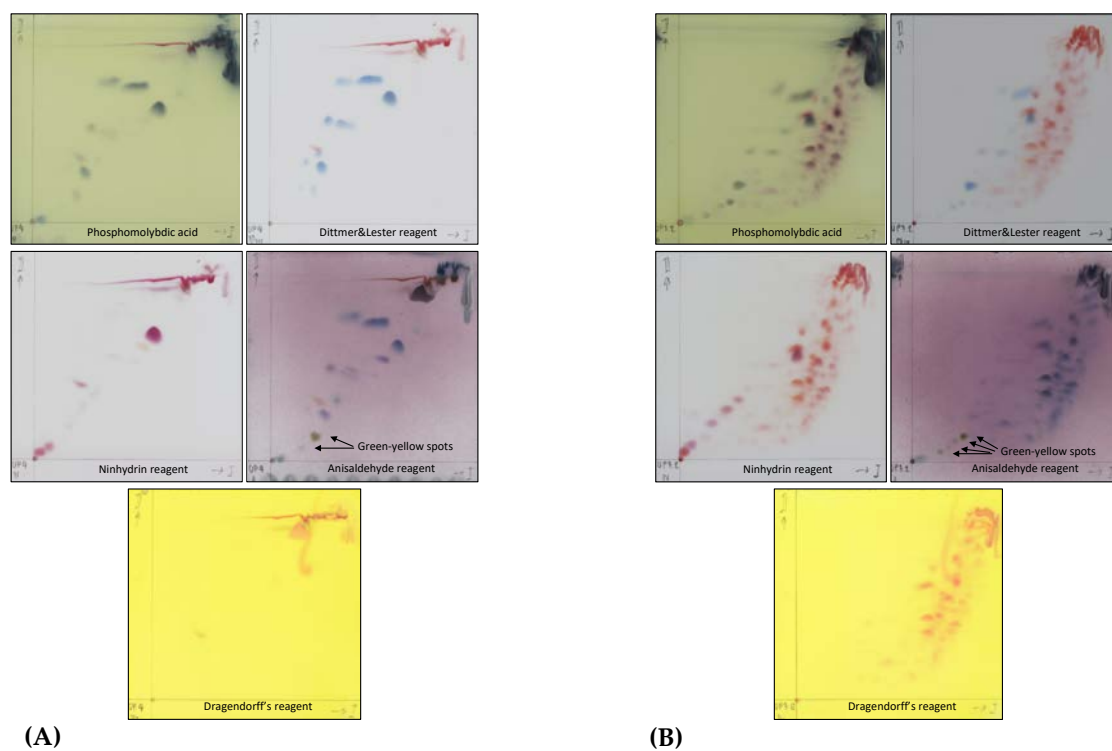


Figure S2. Polar lipid profiles of strains UP-AC4 (A) and UP-3.2 (B) analyzed by two-dimensional thin-layer chromatography. Lipid components were visualized using phosphomolybdic acid (PMA), Dittmer–Lester reagent, ninhydrin, anisaldehyde, and Dragendorff's reagent.

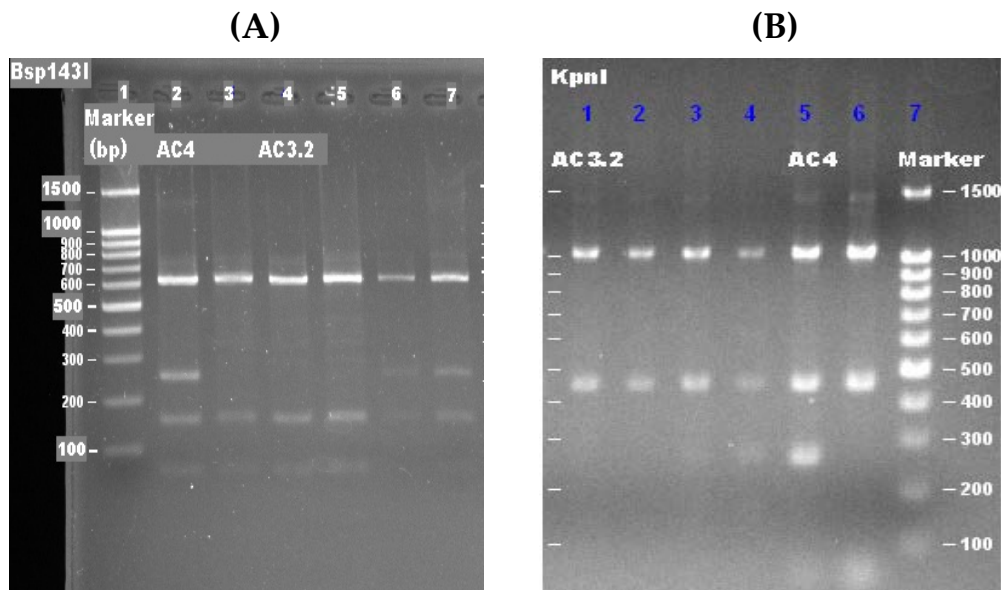


Figure S3. ARDRA fingerprint profiles of UP-AC4 and UP-3.2 strains from *Bsp143I* and *KpnI* restriction analysis. The 16S rDNA fragment products were investigated using a 2.5% agarose gel and analyzed by Image Lab™ Software (Image Lab 5.2.1). (a) *Bsp143I* pattern. Lanes: 1, Marker size of 100bp+1.5kb; lane 2, 16S rDNA fragment of UP-AC4 as 637, 257, 155bp and less than 100bp; lane 4, UP-3.2 as 644, 157 and less than 100bp; lane 3, 5, 6, and 7 were unknown. (b) *KpnI* pattern. Lanes: 1, 16S rDNA fragment of UP-3.2 as 1,024, 457, and less than 100bp; lane 5, UP-AC4 as 1,024, 457, 264 and less than 100bp; lane 2, 3, 4, 6 were unknown; lane 7, marker size of 100bp+1500bp.

Table S1. The top-hit species of BLAST searches of the UP-AC4 strain

No.	Description: BLAST UP-AC4	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. ident	Acc. Len	Accession
1	<i>Streptomyces puniceus</i> strain IIPR:KR01:01 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1416	MK825538.2
2	<i>Streptomyces mediolani</i> strain RHPR25 16S ribosomal RNA gene, partial sequence	<i>Streptomyces mediolani</i>	2481	2481	100%	0	100	1468	MH209253.1
3	<i>Streptomyces violaceoruber</i> strain S21 chromosome, complete genome	<i>Streptomyces violaceoruber</i>	2481	14887	100%	0	100	7916045	CP020570.1
4	<i>Streptomyces microflavus</i> strain nenu_DS_25 16S ribosomal RNA gene, partial sequence	<i>Streptomyces microflavus</i>	2481	2481	100%	0	100	1377	KY007180.1
5	<i>Streptomyces cavourensis</i> strain nenu_DS_16 16S ribosomal RNA gene, partial sequence	<i>Streptomyces cavourensis</i>	2481	2481	100%	0	100	1383	KY007172.1
6	<i>Streptomyces californicus</i> strain UP AC4 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1343	ON629791.1
7	<i>Streptomyces californicus</i> strain HCT1625 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1392	ON064075.1
8	<i>Streptomyces californicus</i> strain HCT1306 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1390	ON062073.1
9	<i>Streptomyces microflavus</i> strain KMJ-8 16S ribosomal RNA gene, partial sequence	<i>Streptomyces microflavus</i>	2481	2481	100%	0	100	1440	KJ020690.1
10	<i>Streptomyces microflavus</i> strain OAM6 16S ribosomal RNA gene, partial sequence	<i>Streptomyces microflavus</i>	2481	2481	100%	0	100	1440	MW757186.1
11	<i>Streptomyces californicus</i> strain FDAARGOS_1210 chromosome	<i>Streptomyces californicus</i>	2481	14864	100%	0	100	7919564	CP070260.1
12	<i>Streptomyces californicus</i> strain FDAARGOS_1213 chromosome	<i>Streptomyces californicus</i>	2481	14875	100%	0	100	7791604	CP070254.1
13	<i>Streptomyces californicus</i> strain FDAARGOS_1211 chromosome	<i>Streptomyces californicus</i>	2481	14870	100%	0	100	7826524	CP070249.1
14	<i>Streptomyces californicus</i> strain FDAARGOS_1212 chromosome	<i>Streptomyces californicus</i>	2481	14875	100%	0	100	7788344	CP070245.1
15	<i>Streptomyces californicus</i> strain FDAARGOS_1209 chromosome	<i>Streptomyces californicus</i>	2481	14870	100%	0	100	7814960	CP070242.1
16	<i>Streptomyces californicus</i> strain I2-3 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1448	MW164952.1
17	<i>Streptomyces californicus</i> strain NBRC 12750 16S ribosomal RNA, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1480	NR_112257.1
18	<i>Streptomyces californicus</i> strain NBRC 3386 16S ribosomal RNA, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1477	NR_112486.1
19	<i>Streptomyces griseus</i> subsp. <i>rhodochrous</i> gene for 16S rRNA, partial sequence, strain: NBRC 3358	<i>Streptomyces griseus</i> subsp. <i>rhodochrous</i>	2481	2481	100%	0	100	1469	AB184748.1
20	<i>Streptomyces californicus</i> strain CSSP711 16S ribosomal RNA, partial sequence	<i>Streptomyces californicus</i>	2481	2481	100%	0	100	1420	NR_115432.1
21	<i>Streptomyces californicus</i> strain P-RH5 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1385	MT533919.1
22	<i>Streptomyces puniceus</i> strain IIPR:TB01:01 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1415	MK825540.2

No.	Description: BLAST UP-AC4	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. ident	Acc. Len	Accession
23	<i>Streptomyces puniceus</i> strain NBRC 12811 (T) 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1447	MK424311.1
24	<i>Streptomyces californicus</i> strain TY004-069 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	99%	0	100	1343	MF582317.1
25	<i>Streptomyces puniceus</i> strain EB120 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1442	KP209438.1
26	<i>Streptomyces californicus</i> strain CPO PES4 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1530	OP897629.1
27	<i>Streptomyces californicus</i> strain NWU303 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1357	KJ542388.1
28	<i>Streptomyces californicus</i> strain VN08A05 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1451	MW405798.1
29	<i>Streptomyces californicus</i> 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1410	JQ218934.1
30	<i>Streptomyces californicus</i> strain xsd08160 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1466	FJ481076.1
31	<i>Streptomyces mediolani</i> strain HBUM175049 16S ribosomal RNA gene, partial sequence	<i>Streptomyces mediolani</i>	2475	2475	100%	0	99.93	1438	FJ486429.1
32	<i>Streptomyces californicus</i> strain HBUM174938 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1432	FJ486399.1
33	<i>Streptomyces californicus</i> strain HBUM174885 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1447	FJ486393.1
34	<i>Streptomyces californicus</i> strain HBUM174817 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1451	FJ486387.1
35	<i>Streptomyces californicus</i> strain HBUM174803 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1449	FJ486386.1
36	<i>Streptomyces californicus</i> strain HBUM174906 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1434	EU841618.1
37	<i>Streptomyces vinaceus</i> gene for 16S rRNA, partial sequence, strain: NBRC 3391	<i>Streptomyces vinaceus</i>	2475	2475	100%	0	99.93	1477	AB184757.1
38	<i>Streptomyces californicus</i> strain NBRC 12811 16S ribosomal RNA, partial sequence	<i>Streptomyces californicus</i>	2475	2475	100%	0	99.93	1477	NR_112285.1
39	<i>Streptomyces californicus</i> strain MJM9973 16S ribosomal RNA gene, partial sequence	<i>Streptomyces californicus</i>	2471	2471	100%	0	99.85	1422	JX203384.1

Table S2. The top-hit species of BLAST searches of the UP-3.2 strain

No.	Description: Blast UP-3.2	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. ident	Acc. Len	Accession
1	<i>Streptomyces purpurascens</i> gene for 16S rRNA, partial sequece, strain:KN-6	<i>Streptomyces purpurascens</i>	2468	2468	100%	0	99.93	1447	AB231806.1
2	<i>Streptomyces purpurascens</i> 16S rRNA gene, type strain LMG 20526	<i>Streptomyces purpurascens</i>	2468	2468	100%	0	99.93	1479	AJ781382.1
3	<i>Streptomyces spinoverrucosus</i> strain Ng2-6 16S ribosomal RNA gene, partial sequence	<i>Streptomyces spinoverrucosus</i>	2444	2444	100%	0	99.63	1386	MK519101.1
4	<i>Streptomyces spinoverrucosus</i> strain 174464 16S ribosomal RNA gene, partial sequence	<i>Streptomyces spinoverrucosus</i>	2444	2444	100%	0	99.63	1436	EU593714.1
5	<i>Streptomyces spinoverrucosus</i> strain 173372 16S ribosomal RNA gene, partial sequence	<i>Streptomyces spinoverrucosus</i>	2444	2444	100%	0	99.63	1439	EU570683.1
6	<i>Streptomyces violaceus</i> strain JZY2-51 16S ribosomal RNA gene, partial sequence	<i>Streptomyces violaceus</i>	2440	2440	100%	0	99.55	1424	MT733918.1
7	<i>Streptomyces purpurascens</i> strain JZY1-51 16S ribosomal RNA gene, partial sequence	<i>Streptomyces purpurascens</i>	2440	2440	100%	0	99.55	1418	MT733914.1
8	<i>Streptomyces purpurascens</i> strain JZY1-49 16S ribosomal RNA gene, partial sequence	<i>Streptomyces purpurascens</i>	2440	2440	100%	0	99.55	1420	MT733912.1
9	<i>Streptomyces purpurascens</i> strain LZ16-14 16S ribosomal RNA gene, partial sequence	<i>Streptomyces purpurascens</i>	2438	2438	100%	0	99.55	1431	MT990541.1
10	<i>Streptomyces purpurascens</i> strain QT194-5 16S ribosomal RNA gene, partial sequence	<i>Streptomyces purpurascens</i>	2429	2429	100%	0	99.4	1433	MT084590.1
11	<i>Streptomyces coeruleorubidus</i> strain FG.B.435 16S ribosomal RNA gene, partial sequence	<i>Streptomyces coeruleorubidus</i>	2429	2429	100%	0	99.4	1485	KF991647.1
12	<i>Streptomyces purpurascens</i> strain MTCC 8547 16S ribosomal RNA gene, partial sequence	<i>Streptomyces purpurascens</i>	2429	2429	100%	0	99.4	1458	KF395224.1
13	<i>Streptomyces purpurascens</i> strain NBRC 13077 16S ribosomal RNA, partial sequence	<i>Streptomyces purpurascens</i>	2429	2429	100%	0	99.4	1473	NR_112521.1
14	<i>Streptomyces purpurascens</i> partial 16S rRNA gene, type strain DSM 40310	<i>Streptomyces purpurascens</i>	2429	2429	100%	0	99.4	1448	AJ310925.1
15	<i>Streptomyces purpurascens</i> strain JCM 4509 16S ribosomal RNA, partial sequence	<i>Streptomyces purpurascens</i>	2429	2429	100%	0	99.4	1484	NR_104281.1
16	<i>Streptomyces purpurascens</i> strain ES-3 16S ribosomal RNA gene, partial sequence	<i>Streptomyces purpurascens</i>	2427	2427	99%	0	99.55	1405	KY649397.1
17	<i>Streptomyces parvulus</i> strain K-15 16S ribosomal RNA gene, partial sequence	<i>Streptomyces parvulus</i>	2423	2423	100%	0	99.33	1487	KY038196.1
18	<i>Streptomyces thermocarboxydus</i> strain CALK1-9 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2423	2423	100%	0	99.33	1370	OR506476.1
19	<i>Streptomyces thermocarboxydus</i> strain PL28 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2423	2423	100%	0	99.33	1450	MW084998.1
20	<i>Streptomyces violaceus</i> strain cfcc3156 16S ribosomal RNA gene, partial sequence	<i>Streptomyces violaceus</i>	2423	2423	100%	0	99.33	1468	FJ792568.1
21	<i>Streptomyces bellus</i> strain NBRC 12844 16S ribosomal RNA, partial sequence	<i>Streptomyces bellus</i>	2423	2423	100%	0	99.33	1478	NR_041222.1

No.	Description: Blast UP-3.2	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. ident	Acc. Len	Accession
22	<i>Streptomyces indiaensis</i> strain NBRC 13964 16S ribosomal RNA, partial sequence	<i>Streptomyces indiaensis</i>	2423	2423	100%	0	99.33	1471	NR_041155.1
23	<i>Streptomyces coeruleus</i> strain CSSP046 16S ribosomal RNA, partial sequence	<i>Streptomyces coeruleus</i>	2423	2423	100%	0	99.33	1450	NR_043337.1
24	<i>Streptomyces indiaensis</i> 16S rRNA gene, type strain LMG 19961	<i>Streptomyces indiaensis</i>	2423	2423	100%	0	99.33	1478	AJ781344.1
25	<i>Streptomyces bellus</i> strain ISP 5185 16S ribosomal RNA, partial sequence	<i>Streptomyces bellus</i>	2423	2423	100%	0	99.33	1450	NR_114828.1
26	<i>Streptomyces thermocarboxydus</i> strain EGI124 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1431	MN704433.1
27	<i>Streptomyces thermocarboxydus</i> strain A15 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1404	MK680818.1
28	<i>Streptomyces thermocarboxydus</i> strain RS35 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1451	MF094453.1
29	<i>Streptomyces thermocarboxydus</i> strain RS31 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1448	MF094451.1
30	<i>Streptomyces thermocarboxydus</i> strain SC2 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1409	OP897030.1
31	<i>Streptomyces thermocarboxydus</i> strain SIS5B 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1478	MZ389922.1
32	<i>Streptomyces thermocarboxydus</i> strain BMI10 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1478	MZ389913.1
33	<i>Streptomyces thermocarboxydus</i> strain NC333 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1385	MW741458.1
34	<i>Streptomyces thermocarboxydus</i> strain EA009 16S ribosomal RNA gene, partial sequence	<i>Streptomyces thermocarboxydus</i>	2418	2418	100%	0	99.25	1369	MW642093.1