

**Supplementary table 1.** Genomic characteristics of rare taxonomic genera and endophytes used for biosynthetic novelty calculation.

Accession Number	Genome Name	Contigs	Genome Length	%GC	BiNI
GCF_900115955.1	<i>Lentzea waywayandensis</i> strain DSM 44232	39	10153412	68.9	334.4
GCF_011067745.1	<i>Lentzea alba</i> strain NEAU.D13	42	10211123	68.7	267.5
GCF_900100275.1	<i>Lentzea albidocapillata</i> subsp. violacea DSM 44796	58	8671075	69	368.7
GCF_900110985.1	<i>Lentzea flaviverrucosa</i> strain CGMCC 4.578	34	9473544	69.2	188.1
GCF_900104175.1	<i>Lentzea jiangxiensis</i> strain CGMCC 4.6609	62	8591279	70.2	257.6
GCF_900111005.1	<i>Lentzea albida</i> strain DSM 44437	43	9441135	70.2	439.3
GCF_900176525.1	<i>Lentzea albidocapillata</i> strain DSM 44073	43	8639486	68.7	369.3
GCF_003350445.1	<i>Lentzea flaviverrucosa</i> strain DSM 44664	38	9468454	69.2	202
GCF_003265345.1	<i>Lentzea terrae</i> strain NEAU-LZS 42	145	10581732	68.6	254.9
GCF_000719115.1	<i>Lentzea albidocapillata</i> strain NRRL B-24057	127	8642480	68.7	334.6
GCF_014646255.1	<i>Lentzea pudingi</i> strain CGMCC 4.7319	63	9209394	69.1	774.2
GCF_002150765.1	<i>Lentzea kentuckyensis</i> strain NRRL B-24416	317	10210611	68.8	350.9
GCF_007845675.1	<i>Lentzea</i> sp. strain FXJ1.1311	120	9370857	69.5	565.8
GCF_001701025.1	<i>Lentzea guizhouensis</i> strain DHS C013	1	9997872	70	348.4
GCF_014653695.1	<i>Lentzea cavernae</i> strain CGMCC 4.7367	43	9738650	69.6	694
GCF_000974445.1	<i>Lentzea aerocolonigenes</i> NBRC 13195	61	10698154	69	277
GCF_003269295.1	<i>Lentzea atacamensis</i> DSM 45479	38	9306230	68.9	365
GCF_016907955.1	<i>Lentzea nigeriaca</i> DSM 45680	42	9332327	68.4	742.5
GCF_900100955.1	<i>Lentzea fradiae</i> CGMCC 4.3506	47	8508028	70.5	382.5
GCF_003148865.1	<i>Lentzea deserti</i> DSM 45480	50	9529573	68.8	423.3
GCF_900110955.1	<i>Lentzea xinjiangensis</i> CGMCC 4.3525	61	8684108	68.9	378.4
GCF_014648475.1	<i>Lentzea flava</i> JCM 3296	190	9721257	69	777.8
GCF_000719205.1	<i>Lentzea aerocolonigenes</i> NRRL B-3298	204	10648728	69	297
GCF_021056325.1	<i>Lentzea</i> sp. CC55	101	8269994	70.5	1008.6
GCF_000374445.1	<i>Actinokineospora enzanensis</i> strain DSM 44649	95	8119858	70.8	290.5
GCF_014332375.1	<i>Actinokineospora xionganensis</i> HBU206404	70	6813329	69.6	1050.5
GCF_900111175.1	<i>Actinokineospora terrae</i> strain DSM 44260	41	7588185	71	254.9
GCF_001940455.1	<i>Actinokineospora bangkokensis</i> strain DSM 44EHW	78	7453713	74	267.9
GCF_003182415.1	<i>Actinokineospora mزابensis</i> strain CECT 8578	32	7546603	72.8	117.7
GCF_002934265.1	<i>Actinokineospora auranticolor</i> strain YU 961-1	61	8431890	71.8	389
GCF_000482865.1	<i>Actinokineospora inagensis</i> strain DSM 44258	120	7278759	70.2	244.5
GCF_000564855.1	<i>Actinokineospora spheciospongiae</i> strain EG49	263	7529476	72.8	260.1
GCF_003663795.1	<i>Actinokineospora cianjurenensis</i> strain DSM 45657	19	7615874	70.9	173.4
GCF_009745975.1	<i>Actinokineospora pegani</i> strain TRM65233	137	6439512	72.6	81.3
GCF_014648415.1	<i>Actinokineospora fastidiosa</i> strain JCM 3276	30	7042850	72.5	1097.2
GCF_004362515.1	<i>Actinokineospora alba</i> DSM 45114	1	7288615	69.7	409.8
GCF_016907695.1	<i>Actinokineospora baliensis</i> DSM 45656	1	7681387	70.6	971
GCF_900101685.1	<i>Actinokineospora iranica</i> IBRC-M 10403	44	6578763	70.8	205.3
GCF_900099755.1	<i>Actinokineospora alba</i> CPCC 201030	35	7273063	69.7	471.7
GCF_900104505.1	<i>Actinokineospora alba</i> IBRC-M 10655	34	7268999	69.7	342.2
GCF_021056305.1	<i>Actinokineospora</i> sp. PR83	182	7639714	72.7	1049.3
GCF_900188345.1	<i>Streptosporangium subroseum</i> CGMCC 4.2132	180	10782574	68.8	195.3
GCF_014636435.1	<i>Streptosporangium jomthongense</i> CGMCC 1.11045	55	4127297	55.8	0
GCF_013409935.1	<i>Streptosporangium sandarakinum</i> DSM 45763	4	7647619	72.5	961.3
GCF_014203715.1	<i>Streptosporangium saharensense</i> CECT 8840	26	8496112	70.3	1120.5
GCF_014191075.1	<i>Streptosporangium becharensense</i> CECT 8961	37	7762257	71.4	764.5
GCF_014204985.1	<i>Streptosporangium becharensense</i> DSM 46887	2	7824014	71.3	877.8
GCF_000725815.1	<i>Streptosporangium roseum</i> NRRL B-2638	308	10168636	70.6	230.6
GCF_000721075.1	<i>Streptosporangium amethystogenes</i> NRRL B-2639	229	9441077	69.4	211.4
GCF_003203775.1	<i>Streptosporangium</i> sp. 'caverna'	1	11342172	68.9	384
GCF_900113865.1	<i>Streptosporangium canum</i> CGMCC 4.2126	91	9273799	70.7	229.6
GCF_014648055.1	<i>Streptosporangium pseudovulgare</i> JCM 3115	73	8586701	72.5	958.4
GCF_014654615.1	<i>Streptosporangium violaceochromogenes</i> JCM 3281	115	6265008	71.0	730.9
GCF_014203795.1	<i>Streptosporangium album</i> DSM 43023	14	9022456	69.4	745
GCF_000024865.1	<i>Streptosporangium roseum</i> DSM 43021	2	10369518	70.9	267.9
GCF_000401915.1	<i>Thermobifida fusca</i> TM51	88	3599272	47.6	339.3
GCA_001313945.1	<i>Thermobifida fusca</i> NBRC 14071 = JCM 3263	82	3643897	67.5	0
GCF_015034585.1	<i>Thermobifida fusca</i> UPMC 901	1	3760927	67.4	175.5

GCF_002939325.1	<i>Thermobifida fusca</i> GAFM-TF-ZOO	129	3638186	67.5	0
GCA_003242745.1	<i>Thermobifida fusca</i> ZC4RG21	204	3609530	67.6	0
GCF_902797715.1	<i>Thermobifida fusca</i> RUG14297	190	3506582	67.7	0
GCF_000012405.1	<i>Thermobifida fusca</i> YX	1	3642249	67.5	169.7
GCF_001660385.1	<i>Thermobifida halotolerans</i> YIM 90462	74	5453353	70.8	265.3
GCF_003574835.2	<i>Thermobifida halotolerans</i> DSM 44931	314	5217717	70.9	314.3
GCF_001517975.1	<i>Thermobifida cellulositytica</i> TB100	19	4430365	70.4	288.3
GCF_009498035.1	<i>Saccharothrix syringae</i> NRRL B-16468	1	10929570	73.4	108.4
GCF_003752005.1	<i>Saccharothrix texasensis</i> DSM 44231	1	9178199	72.2	147.1
GCF_014203665.1	<i>Saccharothrix tamanrassetensis</i> CECT 8640	31	8053586	71.4	1122.1
GCF_001984175.1	<i>Saccharothrix ecbatanensis</i> DSM 45486	1	9689237	70.1	1199.7
GCF_000328705.1	<i>Saccharothrix espanaensis</i> DSM 44229	1	9360653	72.1	252.6
GCF_003014735.1	<i>Saccharothrix carnea</i> CGMCC 4.7097	40	8918169	71.4	157.3
GCF_001280085.1	<i>Saccharothrix</i> sp. NRRL B-16348	279	10896489	71.3	209.2
GCF_000716595.1	<i>Saccharothrix</i> sp. NRRL B-16314	273	8934493	71.1	275.2
GCF_001905065.1	<i>Saccharothrix</i> sp. CB00851	66	9304003	71.2	210.6
GCF_001984175.1	<i>Saccharothrix</i> sp. ALI-22-1 strain ALI-22-1	69	10300059	70.1	345.2
GCF_003634935.1	<i>Saccharothrix australiensis</i> DSM 43800	3	7861373	73.4	233.8
GCF_009769385.1	<i>Saccharothrix</i> sp. BMP B8144	162	10832261	70.3	290.1
GCF_016695385.1	<i>Saccharothrix</i> sp. 6-C	1	9045220	72.3	272.2
GCF_014648515.1	<i>Saccharothrix coeruleofusca</i> JCM 3313	61	7692265	72.6	1084
GCF_014203755.1	<i>Saccharothrix violaceirubra</i> DSM 45084	1	7354386	71.2	994.5
GCF_003634995.1	<i>Saccharothrix variisporea</i> DSM 43911	1	9408895	71.6	339.8
GCF_006716745.1	<i>Saccharothrix saharensis</i> DSM 45456	1	8924967	72.2	211.5
GCF_000236985.1	<i>Saccharomonospora azurea</i> SZMC 14600	216	4973727	70.3	0
GCF_011761185.1	<i>Saccharomonospora amisosensis</i> DSM 45685	3	5534940	68.5	555.5
GCF_000527075.1	<i>Saccharomonospora</i> sp. CNQ490	25	4941689	71.1	244.5
GCF_015910535.1	<i>Saccharomonospora</i> sp. NB11	29	4299407	69.8	1148.4
GCF_000787535.1	<i>Saccharomonospora viridis</i> JCM 3315	13	4304348	67.3	0
GCF_900115515.1	<i>Saccharomonospora viridis</i> ATCC 33517	12	4308214	67.3	0
GCF_001942305.1	<i>Saccharomonospora</i> sp. CUA-673	85	5421117	69.9	666.7
GCF_004519465.1	<i>Saccharomonospora</i> sp. 31sw	1	4713652	69.0	0
GCF_000023865.1	<i>Saccharomonospora viridis</i> DSM 43017	1	4308349	67.3	0
GCF_002077655.1	<i>Saccharomonospora piscinae</i> strain 06168H-1	11	4897614	71.0	79.6
GCF_000231055.2	<i>Saccharomonospora azurea</i> NA-128	93	4662072	64.1	238
GCF_000244975.1	<i>Saccharomonospora cyanea</i> NA-134	5	5407901	69.7	254.6
GCF_000244955.1	<i>Saccharomonospora marina</i> XMU15	8	5964893	68.9	182.4
GCF_000258175.1	<i>Saccharomonospora xinjiangensis</i> XJ-54	16	4774606	68.9	156.3
GCF_000243395.2	<i>Saccharomonospora glauca</i> K62	11	4563208	69.1	91.6
GCA_000374705.1	<i>Salinispora pacifica</i> CNS860	72	5351008	69.6	210.4
GCA_000383995.1	<i>Salinispora pacifica</i> DSM 45543	2	5458189	69.6	171.8
GCA_000378845.1	<i>Salinispora pacifica</i> DSM 45544	29	5462252	69.9	374.3
GCA_000374745.1	<i>Salinispora pacifica</i> CNS996	119	5658754	69.6	252
GCA_000514535.1	<i>Salinispora pacifica</i> CNT001	89	5488014	69.8	178.1
GCA_000514575.1	<i>Salinispora pacifica</i> CNT003	138	5468952	69.9	248.9
GCA_000514515.1	<i>Salinispora pacifica</i> CNT029	45	5233191	69.8	280.2
GCA_000374765.1	<i>Salinispora pacifica</i> CNT045	90	5768959	69.6	271.2
GCA_000514495.1	<i>Salinispora pacifica</i> CNT084	142	5468756	69.6	272.4
GCA_000374785.1	<i>Salinispora pacifica</i> CNT124	55	5160007	69.8	558
GCA_000383575.1	<i>Salinispora pacifica</i> DSM 45547	15	5445911	69.8	227.5
GCA_000378825.1	<i>Salinispora pacifica</i> DSM 45548	10	5096990	69.9	374.3
GCA_000379065.1	<i>Salinispora pacifica</i> DSM 45549	37	5194796	69.4	313.2
GCA_000514815.1	<i>Salinispora pacifica</i> CNT569	48	5232086	69.2	350.2
GCA_000514415.1	<i>Salinispora pacifica</i> CNT603	81	5394462	69.9	79.1
GCA_000375245.1	<i>Salinispora pacifica</i> CNT584	83	5216172	69.7	400.6
GCA_000375265.1	<i>Salinispora pacifica</i> CNT609	105	5325580	69.6	213.6
GCA_000424925.1	<i>Salinispora pacifica</i> CNY239	92	5366811	69.9	157.7
GCF_010671825.1	<i>Micromonospora terminaliae</i> TMS7	40	6699733	73.35	322.6
GCF_003626635.1	<i>Micromonospora musae</i> MS1-9	34	7069771	72.2	302.4
GCF_0003626545.1	<i>Micromonospora musae</i> NGC1-4	28	7058875	72.2	231.5
GCF_000297395.2	<i>Micromonospora lupini</i> str. Lupac 08	50	7325824	71.9	244.5
GCF_003583405.1	<i>Micromonospora radialis</i> AZ1-13	83	5963223	71.9	335.6
GCF_003626655.1	<i>Micromonospora costis</i> CS1-12	20	7182425	73	222.9
GCF_016598485.1	<i>Micromonospora veneta</i> CAP181T	137	6799777	72.4	330.7

GCF_016741875.1	<i>Streptomyces coffeae</i> CA1R205	253	9896405	70.7	939.4
GCF_009755605.1	<i>Streptomyces typhae</i> p1417	69	9812178	72	223
GCF_014649775.1	<i>Streptomyces longisporoflavus</i> JCM 396	168	9802249	70.5	525.3
GCF_006334995.2	<i>Streptomyces mimosae</i> 3MP-10	45	7198341	73.4	297.1
GCF_003024195.1	<i>Streptomyces dioscori</i> A217	57	10239468	70.7	269.1
GCF_002237655.1	<i>Streptomyces</i> sp. XY006	74	8251847	71.8	288.8
GCF_008973465.1	<i>Streptomyces</i> sp. SS1-1	4	7815656	71.8	90.9
GCF_021390935.1	<i>Streptomyces</i> 8s0. CC228A	24	6857711	73.6	546.4
GCF_009025935.1	<i>Streptomyces</i> 8s0. CC208B	110	6898902	71.8	524.2
GCF_021390895.1	<i>Streptomyces</i> 8s0. CC210A	8	7222961	73.4	582.1
GCA_021390875.1	<i>Streptomyces</i> 8s0. CC219A	382	7585741	73.5	450.6
GCA_003352875.1	<i>Pseudomonas fluorescens</i> strain NEP1	1	6313875	60.6	144.4
GCA_002287825.1	<i>Pseudomonas moraviensis</i> strain TYU6	1	6124581	60.3	178.9
GCA_003293395.1	<i>Pseudomonas thivervalensis</i> strain PLM3	1	6591188	61.2	211
GCA_000152545.1	<i>Pseudomonas aeruginosa</i> 2192	1	6905121	66.2	78.9
CP021986	<i>Pseudomonas fragi</i> strain DBC	1	5015937	54.1	216.8
CP022198	<i>Pseudomonas oryzihabitans</i> strain MS8	1	5038716	65.5	247.1
CP020369	<i>Pseudomonas tolaasii</i> strain 2192T	1	6856683	60.5	207.5
JACCAH000000000	<i>Pseudomonas composti</i> strain ZKA28	1	5672870	62.5	412.6
JACCAJ000000000	<i>Pseudomonas kunmingensis</i> strain ZKA55	1	4620945	62.8	130.7
GCA_000022145.1	<i>Anaeromyxobacter dehalogenans</i> 2CP-1	1	5029329	74.7	166
GCA_001027285.1	<i>Archangium gephyra</i>	1	12489432	69.4	259.9
GCA_001189295.1	<i>Chondromyces crocatus</i>	1	11388132	68.7	231.5
GCA_000255295.1	<i>Coralloccoccus coralloides</i> DSM 2259	1	10080619	69.9	230.6
GCA_000024805.1	<i>Haliangium ochraceum</i> DSM 14365	1	9446314	69.5	331.1
GCA_002305855.1	<i>Melittangium boletus</i> DSM 14713	1	9910441	68.4	392.5
GCA_000331735.1	<i>Myxococcus stipitatus</i> DSM 14675	1	10350586	69.2	195.9
GCA_000012685.1	<i>Myxococcus xanthus</i> DK 1622	1	9139763	68.9	109.7
CP070226	<i>Sandaracinus amylolyticus</i>	2	10963797	71.6	431.2
GCA_000067165.1	<i>Sorangium cellulosum</i> So ce56	1	13033779	71.4	346.6
GCA_000380545.1	<i>Corynebacterium crenatum</i> MT	48	3346700	53.9	0
GCA_002775095.1	<i>Corynebacterium striatum</i> strain 2023	41	2375104	59.5	0
GCA_019288275.1	<i>Aspergillus niger</i> strain CBS 554.65	17	40430000	49.6	210
GCA_000149555.1	<i>Fusarium verticillioides</i> 7600	37	41840000	48.7	254
	<i>Fusarium fujikuroi</i> strain CSV1	105			195
GCA_009663055.1			43720000	47.5	
GCA_000993785	<i>Streptomyces xiamenensis</i> 318	1	5961402	72	174.1
GCF_003675955.1	<i>Streptomyces rapamycinicus</i> NRRL 5491	4	12700000	71	201.9
GCA_000203835.1	<i>Streptomyces coelicolor</i> A32	1	9055000	71.5	57.5

**Supplementary table 2.** Pan-genome statistics for *Lentzea* and *Actinokineospora* genera.

	Organism name	No. Core genes	No. accessory genes	No. of unique genes	No. exclusively absent genes
<b>Lentzea</b> genomes	<i>L. aerocolonigenes</i> NBRC 13195	3344	6065	45	1
	<i>L. albidocapillata</i> DSM 44073	3344	4450	46	1
	<i>L. albidocapillata</i> NRRL B-24057	3344	4457	51	1
	<i>L. flaviverrucosa</i> CGMCC 4.578	3344	5269	62	1
	<i>L. flaviverrucosa</i> DSM 44664	3344	5268	66	5
	<i>L. aerocolonigenes</i> NRRL B-3298	3344	6068	85	0
	<i>L. sp.</i> CC55	3344	3822	568	11

<i>L. atacamensis</i> DSM 45479	3344	4718	676	8
<i>L. deserti</i> DSM 45480	3344	4849	683	3
<i>L. albida</i> DSM 44437	3344	4470	694	9
<i>L. albidocapillata</i> subsp. <i>violacea</i> DSM 44796	3344	3874	701	22
<i>L. jiangxiensis</i> CGMCC 4.6609	3344	3821	774	22
<i>L. alba</i> NEAU.D13	3344	4865	791	3
<i>L. nigeriaca</i> DSM 45680	3344	4305	804	17
<i>L. waywayandensis</i> DSM 44232	3344	4815	812	7
<i>L. fradie</i> CGMCC 4.3506	3344	3574	843	81
<i>L. cavernae</i> CGMCC 4.7367	3344	4710	871	6
<i>L. kentuckyensis</i> NRRL B-24416	3344	4686	918	40
<i>L. flava</i> JCM 3296	3344	4545	935	3
<i>L. pudingi</i> CGMCC 4.7319	3344	4267	954	6
<i>L. terrae</i> NEAU-LZS 42	3344	5080	1016	17
<i>L. xinjiangensis</i> CGMCC 4.3525	3344	3543	1176	47
<i>L. guizhouensis</i> DHS C013	3344	4336	1668	40
<i>L. sp.</i> FXJ1.1311	3344	2450	2561	521

	<b>Organism name</b>	<b>No. Core genes</b>	<b>No. accessory genes</b>	<b>No. of unique genes</b>	<b>No. exclusively absent genes</b>
Actinokineospora genomes	<i>A. enzaensis</i> DSM 44649	1956	3218	2176	18
	<i>A. auranticolor</i> YU 961-1	1956	3501	2111	8
	<i>A. fastidiosa</i> JCM 3276	1956	2382	2044	85
	<i>A. iranica</i> IBRC-M 10403	1956	2467	1691	41
	<i>A. bangkoensis</i> DSM 44EHW	1956	2841	1566	24
	<i>A. inagensis</i> DSM 44258	1956	3061	1525	23
	<i>A. baliensis</i> DSM 45656	1956	3492	1276	5
	<i>A. pegani</i> TRM 65233	1956	2557	1263	52
	<i>A. sp.</i> PR83	1956	3855	965	9
	<i>A. xionganensis</i> HBU206404	1956	3341	935	12
	<i>A. cianjurensis</i> DSM 45657	1956	3995	825	6
	<i>A. terrae</i> DSM 44260	1956	4103	591	2
	<i>A. spheciospongiae</i> EG49	1956	4279	399	1
	<i>A. mzabensis</i> CECT 8578	1956	4276	398	1
	<i>A. alba</i> IBRC-M 10655	1956	4456	22	0
	<i>A. alba</i> CPCC 201030	1956	4461	18	0

**Supplementary table 3.** AntiSMASH results for *Lentzea* sp. CC55 (only complete BGCs) and GCF associated.

Region	Type	From	To	Most similar known cluster		Similarity	GCF#
Region 8.1	siderophore	70618	83429				2195
Region 13.2	terpene	255867	276793	isorenieratene	Terpene	0.75	2045
Region 17.1	LAP,thiopeptide	29780	57586				2037
Region 18.1	T3PKS	69039	110076	alkyl-O-dihydrogeranyl-methoxyhydroquinones	Terpene + Polyketide	0.57	2520
Region 19.1	RiPP-like	27080	37898	enduracidin	NRP	0.04	2490
Region 19.2	PKS-like,indole,NRPS,T1PKS	146710	250749	fortimicin	Saccharide	0.06	2005,2173,2398,2522
Region 19.3	lanthipeptide-class-ii	351062	373707				2047
Region 22.1	redox-cofactor	140124	162166	lankacidin C	NRP + Polyketide	0.26	2175
Region 27.1	NRPS-like	35700	79563	indigoidine	Saccharide	0.06	2527
Region 27.2	terpene	96938	119082	geosmin	Terpene	1	2528
Region 33.1	NAPAA	2611	36348				2154
Region 34.1	NRPS	66342	111786	dechlorocuracomycin	NRP	0.12	2531
Region 46.1	NRPS	103568	154430	coelichelin	NRP	0.72	2007
Region 47.1	T2PKS,PKS-like,RRE-containing	198168	270647	LL-D49194 $\alpha$ 1 (LLD) antitumor	Polyketide	0.32	2202
Region 47.2	lanthipeptide-class-iii	284572	307136	Ery-9 / Ery-6 / Ery-8 / Ery-7 / Ery-5 / Ery-4 / Ery-3	RiPP:Lanthipeptide	0.75	2524
Region 54.1	betalactone	38923	69839	platencin	Terpene	0.06	2008
Region 54.2	terpene	92689	113762	2-methylisoborneol	Terpene	0.5	2040
Region 55.1	NRPS-like,PKS-like,T2PKS	126166	238151	xantholipin	Polyketide	0.12	204,2537
Region 55.2	T1PKS	283753	328261	4-Z-annimycin	Polyketide	0.33	2538
Region 57.1	T1PKS	84	50680	pimaricin	Polyketide	0.29	2539
Region 57.2	NRPS-like	52748	109991	napsamycin A-D / mureidomycin A-B	NRP: + Nucleoside	0.13	2540
Region 57.3	NRPS,CDPS,T1PKS	120986	222233	coelibactin	NRP	0.36	2541
Region 57.4	PKS-like,arylpolyene,T1PKS,NRPS	493491	592270	virginiamycin S1	NRP + Polyketide	0.22	2542
Region 57.5	terpene	678213	700280	geosmin	Terpene	1	1918

**Supplementary table 4.** AntiSMASH results for *Actinokineospora* sp. PR83 (only complete BGCs) and GCF associated.

Region	Type	From	To	Most similar Known cluster	Similarity	GCF#	
Region 5.1	NRPS,T1PKS,PKS-like	304	98061	chlorothricin / deschlorothricin	Polyketide:Modular type I + Polyketide + Saccharide	0.09	2301
Region 10.1	NRPS,arylpolyene	22016	91909	atratumycin	NRP	0.26	2065
Region 11.1	CDPS	71619	92335	apramycin	Saccharide	0.06	2303
Region 16.1	transAT-PKS,PKS-like,T1PKS	68105	171100	kalimantacin A	NRP + Polyketide:Modular type I	0.24	2304
Region 17.1	NRPS	5612	69419	gobichelin A / gobichelin B	NRP	0.44	2305
Region 24.1	RiPP-like	69161	81038				2209
Region 24.2	other,PKS-like,amglyccycl,T1PKS	114918	183437	cetoniacytone A antitumor	Other:Cyclitol	0.38	2212
Region 24.3	T1PKS,NRPS-like	267645	360948	streptovaricin	Polyketide	0.65	188,2308
Region 35.1	T2PKS	90495	163028	JBIR-76 / JBIR- 77	Polyketide	0.56	2311
Region 38.1	NAPAA	2306	36265	dynemicin A	Polyketide	0.03	2175
Region 40.1	T2PKS	83180	155671	saquayamycin A	Polyketide	0.25	277
Region 59.1	RiPP-like	3596	14405				53
Region 79.2	T2PKS,ectoine	99927	140302	kosinostatin	NRP + Polyketide	0.11	2315
Region 80.1	terpene	78429	99409	oxalomycin B	NRP + Polyketide	0.09	2316
Region 80.2	siderophore	116820	128580	macrotetrolide	Polyketide	0.33	2165
Region 87.1	furan	4405	25403	methylenomycin A	Other	0.14	2318
Region 108.1	T1PKS	1	4644				2234
Region 114.1	T1PKS	1	4864				2234

**Supplementary figure 1.** KEGG distribution for core, accessory and unique genes for **A.** *Lentzea* and **B.** *Actinokineospora*.

