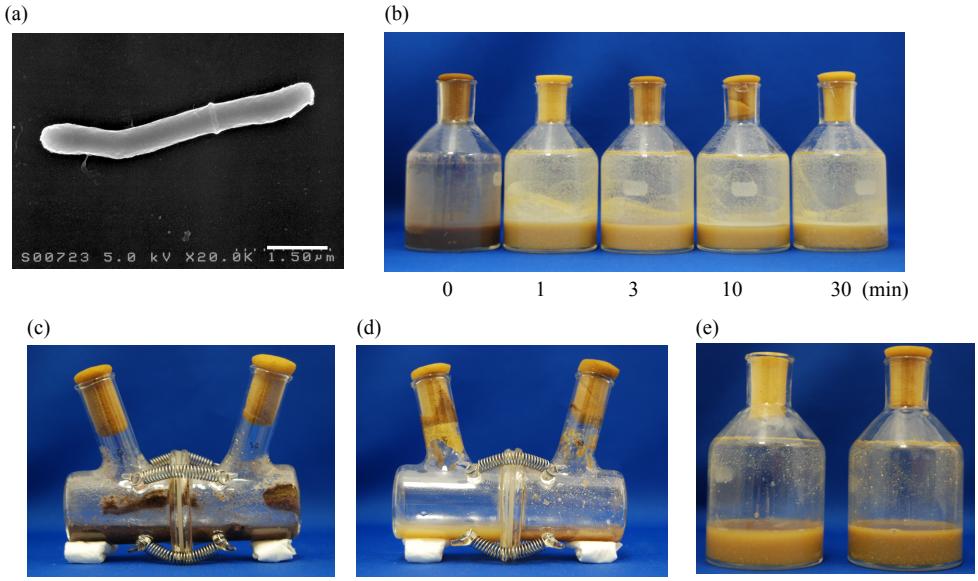

Fig. S1 Scanning electron micrograph of T. pulmonis TP-B0596 (a), the liquid culture of S. lividans with T. pulmonis liquid-culture broth sterilized in an autoclave (b), Co-culture with regenerate cellulose membrane in a dialysis flask (c, d), and the addition of T. pulmonis cell wall fraction into S. lividans pure culture (e).

(a) Scanning electron micrograph of *T. pulmonis* TP-B0596. The bar represents 1 μm. (b) The liquid culture of *S. lividans* with *T. pulmonis* liquid-culture broth sterilized in an autoclave at 121°C for 0, 1, 3, 10, or 30 min. The cultures were grown at 30 °C for 7 days. (c) Co-culture of *T. pulmonis* and *S. lividans* in a dialysis flask without dialysis membrane (positive control). (d) Co-culture of *T. pulmonis* and *S. lividans* in a dialysis flask with regenerated cellulose membrane (pore size is about 50 kDa). *T. pulmonis* was grown in the left compartment and *S. lividans* in the right compartment at 30 °C for 7 days. (e) The addition of cell wall fraction into *S. lividans* pure culture (right), and no addition (left) at 30 °C for 7 days. The cell wall was prepared from a 500-ml culture of *T. pulmonis* pure culture.

Fig. S2 Co-culture of widely divergent microorganisms and *S. lividans*

(a) The combined cultures of *S. lividans* and *Tsukamurella* strains were grown at 30 ˚C for 7 days. The left side of the K-1 flask contains the pure culture of *S. lividans*. Red-pigment production was induced in the combined cultures of *S. lividans* with *T. pseudospumae*, *T. spumae* and *T. strandjordii*. (b) Widely divergent microorganisms and *S. lividans* were co-cultivated in A-3M medium at 30 ˚C for 7 days.The left side of the K-1 flask contains the pure culture of *T. pulmonis*.

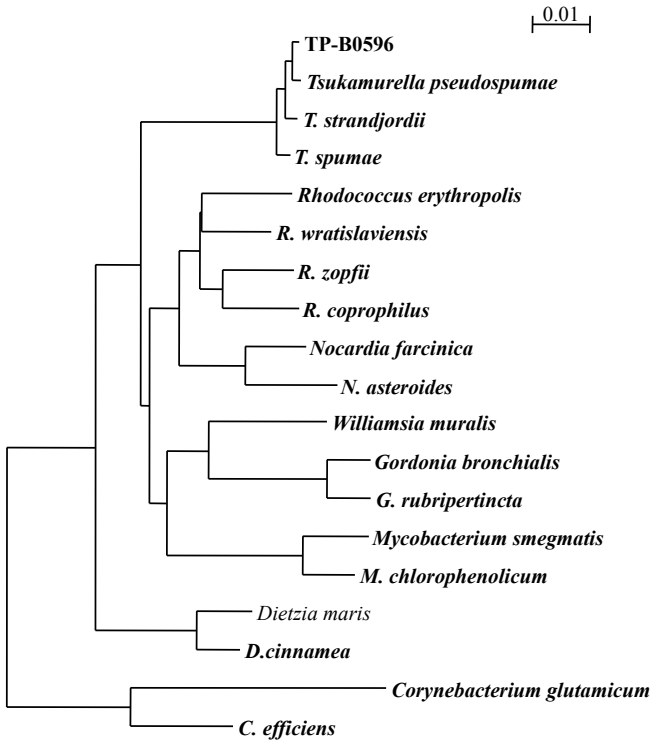

Fig. S3 Phylogenetic tree based on 16S rRNA sequences of microorganisms used in this study.
Specie names in the bold type induced red-pigment formation in *S. lividans*. The bar represents 1% sequence divergence.

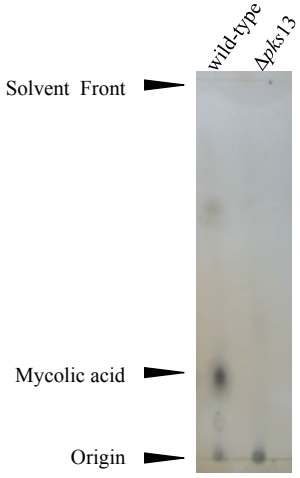

Fig. S4 Mycolic acid detection in *C. glutamicum* wild-type and *Δpks13* strains
Mycolic acid was extracted from *C. glutamicum* wild-type and *Δpks*13 strains that were cultured in LB broth for 2 days. Methyl-esters of the extracted mycolic acids were subjected to thin-layer chromatography (TLC), and the plates were developed in *n*-hexane-diethylether (4:1) and soaked in 50% H_2SO_4.

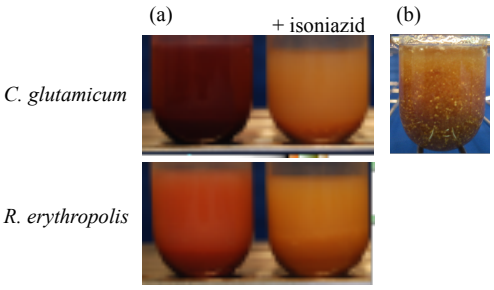

Fig. S5 Addition of mycolic acid synthase inhibitors to co-culture of *S. lividans* with activator strains

(a) Addition of mycolic acid biosynthetic inhibitor isoniazid to the co-culture of *S. lividans* with activator strains. Co-culture of *S. lividans* with *C. glutamicum* and *R. erythropolis* did not induce red-pigment production. (b) Addition of extracted mycolic acid of *C. glutamicum* to a pure culture of *S. lividans* did not induce red-pigment production.

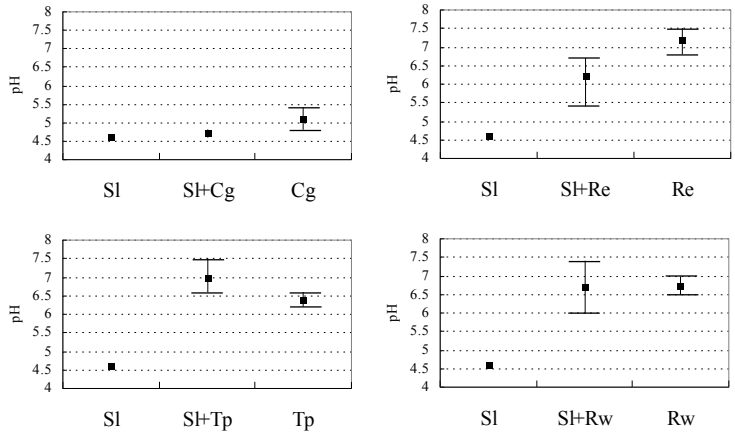

Fig. S6 Measurement of pH of the whole broth of pure cultures and co-cultures.

The pH values of both pure and co-cultures were measured 3 times and the average values were plotted. Cg, Re, Tp, Rw, and Sl are abbreviations for *C. glutamicum, R. erythropolis, T. pulmonis, R. wrastivaensis,* and *S. lividans* and indicate pure cultures of these microorganisms. Cg + Sl, Re + Sl, Tp + Sl, and Rw + Sl indicate co-cultures. The cultures were grown in A-3M medium at 30 ˚C for 7 days.

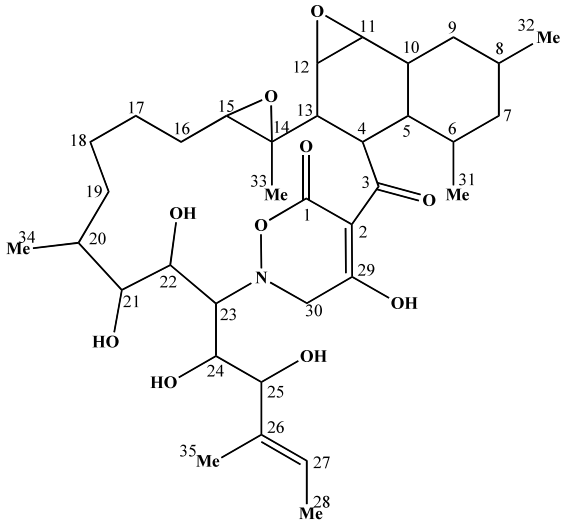

Fig. S7 Determination of carbon positions in alchivemycin A

The numbers represent the carbon positions in alchivemycin A.

Table S1

Nuclear magnetic resonance assignment data of Alchivemycin A

Position	C (ppm)	H (ppm)	Type
1	176.61		C
2	105.28		C
3	201.30		C
4	36.79	4.72 (t, 10.9)	CH
5	38.72	2.25 (dm, 11.5)	CH
6	39.35	1.67 (m)	CH
7	39.89	1.23 (m), 1.34 (q, 12.7)	CH2
8	34.68	1.58 (m)	CH
9	34.00	1.17 (q, 12.4), 1.67 (m)	CH2
10	40.36	2.19 (dm, 12.9)	CH
11	58.70	3.11 (m)	CH
12	54.54	3.05 (d, 3.0)	CH
13	51.29	2.09 (d, 10.1)	CH
14	61.60		C
15	64.78	2.74 (d, 9.6)	CH
16	27.44	1.47 (m), 1.71 (m)	CH2
17	26.54	1.72 (m)	CH2
18	28.03	1.33 (m), 1.58 (m)	CH2
19	34.72	1.57 (m), 1.62 (m)	CH2
20	36.16	1.67 (m)	CH
21	79.45	3.50 (dd, 1.4, 8.8)	CH
22	75.32	4.30 (dd, 3.8, 8.7)	CH
23	62.74	3.77 (dd, 1.9, 3.8)	CH
24	71.76	4.42 (dd, 1.7, 8.1)	CH
25	80.38	4.06 (d, 8.0)	CH
26	137.37		C
27	124.11	5.61 (q, 6.7)	CH
28	13.77	1.66 (d, 6.8)	CH3
29	192.23		C
30	64.08	4.16 (d, 17.0), 4.31 (d, 17.1)	CH2
31	22.07	0.81 (d, 7.3)	CH3
32	23.25	1.02 (d, 6.5)	CH3
33	15.30	1.28 (s)	CH3
34	12.67	0.83 (d, 7.0)	CH3
35	12.14	1.68 (s)	CH3

Table S2, The sample sources of isolated strains

Bacterial strain	Source of isolation	reference
C. glutamicum ATCC 13869	nature	(10)
C. efficiens NBRC 100395^T	soil	(2)
*R. erythropoli*s JCM3201^T	soil	(4)
R. coprophilus JCM3200^T	lake mud	(1)
R. wratislaviensis JCM9689^T	soil	(5)
R. zopfii JCM9919^T	toluene-phenol bioreactor	(14)
T. pulmonis TP-B0596	soil	This work
T. pseudospumae JCM13375^T	activated sludge foam	(12)
T. spumae JCM12608^T	activated sewage sludge foam	(11)
T. strandjordii JCM11487^T	blood from a 5-year-old girl with acute myelogenous leukemia	(9)
G. rubripertincta JCM3204^T	ND	
G. bronchialis NBRC 16047^T	sputa of patients with pulmonary disease	(4)
N. farcinica JCM3088^T	ND	
N. asteroides NBRC 15531^T	soil or human infection	(3)
M. smegmatis NBRC 3082	syphilitic chancres	(7)
M. chlorophenolicum NBRC 15527^T	chlorophenol-contaminated lake sediment	(6)
W. muralis JCM10676^T	Non-water-damaged building material of a children's day care center	(8)
D. cinnamea JCM13663^T	perianal swab of a human with a bone marrow transplant	(15)
D. maris JCM6166^T	soil	(13)

ND : Not described

1. **Cross, T. J. R. a. T.** 1977. Rhodococcus coprophilus sp. nov.: An Aerobic Nocardioform Actinomycete Belonging to the ‘rhodochrous’ Complex. J Gen Microbiol **100:**123-138.
2. **Fudou, R., Y. Jojima, A. Seto, K. Yamada, E. Kimura, T. Nakamatsu, A. Hiraishi, and S. Yamanaka.** 2002. Corynebacterium efficiens sp. nov., a glutamic-acid-producing species from soil and vegetables. Int J Syst Evol Microbiol **52:**1127-31.
3. **Goodfellow, M.** 1992. The Family Nocardiaceae, p. 1188-1213. *In* A. Balows, H. G. Truper, M. Dworkin, W. Harder, and K. H. Schleifer (ed.), The Prokaryotes, Second Edition. Springer-Verlag, New York.
4. **Goodfellow, M., and G. Alderson.** 1977. The actinomycete-genus Rhodococcus: a home for the "rhodochrous" complex. J Gen Microbiol **100:**99-122.
5. **Goodfellow, M., J. Chun, E. Stackebrandt, and R. M. Kroppenstedt.** 2002.

Transfer of Tsukamurella wratislaviensis Goodfellow et a. 1995 to the genus Rhodococcus as Rhodococcus wratislaviensis comb. nov. Int J Syst Evol Microbiol **52:**749-55.

6. **Haggblom, M. M., L. J. Nohynek, N. J. Palleroni, K. Kronqvist, E. L. Nurmiaho-Lassila, M. S. Salkinoja-Salonen, S. Klatte, R. M. Kroppenstedt, and M. M. Hagglblom.** 1994. Transfer of polychlorophenol-degrading Rhodococcus chlorophenolicus (Apajalahti et al. 1986) to the genus Mycobacterium as Mycobacterium chlorophenolicum comb. nov. Int J Syst Bacteriol **44:**485-93.
7. **Hartmans, S., and J. A. de Bont.** 1992. The Genus Mycobacterium-Nonmedical, p. 1216-1237. *In* A. Balows, H. G. Truper, M. Dworkin, W. Harder, and K. H. Schleifer (ed.), The Prokaryotes, Second Edition. Springer-Verlag, New York.
8. **Kampfer, P., M. A. Andersson, F. A. Rainey, R. M. Kroppenstedt, and M. Salkinoja-Salonen.** 1999. Williamsia muralis gen. nov., sp. nov., isolated from the indoor environment of a children's day care centre. Int J Syst Bacteriol **49 Pt 2:**681-7.
9. **Kattar, M. M., B. T. Cookson, L. D. Carlson, S. K. Stiglich, M. A. Schwartz, T. T. Nguyen, R. Daza, C. K. Wallis, S. L. Yarfitz, and M. B. Coyle.** 2001. Tsukamurella strandjordae sp. nov., a proposed new species causing sepsis. J Clin Microbiol **39:**1467-76.
10. **Liebl, W.** 1992. The Genus Corynebacterium-Nonmedical, p. 1157-1171. *In* A. Balows, H. G. Truper, M. Dworkin, W. Harder, and K. H. Schleifer (ed.), The Prokaryotes, Second Edition. Springer-Verlag, New York.
11. **Nam, S. W., J. Chun, S. Kim, W. Kim, J. Zakrzewska-Czerwinska, and M. Goodfellow.** 2003. Tsukamurella spumae sp. nov., a novel actinomycete associated with foaming in activated sludge plants. Syst Appl Microbiol **26:**367-75.
12. **Nam, S. W., W. Kim, J. Chun, and M. Goodfellow.** 2004. Tsukamurella pseudospumae sp. nov., a novel actinomycete isolated from activated sludge foam. Int J Syst Evol Microbiol **54:**1209-12.
13. **Nesterenko O. A. , N. T. M., Kasumova S. A., Kvasnikov E. I., Batrakov S. G. .** 1982. Rhodococcus luteus nom. nov. and Rhodococcus maris nom.nov. Int J Syst Bacteriol **32:**1-14.
14. **Stoecker, M. A., R. P. Herwig, and J. T. Staley.** 1994. Rhodococcus zopfii sp. nov., a toxicant-degrading bacterium. Int J Syst Bacteriol **44:**106-10.
15. **Yassin, A. F., H. Hupfer, and K. P. Schaal.** 2006. Dietzia cinnamea sp. nov., a novel species isolated from a perianal swab of a patient with a bone marrow transplant. Int J Syst Evol Microbiol **56:**641-5.