

TGGAGGGACCCGCCGTCACCGTCGACACGGCGTGCTC-3' and 5'-GAGCAGCC GTGTGCACGGTGACGGCGGGTCCCTCCA-3'. The mutations were confirmed by sequencing before and after introduction into *S. venezuelae*.

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1. Hopwood, D. A. & Sherman, D. H. Molecular genetics of polyketides and its comparison to fatty acid biosynthesis. *Annu. Rev. Genet.* **24**, 37–66 (1990).
2. Cane, D. E., Walsh, C. T. & Khosla, C. Harnessing the biosynthetic code: combinations, permutations, and mutations. *Science* **282**, 63–68 (1998).
3. Donadio, S., Staver, M. J., McAlpine, J. B., Swanson, S. J. & Katz, L. Modular organization of genes required for complex polyketide biosynthesis. *Science* **252**, 675–679 (1991).
4. Cortes, J., Haydock, S. F., Roberts, G. A., Bevitt, D. J. & Leadlay, P. F. An unusually large multifunctional polypeptide in the erythromycin-producing polyketide synthase of *Saccharopolyspora erythraea*. *Nature* **348**, 176–178 (1990).
5. Lambalot, R. H. & Cane, D. E. Isolation and characterization of 10-deoxymethynolide produced by *Streptomyces venezuelae*. *J. Antibiot.* **45**, 1981–1982 (1992).
6. Hori, T., Maezawa, I., Nagahama, N. & Suzuki, M. Isolation and structure of narbonolide, narbomycin aglycone, from *Streptomyces venezuelae* and its biological transformation into picromycin via narbomycin. *J. Chem. Soc. Chem. Commun.* 304–305 (1971).
7. Sherman, D. H. *et al.* in *Proceedings of the 8th International Biotechnology Symposium* Vol. 1 123–137 (Societe Francaise de Microbiologie, Paris, 1988).
8. Tang, L., Fu, H., Betlach, M. C. & McDaniel, R. Elucidating the mechanism of chain termination switching in the picromycin/methymycin polyketide synthase. *Chem. Biol.* **6**, 553–558 (1999).
9. Xue, Y., Zhao, L., H. W. & Sherman, D. H. A gene cluster for macrolide antibiotic biosynthesis in *Streptomyces venezuelae*: architecture of metabolic diversity. *Proc. Natl Acad. Sci. USA* **95**, 12111–12116 (1998).
10. Staunton, J. *et al.* Evidence for a double-helical structure for modular polyketide synthases. *Nature Struct. Biol.* **3**, 188–192 (1996).
11. Gokhale, R. S., Hunziker, D., Cane, D. E. & Khosla, C. Mechanism and specificity of the terminal thioesterase domain from the erythromycin polyketide synthase. *Chem. Biol.* **6**, 117–125 (1999).
12. Gokhale, R. S., Tsuji, S. Y., Cane, D. E. & Khosla, C. Dissecting and exploiting intermodular communication in polyketide synthases. *Science* **284**, 482–485 (1999).
13. Rangaswamy, V., Mitchell, R., Ullrich, M. & Bender, C. Analysis of genes involved in biosynthesis of coronafacic acid, the polyketide component of the phytotoxin coronatine. *J. Bacteriol.* **180**, 3330–3338 (1998).
14. Butler, A. R., Bate, N. & Cundliffe, E. Impact of thioesterase activity on tylosin biosynthesis in *Streptomyces fradiae*. *Chem. Biol.* **6**, 287–292 (1999).
15. Schneider, A. & Marahiel, M. A. Genetic evidence for a role of thioesterase domains, integrated in or associated with peptide synthetases, in non-ribosomal peptide biosynthesis in *Bacillus subtilis*. *Arch. Microbiol.* **169**, 404–410 (1998).
16. Cortes, J. *et al.* Repositioning of a domain in a modular polyketide synthase to promote specific chain cleavage. *Science* **268**, 1487–1489 (1995).

17. Kao, C. M., Luo, G. L., Katz, L., Cane, D. E. & Khosla, C. Manipulation of macrolide ring size by directed mutagenesis of a modular polyketide synthase. *J. Am. Chem. Soc.* **117**, 9105–9106 (1995).
18. Sambrook, J., Fritsch, E. F. & Maniatis, T. *Molecular Cloning: A Laboratory Manual* (Cold Spring Harbor Laboratory Press, Cold Spring Harbor, 1989).
19. Lydiate, D. J., Malpartida, F. & Hopwood, D. A. The *Streptomyces* plasmid SCP2: its functional analysis and development into useful cloning vectors. *Gene* **35**, 223–235 (1985).
20. Bisang, C. *et al.* A chain initiation factor common to both modular and aromatic polyketide synthases. *Nature* **401**, 502–505 (1999).
21. Xue, Y., Wilson, D., Zhao, L., Liu, H.-w. & Sherman, D. H. Hydroxylation of macrolactones YC-17 and narbomycin is mediated by the *pikC*-encoded cytochrome P450 in *Streptomyces venezuelae*. *Chem. Biol.* **5**, 661–667 (1998).

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erratum

The neurobiology of cognition

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