Microbial natural products are a major source of modern medicine, especially antibiotics. Cytolysin belongs to the lanthipeptide antibiotic family that are short polycyclic peptides with thioether crosslinks termed lanthionines. We discovered an unusual lanthionine stereochemistry in cytolysin, the formation of which was controlled by the substrate rather than the synthetase. Our findings serve as a rare example of substrate-controlled stereoselectivity in enzyme-catalyzed reactions.

CRISPR-Cas systems are adaptive immune systems that microbes use to defend themselves against viral infections. The programmable and sequence-specific DNA recognition features of CRISPR-Cas systems have enabled a wide variety of unprecedented genome engineering applications. We developed synthetic memory devices by engineering the CRISPR system to serve as “cell data recorders” that record a history of endogenous or exogenous signals in live bacteria and mammalian cells.

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