SYNFACTS

Highlights in Current
Synthetic Organic
Chemistry

REPRINT

Thieme

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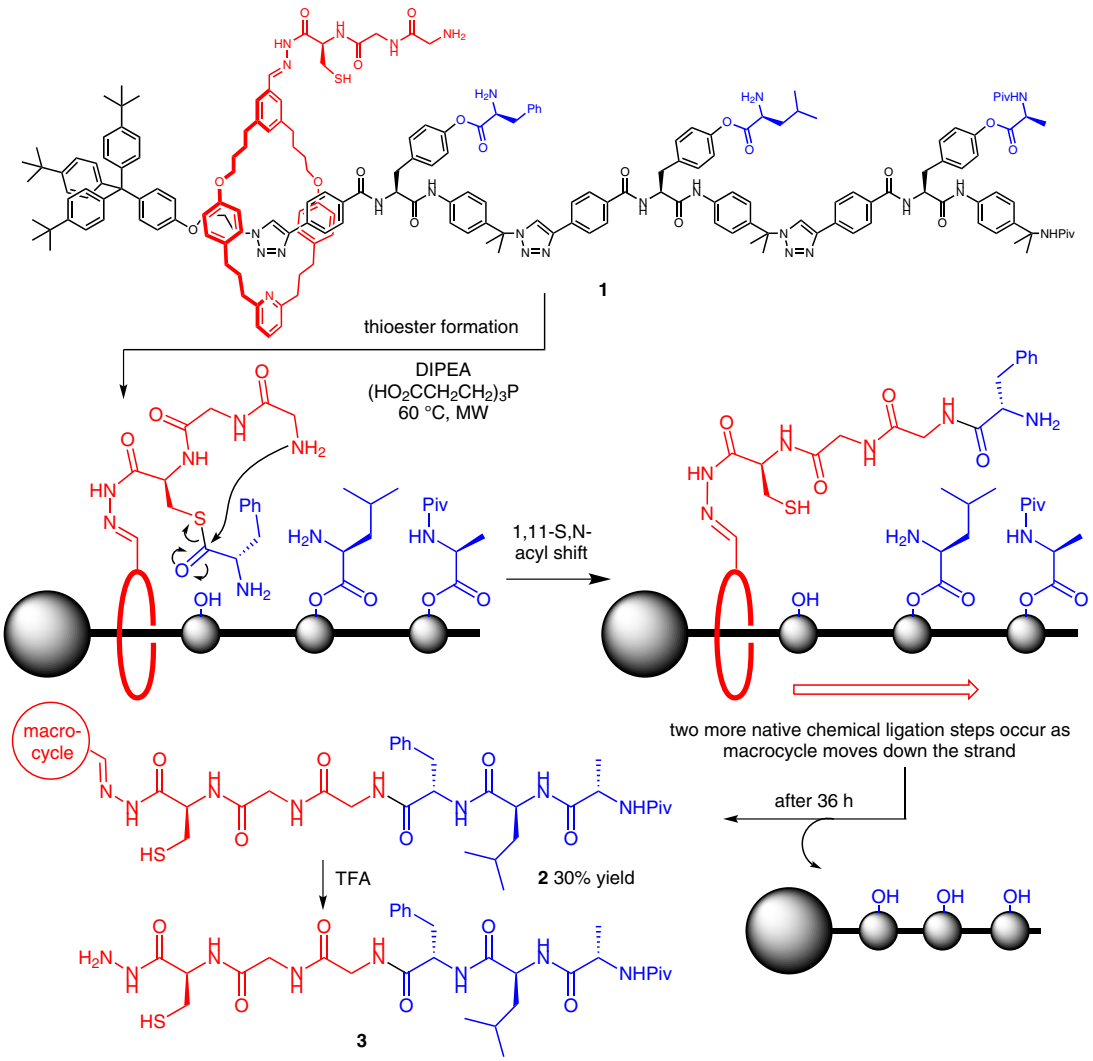
Sequence-Specific Peptide Synthesis by an Artificial Small-Molecule Machine
Science **2013**, *339*, 189–193.

Synthesis of a Peptide with an Artificial Molecular Machine



Significance: Ribosomes construct polypeptides by connecting amino acids in a sequence specified by mRNA. Here, Leigh and co-workers report the design and synthesis of an artificial, rotaxane-based molecular machine that automatically affords a sequence-specific oligopeptide after it is chemically activated.

SYNFACTS Contributors: Timothy M. Swager, Derik K. Frantz
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Comment: Upon deprotonation of the thiol group in the cysteine residue in **1**, the proposed mechanism for the reaction involves a series of sequential native chemical ligation steps, as the macrocycle moves down the threaded strand and eventually separates from it, generating peptide **2**. Hydrolysis of the macrocycle provides oligopeptide **3**.

Category

Synthesis of Materials and Unnatural Products

Key words

artificial molecular machines

sequence-specific peptide synthesis

rotaxanes

native chemical ligation