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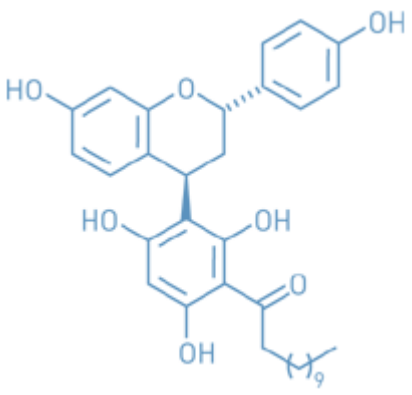
Compound breaks DNA and sustains the break



(+)-Myristinin A (shown) has a remarkable ability to cleave DNA; it also prevents repair of the DNA damage that it causes by inhibiting polymerase β, a DNA repair enzyme. Sidney M. Hecht and coworkers at the University of Virginia confirmed this unusual combination of biochemical activities after they carried out the first stereoselective synthesis of the natural product (*J. Am. Chem. Soc.* **2005,** *127,* 4140). The total synthesis confirms the structure of the natural product and establishes its absolute stereochemistry. It also makes available sufficient amounts of material for biochemical studies. In cancer therapy based on DNA damage, the goal is to keep the DNA damage from being repaired, Hecht says. Scientists seek inhibitors of polymerase β for use as adjuvants to DNA-damaging agents in the clinic to boost their efficacy. "We have in this compound both the DNA-damaging ability and the inhibition of repair," he says.

Aliphatic C–F bond activation at room temperature

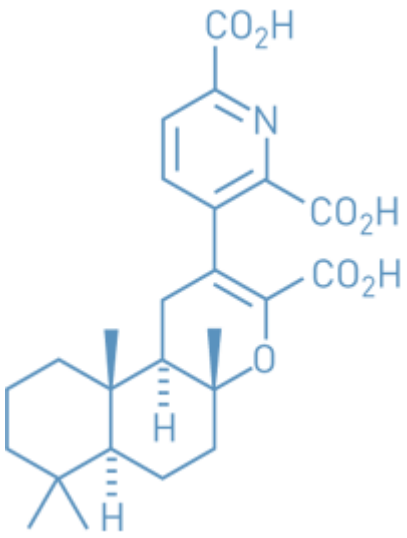
Aliphatic carbon-fluorine bonds can be transformed catalytically into carbon-hydrogen bonds at room temperature, according to new work by chemists at Brandeis University, Waltham, Mass. (*J. Am. Chem. Soc.* **2005,** *127,* 2852). The process, developed by Oleg V. Ozerov, Valerie J. Scott, and Remle Çelenligil-Çetin, uses an unconventional method of C–F bond activation that relies on the abstraction of F^- by an electrophilic silylium species. The substrate (RF) is treated with excess triethylsilane (Et_3SiH) and a catalytic amount of the salt $(C_6H_5)_3C^+X^-$, where $X^- = [B(C_6F_5)_4]^-$. The salt's carbocation abstracts hydride from Et_3SiH, yielding $Et_3Si^+X^-$, which reacts with RF to give R^+X^- and Et_3SiF. R^+X^- then reacts with Et_3SiH, yielding RH and regenerating $Et_3Si^+X^-$. The researchers were able to convert several benzotrifluorides and 1-fluoropentane into the corresponding hydrodefluorinated products, often with 100% conversion. The reaction did not work with perfluoromethylcyclohexane. The team is now tinkering with the process in the hopes of activating C–F bonds in perfluoroalkanes.

Bringing footprinting to the masses

A new, freely available software package developed by a Stanford University team aims to ease the quantitative analysis of data from nucleic acid footprinting, a gel-based technique used to determine the solution structure of nucleic acids and protein-nucleic acid complexes (*RNA* **2005,** *11*, 344). Developers Daniel Herschlag and Russ B. Altman hope that the free software will encourage broader use of quantitative footprinting. In a footprinting experiment, an end-labeled RNA or DNA is exposed to chemical cleavage or modification, and the products are sorted by length via electrophoresis. Inspection of where the RNA or DNA is protected from cleavage or modification can yield quantitative information about the structure, thermodynamics, and kinetics of nucleic acid folding and the binding of proteins and other ligands to nucleic

acids. But quantitative analysis of gel images produced by footprinting experiments is tedious and time-consuming, typically taking as much as several hours per gel, Herschlag estimates, whereas the new software cuts the time down to just 10 minutes. The software can be downloaded for free at http://safa.stanford.edu.

Bacteria spur algae to leaf



In an unusual symbiotic relationship, marine bacteria release a compound essential to algae's normal development. The compound, thallusin (shown), was isolated and identified by Yoshihide Matsuo at Japan's Marine Biotechnology Institute Co. and colleagues (*Science* **2005,** *307,* 1598). Matsuo's group first noticed that the typically leafy yellow-green algae *Monostroma oxyspermum* only clumped into groups of amorphous cells when grown in a sterile lab dish. Thus, they searched for some external cue that signals the algal cells to organize themselves into blades, leaves, and tubes. They found that a nonflagellated glider bacterium that likes to live on the flat surface of the algal leaves releases thallusin. The algae need a constant low dose of bacterial thallusin to maintain a multicellular leafy state, which allows the algae to grow toward the sunlit surface. The bacteria, Matsuo surmises, benefit from a sunny, flat home with abundant polysaccharides and lots of space to glide. Thallusin is a potent signal; the compound is effective at concentrations as low as 1 attogram per mL.

CO_2 used to process carbs

In a new demonstration of carbon dioxide's utility as a "green" solvent, postdoc Poovathinthodiyil Raveendran, assistant chemistry professor Scott L. Wallen, and their colleagues at the University of North Carolina, Chapel Hill, report that carbohydrates and other macromolecules can be readily separated, crystallized, and otherwise processed in gaseous, liquid, and supercritical CO_2 (*Green Chem.* **2005, 7,** 129). Carbohydrates generally are insoluble in CO_2, but Raveendran and Wallen previously have shown that the compounds can be made soluble by replacing CO_2-phobic hydroxyl groups with acetate groups. One process the researchers have focused on is using supercritical CO_2 (110 bar and 40 °C) to prepare single crystals of acetylated β-D-galactose (β-Gal) for X-ray analysis. They believe that this is the first time supercritical CO_2 has been used for bulk crystallization. The researchers also used CO_2 to prepare dispersions of a protein (cytochrome C) and a drug (ibuprofen) in the acetylated β-Gal, and they made porous acetylated cyclodextrin materials for use as sustained-release drug carriers.

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