

Probing the secrets of the ryegrasses

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Loline alkaloids protect plants from attack by insects and have other interesting features that have yet to be studied in detail. Chemists from Ludwig-Maximilians-Universitaet in Munich, Germany, have developed a method for the effective synthesis of these compounds, which will facilitate further investigations in biology and medicine.

Chemists from Ludwig-Maximilians-Universitaet in Munich led by Professor Dirk Trauner have developed a concise and efficient method for the synthesis of the alkaloid loline and related compounds. Loline alkaloids are a biologically interesting group of natural products, which have unusual physicochemical and pharmacological characteristics, but are as of yet poorly understood. They are produced by fungal symbionts that infect weeds and [forage grasses](#), and act as deterrents of insects and other herbivores. Some of the agents synthesized by endophytic fungi are toxic to [grazing animals](#), producing a syndrome known as the staggers.

Indeed, such toxic weeds (commonly called ryegrass or cockle) were much feared in antiquity and are mentioned both by Virgil and in the New Testament. Lolines however are comparatively innocuous to mammalian herbivores, and might therefore be of some therapeutic use. The loline alkaloid temuline has attracted particular attention in another context because it can strongly bind carbon dioxide. Lolines are relatively small molecules and have a fairly simple structure, but [chemical synthesis](#) of the compounds has proven to be quite challenging.

"Our synthetic route is highly efficient and, with a maximum of 10 steps,

very short," says Dirk Trauner, who led the project. "It will allow us to make these compounds in sufficient quantities to enable their various aspects to be investigated in detail. We should then be able to dissect the [complex network](#) of interactions of the plants and their fungal parasites with insects and bacteria. We now plan to use our synthetic material to identify the receptor for loline [alkaloids](#)."

Provided by Ludwig-Maximilians-Universitat Munchen

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