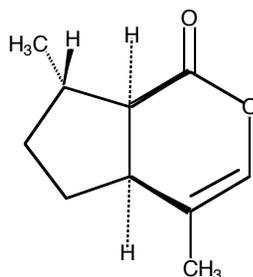


Catnip

Nancy Lowry
Professor of Chemistry
Hampshire College
Amherst MA



I watched as the big, long-haired neighborhood tomcat plodded determinedly across our yard, his destination - the newly planted catnip plant. I had thought it was deep enough in our lot to be safe from the neighborhood posse of cats, but, alas, I was mistaken.

He reached the plant, sniffed, nibbled, and then rolled wildly, reducing the plant to a flattened, mashed and demolished pulp in a matter of minutes. Mission accomplished, he lay there for a moment, then he rose, and retraced his steps and faded back into the neighborhood.

The catnip plant is a member of the mint family and contains a small organic compound called nepetalactone which is attractive to most cats; females show a somewhat stronger reaction than males, and about 15 – 30% of cats seem indifferent to the lure of catnip, as are kittens. Lions, bobcats, tigers, jaguars, snow leopards and many other big cats also respond to nepetalactone.¹ Some big cats seem unresponsive, cheetahs, for example, and while tigers respond, it has been said that they don't like it very much. Rabbits, dogs, mice, guinea pigs and essentially all other species have no reaction. When "on" catnip, cats are apparently more attentive to stuffed animals than their actual, real-life prey. "Catnip does produce, however, an increased attention to stuffed objects and a decreased attention to rats."² The chemical and cat interact through smell, rather than taste, although in the process cats do ingest the plant material.

Nepetalactone has been found to be very repellant to cockroaches, termites, and mosquitoes.³ Since this is true, and since a few insects seem to produce the same compound, plant and selected insects probably make the chemical for defense. Although it may prove useful as a repellant for a variety of insect pests, its use would most likely drive any resident cats crazy, not to mention the people who live with them. One species of aphid produces it as a sex attractant.

One of the more bizarre literature reports on catnip was printed in the *Journal of the American Medical Association* in 1969. The authors reported that smoking catnip cigarettes caused a high, but an alert reader (minimally, 1,612 of them, to be accurate) noted that the accompanying photograph was really marijuana, and it is now accepted that catnip has no hallucinogenic properties on people when smoked. Catnip tea is touted to have mild digestive benefits, although there are no studies supporting this long held belief.

¹ See Tucker and Tucker for a great review.

² Quote from

³ Nepetalactone has been estimated to be 100 time more repellent to cockroaches than DEET, and 10 times more repellent to mosquitoes (American Chemical Society)

Chemistry:

Nepetalactone is a monoterpene compound. There are three chiral carbons and thus there are eight possible stereoisomers of catnip. The most common isomer in *nepeta cataria* is shown in Figure I, although its mirror image has been synthesized and it is equally enticing to cats.

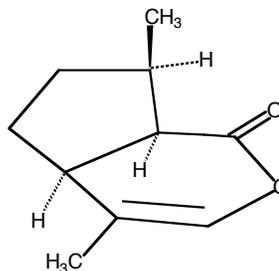


Figure I: The most plentiful isomer of nepetalactone (70+%) in the catnip plant to which cats respond.

The first step in metabolism of nepetalactone is the opening of the lactone ring to form a carboxylic acid/aldehyde via the enol (Figure II).

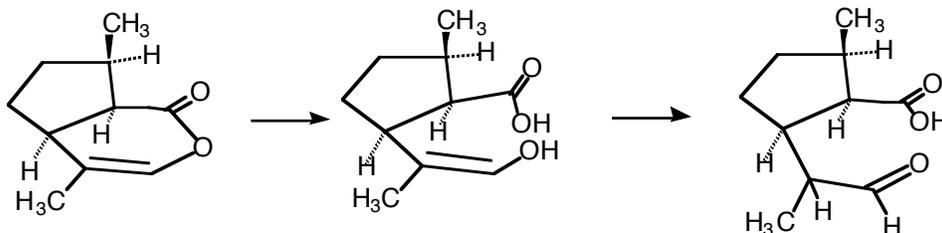


Figure II: Opening of the lactone ring to form the enol/acid and then the aldehyde/acid.

References: There is a wealth of information on the web about catnip; just plug in catnip and another key word into a search engine and you will have more information than you care for. There is, also, a lot of repetition among sites. Always be cautious of websites that sell products for medicinal uses; supporting studies may not have shown the benefits of the herb or may not even have been reliably carried out.

Here are a few sources of particular interest:

A great review: Arthur. O. Tucker, Sharon. S. Tucker: "The Catnip Response" *J. Ec. Botany*, 214 – 231 (1988)

Insect/catnip responses: American Chemical Society:

Catnip Repels Mosquitoes More Effectively Than DEET

(<http://www.sciencedaily.com/releases/2001/08/010828075659.htm>)

Termites: <http://www.sciencedaily.com/releases/2003/03/030326073708.htm>

Cockroaches: <http://www.sciencedaily.com/releases/1999/08/990827071500.htm>

In defense of DEET: <http://www.sciencedaily.com/releases/2002/07/020704084619.htm>

The Merck Index has references to stereochemical and biochemical articles.

Catnip and the supposed alteration of consciousness

B. Jackson; A. Reed: *JAMA*. 1969;207:1349-1350.

And the follow-up article:

JAMA j poundstone 208:360 1969

Nancy Lowry
Professor of Chemistry
Hampshire College
Amherst, MA 01002