

## ABOUT HALLUCINOGENIC NUT IN OUR KITCHEN

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The article describes the nutmeg of a nutmeg tree (*Myristica*), which is used as a spice and traditional medicine but is also abused as an illicit drug. The main chemical components, namely myristicin, are described.

Keywords: nutmeg, nutmeg tree, *Myristica*, spice, medicine, illicit drug, myristicin

Nutmeg tree (fragrant nutmeg or true nutmeg) *Myristica fragrans* Houtt. (Myristicaceae, Fig. 1), ever-green endemic tree for the Indonesian province of Maluku (formerly known as the Spice Islands) has long been important both as a spice and a commodity that had once had geopolitical significance. Its annual production is 12,000 tons. Among the natives, information on medicinal aspects from sellers of herbal medicines, healers and midwives was collected. It has been found that *M. fragrans* is still used, especially its "nut", except culinary also for therapeutic purposes to alleviate diarrhoea or flatulence, ulcers, insomnia, domestic treatment of asthma, pancreatitis, and nephritis.

Around the end of the last century, literature wrote that his alleged hallucinogenic and psychoactive qualities, other than weakly sedatives are not supported by the literature<sup>2</sup>. However, it is known that the use of nutmeg was common in the "hippie culture" of the 1960s and 1970s, among drug addicts, prisoners, adolescents, and university

students where it was considered an affordable alternative to limited availability of alcohol and recreational drugs<sup>3</sup>, often combined with other medicines (cannabis, synthetic cannabinoids, amphetamines, benzodiazepines, diphenhydramine, duloxetine, clonazepam, cough syrup, acetaminophen, antihistaminic) namely with alcohol or simply as cheap dope<sup>4</sup>, psychomimetic, natural hallucinogen, narcotics and spiritual agent<sup>5</sup>. The fact that it is a dope is confirmed by the fact that the well-known drug investigator, Alexander Shulgin, was interested in the substance<sup>6</sup>. The first, alleged, nut intoxication (*Moscata Nux*) was described by a Flemish doctor Matthaëus Lobelius<sup>7,8</sup> in 1576.

The nutmeg is a dried seed, the endosperm of the fruit of the nutmeg tree, it is mainly used as a flavouring spice promoting appetite and providing peaceful digestion. Like a nut, the reddish seed covering (aril) of the nutmeg seed, mace, is used in the kitchen as a flavouring with a more delicate taste. Aril is a specialized outgrowth from a seed that partly or completely covers the seed, a layer between the seed and the "peel". The peel is sometimes used in the kitchen too.

Nutmeg is an effective spasmolytic, soothing especially abdominal pain and convulsions, causing menstruation in medium doses, and may also disrupt the development of the fetus. There are many folk and traditional uses of nutmeg which differ across various cultures such as gastrointestinal disorders, embalming, plague treatment, asthma, cough, cholera, anxiety, haemorrhoids, psychosis, melancholy and rheumatological diseases, use as aphrodisiac abortion, narcotic, substance against flatulence. It also found its places in alternative medicine, such as in Andrew T. Weil's teachings and practice<sup>9</sup>.

Contemporarily, nutmeg can be attributed to antimicrobial, antioxidant, analgesic, antidepressant, anxiolytic, anti-inflammatory, antirheumatic and vasodilation to aphrodisiac activities. It is not excluded in the use in the case of teeth, muscle, and joint aches. The anti-leukemic activity of extracts is studied. Clinical tests with controlled doses have shown to improve the state of thinking, sleep



Fig. 1. Nutmeg tree *Myristica fragrans* Houtt. (Myristicaceae), ref.<sup>1</sup>

and reduce fatigue, and reduce neuropathic pain<sup>5</sup>. The Merck Index states that it alleviates flatulence, colic of the digestive tract and stomach nausea (carminative)<sup>10</sup>.

Negative effects include influence on the CNS, inducing depression, and suicidal thoughts, as well as tachycardia, hypotension, nausea, vomiting, thirst, dry mouth, sweating, vision disorders, reduced temperature, and disorders in the perception of body parts. It has been shown that excessive consumption of nutmeg exceeding the “toxic level” may bring negative effects on health because it acts as neurotoxic<sup>11</sup>.

In higher doses, it acts as a delirigenic narcotic, although it is rarely abused as a drug, often from mere curiosity. In lower doses, the drug manifests itself as an effective narcotic, disrupting the qualitative level of consciousness (so-called deliriant) because it acts as an anticholinergic. In addition, intoxication is long-term and debilitating, residual discomfort and headaches may last for several days. The manifestations of intoxication have three phases: phase I (2–5 hours after ingestion of effective dose): the possibility of light aggression, nausea or vomiting, redness, skin swelling, blurred vision, ataxia, and obscured speech. Phase II (9–12 hours): euphoria or dysphoria, dullness, indifference, disruption of short-term memory, cloudy consciousness, disorientation, illusion, dream visions, rigidity, overall weakness, disturbed perception of time (extremely slow), deformation of image, time, space, reconnection of the past (flash of memories of the past that one has almost forgotten), when the eyes are closed kaleidoscopic (sometimes colourful) patterns and other visuality, the prolongation of the reaction time. Phase III (12–24 hours): exhaustion and depression, partial amnesia, long sleep, stubborn headaches and joint aches, weariness, and lassitude<sup>12</sup>. The fading of the effect may take much longer.

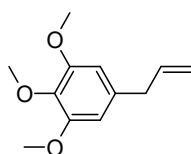
However, as Andrew T. Weil<sup>9</sup> writes: „... persons who use narcotics are often willing to suffer extreme discomfort along with the pleasant effects produced by drugs ...“, because the Aldous Huxley’s requirements<sup>13</sup> set for

ideal drug (he says narcotic): „What is needed is a new drug which will relieve and console our suffering species without doing more harm in the long run than it does good in the short. Such a drug must be potent in minute doses and synthesizable. ... It must be less toxic than opium or cocaine, less likely to produce undesirable social consequences than alcohol or the barbiturates, less inimical to heart and lungs than the tars and nicotine of cigarettes. And, on the positive side, it should produce changes in consciousness more interesting, more intrinsically valuable than mere sedation or dreaminess, delusions of omnipotence or release from inhibition“, has never been met, as while the expected high will come a few hours after taking 5–15 g of ground nuts (1–3 nuts), we can see already a toxic overdose after ingestion of 5 g (ref.<sup>14</sup>).

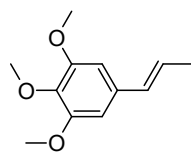
Many clinical cases of poisoning were described. One is the case of an 18-year-old student who complained of palpitation (increased awareness of the heart rhythm, often associated with a feeling of unusually fast, slow or irregular rhythm), drowsiness, nausea, dizziness, thirst and dry mouth. She was very anxious, restless, and upset and described as if “in a trance state”. Specifically, she felt “like a devil in a box who wanted to get out” but didn’t have hallucinations. She did not complain about urinary or abdominal problems or seizures or migraines. Denied any suicidal thoughts<sup>3</sup>.

As the second of many described cases, let’s mention a case of a 25-year-old white man who, after poisoning, felt such thirst (polydipsia) that he drank 5 litres of water (or even his own urine) per hour, at which the doctors were diagnosed with chronic psychosis (Chronic Nutmeg Psychosis) with a very bad prognosis<sup>14</sup>. The effects differ in different people. Many are described in serious and grey literature.

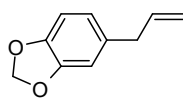
Among the main content of nutmeg and its fruits are reported elemicin, isoelemicin, safrol, myristicin, eugenol, 4-terpineol, sabinene,  $\alpha$ - and  $\beta$ -pinene, and many other terpenes, phenols, lignans and other substances<sup>5,15</sup>.



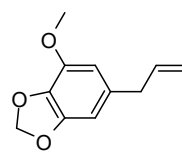
elemicin



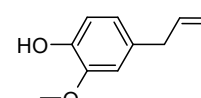
isoelemicin



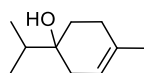
safrol



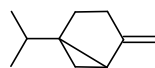
myristicin



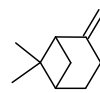
eugenol

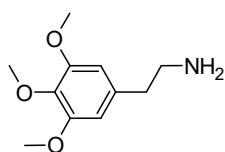


4-terpineol

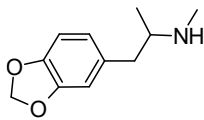


sabinene

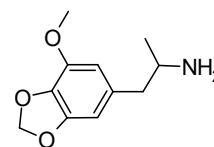
 $\alpha$ -pinene $\beta$ -pinene



mescaline



MDMA



MMDA

However, if we look at the first four and compare their structural patterns with mescaline and MDMA (ecstasy, molly, mandy, 3,4-methylenedioxyamphetamine), and MMDA (3-methoxy-4,5-methylenedioxyamphetamine), some similarity can be found.

The literature considers myristicin (4-methoxy-6-(2-propenyl)-1,3-benzodioxol), which is the most abundant component of the nutmeg (up to 12 %), as the main biologically active ingredient of the “nut”<sup>11,16</sup>. The same source believes that myristicin transforms in the body to MMDA, described by Shulgin<sup>17</sup>, which, however, later sources do not confirm<sup>18</sup>. Rahman<sup>11</sup> further writes that myristicin is a weak inhibitor of monoamine oxidase<sup>19</sup>.

While other components of the nutmeg tree (linalool, safrol, isoeugenol, and eugenol) are (remotely) structurally similar to the agonist serotonin that could be responsible for some cardiovascular symptoms<sup>3</sup>. It is also possible that myristicin only emphasizes an existing mental disorder<sup>14</sup>. It also acts as an anticholinergic, antiallergic, anti-inflammatory, cytoprotective substance and affects the function of several enzymes<sup>20</sup>, and may be beneficial in ulcerative colitis<sup>21</sup>. In addition to nutmeg, myristicin is also included in the tissues of carrots, dill, basil, cinnamon and parsley<sup>22</sup>, citrus<sup>23</sup> and other plants, and is a naturally occurring insecticide and acaricide.

Together, the above information could currently emphasize existing and serious gaps in the field of food chemistry and could help emphasize the need for further research on the adverse health effects potentially associated with food consumption containing alkenylbenzenes, alkylphenols and related substances.

We bring this communication as another contribution to a series of textbooks describing various interesting aspects of the chemistry of natural substances<sup>24-26</sup>, also because we want to respond to the number of fictions, half-truths and nonsense that are spread around the natural compounds today. It is clear that the exploration of natural substances as renewable substances is one of the ways to contribute to general well-being<sup>27,28</sup>.

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