



# Ethnobotanical Leaflets

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## Atropa belladonna: The Deadly Nightshade

By Stephen Howser

What might a person bothered with intense gas, or flatulence to be blunt, do in today's society? Perhaps they would visit a type of "health food store" for a type of common natural remedy. Often, the managers at such stores recommend that comfrey tea be taken to relieve the problem. However, after taking just such a concoction of the tea powder and water, one man became light-headed, agitated, confused and had problems urinating. His pupils became dilated, he had a rapid heartbeat and warm dry skin. After admitting himself to the hospital, the doctors concluded that his comfrey tea was "contaminated" by *Atropa belladonna*.....the deadly nightshade.(11)

This very poisonous plant acquired its name from Theophrastus back in the third century B.C. It has been termed "the Mandragora of Theophrastus." Its English name, Dwaule, is derived from a Dutch word *dwaul*, meaning to wander or to be delirious.(1) It is a perennial herb, and one of the more important species of the nightshade family. Because it is so poisonous it was given the name *Atropos*, which is the Greek word for inflexible. Another meaning is that it refers to "one of three Fates who cut the thread of life."(2)

Taxonomically, *Atropa belladonna* is classified in the Solanaceae, a family that also includes the common potato, tobacco and chile pepper. This species probably came originally from southern Europe and Asia, but is today naturalized in many parts of the world. The plant itself stands between two and six feet in height. Its green berries change to a shiny purplish-black as the plant matures. Some people say the berry is sweet and others say its bitter tasting, but all agree that the size is like the common cherry. To many, the entire plant has a very nauseating odor. The plant also has a thick root, a five-lobed calyx, leaves that are simple, ovate and alternate, and solitary bell shaped flowers.

Today, belladonna is a very important plant to science and the medical field because of its chemical content. Dioscorides knew of the active constituent of this species in the first century, but it wasn't "discovered" for another eighteen hundred-years. In 1809, the chemical was isolated and by 1819 it was classified an "alkaloid." Today, we know that belladonna contains atropine, scopolamine and hyoscyamine. According to the U.S. Pharmacopoeia, "atropine is extremely poisonous."(2) It is so potent that a dilution of only 1 part in 130,000 parts water is sufficient to dilate the pupil of a cats eye.(9)

All parts of the plant contain alkaloids, but the highest content is in the ripe fruit and the green leaves.

Belladonna is harvested wild in some places. In the United States, the plant is cultivated in Pennsylvania, Ohio, California and Wisconsin. Some farms even export to Europe. The seeds are extremely small. As many as 10,000 plants will germinate from one or two ounces of seed (about 40 grams), an amount sufficient to cover an entire acre of land with a spacing of 2 X 2.5 ft. plots(6).

The plant requires rich, moist soil, plenty of fertilizer and a weed free environment. It is usually high yielding but is susceptible to wilt disease and damage from the potato beetle and flea beetle.(3)

Harvesting of the plant is done when it is in full bloom. The first year only one crop is obtained. The years to follow yield two or three crops. By the end of the third year the plants are generally uprooted as no further increase in alkaloid content will be attained.(6)

As noted before *Atropa belladonna* is extremely poisonous. However, some grazing animals eat the plant and berries without having ill effects, but humans who eat the meat of such animals can become seriously ill. People who handle the plant can have the poison absorbed through their skin. Those that come in direct contact with the sap may experience severe dermatitis as well.

After ingestion of this plant, humans experience rapid heart beat, fits of laughter and inability to urinate. (8) The overdose level is only 600 mg taken orally. Any level below this may also cause dilated pupils, dryness of the mouth, nausea, vomiting, depression, increased heart rate, muscle failure, delirium, exhaustion, hallucinations, general paralysis, coma and even death due to respiratory failure. All of this may start to take effect within only a half an hour after ingestion.(3)

With all of these "bad" effects to humans the question of why this plant is still around is a good one. The reason being that there are so many uses for the plant, both good and bad. The Romans used the plant as a type of "weapon" to contaminate their enemies food reserves.(1) Others think that the famous Bacchanalian orgies in which women would tear off their clothes, go into frenzied dances and literally throw themselves to waiting men could not have been induced by alcohol alone, knowing that *A. belladonna* was present during their rituals. The coming of Christianity forced such rituals underground, and this is when the sorcerers' and witches brews began to appear.(9) One use was for surgeries. When a concoction of hemlock, mandrake, *A. belladonna* and henbane (known as "sorcerers promade") was applied to the skin it produced a type of unconsciousness before operations were performed.(5)

There is also a legend that the Scottish army defeated the Danes by putting belladonna in the enemies liquor supply. They waited until all fell into a deep sleep, and then murdered the helpless enemy. The plant was also used as a cosmetic by Spanish and Italian women to dilate their pupils, but, of course, only very dilute solutions were used for these purposes. This use of the plant for the dilation of the pupil is still very important in the field of ophthalmology. The other active chemical agent, scopolamine was added to morphine in 1902 to cause a trance called "twilight sleep" to lessen the pain and the mortality of childbirth. This chemical was also the infamous "truth serum" that was used in so many legal battles and court cases of days past. The only problem is that this "serum" may still be used in some countries

for "brain-washing". During World War II, the Germans invented a type of nerve gas that was odorless, colorless and very deadly. The only antidote to prevent the paralyzing effect of this gas was atropine. Luckily the German gas was never used in combat.(9) A more recent use of atropine as a life saving device occurred in Tijuana, Mexico, in 1967. Many people were poisoned by a deadly insecticide (parathion) when they ingested bread exposed to the chemical. Atropine was once again a major factor in saving many lives.

Atropine has been used in more recent times to cure a number of medical problems, including asthma, bradycardia (slow heart beat), whooping cough, gastric ulcers, hay fever and, most importantly, for the treatment of the tremors and paralysis of Parkinson's disease.

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