

Recreational Use of Ergoline Alkaloids from *Argyreia Nervosa*†

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This article is a review of the botany and chemistry of *Argyreia nervosa* (a relative of the common morning glory), and of the recreational use of ergoline alkaloids found in its seeds. In addition to the scientific literature dealing with this recently discovered hallucinogen, the popular literature of the drug culture has been exhaustively searched for reports of its use. This information has been supplemented by self-experimentation and by reports from a panel of volunteers.

This author's interest in *Argyreia nervosa* seeds had been stirred some time ago on seeing them for sale in a head shop. Preliminary investigation revealed that the entire literature on the hallucinogenic use of these seeds was limited to some hundred papers and references — a manageable number. And, fortunately, the seeds were inexpensive and legal to possess.

BOTANY OF

ARGYREIA NERVOSA (BURM. F.) BOJER

A charming look at "*Argyreia nervosa*. Elephant Creeper. Natural Order, Convolvulaceae" is provided by Lena Lewis (1878) in her *Familiar Indian Flowers*. In the text facing the picture (reproduced here as Figure 1),

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Figure 1. The first published plate of *Argyreia nervosa* appeared as a full-page illustration in *Familiar Indian Flowers* by Lena Lewis (1878).

she stated:

The English name of this plant gives a very fair idea of the size and magnitude to which it grows. Ferminger has briefly described its luxuri-

ant and massive growth as follows: "It is quite unmanageable in a garden unless it can be trained up some tree or outhouse." . . .

It is a native of forests and hedges, and is one of the largest species of convolvulaceae known.

The leaves are heart-shaped, and grow to a large size; they are smooth on the upper side, with parallel veins, and have a beautiful silky down underneath. The stems also are covered with silky down, and are of a pretty cream colour.

The umbels of the flowers are deep and very large. They generally grow in bunches, and the "bractes" "many, large, oval, white, waved, pointed, and caducous." (Roxb.)

It is these white, crinkled-looking bractes which are one of the characteristics of the plant. They form a beautiful contrast to the dark handsome flowers.

It blossoms in Bengal during July and August, and seeds profusely.

I have seen it growing over a skeleton shed made of cross bars of wood, but during the time it was at the height of its perfection the shed had the appearance, when inside, of being thickly thatched, from the luxuriant and heavy growth of this plant.

During the cold weather it casts its leaves and looks equally bare and deplorable.

More formal treatment was given by Ooststroom (1953, 1943) in his exhaustive monographs on the Convolvulaceae. In the 1953 paper, he provided in the key to the species (*Argyreia*) the following information as sufficient for identification of *A. nervosa*: "1. Limb of corolla entire or shallowly lobed . . . 2. Bracts soon caducous, small or rarely large, occasionally a casual foliaceous bract in the cyme. 3. Leaves deeply cordate at the base, densely white-tomentose beneath, glabrous or nearly so above. Bracts large and broad, outer ones ovate to oblong or elliptic, long and narrowly acuminate."

Five other diagnoses, each one of which casts a somewhat different light on the plant, are to be found in Chao (1970), McJunkins, Thornton and Dillon (1968), Maheshwari (1963), Degener (1934) and Dymock (1885). Chao (1970) also gave a review of the taxonomy and nomenclature of this plant.

Information on its range was given by Chao and Der Marderosian (1973), Grubber (1973), McJunkins, Thornton and Dillon (1968), Ooststroom (1953), Degener (1934), Prain (1903), Dymock (1885) and Lewis (1878). It is native to India, but is now grown in many other tropical countries and is also cultivated in Hawaii,

southern California and Florida. Illustrations are to be found in Emboden (1979), Unsigned (1979), Schultes (1978, 1976), Ott (1976), Axton (1975), Gottlieb (1975), Mann (1974), Chao (1970), McJunkins, Thornton and Dillon (1968), Degener (1934) and Lewis (1878).

Popular names in various languages are given in a number of references, most notably Mann (1974), Chao (1970), McJunkins, Thornton and Dillon (1968), Maheshwari (1963), Ooststroom (1953), Degener (1934), Prain (1903) and Dymock (1885). The popular name most commonly used in the United States is Hawaiian baby woodrose. Apart from its garden cultivation for ornamental purposes, there are three economic uses of *Argyreia nervosa*. The major one is actually not economic in the strict sense of the term, but horticultural. This is the use of the dried seed capsules (which have a fanciful resemblance to a rose, hence "woodrose") in floral displays. The second use is that of the seeds as a hallucinogen. Finally, the plant has had use in the folk

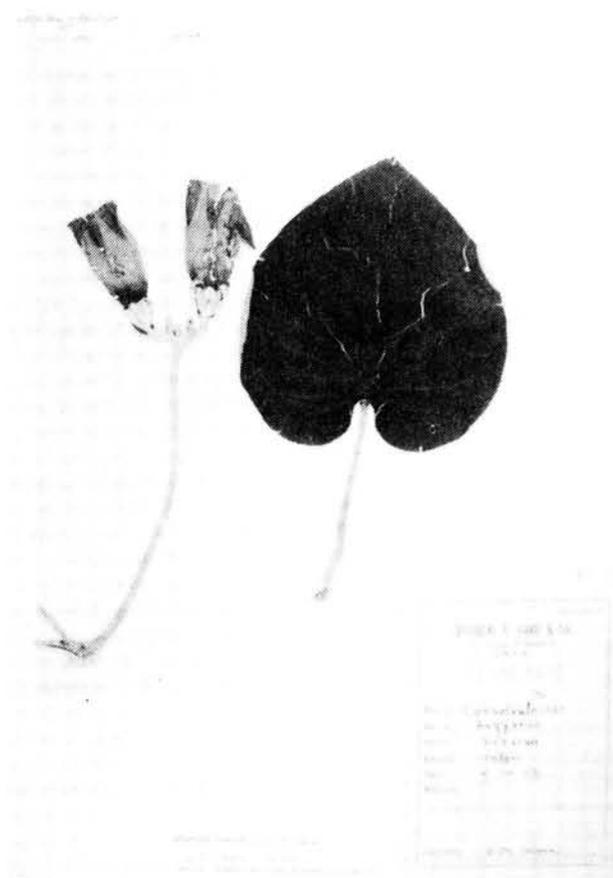


Figure 2. Specimen of *Argyreia nervosa* from the Economic Herbarium of Oakes Ames, Harvard University Botanical Museum. It was collected in Indore, India, by L.M. Solanki on February 10, 1968.



Figure 3. Otto Degener's drawings of *Argyreia nervosa* from his *Flora Hawaiiensis* (1934).

medicine of India. Dutt (1887) reported, "The root of this plant is regarded as alterative, tonic and useful in rheumatic affections, and diseases of the nervous system." Dymock (1885) also said, "The large leaves, which have the under-surface covered by a thick layer of silky hairs, afford a kind of natural impermeable piline, and are used as a maturant by the natives. With regard to the alleged blistering properties of the upper surface of the leaf there must be some mistake, as I find it has no effect when applied to the skin."

CHEMISTRY AND EFFECTS OF THE SEEDS

The Hawaiian baby woodrose entered the drug scene in 1965 with the publication of a paper in *Science* entitled "Ergoline Alkaloids in Tropical Wood Roses" by Hylin and Watson. The wide circulation of this journal assured thorough dissemination of the information they

presented. They wrote, "The possible health and legal problems associated with the presence of similar compounds in commercially cultivated plants led us to examine the ornamental wood roses, *Ipomoea tuberosa* L. and *Argyreia nervosa*, both common Hawaiian crops that have assumed commercial importance as components of dried tropical flower industry." Comparing the seeds of these two plants with those of the morning glory varieties Pearly Gates and Heavenly Blue, they found the following yield of alkaloids (mg of alkaloid/g of seed material):

Heavenly Blue	0.813
Pearly Gates	0.423
<i>I. tuberosa</i> L.	0.000
<i>A. nervosa</i>	3.050

"The seed of *A. nervosa* is the best plant source of ergoline alkaloids discovered; it contains approximately 3 mg of alkaloidal material per gram of seed. Approximately one-eighth of this is lysergamide. Since the small wood rose is easily and commonly cultivated it appears to be a most useful tool for studying biosynthesis of these substances in plants."

Hylin and Watson found the major alkaloidal constituents in *A. nervosa* seeds to be ergine (780 mcg/g of fresh seed) and isoergine and penniclavine (555 mcg). In 1968, McJunkins, Thornton and Dillon identified these same alkaloids. The major study of the alkaloids in these seeds was done by Chao (1970); see also Chao and Der Marderosian (1973). The former is an indispensable reference for anyone interested in the subject. Using thin-layer chromatography (Niwaguchi & Inoue 1969; Genest 1966, 1965) and paper chromatography, 19 indole alkaloids were identified in the seeds.



Figure 4. Seeds of *Argyreia nervosa* bought in June 1981 from Swamp Fox Herbs, Houston, Texas.

How does the activity of woodrose seeds compare to LSD? LSD has very strong psychic effects in minute quantities (in the range of 50 or 100 mcg to perhaps 400 or 500 mcg, according to Grinspoon and Bakalar 1979), while other ergoline alkaloids have similar effects though in larger doses.

Bigwood et al. (1979) have documented the effects of ergonovine, and Ott and Neely (1980) the effects of methylergonovine, to name just two of the related alkaloids. Doses for the first ranged from 3.0 to 10.0 mg, with active doses found to be between 5.0 and 10.0 mg. For the second, a dose of 2.0 mg was found to be as effective as 10 mg of ergonovine. This is about a fortieth the potency of LSD, but the somatic effects overshadowed the psychic ones. As Ott and Neely said, "Accordingly, neither drug seems at all likely to displace LSD in the recreational drug scene."

Brown (1972), citing Hoffer and Osmond (1967), stated, "The amide is about one-tenth as active as LSD." Hofmann (1963) stated, "According to the results of experiments performed thus far with pure alkaloids, it appears as though d-lysergic acid amide, elymoclavine and lysergol and possibly also d-isolysergic acid amide are mainly responsible for the psychic effect of ololiuhqui." With the high concentration of lysergic acid amide and isolysergic acid amide in the seeds of *Argyrea nervosa*, along with some elymoclavine, it should come as no surprise that these seeds are strongly psychoactive.

DOSAGE-RESPONSE STUDY

In reading the popular literature of recreational drug use, one finds a rather wide range of recommendations for the proper dose of *Argyrea nervosa* seeds, as well as much erroneous information. A suitable subtitle for the popular literature section might be Old Wives' Tales, so strange are some of the things found in it concerning dosage and precautions. The information gleaned is quoted here:

Usage: Seeds are removed from pods, white layer is scraped or singed from seed coat, and seeds are ground and consumed or soaked in water, strained and drunk. Dose 4-8 seeds *Effects:* LSD-like experience with extreme lassitude. Nausea may be experienced during first hour or two. Total experience lasts about 6 hours. Tranquil feelings may continue for 12 or more hours afterwards. *Contraindications:* Pregnant women or persons with history of liver disorders should not take lysergic acid amides.

— Unsigned (1973)

The average dose was five seeds. . . . Larger amounts, however, are not recommended since uncomfortable physical effects might occur. . . . The outer coating of the seeds must be scraped or sanded off before ingestion.

— Unsigned (1979)

. . . only 4 to 8 Baby Hawaiian Woodrose seeds are needed to produce hallucinosis. It is thought that if the white layer on the surface of the seeds is not removed, users will experience vomiting. There is no evidence that this layer is more toxic than the rest of the seed. As with the common morning glory, these seeds are poisonous in high doses.

— Axton (1975)

The usual dose is about four-eight seeds which are removed from their seed pods and the outer white layer scraped away. The seeds are now eaten whole or ground and soaked as with morning glory seeds. The seeds produce an acid like high which lasts for about five-six hours.

— French (1976)

. . . four to eight Hawaiian baby woodrose seeds are equivalent to 100 micrograms of LSD.

— Grinspoon & Bakalar (1979)

The seeds (containing lysergic acid amides) are much larger than the common morning-glory, and it only takes about four to eight of them to get off.

— Kowl (1978)

The dose of baby Hawaiian wood rose seeds commonly employed by members of the psychedelic subculture is 4-8 seeds. Each round pod contains four seeds. The standard procedure is to scrape or singe the white layer from the seed coat before grinding. This layer is believed to contain a strychnine-like alkaloid which may cause undesirable symptoms. Many people suffer nausea during the first hour of a wood rose experience. If the body wishes to vomit, it should be allowed to do so. We recommend starting with no more than two seeds.

— Mann (1972)

Dosage: 4-8 seeds. The seeds are 2-3 times more potent than Hawaiian Wood Rose, Large, but the seeds are smaller. *Administration:* Orally. Remove the seeds from the pod. The fuzzy coating of the

seeds contains strychnine and should be removed either by being burned off in a candle flame or rubbed off with sandpaper or a toothbrush. The seeds can be chewed and swallowed, or pulverized and mixed with a liquid, or put into gelatin capsules. *Effects*: Similar to LSD, although the psychedelic effects are milder and the uncomfortable physical side effects are more severe The potency [of lysergic acid amide] is about one-tenth that of LSD

— Margolis (1978)

As little as two grams of seeds [approximately 20] produces hallucinogenic effects not unlike LSD, which persist for 8 hours or more. The seeds must be ground prior to ingestion, for if swallowed whole poor digestion and absorption will vitiate the effects.

— Ott (1976)

This one [*Argyreia nervosa*] comes four to a pod, the ordinary dose. The best procedure here is to scrape or singe the white layer from the seed coat before grinding it for consumption, since this layer is believed to contain a strychnine-like alkaloid which may cause undesirable symptoms. . . . The ingestion of morning glory or baby Hawaiian wood rose seeds may cause vomiting. If the user feels so impelled, he or she should be allowed to throw up.

— Stafford (1977)

The immature seeds of Hawaiian baby wood rose contain lysergic acid amides. They also contain a small amount of strychnine (not enough to be injurious) and several other alkaloids Four to eight seeds is the usual dose. Remove seeds from pods. The fuzz which coats the seed contains a lot of strychnine and should be removed. This can be accomplished either by scrubbing it off with a toothbrush or by inserting a long needle into the seed and thoroughly singeing the outer coating in a candle flame for several seconds. The seeds can then be thoroughly chewed and swallowed or pulverized in a pepper grinder and put into large 000 size gelatin capsules. Wood rose seeds are best taken on an empty stomach

— Superweed (1970)

Because these seeds are so large, it only takes from four to eight to get the tripper on his way. The immature seeds from this plant contain a healthy

dose of lysergic acid amides, strychnine, and several other alkaloids Preparation of a dose requires two pods (there are four seeds in each). When removed, the seeds are found to be coated with a white fuzz containing strychnine and can be mildly sickening if eaten. Washing and scrubbing the seeds with a toothbrush or nailbrush will remove the fuzz (don't forget to wash the toothbrush before using it again). Cleaned seeds can then be chewed thoroughly and swallowed. The seeds may be ground to a powder with any appropriate kitchen appliance and put into large gelatin capsules. A Hawaiian baby wood rose trip can last for hours or days. . . . High doses should be avoided unless the tripper is prepared to say aloha forever.

— Young et al. (1977)

Some of the foregoing information seems more than passingly strange. None of the commercial seeds that this author has seen have a fuzzy white coating. They are brown, smooth, hard and somewhat shiny (as described, for example, by Chao 1970). Size of the seeds is not, of course, the key to their potency, rather it is the high concentration of ergoline alkaloids found in them. Strychnine is not mentioned in the consulted scientific literature as having been found in any of the convolvulaceous plants studied. Where the idea came from that immature seeds should be used is a complete mystery. On the other hand, there is some good advice in these words. Certainly, grinding up the seeds to make their contents available to the digestive system is an excellent suggestion.

The most satisfactory way to arrive at the proper dosage appeared to be the conducting of experiments with a panel of volunteers. It was decided, based on this author's past informal experience with *Argyreia nervosa* seeds, to have each panel member work through a series of four sessions, beginning with two seeds, then four, six and eight. Pairs of seeds were ground in a Chef® pepper mill and put into 00 gelatin capsules; thus, for the first experiment, one capsule would be taken, two capsules for the second, and so on. These capsules were prepared for the panel members immediately before distribution.

Panelists were asked to keep the capsules frozen and to conduct the experiment as expeditiously as possible, to avoid loss of strength of the powdered seeds through oxidation, heat or light. The intervals between doses had to be long enough to prevent build-up of tolerance, for as Grinspoon and Bakalar (1979) said, "Tolerance (resistance to the drug effect) develops quickly — within two or three days — and disappears just as fast"; see also

Zentner (1976). As there was a bit of variation in the yields of the seed pairs, panelists were asked to balance large and small capsules for the most even dosage.

Each participant was given four copies of a questionnaire. The questions concerning the physical and psychic effects were based on observations reported in the literature (e.g., Shulgin 1980; Zentner 1976), and from personal and anecdotal experience.

RESULTS & CONCLUSIONS

Of the six sets of questionnaires given out, only two complete sets were returned: one by this author and one by a man who had been one of Timothy Leary's experimental subjects in the 1960's. Four other individual questionnaires were returned by three persons: two from one of them and one each from the other two. While this was less experimental material than had been desired, it probably represents the most possible, considering the conclusions set forth below.

The average weight of the seeds was determined with an Olhaus® Triple Beam Balance to be 100 mg, in accordance with the findings of Chao (1970). After converting the reported body weights to kilograms and dividing this into the dose in each case, a range of 1.77 to 9.80 mg/kg was found. The specific values were: 1.77, 2.38, 2.48, 3.15, 3.54, 4.74, 4.96, 5.31, 6.44, 7.02, 7.35 and 9.80.

First, the data were examined to see if the results might have been influenced by factors other than the dosage. Time since last meal ranged from three to eight hours, averaging 4.4 hours — certainly long enough so that food would not interfere with rapid alkaloid absorption by the digestive system. Mood was relatively uniformly elevated, never being characterized as worse than "neutral," an important factor in the so-called *set* of an experimental subject. The *setting* was in all cases, but one, the subject's home. All were males, ranging in age from 27 to 46.

Nausea proved to be a very large factor in the experience: Seven of the 12 questionnaires reported it and those that did not were at the low end of the dosage range. All questionnaires indicated physical symptoms in the stomach even when not characterized as nausea. Where there were physical symptoms, this was the first reported, with the time to onset ranging from 10 to 120 minutes (average, 45 minutes). The only cramping reported was at 7.35 mg/kg, where the subject noticed a very slight cramping at one spot in the gut 9.5 hours into the session.

"Speedy" feelings were reported only at the two highest dosages (both by the same individual, who also reported excitement at these levels). No euphoria was

reported except by one subject (dosage 6.44) who said it came in "rushes."

The "psychedelic" effects reported at low doses were seeing enhanced colors and the visualization of patterns in both plain and textured surfaces. These phenomena were so scattered by dose and by subject that no conclusions could be drawn. At the highest three dosages, colors were important, but the general constellation of effects apparent with even moderate dosages of LSD (125 mcg) never appeared.

The lowest dosage at which a comparison with LSD was made was 3.54, where the subject likened the experience to that expected with 25 mcg of LSD or less. At 5.31 and 7.02, the characterization was "less than 75 mcg of LSD"; at 7.35, "compares with 100 mcg in physical symptoms." The conclusion based on these questionnaires is that the experience in this range of dosages is not much like what LSD produces. This author did, however, notice slight urgency of urination at the highest dose taken; this is a characteristic of LSD. A woozy feeling was also noticed at the three highest doses taken, rather like being drunk — a symptom not characteristic of LSD (e.g., Shulgin 1980).

Based on the questionnaires, the experience was interesting to the subjects but mildly distressing physically, and one that no one would probably want to repeat, as the rewards were so small compared to the discomfort for most of the subjects. There is indication in anecdotal material that there may be some variation in the seeds of *Argyrea nervosa*. One of the other subjects and this author tried doses in the six to seven milligrams per kilogram range a couple of years ago (using seeds from a different source) with no nausea and a pleasant though nonpsychedelic experience. On the other hand, another informant said that he and five friends each took 200 mg and suffered strong nausea, with the informant vomiting. The seeds used in the present experiment seem to fit in between these two extremes and the results cited here are probably a reasonable summary of what other users might expect.

PATTERN OF USE IN THE UNITED STATES

There is no traditional use for the seeds of *Argyrea nervosa* as there is for *Ipomoea violacea* and *Rivea corymbosa*. In India, other parts of the plant were used in folk medicine for physical complaints, but no mention is made of the seeds (Dutt 1887; Dymock 1885). Current recreational use seems to date from 1965 when the widely read Hylin and Watson article, "Ergoline Alkaloids in Tropical Wood Roses," appeared. To quote Geller and Boas (1969): "Hippies avail themselves

SOLD FOR GROWING PURPOSES ONLY.

Hallucinogenic

HAWAIIAN BABY WOODROSE SEEDS

Grown in tropical areas, Baby Wood Rose Seeds are known by the natives as a strong hallucinogen and have been used for many years in religious and other ceremonies. Below information is quoted from Legal Highs published by the High Times Press.

HAWAIIAN WOOD ROSE, BABY (*Argyrea nervosa*)
Material: Seeds within round pods of climbing plant found in Asian and Hawaiian forests.

Usage: Seeds are removed from pods, white layer is scraped or singed from seed coat and seeds are ground and consumed or soaked in water, strained and drunk. Dose 4 - 8 seeds.

Active Constituents: D-lysergic acid amide and related compounds.

Effects: LSD-like experience with extreme lassitude. Nausea may be experienced during first hour or two. Total experience lasts about six hours. Tranquil feelings may continue for 12 hours or more.

Contraindications: Pregnant women or persons with history of liver disorders should not take lysergic acid amides."

Herbal Highs published by Stone Kingdom Syndicate has these comments:
 "Four to eight seeds is the usual dose. The seeds can be thoroughly chewed and swallowed or pulverized in a pepper grinder and put into a large 000 size gelatin capsule(s).
 Woodrose seeds are best taken on an empty stomach. A peaceful environment is important! You will probably enjoy the trip best alone or with someone with whom you can have an undisturbing and quiet relationship."

WE SELL THESE SEEDS FOR GROWING PURPOSES ONLY! NO OTHER USE IS IMPLIED OR INTENDED.

20 SEEDS/\$3.00 or 40 SEEDS/\$5.00

Figure 5. Head shop package insert for *Argyrea nervosa* seeds actually sold for recreational use.

of the research reports of naturalists and pharmacologists filed in local libraries. They are quick to appropriate such findings. For example, the flowers of the Scotch Broom plant — a plant that grows extensively along highways and in empty fields — were also discovered to be a good substitute for marijuana. Another recent discovery reported that Hawaiian woodflowers [sic] were psychedelic."

With the extensive press coverage that had been given to morning glory seed usage, it was hardly surprising that *Argyrea nervosa* soon came into great demand among the "hippies" for recreational use. As French (1976) said, "One person we know tried to order from a number of Hawaiian suppliers by telephone (with a fake credit card number, of course) and received a variety of responses from people simply hanging up to 'sorry, all out.' Finally, one supplier said, 'Gee, I am all sold out to the mainland again this season. Man, there must be one heck of a lot of Wood Rose Plants growing in California.'"

The seeds used in the present research project came from Swamp Fox Herbs of Houston, Texas. The information sheet that came with them included the statement: "World-wide production of baby woodrose seeds is said to be only about 300 lbs. annually." At the prices charged by this firm, 300 pounds represents a market value between \$100,000 and \$200,000.

In addition to suggesting the use of *Argyrea nervosa* seeds directly as hallucinogens, "underground" publications have told how to use the ground seeds as starting

material for the manufacture of LSD (Gottlieb 1977, 1975; Smith 1976; Unsigned No date). Another (Superweed 1972) gave instructions for "increasing the lysergic acid content in morning glories and Hawaiian baby wood roses" by proper feeding of the plants. (Actually, anyone interested in the possibilities of changing the level of alkaloids in the living plant should consult Dobberstein and Staba 1969). For those who do not wish to delve too deeply into the chemistry, there are instructions for extracting the lysergic acid amides from the seeds with lighter fluid and methanol (Darth 1977). Of course, even this does not always produce a "good trip," as Eileen and Richard (1977) remarked: "We recently followed the recipe for extraction of lysergic acid amides from Hawaiian wood rose seeds. . . . After about an hour and a half, we both became incredibly weakened and nauseated for five or six hours. There was little psychedelic effect."

Naturally, this "misuse" of the seeds did not escape official notice. California forensic scientists McJunkins,

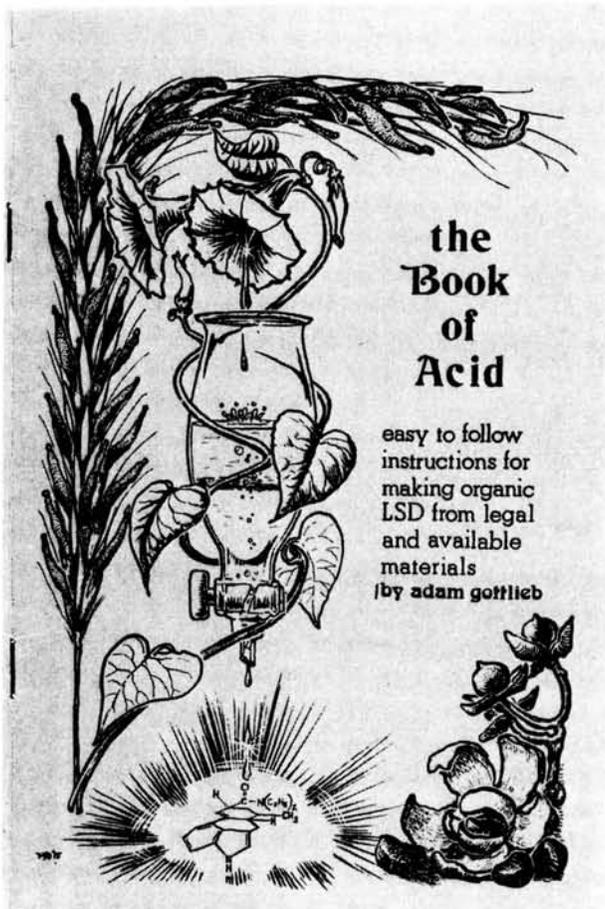


Figure 6. Cover of *The Book of Acid* (Gottlieb 1975), showing the seed capsule of *Argyrea nervosa* (lower right corner).

Thornton and Dillon commented in their 1968 article: "The recent legislation on both the Federal and local level regulating the possession and sale of certain hallucinogenic drugs has given rise to an increased utilization of available natural products by drug users. . . . Recently, a number of cases have been submitted to the authors' laboratories involving the usage of seeds of a tropical wood rose, *Argyrea nervosa*. Many of these cases involve juveniles seeking hallucinatory experiences through ingestion of the seeds." Der Marderosian (1968) also remarked, "However, as legislation has restricted the availability of LSD and some of the other synthetics — so will the use of some of the readily available euphorogenic botanicals rise."

Apparently, the authorities were not slow to act in the case of *Argyrea nervosa*. Kowl (1978) said, "An embargo was placed on the importation of this plant into the continental U.S. to curtail its use as a psychedelic and as a source of LSD manufacture, but the seeds are currently available again from a domestic company at \$13 per 100." According to Emboden (1979), "Since then there have been several embargos, and a great deal of controversy over the propriety of shipping these fruit capsules and seeds throughout the world." To *High Times*, Jerry Graves wrote (1976), "I came across an advertisement in *High Times* for baby wood-rose seeds. Just what garden of delights is contained in these seeds? And is it really legal to buy and sell them?" The magazine answered in part, "As far as we know, there aren't any federal statutes restricting the sale of Hawaiian wood rose. But an embargo has been placed on its importation into the continental United States — apparently in response to growing use of the seeds on the West Coast."

Concerning the question of legality, Axton (1975) said, "Morning glory and woodrose seeds are legal to possess for normal horticultural use, but according to strict interpretation of the laws, when sold or consumed as a narcotic plant, or ground to a powder, they become illegal." (Note the caution on the head shop package insert reproduced as Figure 5 of this article.)

Yet the *United States Pharmacopeia XIX* (1975), in its Schedule I of Controlled Substances, lists lysergic acid diethylamide but not lysergic acid amide, nor does the latter appear in any of the other schedules. Neither is the amide a salt, isomer or salt of an isomer of LSD itself (the criteria for being included with a listed compound), so it seems excluded from the Controlled Substances list. Of course, the regulations are always subject to change, but there is no indication in the literature of any prosecution for the use of *Argyrea nervosa* seeds as a recreational hallucinogen.

Despite widespread interest in the seeds, actual usage does not appear ever to have been especially great and presently seems to be rather small. In 1976, Ott wrote, ". . . their use became popular on the West Coast and persists to this day . . ." Yet five years later (1981), he stated: "My impression now is that recreational use of *A. nervosa* reached its zenith in the late sixties/early seventies, was never extensive but rather served as a substitute, albeit a poor one, for LSD when it was scarce and other more desirable entheogens unavailable. Owing to the oxytocic effects of the ergolines, a psychoactive dose invariably would entail some degree of abdominal cramping in either sex. My recollection of my personal experience with *A. nervosa* includes an episode of sharp abdominal pains, such as I experienced with *I. violacea* to a much lesser degree." (This was presumably with the large dose of 20 seeds, judging from the information in his 1976 book, and therefore hardly surprising.)

The *Blotter* (Unsigned 1979) reported: "The fact that use of the seeds is not legally restricted in any way makes this substance particularly inviting. At various gatherings on the west-coast this year, several people were publicly selling a product called 'Utopian Bliss Balls.' The Bliss Balls were made from a mixture of ground-up baby Hawaiian woodrose, ginseng, damiana, gotu kola and bee pollen pressed into a date. The average dose was five seeds per ball. The high reaffirmed many people's belief again in the crystal clarity of LSD and reportedly invigorated the users so much that they felt like they had been on vacation for a day. Many described the Bliss Balls as falling somewhere in the range of potency between mushrooms and peyote. Larger amounts, however, are not recommended since uncomfortable physical effects might occur."

Certainly, a factor in the current low rate of use of the seeds is the present ready availability in the drug subculture of LSD. As long as quality LSD is readily available, it would appear that the recreational use of *Argyrea nervosa* seeds for hallucinosis will be confined to "nature-food" types and to those who, for some reason or another, are unable to buy LSD.

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