Chamaelirium luteum (L). GRAY

False Unicorn Root

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False Unicorn Root – *Chamaelirium luteum* (L.) GRAY.

1. **Taxonomy**

*Chamaelirium luteum* (L.) GRAY

Family: Liliaceae

Common names: False unicorn root, blazing star, devil’s bit, starwort, drooping starwort, unicorn root, star root, fairy wand, squirrel tails, grub root.


*C. luteum* is the only recognized species in the *Chamaelirium* genus (*The Plant List* 2010).

Note: *Aletris farinosa* L. (Family Liliaceae) is known as ‘true unicorn root’.

2. **Botanical description and habitat**

*C. luteum* is an herbaceous dioecious perennial – the female plant growing to 4 feet and the male plant rather smaller. The whole plant is glabrous, starting with a basal rosette of lanceolate or spatulate-shaped leaves, from which the flowering spike arises. The spikes bear small linear leaves, alternately arranged. *C. luteum* is thought to be a very long-lived plant, existing for several years in a juvenile or vegetative state (Meagher & Antonovics, 1982). The flowers, when they appear in spring, are small, greenish-white with six tepals, arranged in dense spike-like racemes. The longer male spike emerges first, but dies back after flowering. The female spike may last for 2-3 years. The fruit is a loculicidal capsule, with several seeds appearing in each locule. The light-brown rhizomes are compact and non-spreading, with tough wiry rootlets. The rhizome curves upwards at the tip – hence the name ‘unicorn root’, (Rural Action, 2005; Gleason & Cronquist, 1991; Allard 2003). Male plants tend to be far more numerous than females (Meagher & Antonovics, J., 1982).

*C. luteum* is native to the Eastern half of the USA, preferring bogs or damp soils in woodlands and meadows (Krochmal, Walters & Doughty, 1969). Due to loss of old growth forests and overharvesting for medicine, the current abundance and range of the species is much reduced (Soule, 2000; Martin, 2010, Allard, 2003).

**Part used:**
The rhizome and rootlets.
Helonias

N. False Unicorn Root.—O. The rhizome of *Chamælirium luteum* (*Helonias dioica*); *Liliaceae*.—H. North America.—D. Cylindrical, curved, with stem-scars on upper surface and occasionally with leaf-remnants at growing end, closely annulate in small pieces and more coarsely annulate in larger specimens, beset with long, wiry rootlets, which, however, are sometimes wanting in the drug; from two to seven cm. long and five to twenty mm.

Fig. 166-A. \hspace{1cm} Fig. 166-B.

thick; externally dark grayish-brown, internally whitish and horny; fracture abrupt, showing numerous wood bundles near center; odor peculiar, though weak, but readily perceived when the drug is bruised, and the taste bitter and acrid.—G. *Chamaelirin*, etc.—U. Tonic, diuretic and anthelmintic. Dose: 1 to 4 grams. (See Fig. 166-A.)

**Figure 1.** Reproduced from *Handbook of Pharmacognosy* by Otto A. Wall 1917. C.V. Mosby Co., St. Louis

3. Traditional use

**Traditional use in Appalachia**

People of Appalachia use *C. luteum* as a tonic, diuretic, emetic, sialagogue, emmenagogue, vermifuge, and antiscorbutic remedy (Millsbaugh, 1974). Over time, the herb has also become valued for strengthening the heart and for so-called “female conditions” (Crellin & Philpott, 1989).
Traditional use outside Appalachia

Native Americans
Native Americans have a legend that the bad spirit bit off part of the herb to diminish its power, and that is how it got the common name “devil’s bit”. The women used *C. luteum* to prevent miscarriages. They also used the herb for colic, worms and fevers, and learned through experience that chewing the root would ease coughing (Millspaugh, 1974).

Physiomedical
The physiomedicalists saw *C. luteum* as a general remedy and stimulating tonic because of its beneficial effect on various organs including the salivary glands, lungs, stomach, gallbladder, uterus and ovaries. It was used to stimulate the appetite, gastric and bile secretion, and bowel movements. The herb was valued for treating female disorders including prolapses, leucorrhea, menorrhagia, amenorrhea, mild hemorrhage and to prevent miscarriage. It was also utilized specifically for Bright's disease and diabetes (Cook, 1869). For Clymer, *C. luteum* was a miscarriage preventative remedy, as well as a nerve tonic which he used for irritability, nervousness, nervous indigestion and anorexia (Clymer, 1905).

Eclectic
Eclectics employed *C. luteum* for digestive disorders such as dyspepsia, colic, and loss of appetite (Felter & Lloyd, 1898-1900; Scudder, 1898). It was believed to be tonic for the sexual organs and was used for nocturnal emissions, leucorrhea, amenorrhea, dysmenorrhea, and to prevent miscarriage (Felter & Lloyd, 1898-1900; Scudder, 1898). It was well known as a uterine tonic, specifically for when the tissues were so relaxed that it feels like the contents of the pelvis were falling out of place (Felter, 1922). According to John Scudder (1898), it was used as a diaphoretic for colds, coughs, and other chest conditions. It was also used to assist in removal of intestinal worms (Felter & Lloyd, 1898-1900).

Homoeopathic
Distinctly a “female remedy”, Helonias (as it was previously known) is specific for melancholic individuals with pelvic weakness and prolapses, and for tonifying the uterus following miscarriage (Boericke, 1927).

4. Scientific Research

Phytochemistry

Triterpenoids
There have been very few phytochemical investigations of this species. In the late 19th century there were reports of the presence of a bitter glucoside in the roots of *C. luteum* which was named chamaelirin (Greene, 1878). In 1942 Russell Marker and his group isolated small quantities (0.1g / lb = 0.02% of dried root by weight) of the steroidal aglycone diosgenin from *C. carolinianum*, as false unicorn root was then known (Marker, Wagner, & Ulshafer, 1942). Secondary literature indicates the presence of glycosides of
diosgenin in addition to chamaelirin, including helonin (Bradley, 1992; Skenderi, 2003). An Australian group is currently conducting analytical studies of major saponins in *C. luteum* (Matovic et al., 2011). Two new steroidal saponins were characterized (chamaeliriosides A and B), containing a cholesterol-derived steroidal aglycone 23R,24S-chiograsterol B (Matovic et al., 2011). The aglycone has a polyhydroxylated cholestane-type core, structurally different from more familiar steroidal aglycones such as diosgenin, and the authors hypothesize the unusual molecular structure may be responsible for some unique biological activities associated with the species (Matovic et al., 2011). Subsequently, a second pair of saponins named helosides A and B were isolated. These are derived from the aglycone helogenin, which also has a polyhydroxylated cholesterene structure (Challinor et al., in press). Interestingly, no diosgenin-derived saponins were identified in these studies (De Voss, pers.comm.)

![Image of new saponins](image.png)

**Figure 2.** Newly identified saponins from *C. luteum*. Images courtesy of University of Queensland, Australia.

**Other constituents**
These include oleoresin, starch and calcium oxalate. Skenderi (2003) alludes to the possible presence of alkaloids, but no evaluation has been conducted.

**Pharmacology**
*C. luteum* was included in a poly-component ‘estrogen dietary supplement’ tested for antitumor activity for human prostate cancer using immunodeficient mice (Ng & Figg, 2003). The supplement demonstrated antitumor activity in both hormone-dependent and hormone-independent tumors, however it should be noted that *C. luteum* was a minor component in this formula (Ng & Figg, 2003).

In an *in vitro* screening investigation of botanical medicines for tumoricidal properties, only weak activity was revealed for *C. lutea* (Mazzio & Soliman, 2009).

**Clinical trials**
A study on herbal alternatives for menopause (HALT), a randomized double-blind trial using a multi-botanical formula including *C. lutea*, was recently established (Newton et al., 2005). Using relief of vasomotor symptoms (hot flashes) as an indicator, no benefits were found for any of the botanical treatments tested including the multi-botanical formula referred to above (Newton et al., 2006). No other published clinical trials were found in the literature review.
5. Modern Phytotherapy

Modern therapeutic use of false unicorn root reflects traditional indications, and it has proved to be a popular herb amongst British practitioners. It is described in the first volume of the British Herbal Compendium (Bradley, 1992) as being a uterine tonic and emmenagogue, useful for amenorrhea, dysmenorrhea and leucorrhea. It is also listed as being useful for menopausal symptoms and “threatened miscarriage due to atony of the uterus” - indications shared in the naturopathic literature (Kuts-Cheraux, 1953). *C. luteum* may arrest bleeding following the onset of contractions and hemorrhage (Westfall, 2001). Chevallier (1996) refers to it as a “modern gynecological remedy” that encourages a regular menstrual cycle, and also acts as an effective digestive tonic. To Priest and Priest (1982) it is positively stimulating in depressed function of the ovaries and uterus, while promoting appetite and assimilation. It helps to restore circulation and tone in uterine prolapse (Whitehouse, 1974). Trickey (2003) notes that false unicorn has a reputation for normalizing the follicular phase in the ovaries. It is also said to promote fertility, most likely through a hormonal influence (Mills & Bone, 2000), and has been used for ovarian cysts and endometriosis (Soule, 2000).

Despite these intriguing indications, modern practitioners have often discouraged use of *C. luteum* root due to difficulty with cultivation and the plant’s ecological status (Romm, 2010). Sustainable cultivation is an essential goal to allow for the continued use of this important Appalachian remedy.

**Table 1:** Modern phytotherapeutic uses of *C. luteum*

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>THERAPEUTIC INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emmenagogue</td>
<td>Amenorrhea, dysmenorrhea, irregular menstruation</td>
</tr>
<tr>
<td>Sialagogue</td>
<td>Pelvic congestion and inflammation</td>
</tr>
<tr>
<td>Reproductive tonic</td>
<td>Threatened miscarriage</td>
</tr>
<tr>
<td>Vermifuge</td>
<td></td>
</tr>
<tr>
<td>Hormone modulator</td>
<td></td>
</tr>
<tr>
<td>Emetic (large doses)</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Leucorrhea, atonic or prolapsed uterus</td>
<td></td>
</tr>
<tr>
<td>Ovarian cysts</td>
<td></td>
</tr>
<tr>
<td>Endometriosis</td>
<td></td>
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<tr>
<td>Anorexia, anemia, sterility, infertility</td>
<td></td>
</tr>
<tr>
<td>Menopausal symptoms</td>
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<tr>
<td>Dysfunctional uterine bleeding</td>
<td></td>
</tr>
</tbody>
</table>

(Bradley, 1992; Mills & Bone, 2000; Soule, 2000; Trickey, 2003; Morgan, 2011).

**Combinations**
Used with *Dioscorea villosa* L., *Viburnum opulus* L., and *Aletris farinosa* L. for threatened miscarriage

**Preparations and dosage**
1-2g as infusion or decoction
Fluid Extract. 1:1, 1-2ml three times daily
Tincture 1:5, 2-5ml, three times daily (Bradley, 1992)

**Toxicity and contraindications**
The *Botanical Safety Handbook* classifies *C. luteum* in Class 2(b): “Not to be used during pregnancy” (McGuffin, Hobbs, Upton, & Goldberg, 1997). Large doses may cause gastrointestinal irritation, with nausea and vomiting.

**Regulatory Status**
*C. luteum* is regulated in the U.S.A. as a Dietary Supplement.

**6. Sustainability**
*C. luteum* is considered globally secure (Natureserve, 2010) although the global status was last reviewed over ten years ago in 2001. It is on the United Plant Savers ‘At-Risk’ list (UPS, 2011). The species is considered endangered in Massachusetts and Connecticut, historic in Ontario and rare in Delaware, Illinois, Louisiana, Maryland, New Jersey and New York (See Appendix-1). As of 2010, at least 90% of the plants being sold are thought to have been collected from the wild (NatureServe, 2010). Additional impacts on sustainability are forestry and changes in water tables (NatureServe, 2010). Allard (2003) notes that in 2003 there were eleven extant populations in New England
threatened for reasons including: habitat loss, shading, damage from all-terrain vehicles, deer browsing and over-collection by herbalists.

**Harvesting & Collection regulations**

As part of the Connecticut Endangered Species Act, Chapter 495 (State of Connecticut, 2011) Connecticut restricts the taking of endangered and threatened species without permission. However, there are no limits for an owner collecting on his/her property and the State does not restrict the movement of endangered species through the State. The USDA Forest Service issues permits for collection of *C. luteum*, which is considered a non-timber forest product (Allard, 2003).

**Market data - harvesting impact, tonnage surveys**

According to Carroll (2011) most herbalists refrain from using *C. luteum* because it has been almost exclusively harvested from the wild. The American Herbal Products Association (AHPA) resources indicate that there is some cultivation developing. Local Harvest (2011) offers 14 tuber divisions, woods-grown by MoonBranch Botanicals, for $44.00.

NatureServe (2010) notes that currently there is a growing demand for seeds and that the trade in medicinal roots is also increasing. Hirst (2006) notes that buyers come from Europe and North America, and that although some herbalists have ceased using *C. luteum* because of its endangered status in the wild market, demand is predicted to remain strong.

**Table 2. Aggregate harvest in pounds for Chamaelirium luteum (AHPA, 2003; 2007)**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>cultivated</td>
<td>wild</td>
<td>cultivated</td>
<td>wild</td>
<td>cultivated</td>
<td>wild</td>
</tr>
<tr>
<td><strong>Dried</strong></td>
<td><strong>plants</strong></td>
<td>1,043</td>
<td>4,945</td>
<td>1,034</td>
<td>3,838</td>
<td>1,400</td>
</tr>
<tr>
<td><strong>Fresh</strong></td>
<td><strong>plants</strong></td>
<td>1,059</td>
<td>0</td>
<td>927</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Price/lb.</strong></td>
<td><strong>(Greenfield &amp; Davis, 2004)</strong></td>
<td></td>
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<tr>
<td>”root</td>
<td>”root</td>
<td>$45-65</td>
<td>$34-$50</td>
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</table>

Over 67% of the fresh false unicorn root was obtained from cultivated plants in the two-year period 2000-2001 (AHPA, 2003).

According to Persons and Davis (2005):

“Currently, most of the market is for dried root. There is also some demand for
false unicorn planting stock, sold as dormant roots or small plants in flats. It can also be sold in 4-inch pots. In 2004 buyers paid wild harvesters between $27.50 and $45 per dried pound of root. Seeds sold for over $200 per ounce and dried root sold retail for $100 per pound.”

**Table 3.** *C. luteum* as listed as follows by the following sources showing that pricing has not only held, but increased over time.

<table>
<thead>
<tr>
<th>Resource</th>
<th>web address for pricing/catalog</th>
<th>Source</th>
<th>dried root $/lb.</th>
<th>powdered root $/lb.</th>
<th>bulk $/lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Source Ingredients</td>
<td><a href="http://www.naturesourceingredients.com/bulk/2194.htm">http://www.naturesourceingredients.com/bulk/2194.htm</a></td>
<td>wildcrafted USA</td>
<td>125.08</td>
<td></td>
<td>102.79/ lb 25lb. min.</td>
</tr>
<tr>
<td>Starwest Botanicals</td>
<td><a href="http://www.starwest-botanicals.com/category/false-unicorn-root/">http://www.starwest-botanicals.com/category/false-unicorn-root/</a></td>
<td>wildcrafted</td>
<td>222.25</td>
<td>222.25</td>
<td></td>
</tr>
<tr>
<td>Herbs of Mexico</td>
<td><a href="https://herbsofmexico.com/store/bulk-herbs-to-z/h/false-unicorn-root/">https://herbsofmexico.com/store/bulk-herbs-to-z/h/false-unicorn-root/</a></td>
<td>no data</td>
<td>172.63</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Of commercial enterprises that were buying *C. luteum*, most were purchasing a combination of wild and propagated dried roots (Greenfield & Davis, 2004) (See Appendix-II).

**Cultivation**

**Habitat**

In its natural habitat, *C. luteum* is found in a wide soil pH range and a variety of habitats including: hardwood forests, meadows, bogs, thickets and open fields (Allard, 2003; Hirst, 2006; Natural Heritage Endangered Species Program, 2010). Where there is sufficient light, it will flower, however, under shade it can survive for years in its vegetative form (Allard, 2003; Meagher & Antonovics, 1982).

Some studies have noted that male and female populations may differ slightly in their habitat requirements (Allard, 2003) such that there were slight differences in the vegetative zones.
**Propagation**

In the wild, male and female plants simultaneously flower for a 2-3 week period between May and July. Pollination is presumed to be through insects although the specific pollinators are not known (Allard, 2003). The female plants rarely flower two years in a row, have a higher mortality rate, and are substantially larger than the male plants (Allard, 2003; Hirst, 2006; Persons & Davis, 2005). For woods-cultivators, thinning the canopy 20-60% may increase flowering (Allard, 2003; Meagher & Antonovics, 1982).

Experiments with shade cloth (Greenfield & Davis, 2004) were not as successful as woods-cultivation, although the researchers noted that there were differences in soil composition that may have been a factor. Soule (2000) has grown several plants in Maine under leaf mulch protection during the winter. The mulch is removed in the spring, so that plants are exposed to the light. In a five year study of woodland cultivation in Ohio, plant growth was quite slow and inconsistent, and addition of hardwood mulch did not improve survival or rhizome yield (Brush, 2006). The author concluded woodland cultivation of *C. luteum* is a difficult undertaking, while suggesting however that selection of smaller rhizomes (1-3g) for initial planting appears to be a key factor for optimizing survival and yield (Brush, 2006).

**Seed propagation**

Allard (2003) notes that fresh seeds did not germinate unless they had undergone cold stratification, followed by gradual warming during which time seed embryos doubled in size. Under greenhouse conditions, Persons and Davis (2005) found that 80% germination was achieved without stratification, indicating an area for further research and experimentation.

Light is required for seed germination and seeds stay viable only for a single year at room temperature (Cech, 2002; Greenfield & Davis, 2004; Persons & Davis, 2005). Studies by the New England Wild Flower Society (Allard, 2003) found that if seeds were refrigerated, viability remained for up to three years. Cech (2002) suggests planting seeds as soon as they are ripe, under controlled conditions and then waiting two years to move the plants to a permanent location. Soule (2000) presses the seeds on to the soil surface in late winter keeping them under semi-dark conditions inside. Albrecht (2006) found that for false unicorn root, dormancy was broken after 8 weeks alternating temperatures between 6 and 10 degrees Celsius, which is thought to promote embryonic growth.

While false unicorn root needs light to germinate and flower, seedlings may not survive under conditions with full sunlight (Cech, 2002). Mulch consisting of two parts peat moss, one part decomposed pine needles, one part perlite and one-half part sand has been used for successful germination (Cech, 2002).

**Vegetative propagation**

While false unicorn root produces rosette offsets, it has not been shown that these are capable of flourishing once they have been separated (Allard, 2003). The Natural Heritage Endangered Species Program (2010) noted that in Massachusetts, *C. luteum* did not reproduce quickly.
Field propagation
For areas where field cultivation is desired, Greenfield & Davis (2004) suggest that shade-cloth structures be at least seven feet high and allow for prevailing cross breezes.

Pests/Diseases
Deer are known to eat the inflorescences (Allard, 2003) and researchers in North Carolina have observed snails and slugs feeding on foliage under moist conditions (Greenfield & Davis, 2004).

Harvest
In a field study, *C. luteum* juveniles took six years before they flowered (Allard, 2003) and were diminished in size for at least one year following. Another study in North Carolina (Greenfield & Davis, 2004) found that individuals in wild populations took from six to ten years to begin flowering. Harvesting traditionally occurred in the fall after flowering (Cech, 2002; Harding, 1908).

When roots are dug, Cech (2002) recommends leaving the dirt on to protect from mold, and keeping the roots covered to reduce loss of quality from exposure to the sun and heat. Roots can be processed fresh or stored, and dry roots will keep for three years. Harvest yields are about 1/3 dried root per pound of fresh (Cech, 2002).

7. Summary – some possibilities moving forward
*C. luteum* has a long-standing reputation amongst herbalists as an agent for correcting disorders of the female reproductive system, however this species is not widely known outside of the herbal community, and commercial demand is somewhat limited. Even so, the current level of wild harvesting for medicinal use would appear to be unsustainable given the multiple threats to existing populations. While more formal studies would be helpful in terms of helping establish what – if any – level of wild harvesting could be sustained into the future, the more urgent task is to develop more intensive cultivation practices. Given the similarity in habitats to that of *Panax quinquefolius*, existing ginseng growers in Appalachia are strategically well-placed to take up this challenge.

The most exciting research developments for this species are base on phytochemical investigations; the isolation of new triterpenoid compounds, as well as the discovery that the compounds represent a previously unknown class of triterpenoids. This, combined with the inability to duplicate earlier findings of diosgenin-type saponins in *C. luteum*, opens up new opportunities in analytical and biomolecular research.

8. References


woodland medicinals. Fairview, NC: Bright Mountain Books, Inc.


Appendix-I

Ecological status of C. luteum

<p>| | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>Global</td>
<td>G5</td>
<td>MD Rare threatened and endangered species, 2010 <a href="http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/pdfs/rte_Plant_List.pdf">http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/pdfs/rte_Plant_List.pdf</a></td>
</tr>
<tr>
<td>US federal</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Status</td>
<td>Reference</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>MD</td>
<td>s3</td>
<td>MD Rare threatened and endangered species, 2010 <a href="http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/pdfs/rte_Plants_List.pdf">http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/pdfs/rte_Plants_List.pdf</a></td>
</tr>
</tbody>
</table>

**Appendix-II**

Companies purchasing *C. luteum* root in 2004.

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucia Plant Extracts</td>
<td>Naturex SA, Agroparc Zac Montfavet Pole, 84140 Avignon, France</td>
<td></td>
</tr>
<tr>
<td>U.S. Nutraceuticals LLC</td>
<td>2751 Nutra Lane, Eustis, FL 32726, Phone: 352-357-2004</td>
<td></td>
</tr>
<tr>
<td>Twinlab Corporation</td>
<td>150 Motor Parkway Suite 210, Hauppauge, NY 11788, 631-467-3140</td>
<td></td>
</tr>
</tbody>
</table>
Appendix III
Microscopy of *C. luteum*.
Reproduced from *Scientific and Applied Pharmacognosy* by Henry Kraemer (1915).
Fig. 28. Helonias. A, transverse section of rhizome showing epidermis (E); parenchyma cells of cortex containing either starch grains from 0.002 to 0.015 mm. in diameter or raphides of calcium oxalate from 0.025 to 0.040 mm. in length; interrupted endodermis (En); fibrovascular bundle with tracheae (T) and sieve (L). B, transverse section of root showing epidermis (E); cortical parenchyma free from starch; a closed ring of thick-walled endodermal cells (En); sclerenchymatous fibers (Sc); tracheae (T); sieve (L). C, a few tracheae with simple pores (Ts); close annular tracheae (Ta) and reticulate tracheae (Tr).—Drawn by Haase.