Caulophyllum Thalictroides

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Botany

Caulophyllum thalictroides (L.) Michx. (syn. Leontice thalictroides L., Leontopetalon thalictroides Hill.) belongs to the family Berberidaceae. Vernacular names include blue cohosh, pappoose root, papoose root, squaw root, blueberry (E); Löwenblatt, Frauenwurzel (G); and cohoche bleu (F). The plant part used medicinally is the root [1–5].

Chemistry

Flom et al. [6] analysed the roots and rhizomes, and obtained 5.9 mg/g of crude quaternary alkaloid chloride and 2.2 mg/g of crude tertiary alkaloids. The quaternary fraction yielded the aporphine alkaloid magnoflorine, whereas the tertiary fraction yielded the lupine alkaloids methylcytisine (= caulophylline), baptifoline, and anagyrine, as well as three unidentified alkaloids. Recovered amounts were 0.33 mg/g of methylcytisine, 0.20 mg/g of baptifoline, and 0.12 mg/g of anagyrine.

The rhizome and roots were also shown to contain the glycosides caulophyllosaponin and caulosaponin [7]. In one study, approximately 1 mg/g of caulosaponin was obtained [8]. According to Hegnauer [9], caulophyllosaponin is probably the primary saponin, which yields caulosaponin (= leontin) on partial hydrolysis. Further hydrolysis of caulosaponin yields the triterpenoid sapogenin hederagenin [6,10].

Additional substances isolated from the rhizome and roots of the blue cohosh include essential oil, citrullol and a mixture of fatty acids [7].

Secondary sources claim that methylcytisine and glycosides also occur in the leaves and seeds of the plant [5,11]. These claims go back to an unreferenced statement by Hardin and Arena [12].

Pharmacology and Uses

Methylcytisine was found to produce similar pharmacological effects as cytisine in various animal tests, but in most tests active doses were 10 to 20
times higher than those of cytisine. Methylcytisine also resembles nicotine in its peripheral effects, but its central activity may be different from that of nicotine, since the convulsions produced by methylcytisine in mice differ from those produced by nicotine [13,14]. Methylcytisine shows a hyperglycemic action, when given intravenously to rabbits in doses of 20–40 mg/kg [13].

Caulosaponin was found to constrict the coronary vessels of the rat heart and the carotid arteries of cattle and hogs. It also showed an oxytocic action on the rat uterus and a spasmodic effect on the isolated intestine of rodents. The aglycone of caulosaponin produced a similar uterine action [8].

The root of the blue cohosh has been primarily employed as an anti-spasmodic, emmenagogue (to stimulate menstrual flow), and parturifacient (to speed childbirth). Reportedly, it has also been used for various other purposes, such as diuresis, diaphoresis, and the treatment of rheumatism [1–5]. It is also employed as a homoeopathic remedy for uterine dysfunction during labour or menstruation [15].

The roasted seeds are said to have found use as a coffee substitute [1,12].

Adverse Reaction Profile

General Animal Data

Acute toxicity testing of methylcytisine in mice yielded LD50 values of 21 mg/kg intravenously, 51 mg/kg intraperitoneally, and >500 mg/kg orally [14].

Power and Salway [7] gave caulosaponin and caulophyllosaponin to small cats, in oral doses of 0.1 g each, without observing any symptom other than a mild purgative action after several hours.

Ferguson and Edwards [8] reported intravenous LD50 values for caulosaponin of 11.8 mg/kg in mice and 20.3 mg/kg in rats. Small doses produced a depression while larger doses caused increased activity, ataxia, and terminal clonic convulsions. Death appeared to be due to asphyxia. Daily administration of 5 mg/kg subcutaneously to rats for sixty days did not produce symptoms of toxicity or gross pathology of the heart, liver, spleen, intestine, kidney, or uterus. Microscopic examination showed slight edema of the epithelium of renal tubuli, and a thickening in the arterial walls in the spleen. Caulosaponin showed a toxic action on animal cardiac muscle, probably due to its action on coronary vessels.

General Human Data

The dust of the root is extremely irritating to mucous membranes [2,16].

The blue fruits (which are actually naked seeds surrounded by their fleshy coat) are considered poisonous, especially when eaten by children [3,11].