Alkaloids 2

- Evidence suggests that alkaloids have been used by humanity for thousands of years. The first civilizations to use them were probably the ancient Sumarians and Egyptians. However, it was not until the early nineteenth century that these compounds were reproducibly isolated andanalysed. Advances in analytical separation techniques, such as chromatography and mass spectroscopy, led to the elucidation of the chemical structure of alkaloids.
- The term for these compounds is thought to have originated from the fact that the alkaloid, morphine, had similar properties to basic salts derived from the alkali ashes of plants thus, it was called a vegetable alkali or alkaloid. Since the first alkaloids were isolated, thousands more have been identified and classified.
- Prior to approximately 300 years ago, malaria was the scourge of Europe, likely having been introduced through the Middle East. Malaria is caused by protozoa of the genus *Plasmodium,* contained as spores in the gut of the Anopheles mosquito, which then spreads the spores to humans when it bites. As the Spanish and Portuguese explorers began to colonize South America, they discovered a cure for malaria known to the native Indians. This was the bark of the Cinchona trees. The use of Cinchona bark to treat malaria was first reported in Europe in 1633, and the first bark reached Rome about 12 years later. Teas made from the bark cured people suffering from malaria, one of the major scourges in Europe at that time, and the bark was known as Jesuit's bark. Because of the philosophical differences between Protestants and Catholics, many Protestants refused to be treated with the bark. One of the most prominent Protestants of the time, Oliver Cromwell, reportedly died of malaria because of this stubbornness.

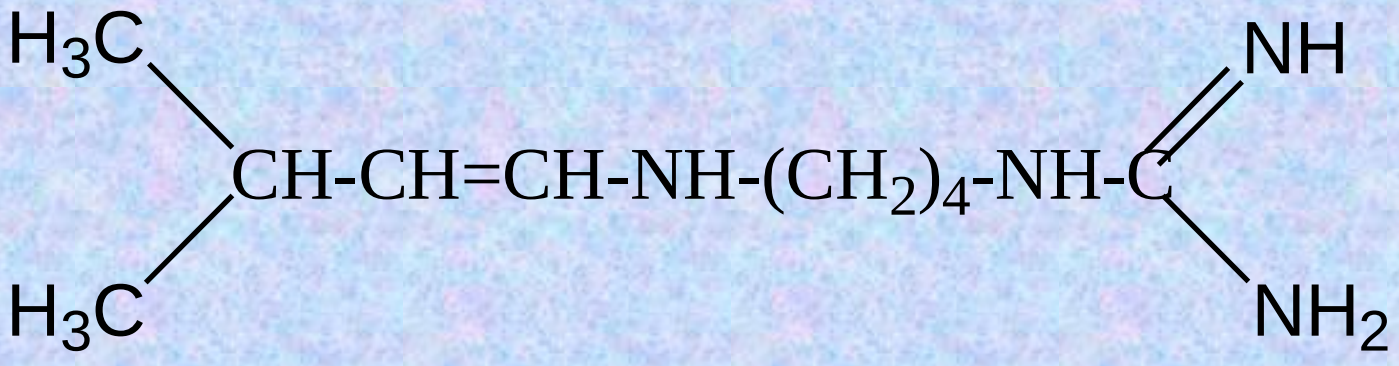
- The French apothecary Derosne probably isolated the alkaloid afterwards known as narcotine in 1803 and the Hanoverian apothecary Serturner further investigated opium and isolated morphine (1806 and 1816).
- Morphine is the principal alkaloid and was first isolated between 1803 and 1806. It was widely used for pain relief beginning in the 1830s, but was also recognized as being addictive. Isolation of other alkaloids, particularly by Pelletier and Caventou, rapidly followed: strychnine (1817), emetine (1817), brucine (1819), piperine (1819), caffeine (1819), quinine (1820), colchicine (1820) and conine (1826). Coniine was the first alkaloid to have its structure established and to be synthesized, but for others, such as colchicine, it was well over a century before the structures were finally elucidated. In the second half of the twentieth century alkaloids featured strongly in the search for plant drugs with anticancer activity. A notable success was the introduction of catharanthus alkaloids and paclitaxel into medicine and there is much current interest in other alkaloids having anticancer properties as well as those exhibiting antiaging and antiviral possibilities.

Medicinal plants and raw materials containing acyclic alkaloids and alkaloids with nitrogen in the side chain

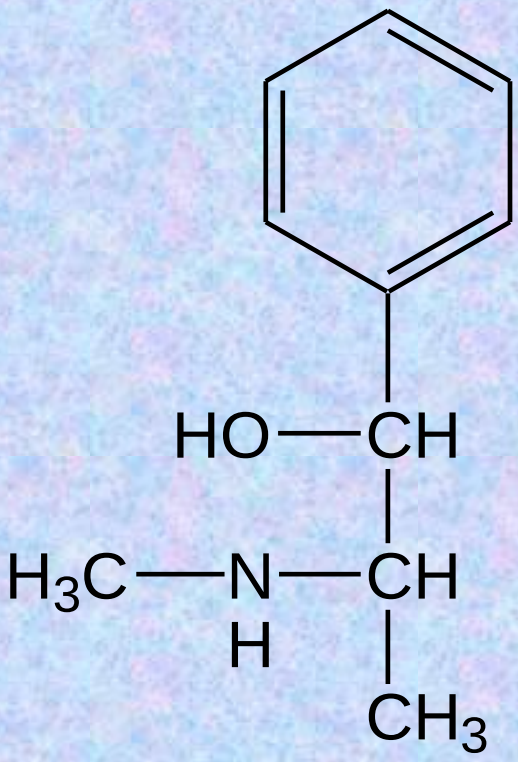
CLASSIFICATION

- Alkaloids are generally classified by their common molecular precursors, based on the biological pathway used to construct the molecule. From a structural point of view, alkaloids are divided according to their shapes and origins. There are three main types of alkaloids: true alkaloids, protoalkaloids, and pseudoalkaloids.
- True alkaloids and protoalkaloids are derived from amino acids, whereas pseudoalkaloids are not derived from these compounds.

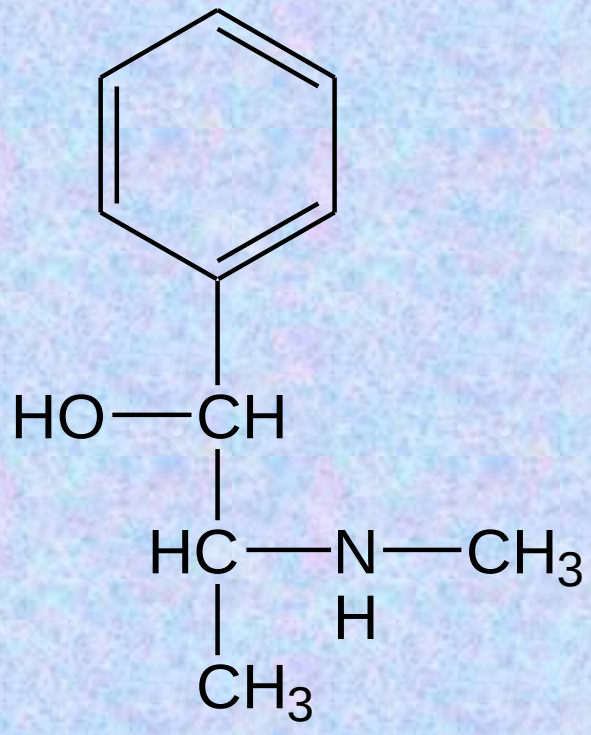
- Alkaloids are mainly divided into two categories on the basis of their chemical structure, that is, heterocyclic rings.
- ***Atypical alkaloids***
- These are also known as nonheterocyclic alkaloids and contain nitrogen in aliphatic chain.
- ***Typical alkaloids***
- These are also known as heterocyclic alkaloids and contain nitrogen in heterocyclic ring system.



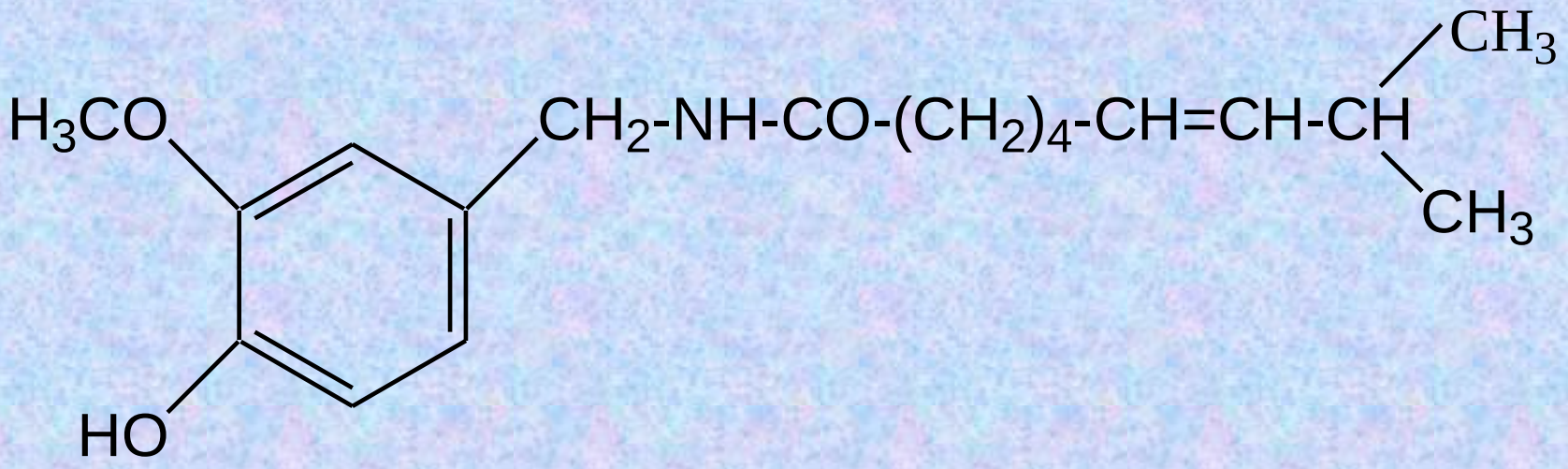
SPHEROFISIN



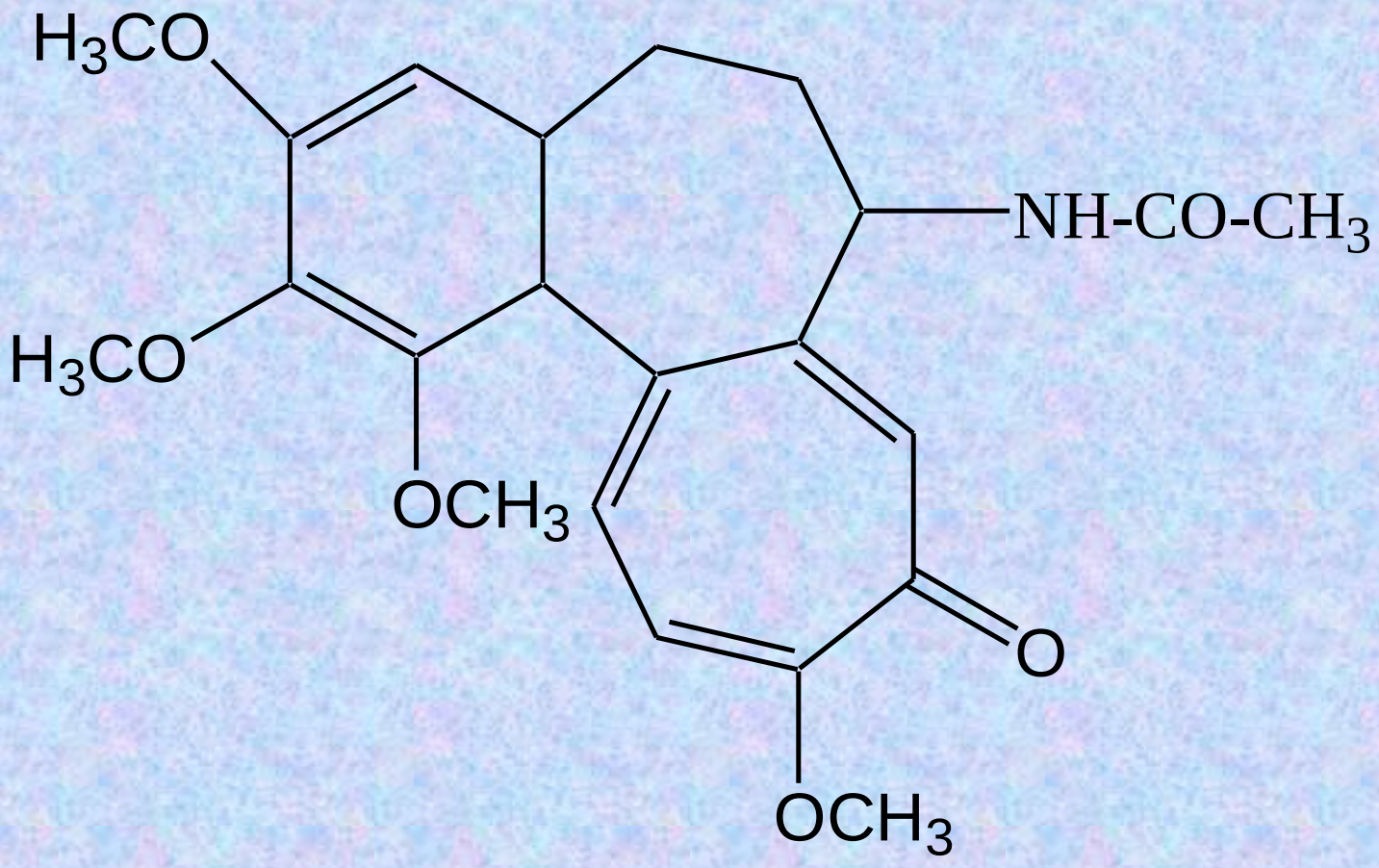
EPHEDRIN



PSEVDOEPHEDRIN



CAPSAICIN



COLHICIN

- **EPHEDRA** (horsetaile ephedra) – *Ephedra equisetina* Bunge.

- Family *Ephedraceae*

- horsetaile ephedra herb (побеги) – *Ephedrae equisetinae herba* (= ephedra herb – *Herba Ephedrae*)

Ephedra equisetina

It consists of cylindrical woody stem. Stems are woodier and more branched 1.5–2 mm. Length 25–200 cm of branches and 1–2.5 cm of internodes, outer surface is grey to pale green and smooth. Nodes, internodes, scaly leaves and terminal buds are present in the stems. The distance between the internodes is 3–4 cm and the nodes bare the scaly leaves. They are bitter in taste. The plant has stamens and pistils on separate flowers; staminate flowers in catkins and a membraneous perianth, pistillate flowers terminal on axillary stalks, within a two-leaved involucre.

Fruit has
two carpels with a single seed in each and is a succulent cone, branches slender and erect, small leaves, scale-like,
articulated and joined at the base into a sheath.

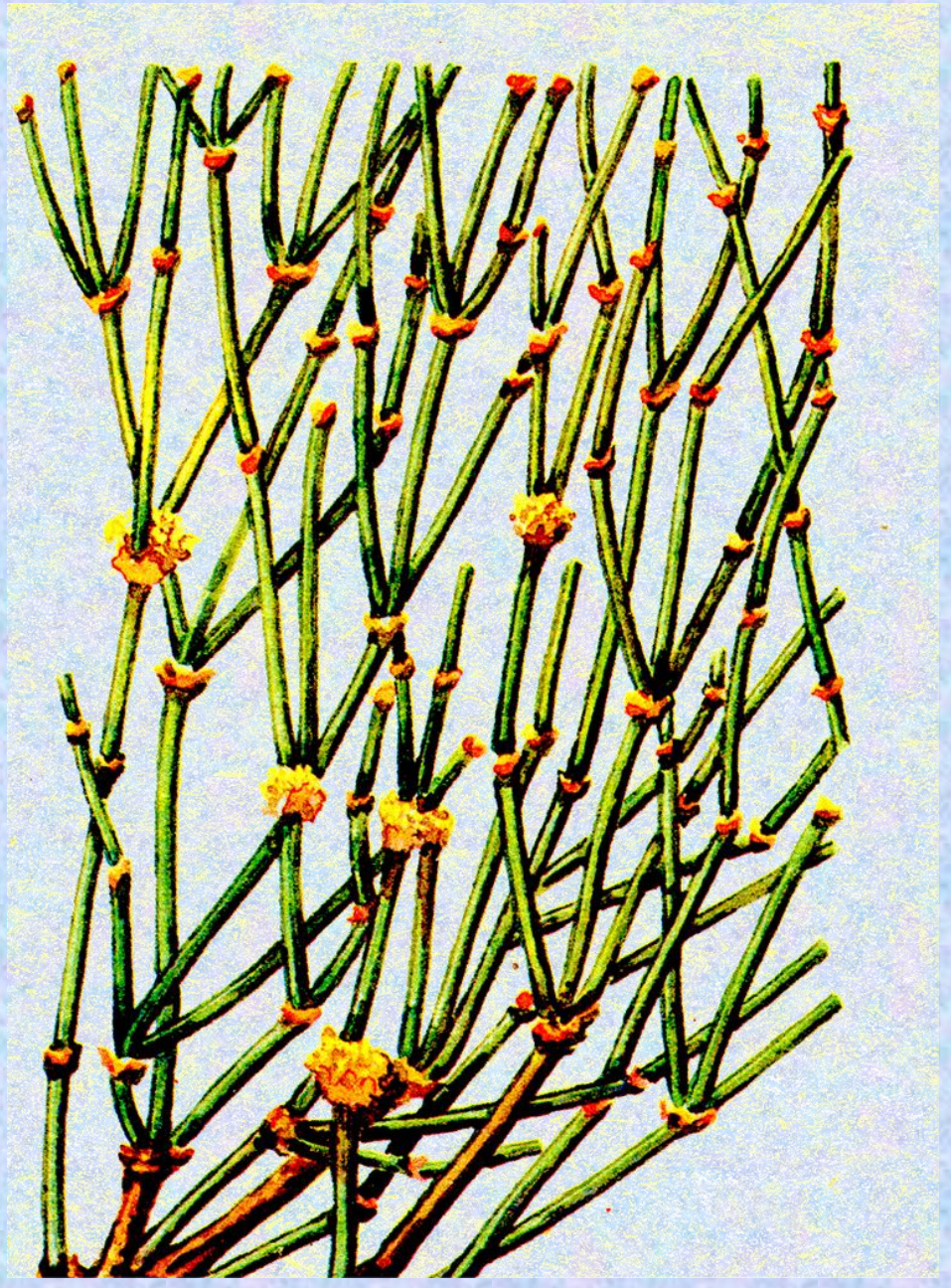
Geographical Source

It is mainly found in China, India, Nepal, Turkey, Pakistan and Bhutan.

Cultivation and Collection

It is an evergreen shrub growing to 0.6 m by 2 m. The plant prefers light (sandy) and medium (loamy) soils and requires well-drained soil. The plant prefers acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It requires dry or moist soil and can tolerate drought. Seeds are sown as soon as they are ripe in the autumn in a greenhouse. It can also be sown in spring in a greenhouse in sandy compost.

Seedlings are transferred into individual pots as soon as they are large enough to handle and grown them for at least their first winter in a greenhouse. Drug is collected in autumn since it contains maximum percentage of alkaloids. Green slender twigs are collected in autumn, dried and packed loose in bags. Sometimes the twigs are pressed tightly.



Chemical Constituents. Ephedra contains alkaloids Ephedrine (water-soluble salt of an alkaloid), Pseudoephedrine (analog of ephedrine), Norpseudoephedrine (An analog of ephedrine). The leaves and stems of ephedra also contain many potentially active compounds, such as tannins, saponin, flavone and volatile oils.

The greatest amount of alkaloids in the raw material is concentrated in the core of the green twigs (0.6-3.2%). Of the total amount of alkaloids, ephedrine accounts for about 90% of ephedra, the rest being a related isomer, pseudoephedrine.

Intermediate ephedra (Ephedra intermedia) is dominated by pseudoephedrine. In addition, ephedra herb contains up to 7 - 10% tannins.

According to Pharmacopial Artical 42-525-72, the content of alkaloids in the raw material should be at least 1.6%.

The alkaloid content varies throughout the year (it is highest in the autumn and winter months).

The amount of alkaloids depends on environmental conditions, e.g. the amount of alkaloids in plants that grow on southern, sunlit slopes is almost twice as high as in plants from shaded areas.

Raw materials are stored according to list B with precautions, separately from other medicinal raw materials, in a dry, well-ventilated room.

In order to avoid poisoning and mucous membrane irritation, gauze bandages and protective goggles should be worn when packing and loading ephedra and hands should be washed thoroughly after work.

- **Pharmacological action.**
- α and β-adrenomimetic, bronchodilator, psychostimulant, vasoconstrictor and cardiovascular stimulant.

- **Uses**
- Ephedrine is antiallergenic, antiasthmatic, antispasmodic, decongestant, cough suppressant, stimulant and vasoconstrictor. Pseudoephedrine is decongestant, cough suppressant and norpseudoephedrine is peripheral vasodilator used to treat angina. As a whole it is decongestant; it opens sinuses, increases sweating, dilates bronchioles (antiasthmatic use), diuretic, CNS stimulant, raises blood pressure, alleviates aches and rheumatism, alleviates hay fever/colds, etc.

Ephedra raw material is used to produce preparations of ephedrine hydrochloride and dephedrine, used for bronchial asthma, urticaria, hypotension, rhinitis.

Ephedrine is an antagonist of drugs, sleeping pills and is used for poisoning with them. Ephedrine hydrochloride is also part of complex preparations: Theophedrine, Efatin, Solutan.

Ephedrine also stimulates α and β-adrenoceptors and increases norepinephrine release from sympathetic nerve endings. Ephedrine raises blood pressure and increases cardiac output. Ephedrine excites the CNS, causes insomnia, restlessness, tremor.


Efedrin Arsan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66

- Autumn Crocus, Meadow Saffron – *Colchicum speciosum* Stev.

- Family *Melanthiaceae*

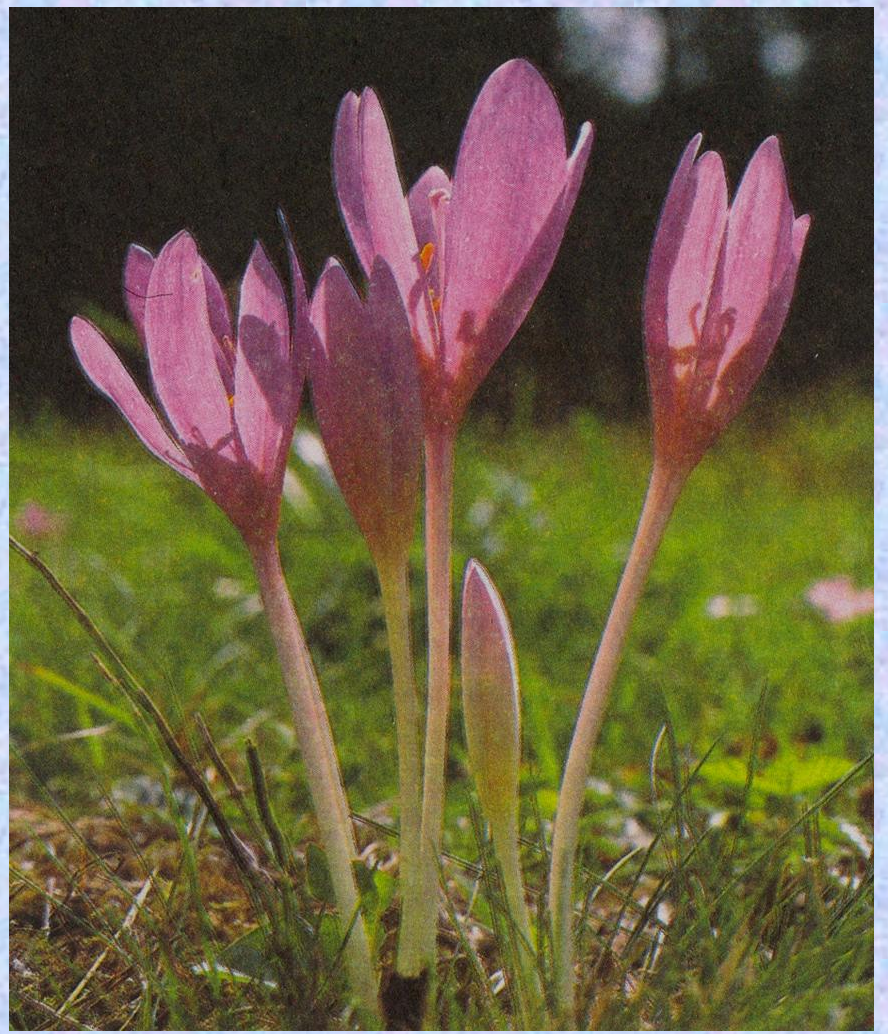
- **Autumn Crocus bulbs (corms) fresh** – *Colchici speciosi bulbotubera recentia* (= *Bulbotubera Colchici recentia*)

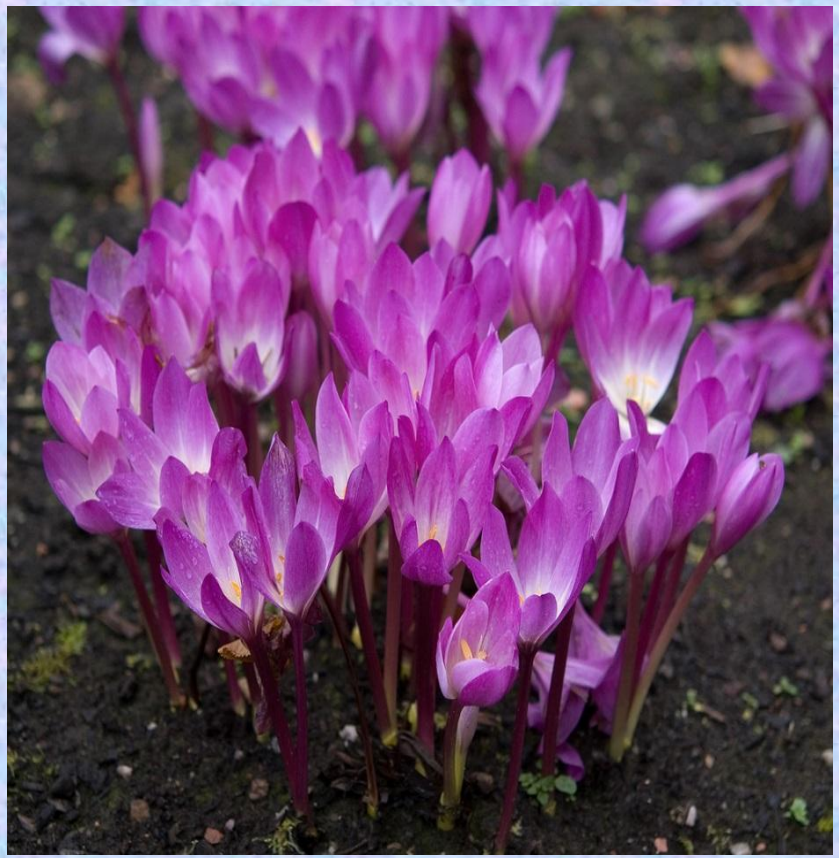
Growing to 18 cm (7 in) tall by 10 cm (4 in) wide, it is n herbaceous perennial growing from corms. C. speciosum blooms in the fall, producing reddish/violet flowers on stems up to 30 centimetres (12 in) tall without any leaves present. The strap-like leaves grow in the spring, then yellow, wither and die back as summer progresses. The flowers strongly resemble those of the crocus, the familiar spring-flowering bulb; hence the common name **autumn crocus** which is applied to this and other colchicum species. However the two genera belong to different families; and there is in fact an autumn-flowering crocus species, Crocus sativus, the source of the spice saffron. By contrast, all parts of *Colchicum speciosum* are toxic if ingested.

Безвременник великолепный — Colchicum speciosum Stev.

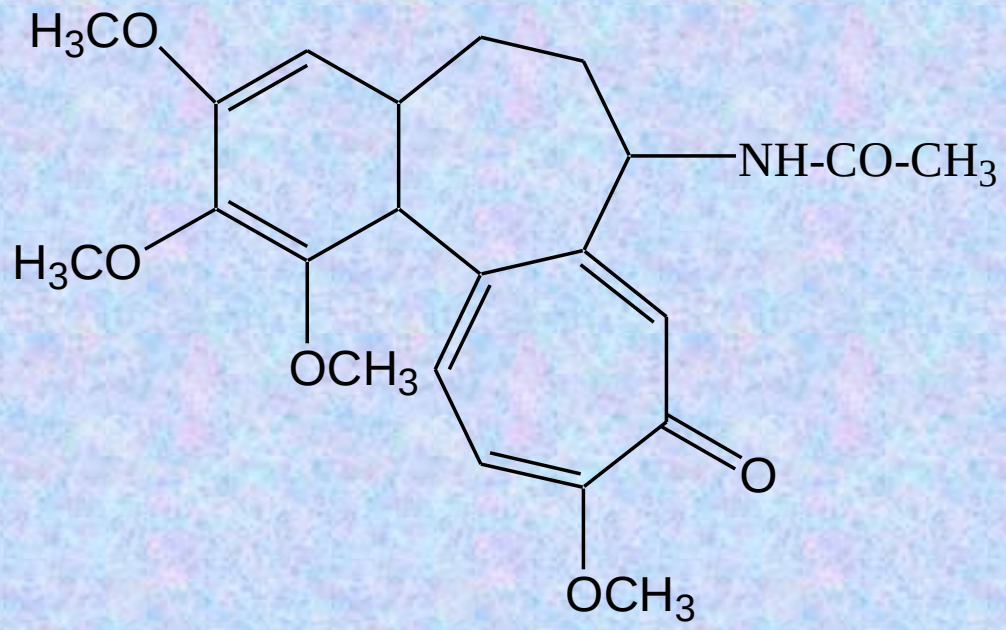
1 — цветущее растение с клубнелуковицей, 2 — плодоносный стебель, 3 — листок околоцветника с тычинкой.

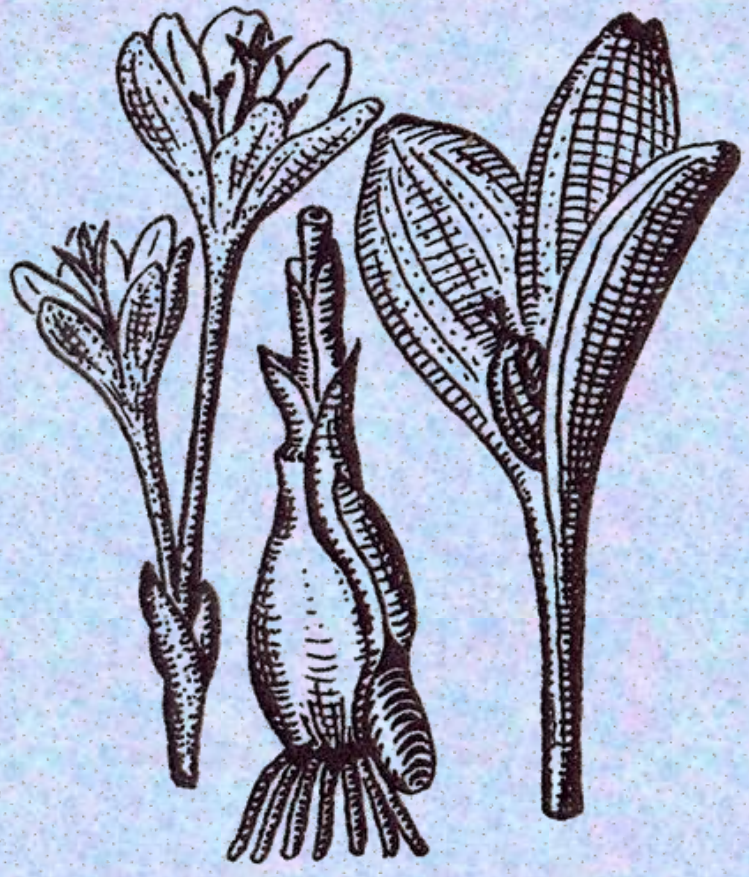
Colchicum speciosum Stev.





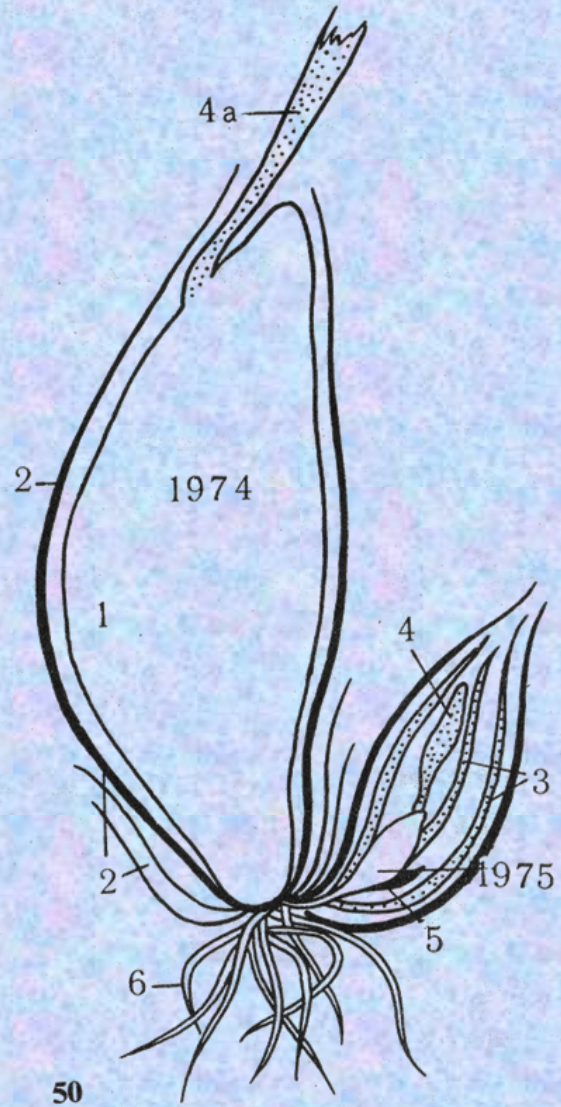
- **Chemical Constituents**. The active principle is said to be an alkaline substance of a very poisonous nature called Colchicine. Besides colchicine, demecolcine and other alkaloids are present.
- They also contain resin, called colchicoresin, fixed oil, glucose and starch**.**





The corm or root is usually sold in transverse slices, notched on one side and somewhat reniform in outline, white and starchy internally, about 1/8 inch thick and varying from 3/4 to 1 inch in diameter. Taste sweetish, then bitter and acrid and odour radish-like in fresh root, but lost in drying.

49



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The raw material is stored as per list A. Shelf life 3 months from the time of harvesting. Up to 3 months storage is permissible only on racks, in a layer up to 10 cm thick, in a well-ventilated room. Shipping crates must be marked with a warning label **"Poisonous!**

Pharm. action. Antineoplastic, cytostatic.

Used to produce the alkaloids colhamine and colchicine. Colhamine is used as a 0.5% ointment (omaine ointment) for the treatment of grade I and II skin cancers. Colhamine tablets are used orally in the treatment of gastric cancer.

Colchicine solution is used orally or intravenously for treatment of chronic leukaemia. Colchicine is used to obtain polyploid forms of plants.


Здоровое поколение
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КОЛХИЦИН
Colchicine
96 таблеток
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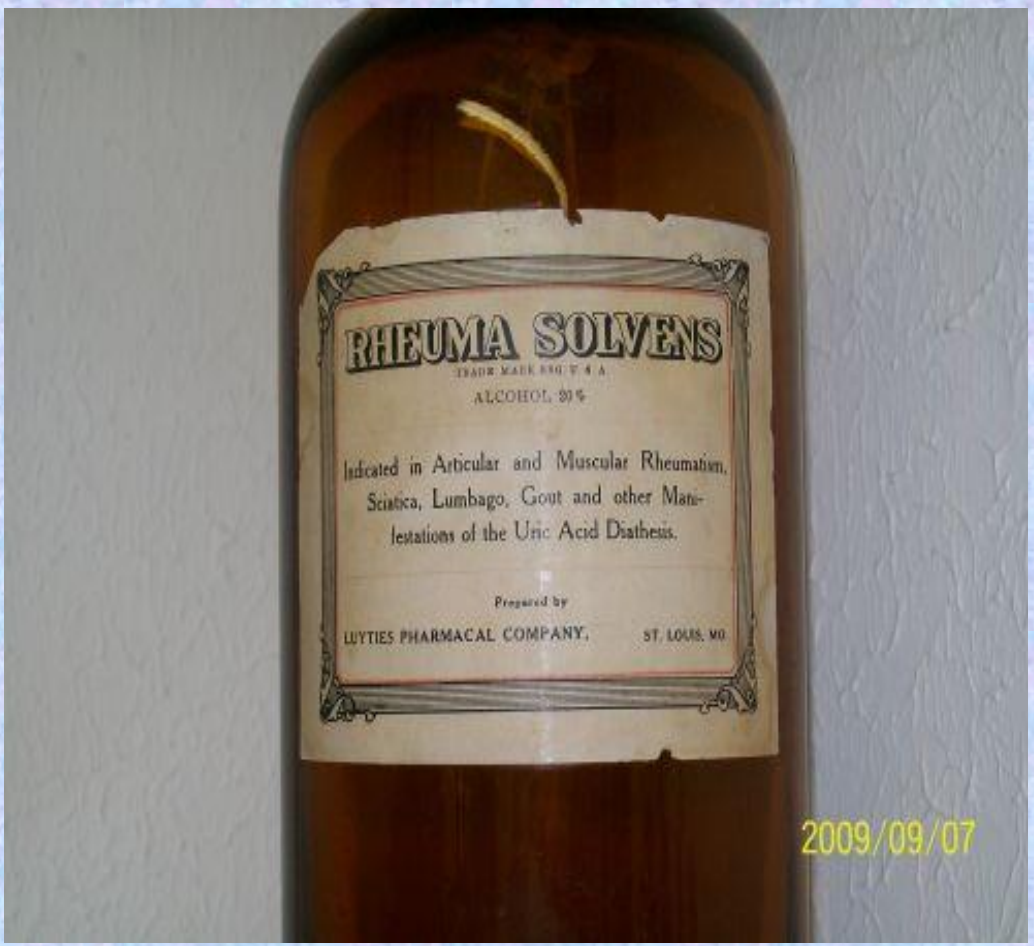
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- **Chilli pepper** – *Capsicum annuum* L.

- Family *Solanaceae*

- **Chilli pepper fruit** – *Capsici fructus* (= *Capsici fructus*)

Capsicum annuum L.

Although the species name *annuum* means 'annual' (from the Latin *annus* "year"), the plant is not an annual but is frost tender. In the absence of winter frosts it can survive several seasons and grow into a large, shrubby perennial herb. The single flowers are an off-white (sometimes purplish) color while the stem is densely branched and up to 60 cm in tall. The fruits are peppers that may be green, yellow, orange or red when ripe. While the species can tolerate most frost-free climates, *C. annuum* is especially productive in warm and dry climates.

Capsicum annuum L.

Capsicum annuum is a species of the plant genus *Capsicum* native to southern North America, the Caribbean, and northern South America. This species is the most common and extensively cultivated of the five domesticated capsicums. The species encompasses a wide variety of shapes and sizes of peppers, including sweet bell peppers and some chili pepper varieties such as jalapeños, New Mexico chile, and cayenne peppers. Cultivars descended from the wild American bird pepper are still found in warmer regions of the Americas. In the past, some woody forms of this species have been called *C. frutescens*, but the features that were used to distinguish those forms appear in many populations of *C. annuum* and are not consistently recognizable features in *C. frutescens* species.

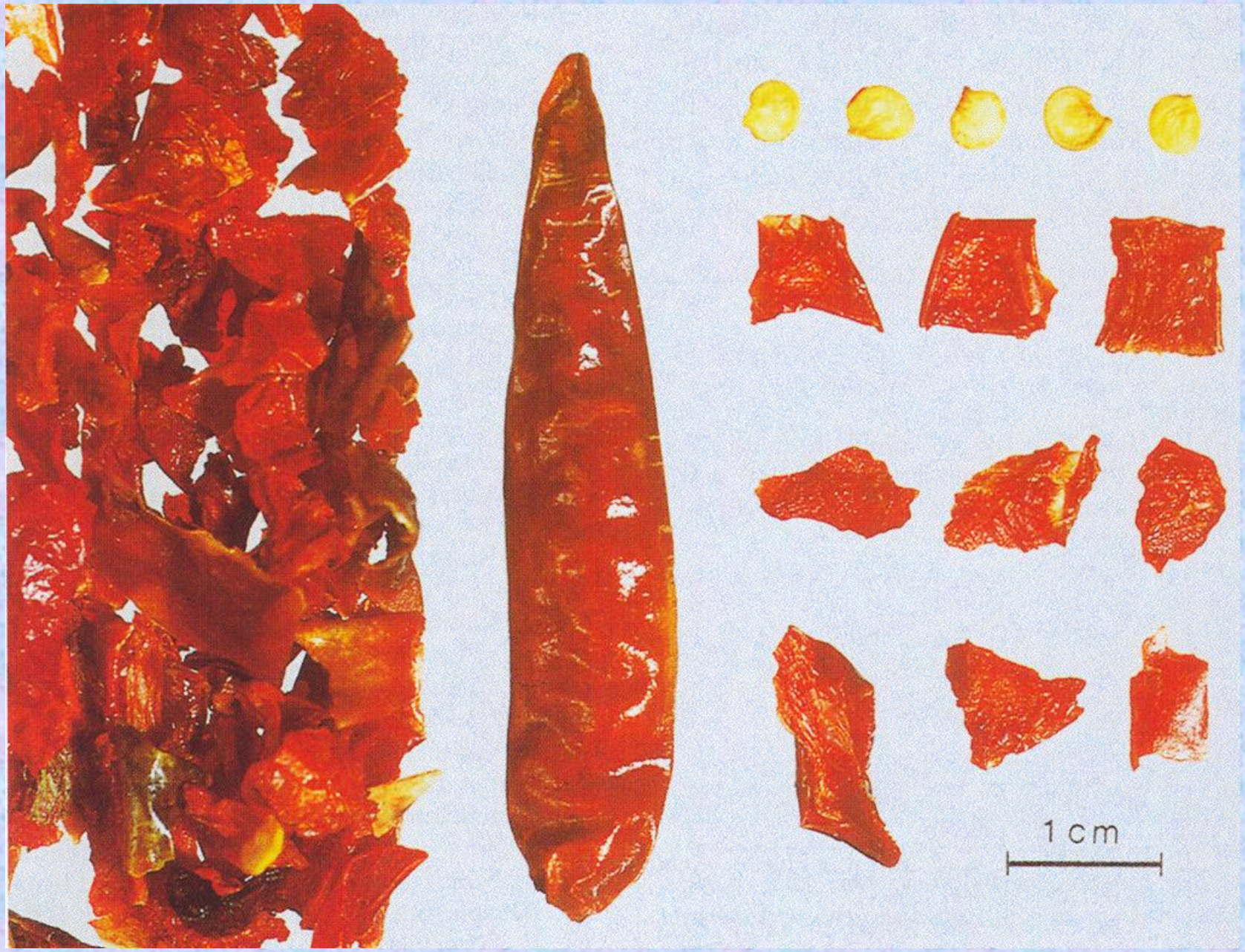
The active ingredient with its irritant and pungent taste is the alkaloid-like amide capsaicin, a decylenic acid vanillamide (discovered in 1875). It is found in the fruit in special secretory cells located under the cuticle.

Its irritant and pungent taste is due to the alkaloids capsaicinoids, of which capsaicin is the main one

According to GOST 14260-89 the content of capsaicinoids, converted into capsaicin-standard, shall be not less than 0.15%.

The fruit also contains carotenoids, ascorbic acid, flavonoids (rutin, hesperidin), essential oil (1.5%) and fatty oil (in the seeds)

Chilli pepper fruit


1 cm

When handling peppers, dust masks must be worn as the dust causes severe irritation to the mucous membranes.

Store the raw material in warehouses on racks in a well-ventilated room, separately from other raw materials. Shelf life of 3 years.

Pharmacological action. Topical irritant, analgesic, as well as bitter to stimulate the appetite.

Usage. Tincture of chilli pepper is prepared from the fruit and used for rubbing as an irritant and distraction in neuralgias, radiculitis, myositis. Tincture of chilli pepper is also part of the preparations "Capsitrin", "Capsin", liniment of pepper-ammonia, liniment of pepper-camphoric and ointment used for frostbite. In addition, dense chilli pepper extract is prepared from the fruit and is included in the pepper patch.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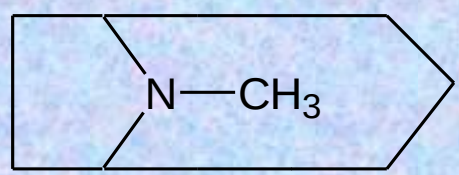
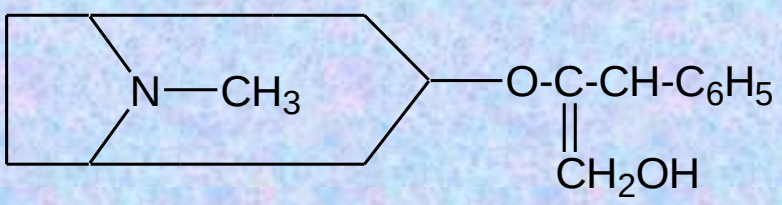
Medicinal plants and raw materials containing tropane alkaloids

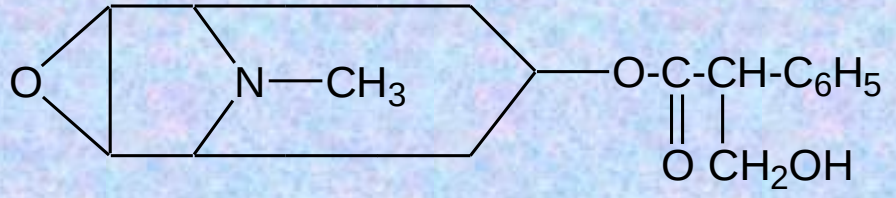
The tropane alkaloids, which have the 8-azabicyclo octane nucleus, are commonly found in plants of three families, the Solanaceae, Erythroxylaceae and Convolvulaceae families. Tropane alkoloids are tropene derivatives. Tropane ring is composed of pyrrolidine and piperidine rings. Tropane is 3-hydroxy tropene. There are two stereoisomers of tropene, tropine and pseudotropine. They are esters combined with acids. These esters of tropic acid could be detected by vitali–morin reaction. The acids present are tropic acid in atropine and atropic acid formed by the loss of water from tropic acid in apoatropine. Other organic acids like tiglic acid, acetic acid, isobutyric acid and isovaleric acid are also present.



Tropane



Hyoscyamine = Atropine



Scopolamine

The alkaloids isolated from plants of these families, while having several legitimate medicinal uses, are probably best known for their toxic properties. This can be a major problem since the plants produce very attractive berries which are tempting to small children. As few as three berries of henbane (*Hyoscyamus niger*) or deadly nightshade (*Atropa belladonna*) can cause death in infants. Many of the plants in the Solanaceae family contain tropane alkaloids, which are responsible for the toxic effects of the plants. Cleopatra is reputed to have tested the effects of henbane and deadly nightshade on her slaves to investigate the possibility of using these extracts to commit suicide (she found the toxic effects too painful). The wives of the Roman emperors, Augustus and Claudius, used deadly nightshade to murder large numbers of Romans. The mandrake (*Mandragora officinarum*) was reputed to possess aphrodisiac properties and was prized for these properties. However, the roots also contain large quantities of the tropane alkaloid hyoscine (scopolamine), making the plant highly toxic.

Coca leaf – *Coca folium* (=*Folium Coca)*

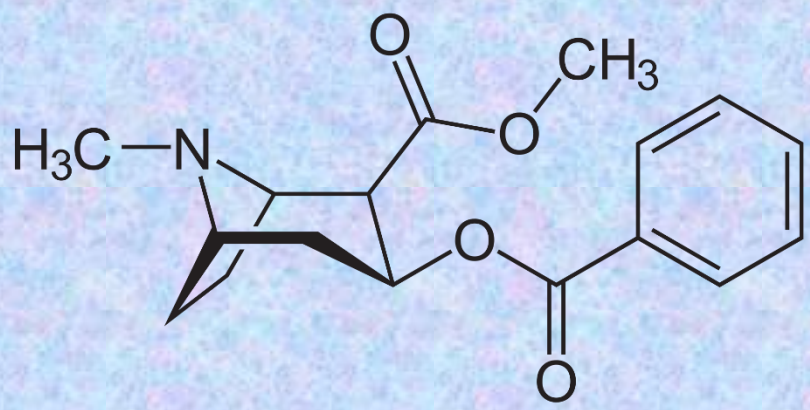
Coca - *Erythroxylon Coca*

Family *Erythroxylaceae*

The coca plant resembles a blackthorn bush, and grows to a height of 2–3 m. The branches are straight, and the leaves, which have a green tint, are thin, opaque, oval, and taper at the extremities. A marked characteristic of the leaf is an areolated portion bounded by two longitudinal curved lines, one line on each side of the midrib, and more conspicuous on the underside of the leaf.

The flowers are small, and disposed in little clusters on short stalks; the corolla is composed of five yellowish-white petals, the anthers are heart-shaped, and the pistil consists of three carpels united to form a three-chambered ovary. The flowers mature into red berries.

- **Chemical Constituents**
- Coca leaves contain the alkaloids Cocaine, Annamyl Cocaine, and Truxilline or Cocamine. Truxillo or Peruvian leaves contain more alkaloid than the Bolivian, though the latter are preferred for medicinal purposes. Java Coca contains tropacocaine and four yellow crystalline glucosides in addition to the other constituents.



Cocaine

Coca shrubs grow well in the situations similar to tea plantations. It requires rich, light and well-drained soil at an altitude of 1,500–6,000 m. Cultivation is carried out by sowing seeds. Fertilizers have their effects over these plants.

In the second year the leaves will be matured enough to collect in dry weather. The collected leaves are dried in shade and packed.

Uses. In the nineteenth century, coca leaf tincture was used as a tonic, but it was not until 1880 that the Russian pharmacologist V.K.Antrep discovered the anaesthetic properties of cocaine and introduced it into medical practice. This property proved to be extremely valuable for dental practice and minor operations.

Cocaine hydrochloride solution - Cocainum hydrochloricum - is used for local anaesthesia of the mucous membranes of the eyes, nose, pharynx, larynx and urinary tract. Cocaine is now being replaced by synthetic drugs.

The use of cocaine as a narcotic on a regular basis is very harmful to the body - the nervous system is disrupted and death quickly occurs.

- Belladonna leaf (Deadly night shade
- leaves) – Belladonnae folia

- Belladonna herb (Deadly night shade
- herbs) –Belladonnae herba

- Belladonna (Deadly night shade) – *Atropa belladonna* L.

- Family *Solanaceae*

Atropa belladonna, commonly known as **belladonna** or **deadly nightshade**, is a toxic perennial herbaceous plant in the nightshade family Solanaceae it is native to Europe, North Africa, and Western Asia. Its distribution extends from Great Britain in the west to western Ukraine and the Iranian province of Gilan in the east. It is also naturalised or introduced in some parts of Canada and the United States.

Atropa belladonna is a branching herbaceous perennial rhizomatous hemicryptophyte, often growing as a subshrub from a fleshy rootstock. Plants can reach a height of 2 m (more commonly 1.5 m), and have ovate leaves up to 18 cm in long. The bell-shaped flowers are dull purple tinged yellow-green toward the base and are faintly scented.

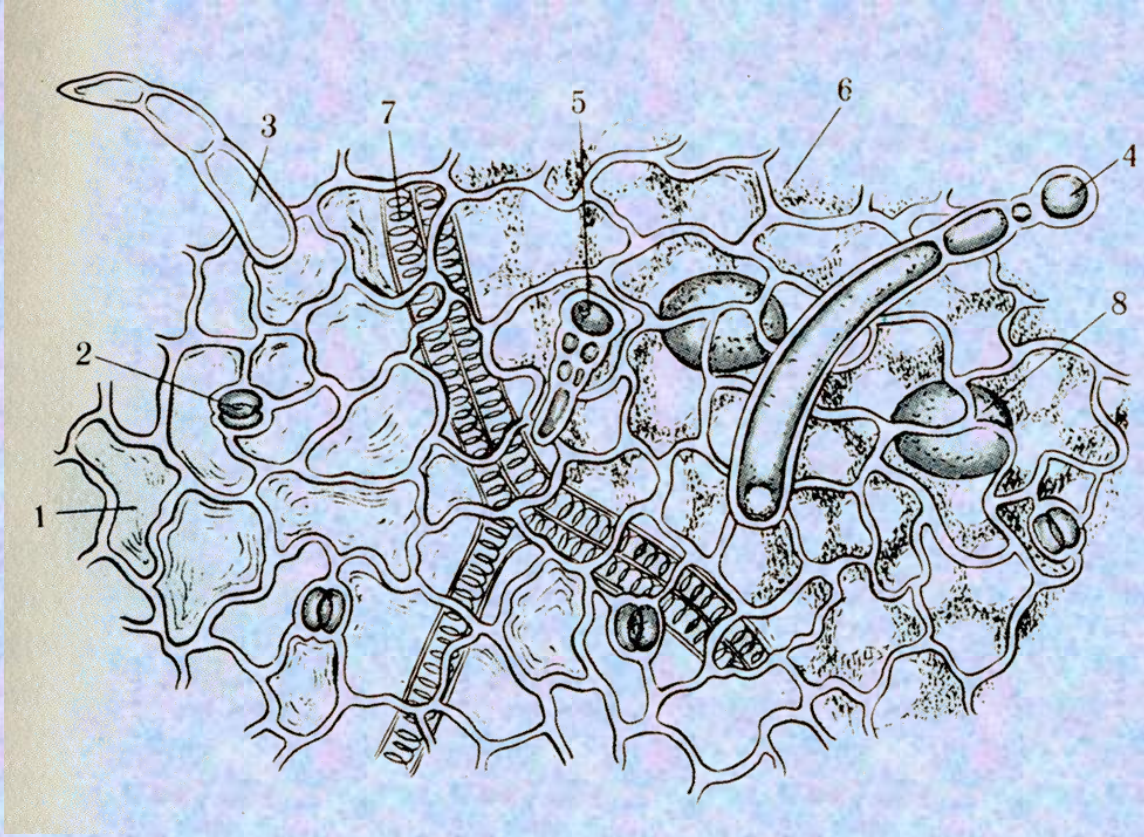
The fruits are berries, which are green, ripening to a shiny black, and approximately 1.5 cm in diameter. The berries are sweet and are consumed by animals that disperse the seeds in their droppings, even though they contain toxic alkaloids . There is a pale-yellow flowering form called *Atropa belladonna* var. *lutea* with pale yellow fruit.

- **Chemical Constituents**
- Belladonna contains 0.3–1.0% total alkaloids, the prominent base is L-hyoscyamine and other components are atropine, apoatropine, as choline, belladonnine, cuscohygrine, chrysatropic acid, volatile bases, such as atroscine, leucatropic acid; phytosterol, N-methylpyrroline, homatropine, hyoscyamine N-oxide, rutin, kaempferol-3-rhamnogalactoside and 7-glucoside, quercetin-7-glucoside, scopoletin, calcium oxalate, 14% acid soluble ash and 4% acid-insoluble ash. Addition of ammonia to the alcoholic solution of scopoletin shows blue florescence. This test is useful to detect Belladonna poisoning. Atropine is formed by racemization during the extraction process.

- The amount of alkaloids in the leaves converted into hyosciamine should not exceed 0.3% (according to State Pharmacopoeia XIV).

Characteristics

The drug contains leaves, smaller stems of about 5 mm diameter, flowers and fruits. Leaves are stalked, brittle, thin, entire, long-pointed, 5–25 cm long, 2.5–12 cm wide, ovate lanceolate, slightly decurrent lamina, margine-entire, apex acuminate, colour dull-green or yellowish-green, surface glabrous, lateral veins join the midrib at an angle of 60°C, curving upwards and are anastomose. The upper side is darker than the lower. Each has a petiole about 0.5–4 cm long and a broadly ovate, slightly decurrent lamina about 5–25 cm long and 2.5–12 cm wide. The margin is entire and the apex acuminate. A few flow ers and fruits may be present. If the leaves are broken, they are characterized by the venation and roughness of the surface due to the presence of calcium oxalate in some mesophyll cells which causes minute points on the surface of the leaf on drying. The flowers blooming in June are solitary, shortly stalked, drooping and about 2.5 cm long. The corolla is campanulate, five-lobed and of a dull purplish colour. The five-lobed calyx is persistent, remaining attached to the purplish-black berry. The fruit is bilocular, contains numerous seeds and is about the size of a cherry. A yellow variety of the plant lacks the anthocyanin pigmentation.



A transverse section of the leaf of *A. belladonna* has a bifacial structure. The epidermal cells have-wavy walls and a striated cuticle. Anisocytic type and some of the anomocytic type stomata arc present on both surfaces but are most common on the lower. Hairs are most numerous on young leaves, uni-seriate, two- to four-celled clothing hairs; or with a uni-cellular glandular head. Some hair has a short: pedicel and a multicellular glandular head. Certain of the cells of the spongy mesophyll are filled with micro-sphenoidal (sandy) crystals of calcium oxalate. The midrib is convex above and shows the usual bicollateral vascular bundle. A zone of collenchyma is present in epidermis near midrib.

Stored raw materials according to list B. Shelf life is 2 years.

The leaves of the nettle leaf are used as a medicinal raw material for tincture and as a medicinal product in Astmatol. Nettle tincture is part of complex preparations, such as Zelenin Drops.

The preparations have antispasmodic, analgesic effects and are used in bronchial asthma, peptic ulcer and other diseases accompanied by cramps in the smooth muscles of the abdominal organs.

Herba Belladonnae

The quality of the raw material is regulated by Pharmacopoeia XIV, where the sum of alkaloids in terms of hyosciamine should not be less than 0.35% and not more than 0.4%.

Stored raw materials according to list B, shelf life of 2 years.

Used to obtain dry and thick extracts that are part of complex drugs, such as Becarbon, Bellalgin, etc. It is used for the same purposes as the leaves of belladonna.

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- **Pharm. effect of the belladonna leaves, herb**. Cholinolytic, antispasmodic.

Atropine and hyoscyamine have an antispasmodic effect, dilating the pupil, relaxing smooth muscles, analgesic, limiting secretion of salivary, gastric, sweat glands, relieving symptoms of seasickness, excitatory CNS.

In ophthalmic practice atropine is used for pupil dilation for diagnostic purposes and for treatment of acute inflammatory diseases.

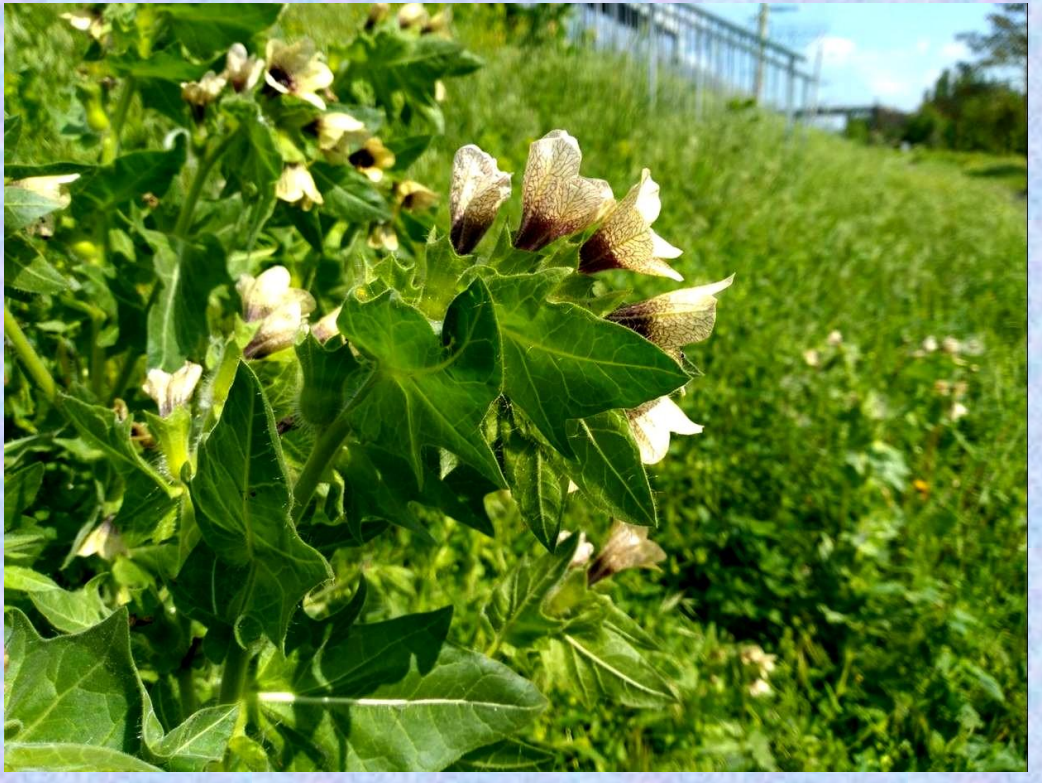
Atropine is an antidote for poisoning by various cholinomimetic and anticholinesterase drugs as well as morphine and other analgesics.

- **Common Henbane leaves** – *Hyoscyami nigri foliae*

- **Common Henbane** – *Hyoscyamus niger* L.

- Family *Solanaceae*

Hyoscyamus niger L.



It is biennial herb. The leaves of this biennial plant spread out flat on all sides from the crown of the root like a rosette; they are oblong and egg-shaped, with acute points, stalked and more or less sharply toothed, often more than a foot in length, of a greyish-green colour and covered with sticky hairs. These leaves perish at the appearance of winter.

The flowering stem pushes up from the root-crown in the following spring, ultimately reaching from 3 to 4 feet in height, and as it grows, becoming branched and furnished with alternate, oblong, unequally lobed, stalkless leaves, which are stem-clasping and vary considerably in size, but seldom exceed 9–10 inches in length. These leaves are pale green in colour, with a broad conspicuous midrib, and are furnished on both sides (but particularly on the veins of the under surface) with soft, glandular hairs, which secrete a resinous substance that causes the fresh leaves to feel unpleasantly clammy and sticky. Similar hairs occur on the sub-cylindrical branches.

Hyoscyamus niger L.

The flowers are shortly stalked, the lower ones growing in the fork of the branches, the upper ones stalkless, crowded together in one side, leafy spikes, which are rolled back at the top before flowering, the hairy, leafy, coarsely toothed bracts becoming smaller upwards. The flowers have a hairy, pitcher shaped calyx, which remains round the fruit and is strongly veined, with five stiff, broad, almost prickly lobes. The corollas are obliquely funnel-shaped, upwards of an inch across, of a dingy yellow or buff, marked with a close network of lurid purple veins. A variety sometimes occurs in which the corolla is not marked with these purple veins. The seed-capsule opens transversely by a convex lid and contains numerous small seeds.

- **Chemical Constituents**
- The chief constituent of Henbane leaves is the alkaloid Hyoscyamine, together with smaller quantities of Atropine and Hyoscine, also known as Scopolamine, The proportion of alkaloid in the dried drug varies from 0.045% to 0.14%. Other constituents of Henbane are a glucosidal bitter principle called hyoscytricin, choline, mucilage, albumin, calcium oxalate and potassium nitrate. On incineration, the leaves yield about 12% of ash. The chief constituent of the seeds is about 0.5–0.6% of alkaloid, consisting of
- Hyoscyamine, with a small proportion of Hyoscine, The seeds also contain about 20% of fixed oil.
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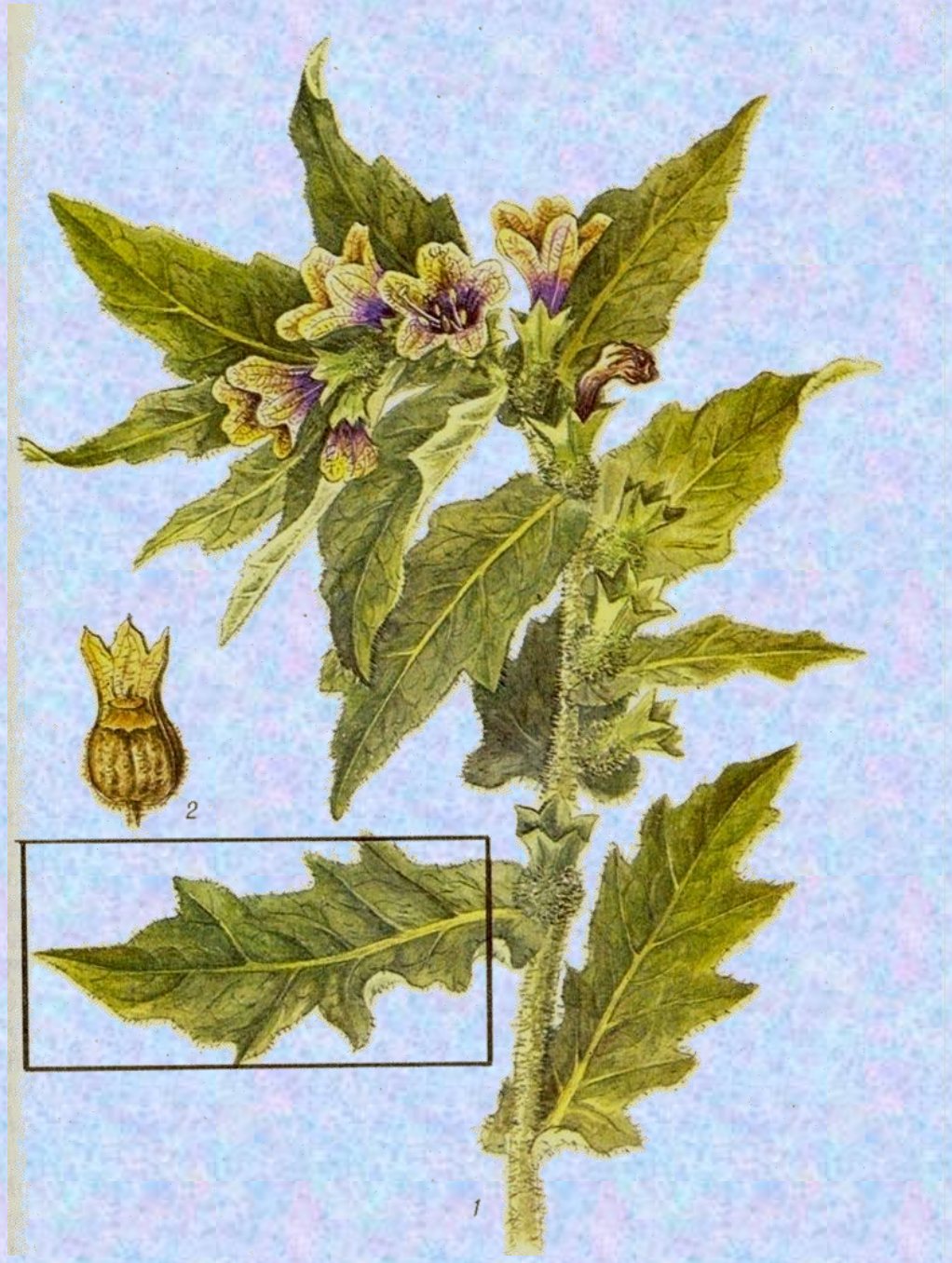
- According to Pharmacopoeia XIV, the sum of the alkaloids converted into hyosciamine should not exceed 0.05%.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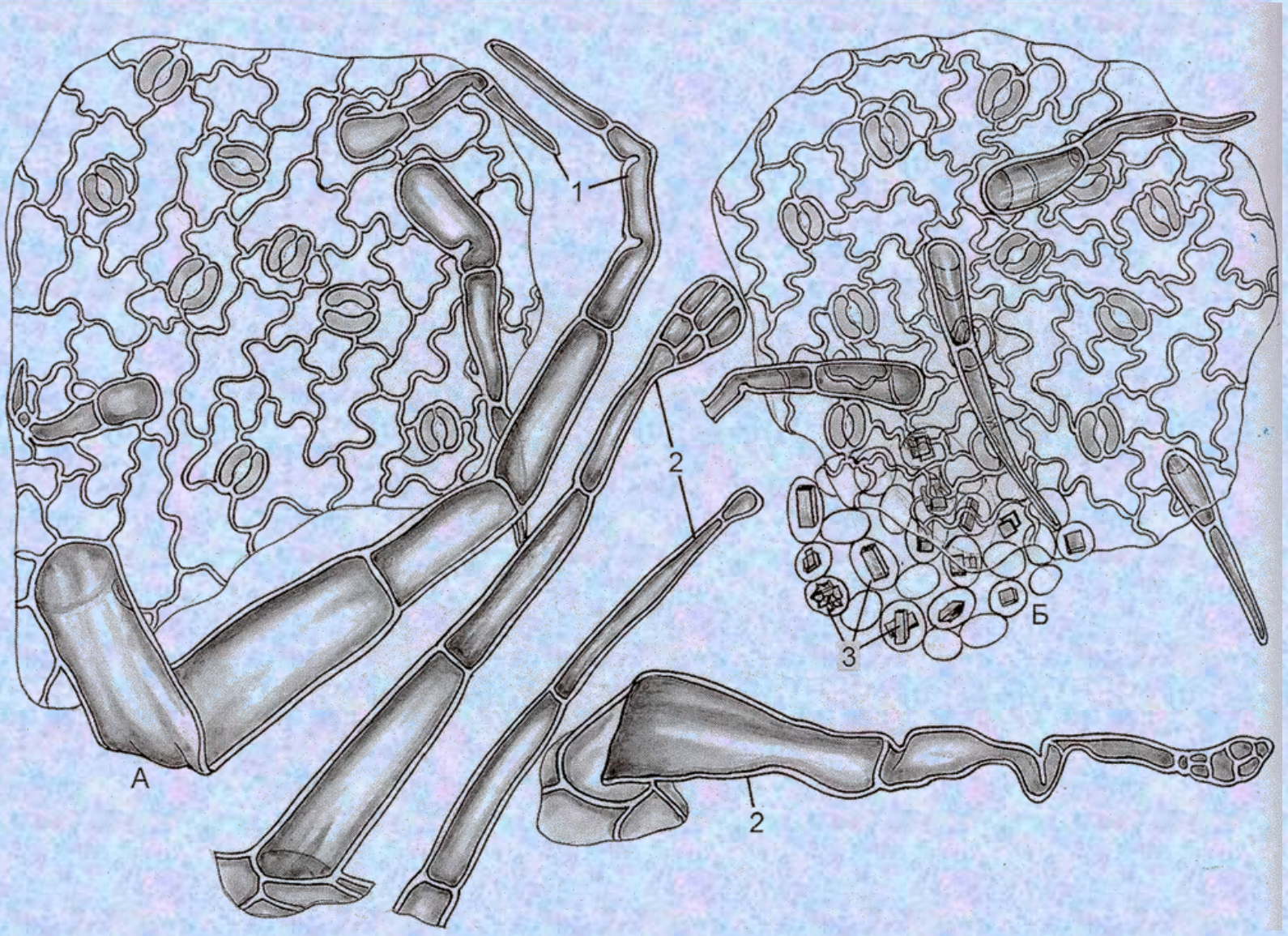
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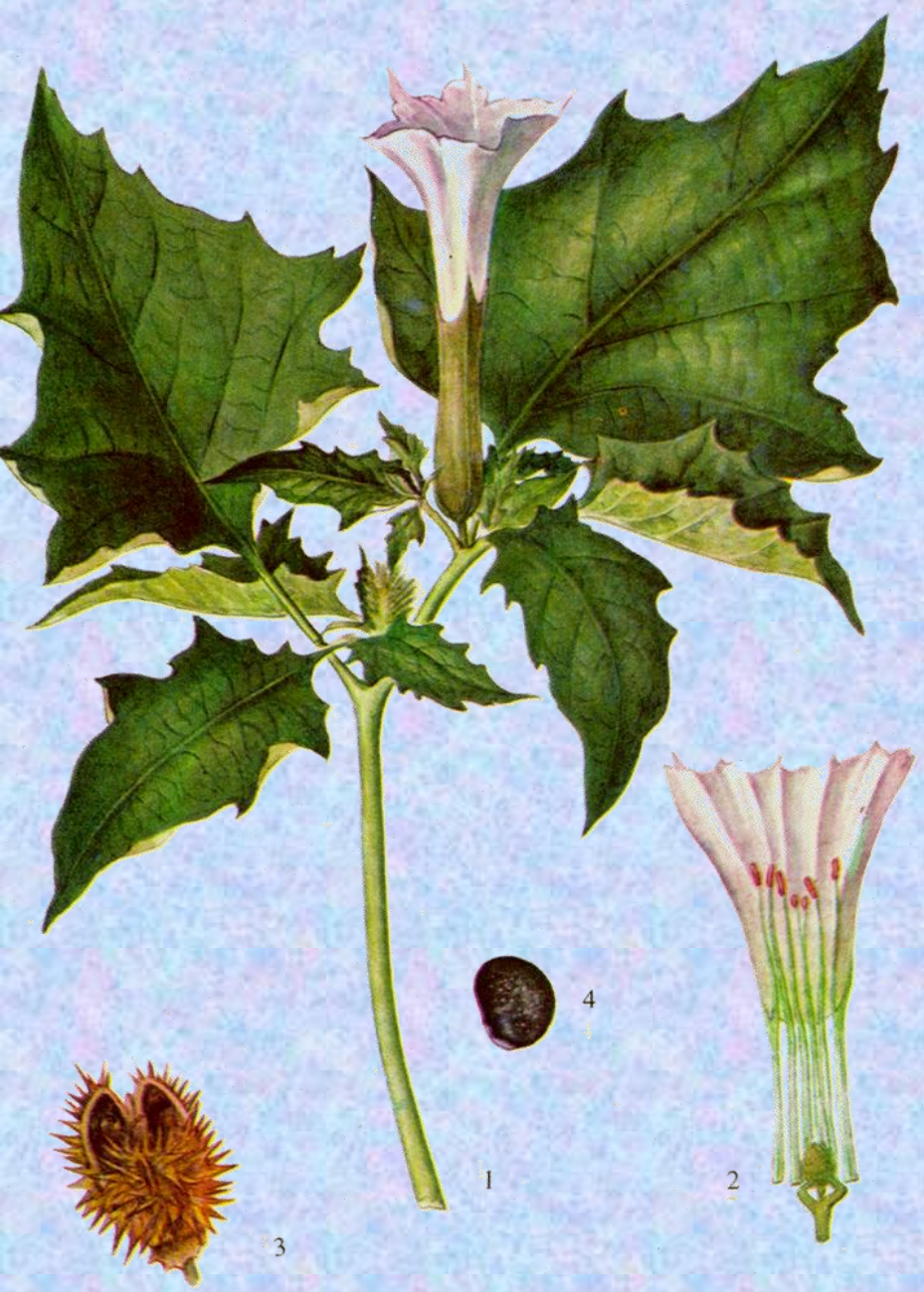
Pharmacological action. Antispasmodic (cholinolytic action).

Application. Leaves are part of Astmatol, Astmatin, used in the form of cigarettes for bronchial asthma.

- The leaves are used to make bleach oil (oil extract of hemp), which is used externally for rubbing as an analgesic and anti-inflammatory.
- The leaves are used to make a whitewash oil (oil extract of betelene) for external rubbing as an analgesic and anti-inflammatory.

- Thorn apple leaves – *Daturae stramonii folia*
  - Thorn apple – *Datura stramonium* L.
    - Family – *Solanaceae*



Datura stramonium is an erect, annual, freely branching herb that forms a bush up to 60 to 150 cm tall.

The root is long, thick, fibrous, and white.

The stem is stout, erect, leafy, smooth, and pale yellow-green to reddish purple in color. The stem forks off repeatedly into branches and each fork forms a leaf and a single, erect flower.

The leaves are about 8 to 20 cm (3–8 in) long, smooth, toothed, soft, and irregularly undulated. The upper surface of the leaves is a darker green, and the bottom is a light green. The leaves have a bitter and nauseating taste, which is imparted to extracts of the herb, and remains even after the leaves have been dried.

Datura stramonium generally flowers throughout the summer. The fragrant flowers have a pleasing odour; are trumpet-shaped, white to creamy or violet, and 6 to 9 cm in long; and grow on short stems from either the axils of the leaves or the places where the branches fork.
The calyx is long and tubular, swollen at the bottom, and sharply angled, surmounted by five sharp teeth.
The corolla, which is folded and only partially open, is white, funnel-shaped, and has prominent ribs. The flowers open at night, emitting a pleasant fragrance, and are fed upon by nocturnal moths.
The egg-shaped seed capsule is 3 to 8 cm in in diameter and either covered with spines or bald. At maturity, it splits into four chambers, each with dozens of small, black seeds.

Datura stramonium L.

Chemical Constituents

- Stramonium contains 0.2–0.6% alkaloids. The main alkaloids are hyoscyamine and hyoscine (scopolamine). It also contains protein albumin and atropine. Atropine is formed from hyoscyamine by racemization. At the time of collection these alkaloids are usually present in the proportion of about two parts of hyoscyamine to one part of hyoscine, but in young plants hyoscine is the predominant alkaloid. The larger stems contain small amount of alkaloid and the official drug should contain not more than 3% stem with a diameter exceeding 5 mm.
- Ditigloyl esters of 3,6-dihydroxytropane and 3, 6,7-trihydroxytropane have also been isolated from the roots in addition to hyoscine, hyoscyamine, tropine and pseudotropine, *D. stramonium also contains 6-hydroxyhyoscyamine,* skimmianine, meteloidine, acetyl derivatives of caffeic, p-coumaric and ferulic acids, β-sitosterol, stigmasterol, campesterol, with anolide I, steroidal glycosides daturataturins A and B; flavonoids chrysins, quercetin and kaempferol and their esters.

I

- **Uses**

- It is a narcotic, antispasmodic and anodyne drug and used to relieve the spasm of the bronchioles in asthma. The leaves are ingredient of *Pulvis stramonii compositus and other* powders used for the relief of asthma. The leaves may be made into cigarettes or smoked in a pipe to relieve asthma.
- They are also used in the treatment of parkinsonism, boils, sores and fish bites. The flower juice is used to treat earache.
- The fruit juice is applied to the scalp for curing dandruff and falling hair. Stramonium ointment, containing lanolin, yellow wax and petroleum, is employed to cure haemorrhoids.

Thank you for your attention