

## THE PRELIMINARY SCREENING OF PHENYLPROPANOIDS IN LIQUID EXTRACTS FROM *POTENTILLA ALBA* L.

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**Introduction.** *Potentilla alba* L. (White Cinquefoil) belongs to *Potentilla* L. genus of the family *Rosaceae*. *P. alba* is native to Europe. *P. alba* is a clumping terrestrial plant of about 15 cm high; basal leaves palmate divided into 5 finger-like dark green leaflets; flowers white, five-petaled, in apical cymes of 2-5 flowers. The flowering stage: from April till June. *P. alba* accumulates major and trace elements, polysaccharides, phenol carboxylic acids, flavonoids, tannins, triterpenes. White Cinquefoil is a unique species possessing thyrotropic properties and successfully used for the treatment of hypo- and hyperthyroid conditions. Nowadays, there are many domestic herbal preparations from underground parts of *P. alba* marked as remedies for the treatment of thyroid disorders.

**Aim.** We aimed at preliminary screening of phenylpropanoids, namely, flavonoids and tannic materials, in liquid extracts from *P. alba* underground organs.

**Materials and methods.** Two marked liquid extracts from *P. alba* underground organs obtained with different extragents (extract I and extract II) were the objects of the present study. The preliminary screening of phenylpropanoids was performed using well-known identification reactions. Flavonoids were identified using alkaline solution, 3% solution of FeCl<sub>3</sub>; tannic materials were identified using precipitation reactions with 1% gelatine and 1% quinine hydrochloride solutions, 10% solution of lead (II) acetate basic; by the reaction with iron ammonium alum solution the group of tannins was detected.

**Results and discussion.** In extract I and extract II, the dark green colouration with 3% solution of FeCl<sub>3</sub> detected flavonols and flavones; the development of red colouration with alkaline solution showed the presence of polyoxyflavonols; in extract I aglycones and glycosides of flavonoids are present in almost equal amounts, whereas in extract II aglycones prevail.

A precipitation with 1% gelatine and 1% quinine hydrochloride solutions identified tannins in both extracts studied, and dark-green coloration revealed the presence of condensed tannins.

**Conclusions.** The results obtained showed the presence of flavonoid aglycones and glycosides, as well as condensed tannins in the objects studied. Still, there were some differences in analytical effects of the performed identification reactions, what justifies further comparative chemical profiling of the liquid extracts from *P. alba*.

## THE RESEARCH INTO AMYRIN DERIVATIVES IN HERBAL DRUGS PREPARATIONS FROM *ASTERACEAE* SPECIES

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**Introduction.** In large amounts, triterpene saponins accumulate mostly in underground organs, seeds, fruits, stems. The chemical structure of saponins is variable; consequently, a wide range of physical, chemical, biological and pharmacological properties is provided. Derivatives of

$\beta$ -amyrin (oleanan) are common in plants, while derivatives of  $\alpha$ -amirin (ursan) are distributed to lesser extent.

$\beta$ -Amyrin derivatives are one of the most effective hypolipidemic agents of plant origin and are used in a complex therapy of cardiovascular diseases. When administered orally, some substances increase the secretion in bronchial glands, excite the cough center and such substances are used as expectorants; they regulate fluid and salt homeostasis, enhance the activity of hormones, enzymes, possess antiviral and anti-inflammatory properties.

The derivatives of  $\alpha$ -amyrin and ursolic acid are used in pharmacy as an integral part of prophylactic drugs, including drugs for the treatment of lymphocytic leukemia, tumors, also these substances are used as modifiers of protein synthesis; exhibit various biological effects: anti-inflammatory, hypoazotemic, antitumor, antidiabetic, antioxidant and antibacterial.

To date, it is justified that a need for ursolic acid increases with a decrease in muscle tone, associated with aging, in acute and chronic diseases, overweight, metabolic disorders, active exercise, cancer, elevated levels cholesterol, disorders of the gastrointestinal tract and vasoconstriction. At the same time, the need for ursolic acid is reduced in adrenal dysfunction, excessive levels of blood sodium ions, increased acidity of gastric juice and reduced activity of the catabolic genes MuRF-1 and Atrogin-1 responsible for the destruction of muscle tissue.

It was reasonable to detect triterpenoids in the representatives of the *Asteraceae* family. The following plants were the objects of the study: *Calendula officinalis* L., *Taraxacum officinale* Wigg., *Inula helenium* L. and *Artemisia annua* L.

To date, it was shown that calendula flowers contain triterpene alcohols – derivatives of lupeol,  $\alpha$ -amyrin and  $\beta$ -amyrin, mainly arnidiol, faradiol and g-taraxasterol, as well as ursadiol, helianol, calenduladiol esterified with palmitic, myristic and acetic acids. The total content of triterpene alcohols in the inflorescence reaches up to 5%. Triterpenoids from calendula are considered to be the main biologically active compounds (BACs) responsible for anti-inflammatory effects, antiviral activity against Epstein-Barr virus, antimutagenic and tumor cell cytotoxic activities against colon cancer, leukemia, and melanoma cells.

Dandelion roots contain  $\alpha$ -amyrin and  $\beta$ -amyrin derivatives – taraxesterol, taraxesterane, *psi*-taraxesterol, pseudotaraxasterol ( $\gamma$ -taraxasterol). The researchers found that taraxasterol, contained in dandelion and calendula, exhibits antitumor effects; induces apoptosis; possesses antioxidant, anti-inflammatory and anti-allergic properties. Also, this compound inhibits activities of acetylcholinesterase and cyclooxygenase; taraxasterol is part of a complex of BACs that blocks the replication of HIV-1, HIV-2 in CD4<sup>+</sup> cells of the human immune system at all stages of infection.

Pentacyclic and tetracyclic triterpene saponins were detected in roots of elecampane. 4H-tomentosin and xanthalongin inhibited soluble epoxide hydrolase and are thought to be promising anti-inflammatory agents.

Most of the articles on research of annual wormwood are devoted to sesquiterpene lactones. Particular attention was paid to these compounds after artemisinin was isolated from annual wormwood (1971), and an effective antimalarial drug was developed on its basis, for which pharmacologist Tu Youyou (China, 2015) received the Nobel Prize in Physiology or Medicine. Artemisinin is gaining relevance today as an antiviral agent to fight the SARS-CoV-19 pandemic. At the same time, saponins and other groups of BACs are poorly studied.

**Aim.** The aim of this research was to carry out TLC studies of triterpene saponins in marked herbal drug preparations from official plants of *Asteraceae* family: *C. officinalis* L., *T. officinale* Wigg., *I. helenium* L. and *A. annua* L.

**Materials and methods.** Herbal drug preparations, namely, tinctures, liquid and thick extracts from *C. officinalis* L., *T. officinale* Wigg., *I. helenium* L. and *A. annua* L. were chromatographed “as is” and after acid hydrolysis.

As reference herbal drug preparations, licorice syrup, escuzan, esflazid, infusions from *Astragalus dasyanthus* herb and *Orthosiphon stamineus* leaves were used. To detect saponins on the chromatograms obtained, a detection reagent (anis aldehyde reagent) was used, followed by heating at 105°C for 5 minutes.

**Results and discussion.** By TLC method, in the objects studied (before and after acid hydrolysis) from 4 to 12 compounds of terpene nature, in particular  $\beta$ -amyrin and  $\alpha$ -amyrin, were detected according to the chromatographic behavior of the spots.

**Conclusions.** The presence of  $\beta$ -amyrin and  $\alpha$ -amyrin in the marked herbal drug preparations from *Calendula officinalis* L., *Taraxacum officinale* Wigg., *Inula helenium* L. and *Artemisia annua* L. gives background for carrying out phytochemical and pharmacological studies aimed at extension of the range of indications for use of tinctures, liquid and thick extracts from the above-mentioned official plants of *Asteraceae* family.

## THE STUDY OF SAPONINS IN *SMILAX EXCELSA* L. ROOTS

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**Introduction.** *Smilax* L. genus is the only genus of Smilacaceae family with more than 350 species, of which 80 grow in China, more than 20 species grow in India, up to 30 – in Central America, others – in Africa, in Europe from 1 to 3 species grow.

Common smilax – *Smilax excelsa* L. (*Smilax aspera*) or Sarsaparilla (*Sarsaparilla excelsa* L.) grows in Europe and the Caucasus. The plant is a climber up to 10 m long, stems with sharp strong thorns 4-8 mm long. Leaves of variable shape, mostly ovate-cordate, rarely guitar-shaped, shortly pointed at the apex, sometimes prickly at the edge, short-petiolate, with 2 tendrils at the base. Flowers 4-10 in the axils of cymes; pedicel up to 2 cm long. Perianth petal-shaped, greenish. Male flowers with 6 stamens. Female flowers bear 1 ovary with 3 stigmas. Berry spherical red, 1-3 locular. A flowering period: from May to December.

The plant is distributed in the Mediterranean region, Asia Minor, the Caucasus, Iran. Sarsaparilla grows both in swampy forests and on limestone rocks. With the help of paired thorns-hooks climbs high on the trees, forms lush impassable spinney.

In *Smilax* plants, flavones, flavonones, flavonols, stilbenes, smilasides, saponins, resins, bitter substances were reported. *Smilax aspera* L. accumulates anthocyanins: pelargonidin and cyanidin.

Radix Sarsaparillae excelsae and other Sarsaparilla species have long been used in folk and ancient medicine as a diuretic and detoxifying agents for the treatment of rheumatoid arthritis, syphilis, diabetes, gout, ulcers, cancer, inflammation, ophthalmic diseases.

Some compounds of *Smilax riparia*, namely, riparoside B and thymosaponin J reverse the damage to renal tissue in hyperuricemia and concomitant urate nephropathy. At the same time, the structure of epithelial cells and renal tubules is restored. According to the results of studies into the use of *Smilax riparia* extract, the level of uric acid in the serum is reduced by 16-39%, while urea nitrogen level is reduced by 20-28%.