

### Main fields of research

- Isolation and structure elucidation of biologically active substances of herbal origin. Main steps of such phytochemical research:

- selection of the plant species to be examined based on literature and/or ethnopharmacological data or chemical and/or pharmacological screening
- extraction of the plant material, pre-purification of the crude extracts, fractionation using various chromatographic methods
- structure elucidation and physico-chemical characterization of the isolated compounds, and determination of their spectral data
- pharmacological investigation of the pure compounds (in cooperation with other departments). The active agents, which show significant biological activity, can be used as models for the development of new pharmaceuticals. The lead compounds of natural origin are important for pharmaceutical research or they may contribute to the discovery of new pharmacological pathways and modes of action.

- Isolation of herbal compounds in large scale for analytical and pharmacological investigations

- Qualitative and quantitative analysis of herbal drugs, standardization of herbal medicinal products
- Development of new methods, which can be used for the analysis of bioactive compounds of herbal origin, elaboration of chromatographic and spectroscopic procedures and methods
- Investigation of the dynamics of the accumulation of active agents in medicinal and aromatic plants.
- Chemotaxonomic evaluations, exploration of the chemical diversity and production biology of medicinal plant taxons, with special regard to the plants of the temperate climate
- Chemical evaluations connected to wild-growing medicinal plants for introducing them to cultivation, and chemical evaluations connected to cropping technologies

**Main research topics:**

- Isolation of terpenoids, alkaloids and phenolic compounds with antitumor effect from the Asteraceae species ( *Xanthium italicum*, *Achillea millefolium*, *Anthemis ruthenica*, *Centauria jacea*

,  
*Conyza canadensis*

,  
*Onopordum acanthium*

)

- Isolation, structure elucidation and pharmacological investigation of diterpenes from the Euphorbiaceae family ( *E. esula*, *E. grandicornis*, *E. exigua*, *E. falcata*)

- Isolation, structure elucidation and pharmacological investigation of diterpene alkaloids from Ranunculaceae species native to the Carpathian Basin ( *Aconitum anthora*, *A. moldavicum*, *A. napellus*, *A. variegatum* subsp. *gracile*, *A. vulparia*, *A. firmum*

)

- Phytochemical analysis of Amaryllidaceae species: isolation, structure elucidation and pharmacological investigation of biologically active alkaloids ( *Hymenocallis festalis*, *Sprekelia formosissima*

,  
*Leucojum vernum*

,  
*Lycoris squamigera*

)

- Chemotaxonomical and production biological investigations – chemical screening of medicinal plant species native or cultivated in Hungary (especially *Salvia*, *Stachys*, *Ballota* genus)

- Investigation of the dynamic of accumulation of compounds in species of the Lamiaceae and other families (e.g. species of the *Ballota*, *Galium*, *Verbena*, *Amsonia*, *Rhazya* genera).

- Screening the Asteraceae, Lamiaceae, Caryophyllaceae, Chenopodiaceae, Helleboraceae species for ecdysteroids

- Phytochemical analysis of products containing herbal extracts: quantitative and qualitative analysis of food supplements and medicinal plant products
- Phytochemical investigations of *Centaurea* species native in Hungary, isolation of the components with anti-inflammatory effect
- Isolation of secondary metabolites of Rutaceae species (*Ruta graveolens*, *Evodia hupehensis*, *Haplophyllum tuberculatum*)
- Isolation of new and already known ecdysteroids from *Silene*, *Serratula*, *Helleborus* and *A juga* species, structure elucidation of the ecdysteroids, pharmacological and insect biology investigations
- Isolation of the antidiabetic compounds of the white mulberry (*Morus alba*)

### Laboratory equipments:

- Analytical and semipreparative HPLC with MS, UV, PDA and RI detections (Waters, Hewlet Packard)
- Chromatotron Centrifugal thin-layer chromatograph (Harrison Research)
- Droplet counter current chromatography (DCCC) (Eyala)
- GC-MS(Finnigan), GC-FID (Hewlet Packard)
- MPLC (Büchi Sepacore)
- TLC densitometer with UV/VIS detection
- UV-VIS spectrometer (Shimadzu UV 2101)
- Common chromatographic techniques (TLC, VLC, CC, flash chromatography)
- Freeze dryer (Hetosicc), centrifuge (Rotanta 460, Hettich), rotavapors, multivapor (Büchi), extractors
- In house access to NMR spectrometer (600 and 500 MHz, Bruker)