B055 Analysis of different tissues of six *Eleutherococcus* (*Acanthopanax*) species (Araliaceae) by LC/UV-APCI-MS and LC-NMR

S. S. Lim [a], K. Ndjoko [a], C. S. Heang [b], S. H. Jung [b], K. H. Shin [b] and K. Hostettmann [a]

[a] Institut de Pharmacognosie et Phytochimie, Université de Lausanne, BEP, CH-1015 Lausanne, Switzerland. [b] Natural Product Research Institute, Seoul National University, 110-460 Jongro-ku, Yeungun-dong, Seoul, Korea.

Eleutherococcus senticosus is an indigenous shrub from the northern regions of Asia. This plant is endangered by over-harvesting, especially as only roots are used in health-food. However, there are other species in the genus such as *E. koreanum* Nakai, *E. sessiliflorum* Seemann, *E. sieboldiana* Makino, *E. chiisanense* Nakai, *E. divaricatus* Seemann in South Korea (1). It may be possible to substitute the extract of the roots of *E. senticosus* with other tissues (stems, leaves and fruits) and/or with other *Eleutherococcus* species, as far as the similarity in their chemical constituents and the clinical activities are concerned. The chromatographic profiles of each tissue of the 6 species were compared by atmospheric pressure chemical ionization liquid chromatography-mass spectrometry (LC/UV-APCI-MS) and liquid chromatography coupled with a nuclear magnetic resonance (LC-NMR). The content of eleutherosides B & E, coniferin, chlorogenic acid and hyperin was also determined using hyphenated techniques (2). In general, the content of eleutherosides B and E in stems was higher than that in roots and the chromatographic profile of *E. sessiliflorum* and *E. chiisanense* was almost the same in all tissues. In the fruits, the content of eleutheroside E was higher in *E. sessiliflorum* and *E. chiisanense* than in *E. senticosus*. The results of this work clarified the chemical composition of each tissue of various *Eleutherococcus* species as basic data for future clinical trials.

Acknowledgements: This work was supported by the Post-doctoral Program of Korea Science & Engineering Foundation (KOSEF).

References: 1. J.S. Kang et al. (2001) Arch. Pharm. Res., 24: 407-411. **2.** J.L. Wolfender et al. (2001) Phytochem. Anal., 12: 2-22.

B056 Chemotaxonomic investigations of the *Achillea millefolium* group with IR spectroscopy

I. Werner, S. Glasl and J. Jurenitsch

Institute of Pharmacognosy, University of Vienna, PharmaCenter Vienna, Althanstrasse 14, A-1090 Vienna, Austria.

The *Achillea millefolium* group contains several taxa of different ploidy, morphology and chemistry (1). As the taxa are partly very similar concerning the morphology, chemical screening methods are needed that provide not only a fingerprint of the plant but also some information about the structures of the main compounds. The IR spectroscopy is a useful tool for structure elucidation of sesquiterpenes, a group that is important for the pharmacological effects of the plant as well as for chemotaxonomic questions (2). Therefore a method for screening single plants by IR spectroscopy was developed.

100 mg of dried flowerheads of single plants were extracted with 1ml dichloromethane. This extract was divided by VLC on silicagel 60 in two fractions by elution with dichloromethane (fraction 1) and dichloromethane-acetone (7: 3, fraction 2). The sesquiterpenes were enriched in fraction 2 which was evaporated. The residue was redissolved in a few drops of methanol and put on a silicium plate for IR measurement.

Experiments with the taxa *A. aspleniifolia* Vent., *A. ceretanica* Sennen, *A. roseo-alba* Ehrend., *A. setacea* W. et K. (2n), *A. ceretanica* Sennen, *A. collina* Becker, *A. pratensis* Saukel & Länger (4n), *A. millefolium* L. S. l., *A. millefolium* subsp. *sudetica* Opiz, *A. styriaca* Saukel ined. (6n) and *A. pannonica* Scheele (8n) from different locations showed characteristic patterns. The recorded spectra correlated well with the IR spectra of the sesquiterpenes isolated from the respective taxa. With this method it was possible to determine whether sesquiterpenes with an α-methylen-γ-lactone or with a saturated lactone dominate in the plant. This can be important because sesquiterpenes with an α-methylen-γ-lactone moiety are known to be responsible for allergic reactions (3-5). Accordingly IR spectroscopy seems to be a useful method for the rapid screening of *Achillea* species in combination with TLC.

References: 1. Willuhn, G. in Wichtl, M. (1997) Teedrogen und Phytopharmaka. Wissenschaftliche VerlagsgesmbH. Stuttgart. **2.** Kubelka, W. et al. (1999) Biochem. Sys. Ecol. 27: 437-444. **3.** Rücker, G. et al. (1991) Arch. Pharm. 324: 979-981. **4.** Hausen, B. M. (1991) DAZ 131: 987-996. **5.** Hausen, B. M. et al. (1991) Contact Dermatitis 24: 274-280.