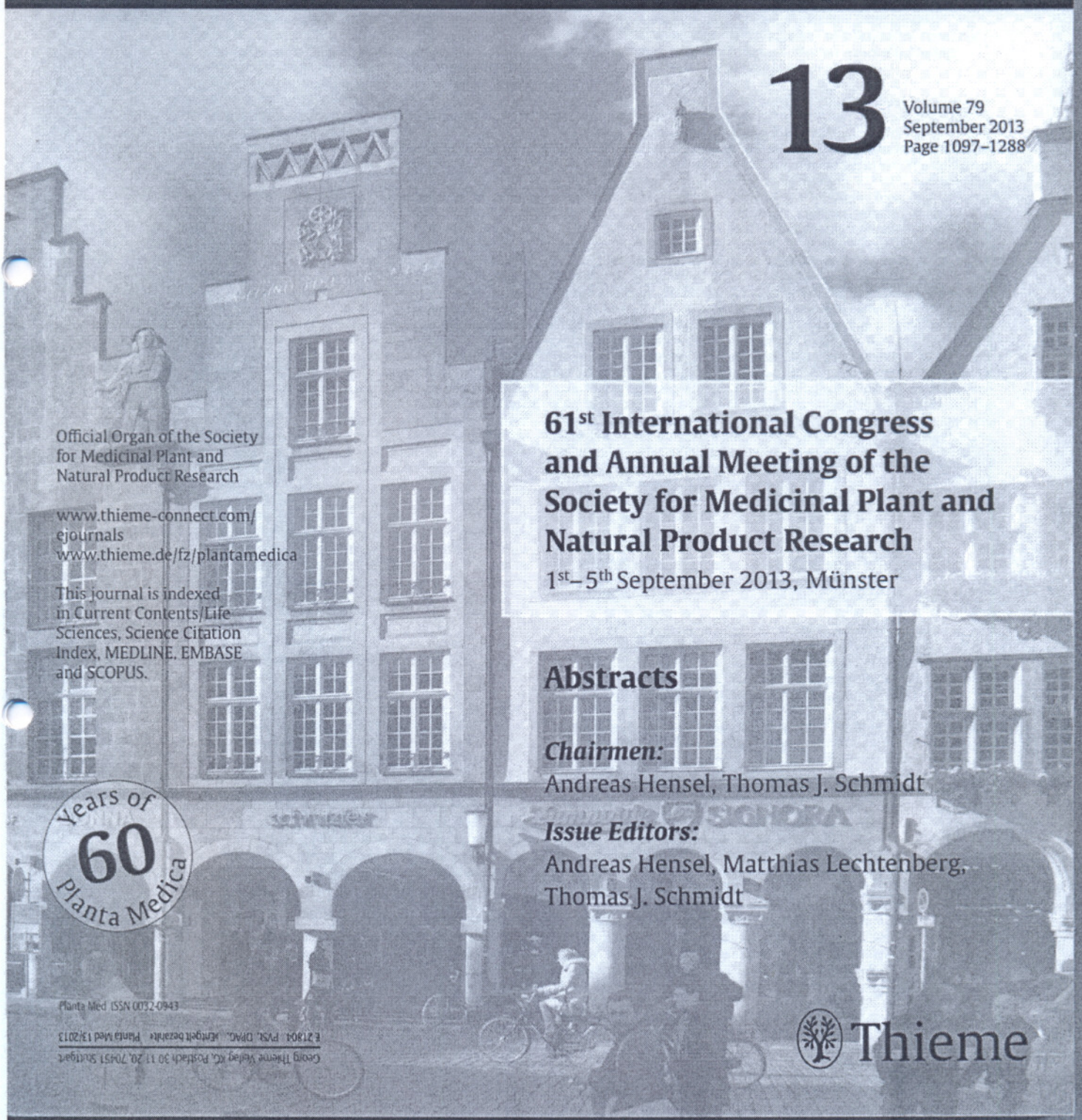
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Abstracts

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PI107 Highly oxygenated sesquiterpenes from the aerial parts of *Artemisia alba* Turra

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Artemisia alba Turra (*Artemisia*, Asteraceae) is widespread in the southern and south-eastern parts of Europe – Spain, Italy and Balkan peninsula [1]. The aerial parts of *Artemisia alba* Turra have been traditionally utilized as a stomach digestive and tonic in the form of a decoction [2]. The literature survey revealed few reports concerning the non-volatile components of this species: santonin, nerolidol derivatives and artalbic acid were isolated from the aerial parts, whereas the roots were shown to contain a sesquiterpene-coumarin ether [3]. The aerial parts of field cultivated *Artemisia alba* Turra were initially defatted with hexane and then extracted successively with chloroform and methanol. Further CC and PTLC purification of the chloroform extract resulted in the isolation of 10 new compounds with germacrane, oplopane, eudesmane, guaiane and bisabolane carbon skeletons. Their structures were elucidated by NMR spectroscopy (^{1}H-NMR, ^{1}H-^{1}H COSY, HSQC, HMBC, NOESY) and MS. It was found that the isolated compounds are highly oxygenated and contained 2 – 5 oxygen-bearing functions (OH, OOH, and OAc). The main components were germacrane derivatives with C-10 exomethylene group and C-3 and C-9 substituted positions. Additional oxygenated positions were C-1, C-2, C-4 or C-12 carbons. The dominant component among the isolated compounds was 1-hydroperoxy-3-hydroxy-9-acetoxy-germacra-5, 10(14)-diene. Acknowledgments: Swiss National Science Foundation in the framework of the Bulgarian-Swiss Research Programme (BSRP, grant No. IZEBZ0_142989; DO2 – 1153) References: [1] Tutin T.G., et al. Artemisia L. In *Flora Europaea*: (Tutin, T.G., et al. Eds.), Cambridge Univ. Press: Cambridge, UK, V. 4, 178 – 186, 1976. [2] Rigat M. et al. *J. Ethnopharmacol., 113, 267 – 277, 2007.* [3] Maggio A. et al., *Tetrahedron Lett.*, 52, 4543 – 4545, 2011 and literature cited therein.

PI108 Polar secondary metabolites from *Juglans regia* pericarps

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The aim of this study was to investigate the constituents of the acetone: H_2O (70: 30) extract of *Juglans regia* fresh pericarps, in continuation to our previous studies [1, 2]. The extract was fractionated by liquid – liquid extraction using ethyl acetate, n-butanol and water. The derived ethyl acetate extract was further fractionated through semi-prep RP_{18}-HPLC and afforded sclerone, 4-hydroxy-1-tetralone, regiolone, vanillic acid, 4-hydroxyphenylethyl 4-hydroxybenzoate, (7S, 8R)-dihydrodehydrodiconiferyl alcohol. The latter two compounds have been found for the first time in *Juglans regia* L. The structures of the isolated compounds were confirmed by spectroscopic methods, including 1D- & 2D-NMR, UV-Vis. In our previous study, it was found that sclerone and 3-MeO-juglone exhibit cytotoxic activity against a panel of cancer cell lines (MTT assay), since both compounds increased NK cell cytotoxicity as well as they enhanced T cell proliferation as assessed by ^{3}H-thymidine incorporation assays [2]. The investigation of the extract concerning its content and the *in vitro* anticancer and immunomodulating activities is still under progress. References: [1] Kavroulaki, E. et al. (2008) Planta Med. 74: 1040. [2] Tsasi et al. (2012) Planta Med. 78: 1196. Acknowledgements: This research has been co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) – Research Funding Program: Heracleitus II. Investing in knowledge society through the European Social Fund.

PI109 Antioxidant phenolic compounds from *Alchornea floribunda* leaves

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Alchornea floribunda leaves have been previously shown to posses potent anti-inflammatory compounds[1 – 3]. Further chemical investigation of a flavonoid sub-fraction of the methanol leaf extract of *Alchornea floribunda* led to the isolation of three flavans (-) catechin (+) catechin (-) epicatechin and a flavanone (2R, 3R) dihydroquercitin. The structures of these compounds were elucidated by 1 D and 2 D NMR spectroscopy and Liquid Chromatography- Electrospray Ionization Mass Spectrometry (LC-ESIMS). All the isolated compounds were assessed for their antioxidant potential *in vitro* using DPPH free radical scavenging and Ferric reducing ability[4]. In the DPPH model, (-) epicatechin, (+) epicatechin and (2R, 3R) dihydroquercitin showed high free radical scavenging activity with IC_{50} values of 19, 40 and 46 µg/mL respectively with the activity of (-) epicathechin comparable to that of the standard, chlorogenic acid (IC_{50} = 22 µg/mL). (-) catechin showed only mild activity with IC_{50} value of 88 µg/mL. In the Ferric reducing test, (-) catechin, (-) epicatechin and (+) epicatechin exhibited IC_{50} values of 46, 68 and 88 22 µg/mL respectively with the activity of (-) epicathechin higher than that of the standar, ascobic acid (IC_{50} = 66 µg/mL). (2R, 3R) dihydroquercitin showed poor Ferric reducing activity (IC_{50} > 100 µg/mL). The observed antioxidant activities of the isolated flavans may explain the efficacy of the extract of *Alchornea floribunda* leaves in the ethnomedicinal management of diseases associated with oxidative stress. References: [1] Okoye FBC, Osadebe PO (2009). *Asian Pacific Journal of Tropical Medicine*, 2(3): 7 – 14. [2] Okoye FBC, Osadebe PO, Proksch P, Edrada-Ebe RAI, Nworu CS, Esimone CO. (2010). *Planta Medica* 76 (2): 172 – 177. [3] Okoye FBC, Osadebe PO. (2010). *Natural Product Research* 24 (3): 266 – 273. [4] RACHH RR etal., (2009) ROM.J.Bio.Plant Biol., vol 54. No2. P. 141 – 148.

PI110 New flavanone glycoside from the leaves of *Faramea marambaiae* (Rubiaceae)

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The species *Faramea marambaiae* M. Gomes (Rubiaceae) is endemic in the city of Rio de Janeiro, Brazil, and there are no reports about its chemical composition or therapeutic potential. From the methanol extract of its leaves were isolated, among other compounds, by liquid-liquid partition followed by reverse phase (C18) column chromatography (CC) and semi-preparative reverse-phase (C18) high performance liquid chromatography coupled to a diode array detector (HPLC-DAD) the novel flavanone glycoside: 5-hydroxy-4'-methoxy-flavanone-7-O-ß-D-apiofuranosyl-(1 – 6)-ß-D-glucopyranoside. Structural determination was made by nuclear magnetic resonance (NMR) techniques in one and two dimensions (^{1}H NMR, ^{13}C NMR, COSY, HSQC and HMBC), ultraviolet spectroscopy (UV) and optical rotation. Preliminary test for *in vitro* cytotoxicity of the methanol extract towards a human breast cancer tumor cell line (MCF-7) showed no cytotoxicity. Tests for antioxidant activity with DPPH and phototoxic activity (photosensitizer action to produce singlet oxygen – $^1O_2$) of the flavonoid rich methanol:water 9:1 fraction, obtained by partition of the methanol extract, showed moderate antioxidant activity (IC_{50}= 174.96 µg/mL) and absence of phototoxicity. Acknowledgments: CNPq and FAPERJ (Brazil), Oswaldo Cruz Foundation NMR Lab.

PN21 Optimization of *in vitro* culture system for biomass and polyphenolics production in *Inula britannica* and *Sideritis scardica* Sofia 2 cultivar

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Inula britannica is used as an anti-inflammatory, anti-bacterial, anti-hepatitic, and anti-tumor agent [1]. Species of the *Sideritis* genus possess anti-inflammatory, antiulcerative, antimicrobial, vulnerary, antioxidant, antispasmodic, anticonvulsant, analgesic and carminative properties [2]. *Sideritis scardica* is a Balkan endemic species traditionally employed as expectorant for the treatment of pulmonary emphysema and angina pectoris [3]. *In vitro* culture was initiated by axillary buds formation of surface sterilized stem explants of *I. britannica*, collected from its wild habitat in Bulgaria, and of *S. scardica* – from sterile germinated seeds of the commercial cultivar Sofia 2, distributed on the Bulgarian market. Vitamin and plant growth regulators (PGR) were modified in order to optimize biomass production and polyphenolics accumulation *in vitro*. In *I. britannica* long-term growth of stock cultures was achieved in PGR-free medium. Biomass and polyphenolics formation were successfully stimulated by supplementation of Gamborg vitamins and a combination of N^6-Benzyladenine (BA) and Naphthylacetic acid. For Sofia 2 cultivar PGR-free medium resulted in a low multiplication index, has been unfavourable for long-term maintenance (over 4 weeks) and required more frequent subculture in order to avoid necrosis of explants. Addition of PGR allowed for optimization of biomass production with only slight reduction of the proportion of high molecular flavonoids as a part of total polyphenolic content. Acknowledgments: This work was supported by the Swiss National Science Foundation in the framework of the Bulgarian-Swiss Research Programme (BSRP, grant No. IZEBZ0_142989; DO2 – 1153) References: [1] Khan AL et al. (2010) Molecules 2010, 15, 1562 – 1577; [2] Gonzalez-Burgos E et al. (2011) J Ethnopharmacol 135: 209 – 225; [3] Ivancheva S, Stantcheva B (2000) J Ethnopharmacol 69, 165 – 172

PN22 Antioxidant potential of *Incarvillea emodi* (Royle ex Lindl.) Chatterjee

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Incarvillea Juss. is notable for being a temperate and herbaceous genus of the primarily tropical and woody family Bignoniaceae. It is composed of 16 species world wide and represented in Pakistan by one native species[1,2]. Most of the species occur in the Himalayas and S.W. China, where the diversity of the mainly herbaceous species appears to be related to the uplift of the Himalaya-Hengduan Mountains[1,2]. *Incarvillea* species are used for the treatment of hepatitis, diarrhea and infectious diseases. Some traditional herbal medicines of genus *Incarvillea* are used to treat rheumatism and relieve pain[1]. Biological activity studies on the genus have proved its antinociceptive, antiinflammatory, neurotrophic and antihepatic activities. Earlier phytochemical investigations on *Incarvillea* species resulted in the isolation of mainly alkaloids, ceramides, iridoids, flavonoids, and triterpenes[1]. In the present study, antioxidant potential of *Incarvillea emodi* collected from two different localities, Abbottabad and Kashmir in Pakistan, was evaluated against different free radicals. Aqueous extracts of the aerial parts and the roots of plant collected from Abbottabad and the aerial parts of plant collected from Kashmir were prepared, separately. Each extract was tested for its radical scavenging activity using DPPH, NO and SO radicals spectroscopically. The extracts showed concentration dependent radical scavenging ability on all the tested radicals. The most active extract, with 47.6168 µg/ml IC_{50} value, against DPPH radicals was found to be the extract obtained from aerial part of the plant from Abbottabad. The activity of the extract of plant from Kashmir was found to be weak. Isolation studies of the active compounds have been continuing. Acknowledgment: This study was supported by The Scientific and Technological Research Council of Turkey Program, No: 2216. References: [1] Fua, J. et al. Chemistry & Biodiversity (2009) 6. [2] Flora of Pakistan http://www.tropicos.org/

PN23 Antiplatelet and antithrombotic effects of *Morus alba* leaves extract

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Morus alba L. leaves has been used in fork medicine for the treatment of beriberi, edema, and diabetes and reported to have anti-obesity, anti-diabetic, anti-hypertension, liver protection, antiviral and antimicrobial activities. However, information on its anti-platelet and anti-thrombosis effects is limited. The current study was performed to examine the effects of M. alba leaves ethanol extract (MAE) in platelet aggregation and thrombosis. The anti-platelet activity of MAE was studied using rabbit platelets for in vitro determination of the extract effect on collagen-induced platelet aggregation, thromboxane B_2 (TXB_2) formation and serotonin secretion. The extract in vivo effects was also examined in arterio-venous shunt thrombus formation in rats. HPLC chromatographic analysis revealed that MAE contained rutin and isoquercitin. MAE significantly and dose dependently inhibited collagen-induced platelet aggregation with the 50 percent inhibitory concentration (IC50) of 0.42 mg/ml. MAE also attenuated serotonin secretion and thromboxane A_2 formation. In addition, the extract in vivo activity showed that MAE at 400, 200 and 100 mg/kg significantly and dose-dependently attenuated thrombus formation in rat arterio-venous shunt model by 52.3% ($p < 0.001$), 28.3% ($p < 0.01$) and 19.1% ($p < 0.05$), respectively.

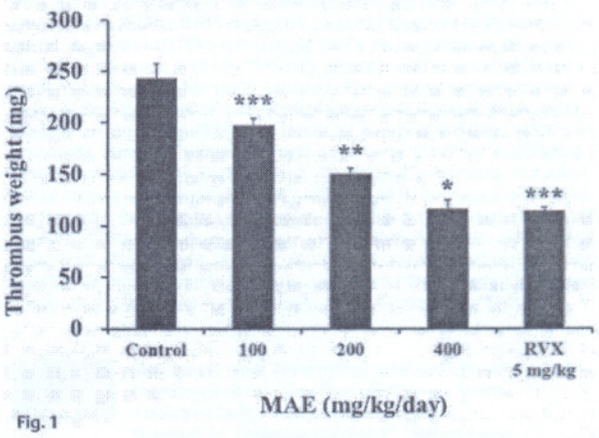


Fig. 1

PN24 The accumulation of free and bound phenolic acids in *Anethum graveolens* L. *in vitro* cultures cultivated on the Murashige and Skoog medium variants – preliminary results

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Phenolic acids, constitute a biologically attractive group of compounds showing among others antioxidant, immunostimulating and anticancer properties. These compounds occur in plants either in the free form or bound in glycoside and/or ester structures. Plant *in vitro* cultures can be a rich source of these compounds. Our earlier studies proved that *Anethum graveolens* L. (Apiaceae) callus cultures cultivated on Murashige and Skoog (MS) medium were an interesting source of free phenolic acids. The aim of the present studies was to analyze the contents of free and bound phenolic acids in biomass cultivated on the same MS medium variants. The callus cultures were cultivated on seven MS medium variants supplemented with plant growth regulators (PGRs): BAP (cytokinin) and NAA (auxin) in the concentration range from 0.1 to 3.0 mg/l. Methanolic extracts from biomass from *in vitro* cultures and fruits from the native plant after acid hydrolysis (2 M HCl, 2 x 2 h) were analyzed for phenolic acid contents by an HPLC method. In total, eleven phenolic acids and cinnamic acid were analyzed. All examined extracts contained six metabolites. The main metabolites in the biomass from *in vitro* cul-

w%, respectively, although elicitor treatment led to slightly reduced biomass increase. After further clone selection and optimization of growth parameters the procedure could be an attractive option for the continuous, field culture-independent production of leoligin. Reference: [1] Reisinger U, Schwaiger S, Zeller I, Messner B, Stigler R, Wiedemann D, Mayr T, Seger C, Schachner T, Dirsch VM, Vollmar AM, Bonatti JO, Stuppner H, Laufer G, Bernhard D. (2009) Leoligin, the major lignan from Edelweiss, inhibits intimal hyperplasia of venous bypass grafts. Cardiovasc Res 82(3): 542 – 9.

PN118 Anti-*Helicobacter pylori* activity of local edible plants

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Helicobacter pylori, gram negative bacteria, are mainly located in human stomach and, recognized as the cause of gastritis, dyspepsia, peptic ulceration and gastric carcinoma.[1] Eradication of *H. pylori* is hard to achieve and requires multiple antibiotic regimens. The growing problem of antibiotic resistance by the microorganism demands the search for novel compounds from plants. This study aimed at evaluating the anti-*Helicobacter pylori* activity of edible plants used in local area of Thailand. The *in vitro* antibacterial activity of a total of 57 methanolic extracts from dietary plants and spices were investigated by disc diffusion method against *H. pylori*. The inhibition strength of extract specimens can be classified in 4 groups which are strong, moderate, mild and no activity. The specimens that showed strong activity were then evaluated the MIC against *H. pylori* using agar dilution technique. It was found that the methanol extract of *Zingiber officinalis*, *Curcuma parviflora*, *Peperomia pellucida*, *Polygonum odoratum*, *Gymnema inodorum*, *Plectranthus amboinicus*, *Spondias pinnata* and *Marsilea crenata* revealed activity against *H. pylori* with MIC 2.5 µg/ml whereas MIC of amoxicillin, positive control, is 7.81 µg/ml. The results showed the possibility of considering local edible plants a chemopreventive agent for peptic ulcer or gastric cancer. Reference: [1] Kandulski A, Selgrad M and Malfertheiner P. (2008). DIGEST LIVER DIS. 40: 619 – 626.

PN119 Phytochemical assessment of the effect of stimulated *in vitro* multiplication on the metabolic profile of *in vitro* cultured *Hypericum richeri* and *Artemisia alba*

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In vitro secondary metabolite production requires a fine balance between biomass formation and expression of the biosynthetic capacity of the species. Comparison of the metabolite spectra of the *in vitro* to *ex situ* material is a crucial benchmark in this process. HPTLC methods known from similar plant species from the *Artemisia* and *Hypericum* genera [1, 2] have been adapted to extracts with varying polarity of different plant parts from *ex situ* and *in vitro* samples of *Artemisia alba* and *Hypericum richeri*. The main differences and similarities of the secondary metabolite and bioactive constituent profiles between *in situ* and *in vitro* produced plant material were assessed. The results of this study revealed that *A. alba* can be maintained successfully long-term in medium lacking plant growth regulators (PGR) whereas *H. richeri* requires cytokinin supplementation in order to stimulate axillary bud multiplication and sustain growth *in vitro*. It was also established that N^6-Benzyladenine (BA) strongly stimulated multiplication index and its individual application led to inhibition of rooting for both species. While the combination of BA and indole-3-butiric acid was found to be favorable for both biomass and polyphenolics stimulation in *A. alba*, enhanced growth led to the drop of polyphenols and flavonoids in *H. richeri*. At the same time hypericins were observed in significant levels *in vitro*. Further research is in progress to clarify the distinctive features of the biochemical and physiological response to PGR treatment as a model system for affecting antioxidant metabolites production *in vitro*. *Acknowledgments:* This work was supported by the Swiss National Science Foundation in the framework of the Bulgarian-Swiss Research Programme (BSRP, grant No. IZEBZ0_142989; DO2 – 1153) References: [1] Froksch P and Wissinger-Gräfenhahn U. Artemisia. In: Blaschek W et al. (Eds.) Hager ROM 2011. Springer Heidelberg [2] European poeia 7.7 online edition

PN120 Precursor feeding and elicitation impro mitragynine production in *Mitragyna sp* shoot culture

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Mitragyna speciosa (Roxb.) Korth. [Rubiaceae] is a unique sourc tragynine, an opioid agonist and possesses an analgesic effect l selective binding to opioid receptors. The present study shoot from axillary buds were established and cultured in the liquid M woody plant medium (WPM) supplemented with 2 mg/L thidi 1 mg/L benzyladenine and 20 g/L sucrose. To improve mitragynir duction in the shoot culture, feeding of precursors and elicitor investigated. Tryptamine, loganin and tryptamine/loganin (final co tration of 0.2, 0.4 mM) were fed on the day of subculture and har at day 14 and 21 of culture. The results showed that feeding of tr mine affected the mitragynine content rather than loganin. Howe combination of tryptamine and loganin (at 0.4 mM of each) enha mitragynine production to 0.364 ± 0.009 mg/g DW (after 14 c $P< 0.01$) and 0.273 ± 0.015 mg/g DW (after 21 days; $P< 0.05$) when c pared to control (0.169 ± 0.019 mg/g DW). Plant hormone-like elici including jasmonic acid (0 – 100 µM), abscisic acid (0 – 100 µM) and icylic acid (0 – 500 µM) were selected. The optimal concentration optimal time exposure of each elicitor were designed using the respo surface methodology (RSM) and central composite design (CCD). T equations, obtained from RSM and CCD were used for calculation optimal conditions in each elicitor. At optimal conditions, the elicit shoot culture with jasmonic acid (100 µM; 48 h) increased mitragyni production (0.482 ± 0.021 mg/g DW) about 2.4 times higher than tl control (0.188 ± 0.030 mg/g DW). In addition, abscisic acid (50 µM 24 h) and salicylic acid (500 µM; 48 h) increased the mitragynine pro duction to 0.273 ± 0.007 mg/g DW and 0.279 ± 0.016 mg/g DW, respec tively when compared to the control (0.116 ± 0.008 mg/g DW).

PN121 Synthesis and biological evaluation of tetrahydroisoquinoline skeletion from *Ancistrocladus tectorius*

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Ancistrocladus tectorius is this plant used in traditional medicine to treat dysentery, malaria and has additionally been found to exhibit antiviral, anti-HIV, antitumoral activities. In this plant found in Ancistrotectorin (1) which exhibits anti-spasmolytic for smooth muscle similar to those of verapamil and papaverine. It structure similar to tetrahydroisoquinoline and was used as a template in this synthesis products. In this study to synthesis of structure of 1,2,3,4-tetrahydroisoquinoline to mimic structure of tetrahydroisoquinoline found in *Ancistrocladus tectorius*. To synthesize the tetrahydroisoquinoline have variation position 1 substituted with 4-Cl-phenyl (2) and 4-NO_2-phenyl (3) group on tetrahydroisoquinoline skeleton. These target compound were prepared via the Pictet-Spengler reaction to give two diastereoisomers of target compounds 2 and 3. The major (2a and 3a) and minor (2b and 3b) products were isolated and structure elucidated with 1D and 2D NMR spectroscopy to be *cis*- and *trans*-isomers, respectively. The synthesized compounds as 2a and 2b were primary screened for anticonvulsant activity via Pentylenetetrazol (PTZ)-induced seizure model in mice. The activity result showed that administration of *cis*-isomer (2a) is significantly increased time latencies for the onset of myoclonic jerk ($p < 0.05$). Moreover, *cis*-isomer seems to be a good arrangement for the anticonvulsant activity. And these finding indicate that the simple structure of 1,2,3,4-tetrahydroisoquinoline might be a good candidate as a new therapy for epilepsy and more derivatives. And next, more derivatives were synthesizes such as 3a and 3b and anticonvulsant were also study.