



ISE



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Transdisciplinary science for our future***

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- ISE1. Ethnopharmacology and Biocultural Diversity
 - ISE2. Circum-Mediterranean Ethnopharmacology and Ethnobotany and the mutual interactions with the Americas
 - ISE3. From traditional remedies to modern medicines – phytochemical, pharmacological and clinical studies
 - ISE5. The interface between History and Ethnopharmacology
 - ISE6. The interface of Medicine and Food Plants

ISE1-001 A sustainable approach to Ethnopharmacology – Biovision Foundation supports pilot project in Kenya's rainforest

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Background: East Africa's protected forests are home to many rare or endemic plant and animal species. Driven by local needs, pressure on the forests has been increasing constantly over the last decades. Due to deforestation and over-exploitation of non-timber forest products, these vital and unique ecosystems are threatened with extinction.

Objectives: Farming families living in the vicinity of the forests are forced to use wood, plants and grass from protected areas in an unsustainable way to secure their livelihoods. In order to counter-act to this trend whilst still enabling vital additional income to be made by the farmers, Biovision and its local partner organization *icipé* demonstrate in a pilot project in the Kakamega forest in northwest Kenya how local aromatic and medicinal plants can be planted on-farm. The plants are then sold for a fair price to create an additional, forest-independent household income.

Methods: Local co-operatives work closely with *icipé* to monitor cultivation, secure a stable selling price and process the raw materials. The extracts from the aromatic and medicinal plants are used to create a range of products for various health and healing purposes, and are sold at local and national markets in Kenya and Tanzania.

Results and conclusions: This project adds value to and motivates utilization of traditional knowledge. By generating new green jobs and additional income, livelihoods of the local community have been improved. The project also enhances community participation in forest protection, especially of women and youth, by conducting environmental education and awareness on biodiversity conservation. Technology transfer into the local communities enables new plant-based marketable products for improvement of health and nutrition. The thousands of people in Kenya, Tanzania and Uganda who buy and use them is proof of the continuing success of this project.

Keywords: Africa, traditional knowledge, medicinal plants, green jobs, technology transfer, women, youth empowerment, biodiversity conservation, improvement of health and nutrition.

ISE1-002 A botanical and medicinal Ethnography of Vanuatu

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Background: Vanuatu is considered as the world's most diverse nation in terms of the number of actively spoken indigenous languages per head of population, resulting in a great cultural diversity. The climate here varies from wet tropical in the northern to dryer subtropical in the southern part, resulting in a huge biodiversity compared to many other islands in this region. This biodiversity together with the huge cultural variety made Vanuatu a unique target for an ethnobotanical survey.

Objectives: Investigation of differences in the traditional medicinal systems and the use of plants on the basis of three case studies - namely islands differing in floristic composition due to their location in different climate zones and discriminative soil composition as well as ethnological background of the inhabitants.

Methods: During five months of fieldwork ethnographic data concerning healing practices and the medicinal plants used were collected on three islands using the semi-structured interview technique. The data obtained were analyzed in context with (ethno)botanical literature already available for this region.

Results and conclusions: A comprehensive database on (ethno)botanical literature of Vanuatu was created listing about 2000 plant species of which about fifteen percent are traditionally used. Additionally different levels of knowledge loss were observed in the three investigated areas reflecting the situation of the whole country.

Keywords: Vanuatu, Melanesia, Traditional Medicine, Ethnobotany

Acknowledgments: The authors are indebted to the Cultural Centre and the government of Vanuatu for giving permission for this research. They also to thank the informants and fieldworkers for sharing their secrets.



ISE1-003 Towards a database on Ethnobotany of the Catalan linguistic area

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Background: Databasing is one of the most extended activities in every field of research. In the fields of Economic Botany and Ethnobotany, several databases exist, with thematic or geographic foundations, which make it easy quantitative works and comparative approaches. Our research group (<http://www.etnobioc.cat>) is performing ethnobotanical surveys in different regions of the Catalan linguistic area in the last 20 years.

Objectives: In this communication we will present the framework, the main characteristics and the results launched to date of a database on the popular knowledge (names, uses, management) about plants in the Catalan language territories.

Methods: A team of botanists and experts in informatics has worked together to design and implement a database in MS-Access format permitting to hold the results of our ethnobotanical researches (and further on also of other investigations) and to quantify and analyse these data.

Results and conclusions: After carefully discussing the database structure and every term of the different thesauri (plant uses, parts of plants, procedures of preparation, modalities of uses) we started introducing data. About 700 plants, 2000 Catalan names and 6,000 medicinal uses are currently available, and this information will grow quickly. Although it is a general database, a significant pool of data belongs to the field of health (medicinal, food and related uses).

Keywords: Catalan speaking territories, ethnobotanical database, food plants, medicinal plants.

ISE1-004 The importance of palms as medicinal resources in northwestern South America

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Background: Palms are versatile and useful plants which have been widely used as ethnomedicinal resources throughout the tropical rain forests regions of South America⁽¹⁾. In Colombia, Ecuador, Peru and Bolivia, many ethnobotanical studies report tens of medicinal species for indigenous and peasant communities in Amazonia, Andes and Chocó (Pacific coast).

Objectives: To review and analyze earlier studies on medicinal palm Ethnobotany in order to highlight the importance of this group of plants for the Ethnopharmacology and biocultural diversity.

Methods: We extensively surveyed both literature in peer-review journals, and regional literature in many local publications of the four countries. Medicinal information was extracted from 100 publications and organized into medicinal use categories by ecoregions and human groups.

Results and conclusions: We found a total of 68 palm medicinal species and 590 use-reports grouped in 19 medicinal subcategories. The most important subcategories included species for the treatment of the digestive system, the respiratory system, and for infections and infestations. The most used species were *Oenocarpus bataua*, *Euterpe precatoria* and *Attalea phalerata*. Amazonia was clearly the region where palms were more used, whereas Andes and Chocó showed similar number of species. Indigenous people reported much more medicinal information than mestizo people. In summary, palms are of great medicinal interest for people of the tropical rain forests.

Keywords: Amazonia, Arecaceae, Chocó, Ethnomedicine, Palm Ethnobotany, Tropical Andes.

Acknowledgments: To Pedro Armesilla and Manuel Pardo de Santayana for their help with the database. This project was funded by the 7th Framework Programme of the European Union (grant # 212631).

References: 1. Plotkin & Balick 1984 Journal of Ethnopharmacology 10: 157- 179.

ISE1-P01 The Medicinal Use of Invertebrates in Northern Vietnam

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Background: Animal-based traditional remedies have received less attention in pharmacological research than those made from plants. However, it is known that especially invertebrates contain potent compounds that could be utilized in medicine. Such medicinal practices are also found among northern Vietnamese ethnic minority groups, who continue to rely on self-made remedies.

Objectives: This study presents the medicinal uses of insects, arachnids, molluscs and earthworms among indigenous ethnic minority groups in northern Vietnam, as well as findings on how these practices evolved in the region.

Methods: Interviews and phylogenetic analyses.

Results and conclusions: Some 40 invertebrates or their products were identified for their medicinal properties. Phylogenetic analyses reveal the relative roles of vertical and horizontal transmission in the evolution of this practice.

Keywords: Ethnomedicine, invertebrates, Vietnam.

ISE1-P02 Plants used as pesticides in Hidalgo State, México

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Background: Plants may provide an alternative to the currently used synthetic agents to control pests^(1,2). Farmers in Hidalgo State, presently use plant materials to control pests. The toxicity and the environmental impact of many synthetic drugs justify the study of alternative drugs.

Objectives: The objective of this study was to investigate the use of the plants to control pests and to test the extracts of 32 species of plant and one compound as a pesticide.

Methods: Ethnobotanical data first was obtained using semi-structured interviews of the inhabitants of the state. The insecticidal activity of 32 plant extracts and one isolated compound were evaluated in a force feeding test with *Sitophilus zeamais*.

Results and conclusions: In Hidalgo, 124 species of plants, from which residents obtain 186 products are used to control 29 types of pests. The species with greatest importance as pesticides were *Trichilia havanensis*, *Psidium guajava*, *Mentha rotundifolia*, *Ipomoea stans* and *Tagetes lucida*. In the tests carried out, alcohol extract from *Barkleyanthus salicifolius*, *T. havanensis*, *Decatropis bicolor*, *Schinus molle*, *Erythrina americana* and *Plumbago pulchella* showed high anti-feeding activity (AA) (ANOVA F=32.7 df 31 $p=0.0001$) and mortality (M) (ANOVA F=14.12 df 31 $p=0.0001$) against *S. zeamais*. Plumbagin was identified (by GC-MS) as the active principle responsible for the insecticidal activity from *Plumbago pulchella*. Hidalgo residents are strongly dependent on the local flora to control pests using multiple strategies combined with traditional techniques.

Keywords: Plants as pesticides, Hidalgo State, México.

Acknowledgments: To the Programa Nacional de Posgrados de Calidad PNPC CONACyT 00312.

References: 1. Arnason, J.T. et al. Insecticides of plant origin. Washington. American Chemical Society. 1989. 2. Isman, M.B. Ann Rev Entomol 2006. 51: 45–66.



ISE1-P03 Evaluation of cestocidal efficacy of *Acacia oxyphylla* (Leguminosae)

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Background: *Acacia oxyphylla* Graham *ex* Bentham is a commonly used medicinal plant by natives in North east India, the stem bark of which is reported to be anthelmintic

Objectives: In this study the in vitro effect of crude alcoholic extract and active component of the plant were tested using ultrastructural, histochemical and biochemical parameters.

Methods: Adult *Raillietina echinobothrida* collected from freshly sacrificed domestic fowl were exposed to various concentrations of extract and active component. Normal and treated materials were processed for histochemical, biochemical and electron microscopic observation following standard procedure

Results and conclusions: Time taken for paralysis and death of parasites revealed to be dose dependent and significant at pble deformity of tegumental architecture, destruction and deformation of cytoplasmic organelles along with decline in level of trace elements (Ca and Mg), many amino acids like arginine, glycine, alanine and glutamine, and reduced activity of vital enzymes in the parasite tissue. The isolated active component also showed ultrastructural alteration and decline in vital enzyme activity. Ultrastructural and biochemical changes observed on the treated parasites may be due to generalised stress response. Considerable structural and functional alterations in the treated parasites are suggestive of an efficient vermifugal activity of *A. oxyphylla* derived botanical(s) against cestodes.

Keywords: *Acacia oxyphylla*, Anthelmintic.

ISE1-P04 Evaluation of the insecticidal activity from *Tithonia diversifolia* and *Clibadium sylvestre* in the control of *Atta cephalotes* L.

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Background: *Tithonia diversifolia* and *Clibadium sylvestre* are used in various tropical countries as remedy against malaria, intestinal parasites, chill, liver problems, also as insecticides and ictiotoxics. Natural insecticides or natural protection of crops reduce the risk of insect's resistance, they have less lethal consequences for natural enemies, reduce the arrival of secondary pests, are less harmful to humans and causes no damage to the environment ⁽¹⁾.

Objective: Evaluate the effect of *T. diversifolia* and *C. sylvestre* to control *Atta cephalotes*

Methods: Using the methodology proposed by Adoyo *et al.* ⁽²⁾ modified for the cutting ant control, which takes into account aspects such as: inventory, cleaning, measuring, marking, and identification of the nest; descriptive and exploratory one-dimensional analysis, also structure and population density was analyzed, with Shapiro-Wilk and Levenne test to homogeneity of variances.

Results and conclusions: We found 44 nests of *A. cephalotes*, the treatment that showed more activity was the mix of *T. diversifolia* and *C. sylvestre*. Diluted sample 1:2 v/v with a 93% decrease of the forage activity, significant differences between the treatments was presented at a confidence level of 95.0%. These species are an important less cost alternative to be used sustainably by people in rural areas.

Keywords: Useful plants, Insecticidal activity, Asteraceae.

Acknowledgments: Financial support from UTCH, CENIVAM and COLCIENCIAS are gratefully acknowledged

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ISE1-P05 Review of Oncology-focused publications in field of Chinese Herbal Medicine

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Background: A series of 192 published papers in the field of *in vivo* cancer research in Chinese Herbal medicines (CHM) were reviewed to allow an analysis scientific quality.

Objectives: To review the quality of experimental method, data analysis and scientific interpretation in the use of CHM in *in vivo* cancer models.

Results and conclusions: The most common cancer types studied were gastrointestinal, mainly stomach and colon, followed by breast and prostate. The majority of experimental animals were either conventional or nude mice (82%) and the majority of models involved use of xenograft, syngeneic cancers or carcinogen-induced models (94% in total). The models were simple, i.e. subcutaneous implantation, mostly derived from cell lines and treated orally by gavage or via the diet (51%). The main signaling pathways involved those associated with apoptosis and angiogenesis. Biomarkers were infrequently used with PSA being the most commonly cited. Very few details on associated toxicity were described, and, where defined, were associated with weight loss. A small number of studies (20%) compared test agent effects with Western standard of care agents and in terms of experimental design, 50% of studies used group sizes >5, 40-50% had appropriate statistical analyses and included a relevant control. However only 14% cited compliance with a regulatory authority. Variation in tumor size within experiments was not shown in 41% of studies but where shown was >10% in 34% studies and clinically-relevant treatment of established lesions were only described in 19% of papers.

Overall the quality of research was insufficient/poor in 41% of papers and good/ excellent in 9%.

ISE1-P06 Significance of *Tovomita* species in strict diets in Chazuta valley (Peruvian Amazon)

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Background: Ethnomedical reports for *Tovomita* species (Clusiaceae) are scarce in the literature. Nevertheless, they have been detected as the main plants used in Chazuta valley (Peruvian Amazon) in the traditional healing practices known there as strict diets⁽¹⁾.

Objectives: Evaluate the possible role of *Tovomita* species in strict diets.

Methods: An ethnopharmacological field work on the use of plants in strict diets was performed in Chazuta Valley and results were confronted to the existing literature.

Results and conclusions: In strict diets, plant remedies are consumed with nearly fasting and with some sort of seclusion. These practices: a) always produce depurative effects, b) usually originate other physiological or pharmacological effects, c) sometimes induce holotropic states of consciousness. The plants more frequently used are *Tovomita stylosa* (34 of 122 reports) and *T. foldatsii* (29 of 122 reports). A wide range of medicinal uses was recorded for the diets with these plants, which are considered a panacea in Chazuta. In the literature, only cytotoxic and antimicrobial activities have been described for *Tovomita* species, that have been related to the presence of xanthenes, benzophenones and betulinic acid⁽²⁻⁴⁾. However, other pharmacological activities that could be related to the use of *Tovomita* species in strict diets have been reported for xanthenes of the Clusiaceae, such as anti-inflammatory and psychoactive activities⁽⁵⁾.

Keywords: *Tovomita*, strict diets, xanthenes, benzophenones.

References: 1. Sanz-Biset J, Cañigueral S. 6th European Colloquium on Ethnopharmacology. Leipzig, 2007. Poster. 2. Seo EK et al. Phytochemistry 1999; 52: 669-674. 3. Zhang ZZ et al. Planta Med 2002; 68: 49-54. 4. Pecchio M. et al. J Nat Prod 2006; 69: 410-413. 5. Bennett GJ, Lee, HH. Phytochemistry 1989; 28: 967-998.



ISE1-P07 Evaluating the contribution of the reintroduction and use of yagé in Siona indigenous communities in Putumayo, Colombia

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Some factors could explain the significant improvement of health and social indicators in a few developing countries in Asia and South-America. The integration and complementation side by side of ancient medicinal alternatives with allopathic medicine has been identified as one of the factors for improving wellbeing and health at community level. Among these traditional medicine alternatives, the use of medicinal plants is a fundamental component within the indigenous health systems in many parts of the world.

The Amazon Piedmont region of Putumayo in Colombia, where the research project has taken place, due to its high degree of local endemism is considered one of the regions in the world with more biological biodiversity. In addition, the Amazon piedmont is home of a great diversity of indigenous groups that live in symbiosis and respect with their surrounding nature, keeping their ancestral shamanic traditions. Despite their great variability of fauna, flora and indigenous cultures, the Amazon piedmont has a common element, which is the anthropological sacred ceremony of yagé medicinal plant consumption. Yagé or *Ayahuasca* is either a medicinal plant or a plant of knowledge. As a medicinal plant, yagé is generally used to diagnose and treat mental and physical diseases, while as a plant of knowledge is used for understanding the problems and realities of their social-cultural organization. Unfortunately, the lost of indigenous areas in the Colombian Amazon Piedmont due to uncontrolled land occupancy by armed militias and narcotic industry in last decades has had a direct negative impact on sources for local medicinal plants. Consequently, some indigenous communities have not been able to conserve their yagé ritual and other local medical traditions. In addition, the difficulties in accessing allopathic health services in that area have created a poor health situation for many of the indigenous communities in Putumayo.

In last years, local institutions have fortunately reacted by protecting and recognizing indigenous traditional medicine as real medicine as well as by strengthening and promoting the transmission of the use of yagé knowledge among different tribes. This research has evaluated and elucidated, with a humanistic perspective, the contribution and impact of the reintroduction and use of yagé in two Siona indigenous communities in a remote area in the Colombian Amazon-Piedmont region of Putumayo. Results has shown how after seven years of the yagé reintroduction either health or well-being parameters has significantly improved in these Siona communities.

ISE1-P08 Establishment of a Dynamic Ethnomedicinal Database based on Encyclopedia of Medicinal Plants

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Background: The 4-volume Encyclopedia of Medicinal Plants (simplified Chinese version) has been named one of the 22 most outstanding imported science books (2007) in China. The entire book is consisted of the Eastern Chapter (volumes 1-2, commonly used medicinal plants of traditional Oriental medical systems, such as those from China, Japan, the Korean Peninsula, and India), the Western Chapter (volume 3, commonly used American and European medicinal plants, such as those from Europe, Russia, and the United States) and the Lingnan Chapter (volume 4, medicinal plants commonly used and produced in the Lingnan area, including those commercially circulated via this area). A total of 500 commonly used ethnobotanicals (involving over 800 species of medicinal plants) are recorded with the latest botanical, phytochemical, pharmacological and clinical data together with the characteristics and perspectives of each individual ethnobotanical. 1358 high resolution digital pictures of the original plants, medicinal materials and their plantation sites are included.

Objectives: Establishes an on-line ethnomedicinal database, providing comprehensive information on contemporary medicinal plants.

Methods: Based on the contents of Encyclopedia of Medicinal Plants, multimedia techniques are adopted to design the web pages, and ethnobotanical approaches are used to identify and maintain the related voucher specimens.

Results and conclusions: The ethnobotanical database is serving as a bridge that facilitates academic and cultural communication regarding ethnomedicinal plants.

Keywords: Ethnobotanical database, Encyclopedia of Medicinal Plants.

Acknowledgments: Hong Kong Jockey Club Institute of Chinese Medicine Limited

References: 1. Zhao, Z. Z., Xiao, P. G. Encyclopedia of Medicinal Plants. Shanghai: World Publishing Corporation, 2010.

ISE1-P09 Mixtures of Medicinal Plants used in Navarra (Spain)

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Background: This work provides significant ethnobotanical information on medicinal plant uses in mixtures.

Objectives: To collect, analyze and evaluate the Ethnobotany knowledge about medicinal plants in a northern Iberian region (Navarra, 10421 km², 620377 inhabitants).

Methods: Fieldwork was carried out from 2004 to 2007⁽¹⁾. We performed semi-structured interviews with 667 informants (mean age 72; 56% women, 44% men), identified the plant reported and analyzed the results. The data was analyzed using quantitative indexes.

Results and conclusions: Informants reported 152 plant mixtures, in which 102 different plant species are used. 52% of mixtures were for internal administration and 48% for external use (infusion and ointment are the most employed, respectively). It worth mentioning the 39 mixtures recopilated for dermatological problems; 30 for respiratory tract infections and 22 to treat digestive problems. Pharmacological action from plant mixtures should be attributed to the synergy among all plants more than to individual medicinal properties, so that the recognition of the contribution of each plant to the final effect becomes somehow difficult.

Keywords: Traditional plant Knowledge; Ethnobotany; Medicinal plants.

Acknowledgments: We thank all our informants, who were happy to share with us their knowledge. This study has been subsidized by a grant from the Navarra Government, and the Foundation Universidad de Navarra.

References: 1. Akerreta, S., 2009. Etnobotánica farmacéutica en Navarra: del uso tradicional de las plantas medicinales a su evidencia científica. PhD Thesis, Faculty of Science, University of Navarra, 831pp. 1 CD.

ISE1-P10 Antibacterial activity of extracts from endemic "Montado" species against multi-drug resistant pathogens

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Background: The "Montado" is a unique Mediterranean ecosystem, whose importance is related to its huge biological diversity. Medicinal and aromatic plants are an important part of "Montado" flora and it's scientific evaluation will strengthen the interest on their biological applications.

Objectives: The aim of this study was to evaluate the antibacterial activity of several "Montado" plants: *Adenocarpus complicates* ssp. *anisochilus*, *Sanguisorba hybrida*, *Erica lusitanica*, *Quercus faginea*, *Lavandula luisieri* and *Paeonia broteroi* against both sensitive and resistant standard bacteria.

Methods: The minimum inhibitory concentrations (MIC) were determined by using the serial broth microdilution method against *S. aureus* strains (ATCC 6538, 43866 and 106760) and Gram-negative bacteria (*P. aeruginosa*, *S. typhimurium*, and *K. pneumoniae*).

Results and conclusions: 70% of extracts had activity against *S. aureus* sensitive strains (MICs 62-7.5 µg/mL). The active extracts were screened for multiresistant bacteria. 50% and 84% of the extracts showed activity, with MICs values ranging 62-7.5 µg/mL against *S. aureus* meticillin resistant (MRSA) and vancomycin resistant (VRSA), respectively. All extracts of *Sanguisorba hybrida* displayed high activity against both *S. aureus* sensitive and VRSA strains with MICs values of 30-7.5 µg/mL, while the methanol and water extracts had strong activity against the MRSA strains with MIC of 7.5 µg/mL. No activity was detected against Gram negative bacteria.

Keywords: Antibacterial activity; Multiresistant strains; MIC determination; Montado flora.

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ISE1-P11 *Salvia divinorum*: Its novel use and representation on the WWW

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Background: Over the past decade the novel use of the Mexican psychoactive Labiatae, *Salvia divinorum*, has developed outside of Mexico (Casselmann 2009). Use by the Mazatec, in Oaxaca contrasts this emerging, novel, worldwide use. While Mazatec ingest the leaves under the guidance of a curandero or curandera (Wasson & Hoffman 1963), the novel use is characterized by users smoking the leaf fortified with salvinin A (Baggott et al 2004), the active psychoactive chemical compound in *Salvia divinorum* (Ortega et al. 1982). A predominant mode of information exchange regarding this novel use is through various WWW user generated content (UGC) interfaces (often referred to as Web 2.0) such as YouTube and Wikipedia (Casselmann 2009).

Objectives: To understand how user generated content interfaces contributes to ethnopharmacological information exchange on the WWW through UGC interfaces.

Methods: Digital trace (Jenetzko 2008) was utilized to collect data for this project. This set of unobtrusive measures combine the collection qualitative and quantitative data from WWW UGC sources.

Results and conclusions: a) The use of *S. divinorum* and its representation on the WWW, specifically UGC interfaces, is increasing. b) there are four distinct differences between the Mazatec use of *S. divinorum* and the novel use. Mazatec use: leaves chewed, endemic to Oaxaca, administered by a trained practitioner, part of a ritualized practice. Novel use: leaves smoked, global use, self-administered, used outside of a ritualized practice.

Keywords: *Salvia divinorum*, YouTube, Wikipedia, User Generated Content, Unobtrusive Measures, Digital Trace, Ethnobotany 2.0.

ISE1-P12 Diffusion indices as innovative tools to compare ethnopharmacological data. Case of antileishmanial plant species in Amazonias

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Background: Studies specifically focused on phytotherapeutic treatments of leishmaniasis in Amazonia are rare. However, it was found from the literature that 250 vegetal species are used in a variety of cultures and places against this disease.

Objectives: The goal is here to design a tool for the analysis of these data in order to assess representativeness of the useful species.

Methods: Thus, three indices were developed. Cultural diffusion index gives the distribution rate of a species among different cultural groups. It is calculated as the ratio of the number of groups using the species to the total number of groups cited. Geographical diffusion index allowed us to quantify spatial distribution of the uses of a species in the region. It is calculated geometrically by measuring the average distance between the points where uses are reported and the barycenter of those points. The last index is an arithmetic combination of the previous two, giving information on both cultural and spatial criteria.

Results and conclusion: Several repartition patterns were highlighted: some species are used in restricted areas while they are present on either side of Amazonia, and other, widespread too, are used everywhere. Our work shows that these indices, applied to plant species used against a given disease, are an interesting tool to analyze literature relative to traditional uses.

Keywords: Leishmaniasis, Amazonia, diffusion indices, medicinal plants, traditional remedies.

ISE1-P13 Comparison of the chemical profiles and anti-platelet aggregation effects of two "Dragon's blood" drugs used in Traditional Chinese Medicine

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Background: Imported Dragon's Blood is the prepared resin of the fruit of *Daemonorops draco* Bl. (Fam. Palmae). Having a reputation for facilitating blood circulation and dispersing blood stasis, this resinous medicine is commonly prescribed for the treatment of traumatic injuries, blood stasis and pain. Because of biodiversity, native medicinal plants could be explored for similar therapeutic purposes in folk medicine. The prepared resin of the stem of *Dracaena cochinchinensis* has been used as "domestic Dragon's Blood" instead of "imported Dragon's Blood" in some areas of China. The original plant of the two medicines are different, and the alternative use each other should be based on a chemical and pharmacological study.

Objectives: The present investigation is proposed to compare the chemical composition and the inhibitory effects of the two medicines on platelet aggregation.

Methods: A UPLC-PAD-ESI/MS fingerprinting method was developed to characterize the various constituents of two medicines. The anti-platelet aggregation effects of two medicines on AA induced rat platelet aggregation were evaluated using light transmission, respectively.

Results and conclusions: The results revealed that the developed UPLC-PAD-MS method could unambiguously identify the two medicines, and the characteristic constituents of the two medicines are found to be: flavanes in imported Dragon's Blood and stilbenes in domestic one, respectively. From the result of anti-platelet aggregation tests, it was shown that the inhibitory effect of imported Dragon's Blood were more potent than that of domestic one.

Keywords: Dragon's Blood; *Daemonorops draco*; *Dracaena cochinchinensis*.

ISE1-P14 Medicinal plants in the markets of Pucallpa, Peruvian Amazon

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Background: Pucallpa, the capital of the Amazonian province of Ucayali (Peru) is, economically speaking, one of the most dynamic cities in the Peruvian Amazon, and is considered to be the centre of the country's lumber industry.

Objectives: To know the medicinal plants sold in Pucallpa, and to understand the functional dynamic of the markets themselves.

Methods: During the years 2003-2008 an ethnobotanical survey of the popular markets of Pucallpa was carried out. Twenty stalls (71% of the total) were selected, and more than 50 regular and occasional suppliers were identified. Semi-structured interviews of the sellers and their suppliers were conducted. Detailed information about all the plants sold in the market was collected using a specially designed questionnaire. Photographs were taken of the plant parts used, and a herbarium of all the species was created.

Results and conclusions: 174 species belonging to 57 families were identified, and 300 different medicinal remedies used in the treatment of 113 subcategories of therapeutic use were registered. The practice of traditional medicine continues to be a viable alternative to conventional medicine. The "native mind" does not fully trust in the medical system practiced in the hospitals and clinics. Despite this, there is the risk of losing, in the near future, a large part of the traditional knowledge and wisdom that is a product of thousands of years in close relationship with nature.

Keywords: Street markets, Medicinal plants, Amazonia, Peru.

Acknowledgements: To each of the key informants for his/her patience, hospitality and receptivity. To Don Julio Ruiz Torrejón, President of the Biodiversity Foundation of Peru, for his advice and hospitality. To IVITA Pucallpa for their collaboration in the identification of the species, and to Jorge Gahona for preparing the plant samples and herbarium.



ISE1-P15 Sustainable use of wild medicinal plants: a case study in Nabanhe National Nature Reserve, Yunnan/China

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Background: 87% of all components in Traditional Chinese Medicine (TCM) are plants mainly collected from wild resources. Prevailing collection practices are often not sustainable which not only threatens plant populations and ecosystems, but also endangers the livelihood of the collectors. Although cultivation is possible, management plans for sustainable collection from wild resources could be developed.

Objectives: The aim of the study was to find out ethnomedicinal use, ethnoecological knowledge and harvest practices of target medicinal plant species and to find out what the sustainable harvest would look like.

Methods: Five medicinal plant species (*Tacca chantrieri* André, *Paris polyphylla* Sm., *Stemona tuberosa* Lour., *Asparagus subscandens* F.T. Wang & S.C. Chen and *A. filicinus* Buch.-Ham. ex D. Don) were selected. These species are used in TCM as well as in folk medicine by local minorities. Data on medicinal plant use and plant collection was obtained by interviews. To estimate the plant population status, striptransects were conducted in forests, along rivers and in fallow lands around five selected villages.

Results and conclusions: The harvest is not sustainable. Only the subterranean parts of the plants are medicinally used and the whole plants are therefore excavated. Amounts harvested are determined by market demands rather than ecological aspects. The *Asparagus* species are rarely used in local ethnomedicine, whereas *Paris polyphylla* is regarded as highly effective among the people in the area. But highest harvest amounts derives from the *Asparagus* species, lowest of *Paris*, since it's abundance is very low whereas *Asparagus* is to be found in comparably large numbers and used elsewhere. Populations are decreasing according to the local informants because collection impact is too high and natural habitats are destructed. Still sustainable harvest of the remaining plants could be possible if existing harvest methods would change.

Keywords: TCM, non timber forest products, NTFP, wild plant collection, biodiversity conservation.

ISE1-P16 Anatomical caracterizacion, anti-tripanicide and free radical scavenging activities of *Castela tweedii* Planch. (Simaroubaceae)

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Background: *Castela tweedii* Planch. is a small tree that grows mainly in South America. Decoction of leaves and bark was popularly used against gastrointestinal disorders and diarrhea.

Objectives: The aim of this work is to study anatomical and biological features to contribute to the analysis of *C. tweedii* stem, bark and leaves.

Methods: Longitudinal and transversal sections stained with safranin-fastgreen were evaluated.

Results and conclusions: Bark: remaining rhytidome was made up of 1-2 peridermis. Phloem was separated by fibers in small clusters and limited by tangential bands of axial parenchyma. Wood: diffuse-porous, paratracheal confluent parenchyma and rays of 1-5 cells wide, with abundant oxalate crystals. Leaf was dorsiventral and hypostomatic. Epidermis single-layered with unicellular hairs and mucilaginos hypodermis. Tripanicide and free radical scavenging capacity were studied in leaf, bark and wood dichloromethanic and ethanolic extracts. Wood and bark dichloromethanic extract were active against *Trypanosoma cruzi* epimastigotes, with percentage of parasite's growth inhibition of 78% and 69% each. Leaf ethanolic extracts showed the highest DPPH scavenging capacity (IC₅₀=60 mg/mL). The compounds responsible for this activity were of phenolic nature. The results of this work might contribute to identification and standardization of *C. tweedii*.

Keywords: *Castela tweedii*, Simaroubaceae, Anatomical study, Trypanicide, Antioxidant activity.

ISE1-P17 Traditional andalusian phytotherapy: synthesis and comparative analysis between eastern and western Andalusia

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Background: In Andalusia, ethnobotanical studies started in the 80s with a work dedicated specifically to recover the knowledge of medicinal plants in the province of Granada. Gradually, the research in this discipline spreads over to other areas of Andalusia and currently large areas of our community are known in this regard. In this paper, a synthesis of Andalusian popular herbal medicine is done, taking as reference different published unpublished studies.

Objective: To analyze comparatively the ethnobotanical resources of medicinal interest in Andalusia, with particular attention to the differences and / or similarities between the information known in western and eastern Andalusia

Methods: The information has been indexed in a database, including among other information, the study site, listed taxa, parts of the plant used, preparation methods, pathology and pathologic groups according to Adjanohoun *et al.* (1989) and when possible, number of references to its use. Qualitative and quantitative technologies will be use for making the analysis.

Results: The results are set out in the comparison of eastern and western Andalusia traditional herbal medicine, establishing similarities and differences as well as possible vicariance in relation to the species used and diseases treated with plants

Keywords: Ethnobotany, Medicinal plants Andalusia, Spain.

ISE1-P18 The medicinal use of acorns in the Iberian Peninsula

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Background: Although acorns, the fruits of the different *Quercus* species, have played a very important role in human and animal nutrition since prehistoric times, their medicinal role has been neglected and is not well known.

Objectives: To review the medicinal importance of acorns during history in the Iberian Peninsula: their medical indications, methods of preparation, ways of administration, dosage and duration of treatments.

Methods: Extensive bibliographic review of references in archaeological, historical, literary and ethnobotanical books and journals and ethnobotanical semistructured interviews with 42 informants of Toledo, Cáceres and Badajoz (Spain).

Results and conclusions: Only few references were found about the curative uses of acorns. Most of them were from *Quercus ilex* subsp. *ballota* (holm oak), the most widely spread species of the genus in the Iberian Peninsula. Other species used were: *Q. suber*, *Q. faginea*, *Q. pyrenaica*, *Q. robur*, *Q. coccifera*, etc.

Their main use was against diarrhea, although it was administered in different ways. They have been also used against bones and joints ache, heartburn, to cure sores, to soften calluses, to relieve earache or as an antidote against poisoning. It is an abundant fruit that can be found homogenously spread in the Iberian Peninsula. Therefore people have taken advantage of it for many uses. The most important are those that meet basic needs such as food and health.

Keywords: acorn, Ethnopharmacology, *Quercus ilex* subsp. *ballota*, holm oak.



ISE1-P19 Medicinal plant uses linked to the transhumance cattle track of the Cañada Real Segoviana in Toledo (central Spain)

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Background: Iberian Peninsula has some geographical and climatic conditions ideal for the development of transhumance. The cattle routes designed for this purpose, have contributed to increase the biological diversity and landscape richness. People in the old rural society linked to the transhumance used the botanical resources of their environment to solve health problems.

Objectives: To carry out an inventory of plants with medicinal properties in the cattle track of the Cañada Real Segoviana in the province of Toledo, as well as their documented uses. The study also includes toxic plants, plants with culinary values and plants with veterinary uses.

Methods: A floristic catalogue has been compiled for the study area, through extensive fieldwork along the cattle track. After a revision of the ethnobotanical literature on central Spain, the medicinal, culinary, veterinary and other uses of plants were obtained through interviews with people linked to the Cañada Real Segoviana, like shepherds.

Results and conclusions: The study area presents an important floristic diversity which results in a catalogue of 695 plants, mostly native. An important amount (33%) of the flora presents some kind of medicinal properties. 174 species can bring benefits to the circulatory, digestive, excretory systems, etc. 69 species have culinary properties. On the other hand, 51 species have been used for livestock healing or feeding.

Keywords: transhumance, floristic diversity, medicinal plants, culinary plants, toxic plants.

ISE1-P20 Medicinal plants known as "Arnica" in the Iberian Peninsula (Spain and Portugal): An ethnobotanical review

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Background: The concept of "Arnica" covers a complex of different species of Asteraceae and other plant families. It was introduced in Spain and Portugal by physicians and pharmacists during the second half of the 18th century. It was first used for *Arnica montana* L., applied to the treatment of hematoma and inflammation and lately for other species.

Objectives: Identify the plant species included in the complex known as "Arnica" in the Iberian Peninsula and determine the common morphological and ethnopharmacological features.

Methods: A review of published data and of our own unpublished original data recorded in semi-structured interviews to informants in SE and Central Spain.

Results: A total of 31 species belonging to 6 families are named "Arnica". Species with a single name ("arnica") are: *Achillea ageratum* L., *Crepis paludosa* (L.) Moench, *Doronicum carpatanum* Boiss. & Reuter ex Willk., *Doronicum grandiflorum* Lam., *Doronicum pardalianches* L. & *Senecio pyrenaicus* L.. However some species receive also other different names: *Chiliadenus glutinosus* (L.) Fourr. (up to 25 names) and *Dittrichia viscosa* (L.) Greuter (14). The folk medicinal uses are organized in two main groups: a) externally for hematoma and inflammation and b) orally for stomach ailments, fever and flu.

Keywords: Arnica, Antiinflammatory, Herbal teas.

Acknowledgements: Estudio Etnobiológico de la Flora Medicinal de Castilla - La Mancha PAC08-01734838.

ISE1-P21 Wild food plants used in Kfarhamam (Southern Lebanon)

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Background: Kfarhamam is a small village located in the Hasbaya District in Southern Lebanon. The population was about 3500, however only a very small minority reside in the village. The village has a strategic location in the Hermon mountains (850 m a.s.l.). Kfarhamam is originally a Syriac word meaning the "the house of peace".

Objectives: To determine the vascular plant species named and used by the habitants of Kfarhamam, particularly as food and medicine. To analyze the results within the context of the Arabic, Syriac and Palestine cultural traditions and within a system of global analysis.

Methods: Review of literature, especially local papers and books. Interviews with farmers, housewives and shepherds. Collection of voucher specimens in the different areas. The use of a global database of Gathered Food Plants for comparison and analysis.

Results and conclusions: a total of 40 wild species of vascular plants are consumed at Kfarhamam. Up to 3 species are not yet reported as food plants in the literature on the Lebanon, Syria or Palestine and Israel. A 55 % of the species (22) are relatively common as food in the Near East. A 65 % of the wild food plant species (26) are used in the local folk medicine, which is an extremely high proportion.

Keywords: Ethnobotany, Folk Medicine, Ethnopharmacology.

Acknowledgements: Proyecto CGL2008-04635

ISE1-P22 Biological and cultural heritage of native medicinal plants in the South of Santa Catarina, Brazil: rescue and communication of knowledge

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Background: Since 1997, an interdisciplinary team conformed by several technicians of the natural and health sciences, and local stakeholders as well, was created in the South of Santa Catarina, Brazil, for studying the uses of the medicinal plants.

Objectives: Study the uses of medicinal plants according to the Brazilian National Program of Medicinal Plants to rescue and communication the traditional knowledge.

Methods: An exhaustive bibliographical review on Ethnobotany based on participatory approach were carried out from 1997 to 2009. This meetings with the leaders of the communities, medicinal plants were identified and were discussed as well.

Results and conclusions: 108 medicinal plants have been studied, whose 33 are already listed on the National List of Medicinal Plants and approved for their use by the Health Ministry of Brazil. Bulletins of botanical, agricultural, pharmacological and toxicological aspects have been published of *Cecropia glaziovi*, *Casearia sylvestris*, *Maytenus ilicifolia*, *Cordia verbenacea*, *Alternanthera brasiliana*, *Solanum paniculatum*, *Mikania glomerata*, *Passiflora alata*, *Sphagneticola trilobata*, *Dichorisandra tyrsiflora*. These bulletins have been transferred to the community leaders as a way of communication and divulgation of the traditional knowledge within the region. We may conclude that the results have contributed to enhancing the use of native medicinal species, indicating their therapeutic potential, which has been promoted the development of other studies on the production of herbal medicines.

Keywords: medicinal plants, Ethnobotany, Brazil.



ISE2-001 Historical and molecular evidence for date palm introduction in America (*Phoenix dactylifera*, *Arecaceae*)

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Background: Date palm (*Phoenix dactylifera* L.) populations can be found in several places across America. Those associated to jesuitic missions in Baja California (Mexico) are specially remarkable due to their magnitude and number of individuals.

Objectives: Study of palm groves from an historical point of view. Determine possible sources of genetic material.

Methods: Sampling in different palm groves. DNA extraction and amplification of SSR markers. Comparison with Spanish and North African palm samples. Revision of bibliography, specially Colonial Latin America Indian Chronicles and descriptions of California and Baja California missions.

Results and conclusion: Palm groves were located in maps, rescuing the oldest references for most of them, some dating back to the first half of XVI century in Caribe and Mexico. Baja California palm groves are not accounted for in jesuit missions ⁽¹⁾. They could have been the product of subsequent introduction by franciscan and dominican orders in the late XVIII century. Little genetic diversity was detected among samples from different missions, suggesting a small sample as starting material or successive introductions from one of the missions to the rest.

Key words: Crónica de Indias, Misiones Jesuitas, SSR.

Acknowledgement: Proyecto INIA RF2007-00010-C03

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ISE2-P01 Cypriot *iatrosophia* and Dioscorides De Materia Medica in a diachronic perspective

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Background: A recent investigation has provided arguments for a substantial influence of the De Materia Medica (DMM) of Dioscorides on the development of the medicinal traditions in the Mediterranean ⁽¹⁾.

Objectives: This study explores the relationship of medicinal plant uses in Cypriot *iatrosophia* ⁽²⁾, a type of historical Greek literature rooted in the Byzantine Empire ⁽³⁾, to those in DMM.

Methods: Focusing on dermatological and gastrointestinal conditions we carried out a one-to-one comparison of the respective species mentions in the *iatrosophia* with the ones in Dioscorides' text.

Results and conclusions: The *iatrosophia* include not less than 169 taxa related to dermatology and gastrointestinal uses with a total of 747 mentions. Of those, 28 taxa are not included in DMM and mainly refer to drugs introduced to the Eastern Mediterranean at later times. The remaining 141 taxa involve 650 mentions, 20.2% show no correspondence, 56.2% have same or similar uses and 10.6% are related to copies of complete recipes from DMM. Fifty-five (39%) of the taxa included in Dioscorides' text were also reported for dermatological and gastrointestinal uses in an ethnobotanical field study we conducted in the monasteries of Cyprus where some of the investigated *iatrosophia* were compiled. Our comparison reveals many parallels between these two historical sources suggesting both a direct and indirect influence of DMM on the *iatrosophia* but also emphasises the importance of other influences and the dynamic character of the medicinal knowledge of this tradition.

Keywords: Historical texts, Ethnobotany, Dioscorides, *iatrosophia*, Cyprus.

Acknowledgments: This study was supported by a grant from the A. G. Leventis Foundation.

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ISE2-P02 Plants used in folk veterinary medicine in the Arribes del Duero Natural Park, western Spain

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Background: The territory of the Arribes del Duero Natural Park (Salamanca-Zamora, Spain) can be said to be a good example of a Mediterranean heterogeneous landscape with a marked alternation of habitats and land uses, is characterised by a strong demographic regression, and is devoted mainly to livestock

Objectives: We studied Ethnoveterinary knowledge among the inhabitants of the area, documenting traditional veterinary medicine practices. The remedies used, their preparation and administration were documented

Methods: Information was obtained in 116 semi-structured interviews (conducted from 2005 to 2009) of 80 non-specialist people (44 men and 36 women; age range, 45-98 years; mean age, 72)

Results and conclusions: A total of 31 veterinary remedies based on the use of a single plant species and cited by at least three independent informants were recorded. We observed the use of 25 species of vascular plants, belonging to 18 botanical families. Most of the remedies described by the interviewees referred to the treatment of mild ailments related to the skin and the respiratory system. A total of 11 remedies (35%) are related to cleaning and treatment of wounds. Likewise, we recorded remedies comment on the influence exerted by superstition. Currently, many people preserve a rich traditional knowledge about useful plants, and it may be affirmed that the folk veterinary medicine is still very much alive in the studied area.

Keywords: Ethnobotany, Ethnoveterinary, Arribes del Duero, Spain.

ISE2-P03 European plants used by Brazilian communities in Santiago (Rio Grande do Sul, Brazil)

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Background: For a long time, the communities of the South of Brazil have incorporated to their traditional knowledge many European useful plants. Some of these communities were created by the Italian immigrants arriving with their customs to Brazil in past centuries, as occurred in the state of Rio Grande do Sul. This is the first ethnobotanical study in Santiago (RG, Brazil).

Objectives: The main goal of our research was to know which plants are used by these communities, most of them not native, but naturalized or cultivated plants incorporated to their cultures.

Methods: The fieldwork was conducted in 1996-2000. It consisted in interview surveys and the collection of plant vouchers provided by the interviewed. The groups of people studied belong to the agricultural sector or related activities. Prior to the research, local institutions and organizations arranged meetings to ensure the participation of the inhabitants. Some 24 localities and 175 informants were contacted. In order to obtain accurate and complete information, it was necessary to make multiple contacts with each of the interviewed, as it was difficult to process all the amount of the information provided during a single talk. Data were collected through semi-structured interviews, performed either to a single informant or to a group of them. We registered as main information: the name of the informant, plant name, used part, application form and use. We tried to register the exact spelling used by every informant. We also collected a voucher specimen, preserved in the herbaria LEB, or HERBARA. The obtained information was compiled in a database, to facilitate its manageme.

Results and conclusions: We have identified some three hundred taxa belonging to 219 genera and 81 families. All of them have multiple uses. The most frequent families are Asteraceae, Fabaceae, Lamiaceae, Poaceae and Myrtaceae, reaching up to 40 % of the recorded plants. Studying the origin of the taxa, we verified that only some 51% are native plants, and that 20% are naturalized and 29% cultivated plants. Most of naturalized (50%) and cultivated plants (80%) are native from Europe, or arrived to Santiago because they were cultivated there. These results reflect the ethnic origin of the informants and the mixed culture of the investigated population.

Keywords: Brazil, Rio Grande, Ethnobotany, European plants.

Acknowledgments: We thank the people who shared their knowledge with us and everybody helped in our research.



ISE2-P04 Traditional medicinal plants used in the region of Gorbeialdea (Biscay, Basque Country)

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Background: Although ethnographers have been interested in Basque folk medicine, few researchers have addressed the topic with an ethnobotanical perspective.

Objectives: The aim of the study was to describe and analyze the plants traditionally used in the folk medicine of Gorbeialdea, a Basque speaking rural mountainous region located in the south of Bizkaia, Basque Country.

Methods: Seventy six semi-structured interviews have been conducted between 2008 and 2010 with 84 informants born in the area. Informants were selected using the "snowball" method.

Results and conclusions: Eighty two taxa were recorded, most of them were used for skin diseases (39 species), followed by digestive (32) and respiratory (28) disorders. The most important species used to cure respiratory disorders were *Eucalyptus globulus*, *Urtica dioica* and *Verbena officinalis*; *Chelidonium majus*, *Juncus* sp., *Allium cepa* are used for skin conditions; *Plantago lanceolata* for musculoskeletal disorders; *Chamaemelum nobile* and *Helleborus viridis* against digestive diseases and *Urtica dioica* for circulatory conditions. Plants scarcely cited or previously unknown to the literature include: *Coronopus didymus* (pulmoni bedarra) for pneumonia; *Helleborus viridis* (arioa) for intestinal worms, and *Plantago lanceolata* (sanbedarra) for strains. Compared with the rest of the Iberian Peninsula and even with other Basque-speaking areas, Gorbeialdea shows significant specificity of remedies

Keywords: Medicinal plants, traditional knowledge, Biskay, Iberian Peninsula.

Acknowledgements: To all the informants, Dani Pérez.

ISE2-P05 An ethnopharmacological review on the Turkish Labiatae species

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Labiatae is one of the richest families in the flora of Turkey. And it is also one of the most important families in which there are many popular plants used in traditional therapy in Turkey. The aim of this study is a revision on the Turkish folk medicinal plants of the Labiatae family according to our investigations and scientific literature records. Our studies are based on mainly local ethnobotanical investigations. The ethnopharmacological information was obtained from the local people by personal interviews carried out face to face. The specimens of the folk medicinal plants were collected during the field works and then identified. In addition, the scientific literature records on the subject were revised.

According to the list based on our investigations and the literature records, 113 species of Labiatae are used in therapy in Turkey. Among them, *Teucrium polium*, *Mentha longifolia*, *Teucrium chamaedrys*, *Melissa officinalis*, *Origanum vulgare*, *Mentha spicata*, *Thymus longicaulis*, *Mentha pulegium*, *Thymbra spicata*, *Lavandula stoechas*, *Origanum onites*, *Salvia fruticosa* and *Origanum majorana* are the most popular plants and they are used in many parts of Turkey. The plants are mostly used for the digestive system diseases, the respiratory system diseases and the cardiovascular system diseases.

Keywords: Medicinal plants, folk medicine, Labiatae, Turkey.

ISE2-P06 Ethnoveterinary knowledge in Granada, Andalusia, Spain

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Background: Although ethnobotanical information available for Granada Province is not scarce, few publications have been made about plants and other resources uses in veterinary medicine.

Objectives: Based on previous ethnobotanical works for Granada Province, we review the used plants in veterinary medicine, as well as the used parts, employment forms and the animals to which they are intended. Plants with known active principles or biological activity are highlighted. Another section deal with the ritual practices of disease prevention and on the belief system that encourages this type of healing practices.

Methods: The information comes from diverse ethnobotanical researches, gathered through open and semi-structured interviews with various informants. Data on Ethnoveterinary medicine mostly came from people involved in breeding and maintenance of livestock (mostly farmers and shepherds) or related to agriculture.

Results and conclusions: Besides the development of a local database of the species and their uses in Ethnoveterinary medicine, plants for which applications in human medicine are similar are especially discussed, trying to understand the relationship between those traditional medicines. Species used in animal health prevention are separately mentioned, such as those offered as fodder to different purposes, or used as an insecticide or insect repellents in feedlot sites. A list of species collected as fodder or identified as high interest for pasture is given.

Keywords: Ethnoveterinary, veterinary medicine, Granada, Spain.

ISE2-P07 Traditional management of autochthonous endangered breeds of hen (*Gallus domesticus*) in the Iberian Southeast (Spain): between the Ethnoveterinary and the superstition.

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Background: The lost of biodiversity is especially worrying concerning the autochthonous breeds of domestic animals. Parallel to the population decrease of these breeds, its is vanishing the traditional knowledge associated to their management.

Objectives: The study aims to compile information about the traditional management of fowl diseases and parasites in the Iberian Southeast with special focus on the use of both wild and cultivated plants.

Methods: The information was obtained through semi-structured interviews to old people and breeders of autochthonous breeds which are at risk of extinction. The plants that, according to interviewed people, were used are evaluated with published literature in order to determine the possible effects on fowl health

Results and conclusions: Traditional management of hens include the use of plants whose function is not only simple nutrition of the animals, as many species contain active principles which were experimentally shown to be useful for prevention and treatment of diseases and parasites which usually afflict to hens. However, we also recorded oral traditions for the management of the fowl that presents evident relations to numeric superstitions and magic.

Keywords: Hens, Ethnoveterinary.



ISE3-001 Evaluation of the cholinergic pathways in α -hederin-induced contraction of rat isolated stomach strips

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The extract of common ivy (*Hedera helix*) is extensively used in traditional and contemporary medicine in the treatment for catarrhs of the respiratory passage and for the symptoms of chronic inflammatory bronchial conditions. On the other hand, ivy plant causes serious poisonings in human and animals with the predominant symptoms of severe diarrhea and dyspnea. Those clinical observations became confirmed in *in vitro* studies which revealed the contractile effect of two triterpenoid saponins extracted from *Hedera helix* (α -hederin and hederacoside C) on rat isolated gastrointestinal strips. However, the mechanism of the contractile effect remained unknown.

Thus, the aim of the study was to evaluate the participation of cholinergic pathways in α -hederin-induced contraction of rat isolated stomach strips.

The experiments were performed on rat isolated fundus and corpus stomach strips under isotonic conditions. The effect of atropine and hexamethonium on α -hederin-induced contraction of stomach strips was investigated. All results are expressed as % of the response to acetylcholine (ACh) – a reference contractile agent.

The obtained results revealed that the administration of atropine neither prevented nor reduced the response of stomach strips to α -hederin. The contraction caused by saponin (100 μ M) in the presence of atropine amounted to 96.02 \pm 23.06% and 102.73 \pm 11.01% of the reaction induced by ACh for stomach corpus and fundus strips, respectively, whereas the response to α -hederin without atropine pretreatment was as big as 94.79 \pm 75.91% and 101.57 \pm 27.75% of the reaction produced by ACh for stomach corpus and fundus strips, respectively. The application of nicotinic antagonist also did not change the force of α -hederin-induced contraction. If the administration of saponin was preceded by treatment with hexamethonium the strength of stomach fundus strips* contraction was 106.68 \pm 11.90% of the reaction to acetylcholine and the contraction was comparable with the one caused by α -hederin without prior hexamethonium-treatment.

Summing up, it can be assumed that the cholinergic pathways do not participate in α -hederin-evoked contraction of rat isolated stomach preparations.

Keywords: α -hederin, isolated stomach strips, cholinergic pathways.

ISE3-002 Safety assessment of selected Indian herbs through cytochrome P450 inhibition assay

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Background: Indian herbs are believed by many to be safe. Several natural products have been reported to produce adverse reactions due to interaction of cytochromes, when simultaneously administered along with conventional medicines⁽¹⁾. Assessing CYP inhibition of Indian herb extracts has important implications for predicting the likelihood of their potential herbal-drug interactions.

Objectives: To assess the safety of standardized extract of *Centella asiatica* through drug interaction potential on drug modulating enzymes.

Methods: *Centella asiatica* extracts were standardized through HPTLC and HPLC. Cytochrome inhibition assay was performed using CYP450-CO complex assay⁽²⁾ and fluorimetric screening on CYP3A4 and CYP2D6 isoforms.

Results and conclusions: The effects of the standardized extracts on cytochrome P450 concentration were determined using its spectral difference and the reduced form of its CO complex. Different extracts, its fractions and phytomarkers showed significantly less inhibition ($p < 0.001$) when compared with standard ketoconazole. This experimental findings demonstrate that selected Indian herbs can inhibit CYP3A4 and CYP2D6 (IC₅₀ 127.39 \pm 3.46; 143.27 \pm 4.56 mg/mL) isoforms. Assessing CYP inhibition of Ayurvedic plant extracts has important implications for predicting the likelihood of their potential herb-drug interactions that may lead to drug induced toxicity, as well as determining candidates for further comprehensive analysis.

Keywords: *Centella asiatica*; Cytochrome inhibition; herb-drug interaction; safety studies

Acknowledgments: Central Council for Research in Ayurveda and Siddha (CCRAS), Department of AYUSH, Govt of India, New Delhi.

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ISE3-003 Cholinesterase inhibitory potential of *Piper longum* L. fruit alternative management of Alzheimer's disease

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Background: *P. longum* Linn. (Piperaceae) traditionally used in various central nervous system disorders like CNS depressant, anti-inflammatory, antioxidant, anticonvulsant etc. It contains a bioactive alkaloid piperine as major compound.

Objectives: Objective of the present study is to explore the anticholinesterase potential of *P. longum* fruit.

Methods: Liquid chromatographic standardization of the plant extract has been carried out with reference to the piperine. The acetylcholinesterase and butyrylcholinesterase activity of hydro-alcoholic extract and its different fractions (Chloroform, n-Butanol, Ethyl acetate and water) were studied by TLC-bioautography and modified Ellman's method. The results were expressed as IC₅₀ values. Galantamine was used as reference anticholinesterase drug.

Results and conclusions: Ethyl acetate and chloroform fractions showed more activity than the other fractions. The order of inhibition was Piperine > Ethyl acetate > Chloroform > Hydroalcoholic extract > n-Butanol. Specificity of the Piperine and extract was more towards acetylcholinesterase than butyrylcholinesterase. Piperine found to be the bioactive compound in *P. longum*.

Keywords: *Piper longum*; Acetylcholinesterase; Butyrylcholinesterase; Bioautography.

ISE3-004 Scientific monographs of medicinal plants of Mexico: Quality, safety and efficacy of Mexican Traditional Medicines

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Background: In Mexico most of the population avail themselves of medicinal plants in order to cover their health problems. The biodiversity added to the cultural heterogeneity generates one of the most plentiful folk medicines of the world. Nevertheless, the lack of regulation causes several problems such as substitutions and adulterations of the most widely commercialized crude drugs, as well as natural resource depletion. In this scenario, it is imperative to generate an instrument that assures the quality, safety and efficacy of these plants.

Objectives: Develop a scientific document that guarantees the quality, safety and efficacy of *Hintonia latiflora* one of the most widely used and commercialized medicinal plants.

Methods: Generate and compile scientific information about *H. latiflora*.

Results: The document comprises several sections: Nomenclature, Definition, Popular Medicinal Uses, History, Location, Anatomical Identification, Handling and Commercialization, Chemical Constituents, Analytical Procedures of Identity and Composition, Toxicology and Pharmacology. This document indeed, will be very useful for health authorities, practitioners of phytotherapy, physicians, and any scientist involved in the study of medicinal plants. In addition, this work could be a useful tool for legislation in order to promote laws aimed to regulate conservation, production, commercialization and consumption of medicinal plants.

Keywords: Quality, Safety, Efficacy, Medicinal Plant Monograph, *Hintonia latiflora*.



ISE3-005 *Piptadeniastrum africanum* (Hook.f.) Brenan: isolation and characterization of saponins responsible for the activity against the rice blast fungus *Pyricularia grisea*

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Background: As part of our contribution to phytochemical and biological survey and to validation of traditional uses of pygmies Baka medicinal plants⁽¹⁾, we report herein the study on *Piptadeniastrum africanum* stem bark. The water and methanolic extracts showed a weak activity against *Staphylococcus aureus* and a pronounced activity against the rice blast fungus *Pyricularia grisea*.

Objectives: Isolation and characterization of compounds active against *P. grisea*.

Methods: Spectrophotometric analyses, Sephadex LH-20 column, RP-HPLC, ¹H, ¹³C NMR, MS

Results and conclusions: Preliminary spectrophotometric analyses performed on the more active methanol crude extract highlighted the presence of phenolic compounds and tannins. Two fractions were collected after separation on a Sephadex LH-20 column: a tannin fraction, active against bacteria and a non tannin fraction, containing saponins, with a pronounced antifungal activity against *P. grisea* (MIC 1 mg/mL, MFC 2mg/mL). After a preliminary filtration of the non tannin fraction on RP-18 to remove sugar and idrophilic compounds, analytical and semi-preparative RP-HPLC were performed in order to enhanced the separation and to obtain pure saponins for further structural elucidation by ¹H, ¹³C NMR and MS analyses.

Keywords: *Piptadeniastrum africanum* (Hook.f.) Brenan, *Pyricularia grisea*, saponins, bark extract, pygmies traditional medicine.

Acknowledgments: Department of Territorial Ecology – Mycology Section, University of Pavia, Via S. Epifanio 14, 27100 Pavia, Italy; Dr. S. Tosi and Prof. A.M. Picco for biological tests.

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ISE3-006 Ethnopharmacology and Phytochemistry of Malian medicinal plants

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Background: Mali is a West African country where about 80% of the people are using traditional medicine for health care. This medicine is using animal, mineral and mainly vegetal products as raw materials. To promote traditional medicine the government has created the Department of Traditional Medicine where ethnopharmacological, pharmaceutical and medical research are performed.

Objectives: The objectives is to determine medicinal plants, their efficacy, quality and security. Ethnobotanical surveys related to wound healing plants, antischistosomiasis and biological tests have been in focus. Phytochemical studies were performed to identify chemical markers and compounds responsible for bioactivities.

Methods: Woundhealing plants surveys were performed in the Mande area, Dogonland, Kolokani and Koutiala and a survey in the Office du Niger, Niono District, determined the plants traditional healers used against schistosomiasis. Immunomodulating activity tests were used for extracts of wound healing plants and their polysaccharide compositions determined.

Results and conclusions: Traditional healers treat both internal and external wound. Gastric ulcer was one of the types of internal wounds. 60 plants were identified to be used against wounds. The most interesting plants being identified will be presented. The complement fixing activities were high for water extract of *Biophytum petersianum*, *Ximenia americana*, *Cochlospermum tinctorium*, *Trichilia emetica* and *Opilia celtidifolia*. *Vernonia kotschyana* is the plant of the improved Traditional medicine used against gastric ulcer and had high complement fixing activity. Pectins of the arabinogalactan and rhamnogalacturonan types were identified in different plants as the very active polysaccharides.

Additionally fifty-five plants belonging to 30 families were reported to be used alone for treating urinary and intestinal schistosomiasis, while 9 combinations of plants were used against the urinary form of the disease. *Cissus quadrangularis* and *Stylosanthes erecta* were the plants most frequently used and were reported for the first time, to be used against schistosomiasis in Mali.

Keywords: Mali, medicinal plants, wound healing, schistosomiasis.

ISE3-007 Ethnopharmacology Project. A summary of an experiment in Guinea-Bissau.

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Background: Guinea-Bissau is a west African country with few western medical resources and where the majority of the population (belonging to more than twenty ethnic groups) rely mostly on local flora resources to treat diseases.

Objectives: Collect ethnobotanic data on more used medicinal plants to treat infectious diseases all over the country, test them using in vitro biological methods; identify chemical compounds responsible for the activity and develop methods of quality control for the most active plants.

Methods: Ethnomedic data were obtained by local inquires performed with Traditional Medical Practitioners and completed with bibliographic resources; Biological tests, phytochemical and analytical methods were performed by standard methods of each area by a multidisciplinary team.

Results and conclusions: A summary of main results of the project developed over a twenty years period confirm that traditional knowledge is a very important source for the development of standard pharmaceutical formulations for local use and even for the discovery of new active chemical compounds.

Keywords: West African Ethnomedicine; Pharmacognosy; Ethnopharmacology.

ISE3-008 Evaluation of extracts of *Triclisia subcordata* Oliv and *Heinsia crinita* (Afz) G. Taylor for antimicrobial activity against some clinical bacterial isolates and fungi.

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Background: We report antimicrobial potential of extracts of roots of *Triclisia subcordata* and whole plant of *Heinsia crinita* used as components of various herbal portions in Ethnomedicine in South West Nigeria to treat acute urinogenital infections and infertility. Methanol and hexane extracts of each plant were obtained by maceration and tested for antimicrobial activity using agar diffusion and microbroth dilution techniques

Objectives: Our interest in these two medicinal plants arose because we observed that herbalists in South West Nigeria used them in Ethnomedicine for the treatment of acute urinogenital infections and infertility complicated with chronic microbial infections particularly STD

Methods: 100 g of powdered sample (whole plant or root) of each plant was separately macerated in 600 mL methanol (MeOH) and 600 mL hexane for five days to obtain the MeOH and hexane extracts of each plant used for the analysis.

Results and conclusions: This study indicates that the extracts from *H. crinita* and *T. subcordata* exhibited profound antibacterial activity against clinical strains of *S. aureus* and *E. coli* isolated from patients with STD or non-gonococcal urethritis.

In conclusion, this study shows that *H. crinita* and *T. subcordata* are effective against the test pathogens and it justifies the ethnopharmacological uses of both plants in the treatment of microbial infections

Keywords: *Triclisia subcordata*, *Heinsia crinita*, antimicrobial activity, non-gonococcal urethritis, infertility.



ISE3-009 Phytochemical composition and *in vitro* analysis of antioxidant properties in flowers of medicinal species traditionally used in Northeastern Portugal

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Background: Oxidative stress can be attenuated by diets containing fruits, vegetables and herbs that have antioxidant activities due to their high content in bioactive compounds. In the Iberian Peninsula, several wild species have been regarded as powerful ingredients for homemade remedies mainly due to their anti-inflammatory, diuretic and diaphoretic properties, traditionally recognized by healers and consumers.

Objectives: To study phytochemical composition and antioxidant properties of flowers of *Cytisus multiflorus*, *Crataegus monogyna*, *Filipendula ulmaria*, *Malva sylvestris* and *Sambucus nigra*.

Methods: Phytochemical analyses include determination of several antioxidant agents by spectrophotometric techniques, HPLC/fluorescence, HPLC/RI, GC/FID. The antioxidant activity was accessed by four *in vitro* chemical and biochemical assays using animal cells (1).

Results and conclusions: *C. monogyna* revealed the highest phenolics, tocopherols, β -carotene and SFA contents and the most promising antioxidant properties ($EC_{50} < 52.4 \mu\text{g/mL}$), even better than Trolox. *F. ulmaria* also revealed a promising antioxidant activity with the highest ascorbic acid content. *M. sylvestris* have the highest sugars and PUFA contents. Results show correlations between phytochemical composition, antioxidant behaviour and traditional uses. Flowers could be incorporated in extracts, functional beverages or products with health-promoting properties, such as anti-inflammatory and other properties related to oxidative stress.

Keywords: Phytochemicals, oxidative stress, Portuguese pharmacopoeia.

Acknowledgments: L. Barros is financed by FCT (SFRH/BPD/4609/2008)

References: 1. Barros et al., Food Chem. Toxicol., 2010, 48, 1466–1472.

ISE3-010 The antitumour effect of Samento, a preparation of *Uncaria tomentosa*, is probably due to its anti-inflammatory activity.

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Background: Samento is a chemotype of *Uncaria tomentosa* used in traditional medicine by the Ashaninka of Peru, for the treatment of inflammatory diseases, cancer and infections^(1, 2). The curative properties of Samento have been attributed to immunomodulatory pentacyclic oxindole alkaloids⁽³⁾.

Objectives: Evaluate the anti-inflammatory and antitumour effects of Samento.

Methods: A commercial Samento preparation (NutraMedix, Florida-USA) and two acetone soluble and insoluble fractions (A and B) were tested for cytotoxicity *in vitro* using the Sulphorhodamine B assay with four cell lines. Anti-inflammatory activity *in vitro* was assessed as the inhibition of the macrophage TNF α , IL-6 and nitric oxide responses to lipopolysaccharide. The effect of Samento on primary tumour growth and metastasis in BALB/c mice inoculated with 4T1 mammary tumour cells was also assessed.

Results and conclusions: A partial cytostatic, but not cytotoxic effect of Samento and its fractions was observed over the range of concentrations tested (< 100 $\mu\text{g/mL}$). Samento and Fraction A inhibited pro-inflammatory mediator production *in vitro*, the most marked effect being observed with nitric oxide (50% inhibition at 1 $\mu\text{g/mL}$). Daily i.p. injection of Samento inhibited primary tumour growth and metastasis. These results support previous reports that the antitumour effect of *U. tomentosa* is probably not related to direct cytotoxicity on tumour cells⁽⁴⁾.

Keywords: Samento, *U. tomentosa*, Inflammation, Cancer.

Acknowledgements: Misión Ciencia, MPPCYT, Venezuela

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ISE3-P01 Exploring possible Interaction potential of standardized *Glycyrrhiza glabra* with reference to glycyrrhizin on Cytochrome P450

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Background: *Glycyrrhiza glabra* Linn. commonly referred as liquorice, is used in Indian System of Medicine in respiratory/urinary infections, liver disorder, diabetics etc. ⁽¹⁾. Cytochrome P450 is the principal enzymes responsible for the metabolism of most of the clinically used drugs.

Objectives: To determine the percentage of glycyrrhizin present in *G. glabra* extract and their possible interaction potential with drug metabolizing enzyme through CYP450 inhibition study.

Methods: Quantitative determination of glycyrrhizin was performed by HPTLC (9.1% W/W) and RP-HPLC (5.27% W/W). Preliminary screening on the effect on isolated CYP450 was done by CYP450 carbon monoxide (CYPCO) assay. Inhibition on CYP3A4 and 2D6 isozymes by *G. glabra* extract were analyzed through fluorescence product formation and IC₅₀ value were determined ⁽²⁾.

Results and conclusions: In CYP450-CO assay interaction potential (percentage inhibition 23.23±1.84 %) was very less compare to standard inhibitor. In fluoremetric assay *G. glabra* (CYP3A4:140.95±4.80, CYP2D6:132.49±1.07) and glycyrrhizin (CYP3A4:174.62±2.30, CYP2D6: 156.25±3.48) showed significantly higher IC₅₀ value (µg/mL) than their respective positive control, for both the isozymes. Results demonstrate that the *G. glabra* and glycyrrhizin with co-administered conventional medicines have very less interaction potential with drug metabolizing enzyme which indicates that drug metabolism base toxicity of licorice is minimal.

Keywords: *Glycyrrhiza glabra*, glycyrrhizin, Cytochrome P450, CYP3A4, CYP2D6.

Acknowledgments: Central Council for Research in Ayurveda & Siddha, Ministry of Health and Family Welfare, Govt. of India

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ISE3-P02 Biomedical properties of saffron (*Crocus sativus* L.) consumption

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Background: Saffron (*Crocus sativus* L.) is an important Spanish product, specially used for its aromatic, flavour and colouring properties ⁽¹⁾. Since ancient ages has been used, as well, for its biomedical properties, such as antioxidant, anti-inflammatory, antinociceptive and even by its antitumor and anticancer activity ⁽²⁾, in addition to antidepressant, respiratory decongestant, antispasmodic, aphrodisiac, expectorant and sedative property.

Objectives: The main objective of this work is to make an estimation of the potential healthy effects of saffron consumption in humans based on saffron research of the biological activities.

Methods: Research of the past decade on saffron biological activities has been based on Scopus and Sciencedirect databases. Human equivalent doses (HED) have been calculated as follows: HED equals to animal dose (mg/kg) multiplied by animal Km/human Km ⁽³⁾ using Km human factor of 37 and rats and mouse 6 and 3, respectively.

Results and conclusions: The antioxidant activity of saffron is responsible for many chemical reactions that have effects on preventing many diseases. According to HED calculations it can be observed that some of the doses studied in saffron research are really approachable for adults, such as antioxidant activity (57-908 mg), depression (128-426 mg) and learning behaviour (341-681), being seizures (1-11 mg) and Parkinson the diseases that needs less saffron doses for its prevention or amelioration ⁽⁴⁻⁸⁾.

Keywords: Antioxidant properties, *Crocus sativus* L., healthy effects, human equivalent doses, saffron intake

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ISE3-P03 *Quassia* extract induces the expression of alpha-enolase

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Background: Antitumor activity has been demonstrated for isolated quassinoids as well as extracts prepared from different plants of the Simaroubaceae family^[1,2].

Objectives: The aim of the present study was to analyze the proteome changes after *in vitro* treatment with *Quassia* extract (QE), determine whether particular proteins are specifically affected by QE treatment and elucidate the possible mechanism underlying its antitumor effect.

Methods: 2-D gel electrophoresis, quantitative PCR, Flow cytometry, cell cycle analysis, 3-D cell invasion assay, immunofluorescence microscopy, Western blot, non-paired t-test

Results and conclusions: Alpha-enolase was identified as the protein whose expression increased as a result of QE treatment of human hepatoma HepG2 cells and MCF-10A neoT human breast cancer cells. We showed that the increased amounts of the protein were localized in the cytoplasm and the nucleus. After treatment with QE, and as a result of the increased expression of alpha-enolase, c-myc mRNA was confirmed to be downregulated and the invasion of cancer cells in a 3D model of cell invasion was inhibited. G2/M cell cycle phase arrest occurred in treated HepG2 cells, while there was no change in cell cycle progression in MCF-10A neo T cells. In conclusion, these results elucidate a new possible mechanism underlying the antitumor effect of QE.

Keywords: *Quassia* extract, Alpha-enolase, c-myc, Cell invasion, Proteomics

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ISE3-P04 Uighur remedies used for cardiovascular disease prevention: From biodiversity to evidence-based phytomedicines

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Background: The use of complementary and alternative medicine is increasing for cardiovascular disease prevention.

Objectives: To analyze the effectiveness for cardiovascular disease prevention of Uighur remedies.

Methods: An ethnopharmacological survey was carried out using written sources of TUM.1 We searched different databases and compiled data according to evidence-based toxicological, pharmacological and clinical studies. The ecological parameters of the remedies were also studied.

Results and conclusions: Among 72 remedies, 70 originated from plants belonging to 44 families and 2 from insects (*Bombyx mori* and *Oecophylla smaragdina*). Most of the plants are native from Asia, 2 of them are endangered: *Paeonia hybrida* and *Saussurea involucreta*. Some plants are also used in traditional Chinese medicine or Ayurvedic medicine. 2,3 There was good scientific evidence for 10 % of the remedies. Special attention to these effective natural remedies is a step toward high-quality standardized phytomedicines.

Keywords: Uighur Medicine, hypertension, antiplatelet activity, dyslipidemia, diabetes

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ISE3-P05 *Ginkgo biloba* extracts are antagonists of insect GABA receptors

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Background: The *Ginkgo biloba* tree has been used in TCM for over 2,500 years. *Ginkgo biloba* leaf extracts are potent insecticides but their mechanism of action has not yet been elucidated⁽¹⁾. Ginkgolide A, ginkgolide B and bilobalide are terpene trilactones found in these extracts. These compounds are similar to picrotoxin (PTX) in that they are antagonists of the human GABA_A and glycine receptors, binding in the channel pore close to the 2nd and 6th channel-lining residues^(2,3).

Objectives: The aim of this study was to assess the properties of GA, GB and BB on the insect GABA_A-like receptor "RDL" and to determine the role of the 2nd and 6th channel-lining residues.

Methods: *Drosophila* RDL receptors were expressed in *Xenopus* oocytes and responses were detected using voltage-clamp electrophysiology. Mutant receptors were generated using PCR. Homology models were made and compounds were docked into the channel pore.

Results and conclusions: Wild type receptors responded to GABA with an EC₅₀ of 20 µM. GA, GB and BB inhibited GABA responses with IC₅₀s of 1.0 µM, 0.8 µM and 0.3 µM respectively, similar to the potency of PTX on this receptor (IC₅₀ = 1.1 µM). Mutation of the 2nd and 6th channel-lining residues reduced the potency of these compounds. Mutant-cycle analysis of ginkgolide IC₅₀s predicted interaction energies of 3.9 and 4.8 kJ/Mol at the 2nd and 6th residues and docking experiments predicted H-bonding interactions between ginkgolides and these residues. In conclusion, GA, GB and BB are antagonists of insect GABA receptors - binding in the channel pore - and this may be the mechanism underlying their potent insecticidal properties.

Keywords: *Ginkgo biloba*, GABA receptor, antagonist, Cys-loop.

Acknowledgments: R.K. Duke and G.A. Johnston (Dept. Pharmacology, Univ. Sydney) kindly provided Ginkgolides.

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ISE3-P06 An ethno-pharmacological study of Egyptian Bedouin women's knowledge of medicinal plants

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Background: Bedouin women in Egypt are heavily involved in all aspects of medicinal plants from collecting, processing, storing and the use.

Objectives: Explore and document the Bedouin women perception, attitude and treatment choices related to women's health, such as dysmenorrhoea, perinatal problems, womb cleansing and urinary tract infections and find a scientific basis for this knowledge, by isolating and characterizing bioactive compounds in some selecting plants.

Methods: Ethnobotany surveys have been conducted with Bedouin women, they recalled medicinal plants that they use and describe the preparation of medical remedies.

Results and conclusions: Results revealed that 28 different plant species are commonly used by the Bedouin women. Laboratory results for *Achillea fragrantissima*, commonly used as a decoction for infection, showed that the aqueous extract was non-cytotoxic in human THP-1 cell line at 0.1 mg/mL. It also exhibited antimicrobial activity against *Staphylococcus aureus* and *Escherichia coli* with 15.625 and 31.25 µg/mL. Sesquiterpene olide isolated from the same extract which significantly inhibited TNF-α production in LPS-stimulated cells⁽¹⁾ also different flavones obtained showed antitrypanosomal activity at 0.003 µM compare to suramin 0.06 µM. Methanol extract from *Haloxylon salicornicum* exhibited potent inhibitory activity (4 µg/mL) in the mouse uterine contraction assay. Some of this work justifies the use of this plant in the Bedouin communities for the treatment infection and perinatal problems and provide a scientific correlation between traditional medicinal plant use among the Bedouin and the pharmacological basis for their administration.

Keywords: Bedouin, medicinal plants, women health and anti-inflammatory.

Acknowledgments: The Citadel Capital Foundation for sponsoring this work, Bedouin people who generously gave me their time and shared their knowledge over the course of this study.

References: 1. Kastner, U. et. al. Planta Med 1993, 59: A669.



ISE3-P07 Minimum inhibitory concentration of medicinal plants used in Northern Peru as antibacterial remedies

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Background: The plant species reported here are traditionally used in Northern Peru to treat bacterial infections, often addressed by the local healers as "inflammation". The aim of this study was to evaluate the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of their antibacterial properties against Gram-positive and Gram-negative bacteria.

Methods: The antimicrobial activity of ethanolic and water extracts of 141 plant species was determined using a deep well broth microdilution method on commercially available bacterial strains.

Results and conclusions: The ethanolic extracts of 54 species inhibited *Escherichia coli*, and 117 ethanolic extracts inhibited *Staphylococcus aureus*. In contrast, only 29 water extracts showed activity against *E. coli* and 37 extracts against *S. aureus*. The MIC concentrations ranged from 0.1563 to 512 µg/mL. The ethanolic extracts exhibited stronger activity and a much broader spectrum of action than the water extracts.

The presence of antibacterial activity could be confirmed in most species used in traditional medicine in Peru for the treatment of bacterial infections. However, the MIC for the species employed showed a very large range. Traditional knowledge provides promising leads to elucidate potential candidates for future development of new antibiotic agents.

Keywords: Medicinal Plants, Ethnobotany, phytochemistry, antibacterial, *Escherichia coli*, *Staphylococcus aureus*.

ISE3-P08 Antimalarials from Renaissance herbals: Identification of antiplasmodial dammaranes from *Alisma plantago-aquatica* by HPLC based activity profiling

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Background: The common water plantain *Alisma plantago-aquatica* L. (Alismataceae) was used in the 16th and 17th centuries in Central Europe to treat *Plasmodium vivax* malaria (tertian fever). The Renaissance herbals by Bock (1532), Brunfels (1532), Mathioli (1560) and Zwinger (1696) described the internal use of its tubers to treat this disease⁽¹⁾. In a recent screen of such remedies an EtOAc extract of *A. plantago-aquatica* was active against *Plasmodium falciparum*.

Objectives: To identify antiplasmodial constituents in the active extract.

Methods: With analytical scale time-based HPLC separation and testing of one-minute fractions in combination with HPLC hyphenated methods (HPLC-PDA, -MSn, HR-MS, off line microprobe NMR) the active substances were identified as acetylated dammarane triterpenes. Seven of these compounds were isolated. Structure elucidation was achieved by extensive 1H and 13C NMR.

Results and conclusions: The dammaranes had IC₅₀ ranging from 3.3 to 7.0 µM. This study shows that European Renaissance herbals could be a promising source of new antiprotozoal agents. HPLC based activity profiling is an efficient tool to quickly identify active constituents in complex mixtures. This is the first report of antiplasmodial activity of this triterpenoid class, and the first result of our ongoing project of screening for antiprotozoal natural products from remedies described in European Renaissance medicine.

Keywords: Renaissance herbals, malaria, *Plasmodium*, dammarane triterpene.

ISE3-P09 The essential oil of *Thymus zygis* subsp. *gracilis* R. Morales (Lamiaceae) in his limit of western distribution in the Iberian Peninsula

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Background: *Thymus zygis* subsp. *gracilis* R. Morales is endemic of S Spain and N Africa^(1,2). Its essential oil has been studied in Africa^(3,4) and SE Spain⁽⁵⁻⁹⁾.

Objectives: We have studied the essential oil of this taxon from SW populations and compared the results with the populations analyzed up to the date (SE Spain and N Africa).

Methods: *Plant material.*- *Thymus zygis* subsp. *gracilis* was gathered for 3 years in the flowering state in a wild population (Badajoz, Spain, 29SPD70). *Oil isolation, gas chromatography, gas chromatography-mass spectrometry and qualitative analyses.*- according to the method 10.

Results and conclusions: The studied population had a composition different to those published before from the aforementioned geographical areas. It had as principal components thymol (72.8-40.7%), *p*-cymene (22.9-8.0%) and γ -terpinene (12.9-9.6%). Thymol values are the highest percentages known, and due to the great applied interest of this component, our population might be of high value in order to be domesticated for cultivation, as it has been already done in the similar cases of the *Th. zygis* s.l. complex 11.

Keywords: *Thymus zygis* subsp. *gracilis*, essential oil, chemosystematics, Iberian Peninsula.

Acknowledgments: INIA (RF00-019-C2-2) and J. Sanz (C.S.I.C.).

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ISE3-P10 From traditional remedies to modern medicines – phytochemical and pharmacological aspects of Figs: a reverse pharmacology journey

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Background: *Ficus racemosa* and *Ficus hispida* leaves are the most traditionally used plants against diabetes and inflammations particularly in the rural areas of West Bengal, India.

Objectives: The main objective of the work was to validate traditional claims and lay down standard protocols for establishing the purity of the material, identification of adulterants and substitutes and quality control aspects through identification of biomarkers leading to better global acceptance.

Methods: Antidiabetic assay (0.2 g/kg, *p.o.*) was performed in streptozotocin-induced diabetic rats and anti-inflammatory activity (0.2 g/kg, *p.o.*) was evaluated by acute (carrageenan-and dextran-induced rat paw edema) and chronic (cotton pellet granuloma) assays. Two pure compounds namely lupeol acetate and β -amyryn were isolated from *F. racemosa* and *F. hispida*.

Results and conclusions: *F. racemosa* and *F. hispida* leaves demonstrated significant antidiabetic activity in terms of reduction of fasting blood glucose level with a maximum reduction of 42.6 ($p < 0.001$) and 38.3 % ($p < 0.001$) respectively and comparable to glibenclamide (0.001 g/kg, *p.o.*). In anti-inflammatory studies *F. racemosa* exhibited significant inhibition of carrageenan (30.4 %, $p < 0.001$) and dextran- (28.5 %, $p < 0.01$) induced paw edema and the activity was found superior than *F. hispida* (18.6% and 15.4 % ($p < 0.05$) inhibition in respective models). Significant activity ($p < 0.01$) was found in the cotton pellet granuloma assay for both extracts. Lupeol acetate (0.03 g/kg (*p.o.*)) possessed better anti-inflammatory activity.

Keywords: *F. racemosa*; *F. hispida*; antidiabetic assay; β -amyryn; lupeol acetate; anti-inflammatory.

Acknowledgments: The financial support and research infrastructure provided by Jadavpur University is greatly acknowledged

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ISE3-P11 Medicinal properties of *Opuntia stricta* fruits

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Background: *Opuntia* spp. crops are interesting alternatives for semiarid regions. International Cactaceae Systematic Group recognizes 75 species, offering the study of a broad diversity of fruits, cladodes, seeds and flowers. These multipurpose plants have been used in the traditional medicine. In particular, its fruits are of nutraceutical and functional importance^(1, 2). *Opuntia stricta* (Haw.) is a promising crop for its high fruit productivity and it has been evaluated as an interesting source of a red-purple food betalainic colorant⁽³⁾.

Objectives: The objective of this study was to evaluate the potential medicinal properties of *Opuntia stricta* fruits through the knowledge of its main components compositions, which could be related with its health benefits claims.

Methods: Mature *Opuntia stricta* (Haw.) fruits were collected from a Murcia cultivar. Juice was obtained after fruits homogenization and centrifugation. Juice composition was analyzed by HPLC.

Results and conclusions: Main antioxidant compounds found in *Opuntia stricta* juice are betacyanins (800 mg/Kg) and polyphenols. Medicinal properties as analgesic, anti-inflammatory, anti-carcinogenic (leukemia), or its use for degenerative diseases and asthma are suggested. All cases are related to oxidative stress processes. Although *Opuntia stricta* fruits may have many potential health benefits, more clinical test are needed to assess these health claims.

Keywords: *Opuntia stricta*, betalains, oxidative stress.

Acknowledgments: Research funded by MICCIN AGL2007-60455 and "Fundación Séneca" 12610/BPS2/09.

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ISE3-P12 Gastroprotective and anti-inflammatory activity of carnosic acid derivatives

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Background: Rosemary (*Rosmarinus officinalis* L., Lamiaceae) is widely used as digestive and spice in Latin America. Carnosic acid (CA) is the main diterpene from rosemary and presents gastroprotective activity.

Objectives: To determine the gastroprotective and anti-inflammatory effect of semisynthetic derivatives from CA and to establish structure-activity relationships.

Methods: Starting from CA, 18 semisynthetic derivatives were prepared. The gastroprotective and anti-inflammatory effect of the compounds was determined in mice. The antioxidant activity was studied using the human erythrocyte membrane lipoperoxidation model.

Results and conclusions: In dose-response studies, CA showed excellent gastroprotective effect, reducing the lesion index by 74%, 60% and 44% at doses of 40, 20 and 10 mg/kg, respectively. At a single oral dose of 10 mg/kg, 61% of the new derivatives reduced gastric lesions by $\geq 60\%$. The anti-inflammatory activity of 8 compounds was assayed at 10 mg/kg. Five derivatives presented an effect comparable to that of naproxen sodium at the same dose. In the erythrocyte membrane lipoperoxidation assay, the derivatives were less active than CA. However, 3 derivatives as well as CA were more effective than catechin as antioxidants. This study points out the potential of plants with traditional use to obtain new analogues with better bioactivity.

Keywords: *Rosmarinus officinalis*, carnosic acid, semisynthesis, gastroprotective effect, anti-inflammatory activity.

Acknowledgments: Financial support by FONDECYT Project N° 1060841 and Programa de Productos Bioactivos, Universidad de Talca, is kindly acknowledged.

ISE3-P13 Ethnobotanical study of medicinal plants used as spicy and aromatic Chinese medicinal material in hotpot

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Background: Foreign spices have enriched Chinese diet culture especially the hotpot culture. But there was no clear market investigation or historical review. This is the first study of medicinal plants used as spicy and aromatic Chinese medicinal material in hotpot.

Objectives: This investigation was to collect data from Chinese herbal medicines and spices markets, cultivation sites and restaurants in China. It also documented valuable information from historical record about how the foreign spices have become the Traditional Chinese Medicines and were used as spices in Chinese diet.

Methods: Data was obtained by using semi-structured forms to record the interviewee's personal information and topics related to the medicinal plants used in hotpot. A total of about 50 medicinal plants that are commonly used in hotpot were collected from selected Chinese herbal medicines wholesalers, spices retailers and hotpot cooks. The historical record and literature concerning spicy and aromatic Chinese medicinal material were also reviewed.

Results and conclusions: The results demonstrated that about 20 out of the 50 studied medicinal plants were the most popular spices used in hotpot. Majority of them processed spicy tastes and aromatic smells, and also provided special flavors, stimulating sense, or enhanced colors. According to traditional Chinese medicine theory, most of them were warm in nature. Among the 50 medicinal plants, more than half of them were not native in China but foreign spices imported from ancient Southeast Asia, West Asia or other countries.

Keywords: Spicy and aromatic material; Medicinal plants; Hotpot; Ethnobotany; Foreign spices.

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ISE3-P14 From the *Araucaria araucana* resin to new gastroprotective compounds by selective semisynthesis

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Background: The resin of *Araucaria araucana* (Molina) K. Koch (Araucariaceae) was used to treat ulcers by the Mapuche Amerindians. Labdane diterpenes are the active constituents of the resin and present gastroprotective activity.

Objectives: To determine structure-activity relationships of semisynthetic labdane derivatives with gastroprotective effect and to assess the cytotoxicity of the compounds.

Methods: Some 10 naturally occurring diterpenes were isolated from the resin and 90 semisynthetic derivatives were prepared. They included different oxidation patterns at C-15 and C-19, amides with aromatic amines and aminoacids (both at C-19, C-15 and C-15,19) and hybrid molecules with naphthoquinones. The gastroprotective effect of the compounds was determined in mice and cytotoxicity was measured on MRC-5 fibroblasts and gastric adenocarcinoma AGS cells.

Results and conclusions: In dose-response studies at a single oral dose, the main resin diterpenes reduced gastric lesions by 50% at 100 mg/kg. Structural modification led first to derivatives displaying similar effect at 25 mg/kg while hybrid molecules presented a strong activity at 5 mg/kg. The cytotoxicity was also modulated affording compounds with very low cell toxicity and some with selective effect towards the selected cell lines. The study shows how starting from the ethnopharmacological approach, new analogues with better bioactivity can be obtained by functional groups modification of the main crude drug constituents.

Keywords: *Araucaria araucana*, labdane diterpene derivatives, semisynthesis, gastroprotective effect, cytotoxicity.

Acknowledgments: Financial support by FONDECYT Project 1085306 and Programa de Productos Bioactivos, Universidad de Talca, is kindly acknowledged.



ISE3-P15 Photodynamic inactivation of yeast and bacteria by extracts from *Alternanthera brasiliana* (Amaranthaceae)

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Photodynamic therapy involves the administration of a photosensitizer that is activated in the presence of light and oxygen, resulting the formation of reactive oxygen species that can induce pathogenic microorganism death. This study was undertaken to evaluate the effect of *Alternanthera brasiliana* extracts in photodynamic antimicrobial chemotherapy (PACT) on the viability of yeast and bacteria. Crude hexane and ethanol extracts of *A. brasiliana* obtained, presented absorption at 650-700 nm. The extracts ability to produce singlet oxygen was measured by 1,3DPBF scavenger method. For bioassays, each extract were tested against *Staphylococcus aureus* 14458, *Staphylococcus epidermidis* 12228 or *Candida dubliniensis* 778157 and 777 (107 CFU/mL) in a 96-well microtiter plate. The irradiation was with a 685 nm diode laser with an output power of 35 mW, which was distributed through the well cross section yielding an energy dosage of 28 J/cm². For each sample, the number of colony-forming units per milliliter (CFU/mL) was obtained, and data were analyzed by the Tukey test. The results suggest inhibition of the growth of all microorganisms tested when irradiated with laser in the presence of both extracts as photosensitizers. Neither just laser irradiation nor crude extracts significantly reduced the number of CFU/mL. At photoactivity assay the 1,3DPBF photodegradation was highly enhanced in the presence of both extracts indicating singlet oxygen production. Steroids, triterpenes, and flavonoids were identified in extracts by chromatographic and spectroscopic techniques. In conclusion, photoactivation of crude hexane and ethanol extracts of *A. brasiliana* by red laser radiation 685 nm promoted an antimicrobial effect, showing that these natural products can be used as photosensitizers. However, further investigations are necessary to confirm the potential power that these natural products offer as real and useful *in vivo* application in PACT.

Keywords: Photodynamic therapy, photosensitizers, antimicrobial, Amaranthaceae.

ISE3-P16 Pharmacological properties of *Anagallis arvensis* and *Anagallis foemina* traditionally used as wound healing remedies

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Background: *Anagallis arvensis* L. and *Anagallis foemina* Mill. (Primulaceae) are traditionally used in Navarra (Spain) for dermatological purposes regarding wound healing properties^[1,2]. In some cases they are also used to treat internal infections although they are known to be toxic at high doses.

Objectives: Due to lack of studies we decided to evaluate antimicrobial, cytotoxic, and anti-inflammatory activities of both species using *in vitro* procedures.

Methods: Antimicrobial effects were studied against four bacteria and one fungus. Cytotoxicity was determined in PC12 and DHD/K12PROb cells by MTT and LDH assays. Anti-inflammatory properties in terms of COX-1 and -2 inhibition as well as free radical scavenging methods.

Results and conclusions: Both species exerted antimicrobial, cytotoxic and anti-inflammatory effects. The methanolic extract obtained from *A. arvensis* produced the highest inhibition in *Candida albicans* (MIC = 0.31 mg/mL) and in cell growth. COX-1 and -2 activity was also stronger for methanolic extracts while the aqueous were revealed as better free radical scavengers. The study reveals that both species possess antimicrobial and anti-inflammatory activities related to their ethnomedicinal uses and cytotoxicity that may explain the toxic effects traditionally described.

Keywords: *Anagallis arvensis*, *Anagallis foemina*, Primulaceae, traditional medicine, antimicrobial, anti-inflammatory.

Acknowledgments: San Jorge University and University of Navarra Foundation and are thanked for financial support.

References: 1. López V. et al. Pharm Biol 2008, 46:602-609. 2. Akerreta, S. et al. J Ethnobiol Ethnomed 2007, 3:16.

ISE3-P17 Effect of jasmonic acids, yeast extract and salicylic acid on tropane alkaloids production by *Atropa belladonna* L transformed with the rolB gene

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Background: Hyoscyamine and scopolamine are the two most common tropane alkaloids found in the Solanaceae, and many plants containing these alkaloids have been used for their medicinal, hallucinogenic, and poisonous properties. *Atropa belladonna* L. (Solanaceae) is one of the widely used medicinal plants in the world and contains tropane alkaloids hyoscyamine and scopolamine. Hairy root cultures of *Atropa belladonna* L. produce the tropane alkaloids scopolamine and hyoscyamine.

Objectives: The effects of some abiotic elicitors such as jasmonic acids, yeast extract and salicylic acid on hyoscyamine and scopolamine production by hairy root cultures of *Atropa belladonna* were studied.

Methods: Jasmonic acids, yeast extract and salicylic acid were tested at different concentrations (0,25,50,75,100µM for Jasmonic acids, 0, 250, 500 and 1000 mg for yeast extract and 0, 250, 500 and 1000 µM for salicylic acid). Hairy roots of 21-day old cultures were exposed to these elicitors for 48 hours.

Results and conclusions: At low concentrations as 25 µM 250 mg and 250 µM, jasmonic acids, yeast extract and salicylic acid increased the content of root scopolamine 2/1, 1/9 and 1/6 and hyoscyamine 2, 1.6 and 1.3-fold in comparison with control root, respectively. The highest hyosyamine (6.96 mg/gr dw) and scopolamine (1.42 mg/gr dw) accumulation were obtained in cultures treated with 50 µM jasmonic acids, whatever in control hairy root cultures were 3.3 mg/gr dw and 0.67 mg/gr dw, respectively. In conclusion, the protocol presented here can be used for the production of these medicinally important tropane alkaloids by the pharmaceutical industry, subject to economic considerations.

Keywords: *Atropa belladonna*, Hairy root, Tropane alkaloids, Jasmonic acids, Yeast extract and salicylic acid.

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ISE3-P18 Ethnopharmacological screening of South African medicinal plants and HPLC based activity profiling for antiprotozoal leads

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Background: Diseases caused by protozoa are widespread in Southern Africa and there is a long tradition of using herbal remedies for their treatment⁽¹⁾.

Objectives: To screen plants traditionally used to treat protozoal infections against the parasites *Plasmodium falciparum*, *Trypanosoma brucei rhodesiense*, *Trypanosoma cruzi* and *Leishmania donovani* and to identify their active constituents by HPLC based activity profiling.

Methods: 107 plants were screened. To identify antiprotozoal peaks in active extracts, 350 µg were fractionated by HPLC into 32 one-minute fractions in a fully automated 96 well microfractionation scheme⁽²⁾, and microfractions were tested. HPLC hyphenated methods (MS, UV, ELSD, HRMS and offline LC-NMR) helped identify active substances online.

Results and conclusions: From the screened library, 102 (34.0%) exhibited more than 50% growth inhibition of one of the parasites at the concentration of 9.7 µg/mL and were thus active. *P. falciparum* against which 72 plant extracts (24.0%) showed activity was the most susceptible parasite, followed by *L. donovani* (49, 16.3%) and *T. b. rhodesiense* (36, 12.0%), with *T. cruzi* (0).

Keywords: Anti-parasitic diseases, HPLC-profiling, South African plants.

References: 1. Pylla, B. (2008) J Ethnopharmacol, 119:438-454. 2. Adams M. et al. (2009) Nat Prod Comm., 10:1377-8.



ISE3-P19 Comparison of biochemical markers of stress responses in *Rosmarinus officinalis* L. (Lamiaceae) from three different Valencian habitats

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Background: *Rosmarinus officinalis* is a perennial herb native to the Mediterranean region belonging to the Lamiaceae family. It is a medicinal plant used in traditional and modern pharmacology due to its antiviral, antibacterial, antiinflammatory and antioxidant properties. In the Valencian region it is abundant in the Thermo and Mesomediterranean belts, occupying different habitats, such as the three stressful environments studied here.

Objectives: The present study analyses biochemical responses to stress, such as osmolyte (proline, total sugars) and antioxidant (total phenolic compounds, flavonoids) synthesis or cation (Na^+ , K^+ , Mg^{2+} , Ca^{2+}) accumulation by comparing plants from different habitats.

Methods: Environmental stress was checked in three different habitats according to climatic and soil conditions: semi-arid climate, saline (with a strong influence of the sea) and gypsic soils. Leaf material was sampled from five individuals in each plot and biochemical analyses were conducted by standard spectrophotometric methods. The cations were analysed by Atomic Absorption Spectrometry.

Results and conclusions: *R. officinalis* synthesises higher amounts of proline, sugars, phenolic compounds and flavonoids when growing on gypsic soils as a response to high and constant salinity level. Cation patterns correspond to the characteristics of the soils: the highest amount of Na^+ was found in plants from the saline habitat. The highest Ca^{2+} amount was registered in plants from the semi-arid and gypsic soils areas. Plants from the semi-arid habitat contain higher levels of K^+ whereas Mg^{2+} amount is similar in the three areas.

Keywords: Abiotic stress, biochemical, cations, gypsic, saline, semi-arid.

Acknowledgments: This work is being funded by the Spanish Ministry of Science and Innovation (project CGL2008-00438/BOS), with contribution from the European Regional Development Fund.

ISE3-P20 Screening of cytotoxic and antimicrobial effects of two American mistletoes

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Background: Loranthaceae family has members with cytotoxic and antimicrobial properties. *Phoradendron longifolium* ex Eichl and *Psittacanthus calyculatus* (DC.) G, members of Loranthaceae family, are plants endemic from México. However, there are not pharmacological studies of *P. longifolium* and *P. calyculatus*.

Objectives: To evaluate the cytotoxic and antimicrobial effects of aqueous extracts of two American mistletoes.

Methods: Several concentrations of American mistletoes were evaluated on human cancer cell lines using MTT assay. Antimicrobial effects were evaluated in drug-resistant clinical isolates of bacteria and fungi using agar diffusion method.

Results and conclusions: *P. longifolium* and *P. calyculatus* ($\text{IC}_{50} > 30 \mu\text{g/mL}$) lack of cytotoxic effects on human cancer cell lines. On the other hand, *P. calyculatus* showed active ($> 10 \text{ mm}$ zone inhibition) antimicrobial effects on *Acinetobacter Iwoffii*, *Pseudomonas aeruginosa* and *Burkholderia cepacia*, whereas *P. longifolium* was active on *Acinetobacter Iwoffii*.

Keywords: American mistletoes, cytotoxic, antimicrobial, Loranthaceae.

Acknowledgements: AJAC (174493) was endowed with a graduate scholarship from CONACYT, México.

ISE3-P21 Phytochemical and pharmacological investigation of *Cordia americana*

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Background: *Cordia americana* (Boraginaceae), locally known as "Guajuvira", is a native Brazilian tree, whose leaves have been widely used in traditional medicine in South Brazil to treat wounds and various inflammations.

Objectives: The objective of this work was to identify the effective compounds in the ethanolic extract prepared from the leaves of *Cordia americana*, which is used as anti-inflammatory and wound healing remedy.

Methods: Isolation and structure elucidation techniques were performed in order to identify the compounds of *Cordia americana* and HPLC analysis was used for the quantification. The major constituent and the ethanolic extract were investigated for inhibition of 5-lipoxygenase, p38 α MAPK, TNF α release and NF- κ B as well as in the fibroblast scratch assay.

Results and conclusions: Phytochemical studies (i.e., MS and 1D and 2D NMR) revealed the presence of flavonols, phyosterols and phenolic compounds. Rosmarinic acid (RA) was identified as the major compound with an amount of 8.44% in the ethanolic extract of the leaves of *Cordia americana*. The ethanolic extract as well as RA exhibited the highest inhibitory effects on 5-lipoxygenase (IC₅₀ = 0.69 and 0.97 μ g/mL, resp., IC₅₀ of BWA4C as reference: 0.3 μ M) and p38 α (IC50 = 3.25 and 1.16 μ g/mL, resp., IC₅₀ of SB203580 as reference: 0.046 μ M) and moderate inhibitory effects on TNF α release. Slight effects were observed in the fibroblast scratch assay. As conclusion, this study increases our knowledge on the effective compounds in *Cordia americana* and supports its use in traditional medicine. We demonstrated for the first time pharmacological effects of *Cordia americana* and we provide evidences for a crucial role of rosmarinic acid as the major key player.

Keywords: *Cordia americana*, Rosmarinic acid, Anti-inflammatory, p38 α MAPK, TNF α , 5-LO, Fibroblast Scratch assay.

ISE3-P22 Pharmacological evaluation of *Artemisia vulgaris*

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Background: *Artemisia vulgaris* is a perennial weed native to Asia, Europe and North America⁽¹⁻³⁾, widely used in the Philippines as an alternative medicine for its antihypertensive⁽¹⁾, antispasmodic⁽⁴⁾ and bronchodilator activities mediated through blockade of muscarinic receptors and Ca²⁺ influx⁽⁵⁾.

Objectives: This study evaluated *A. vulgaris* for antagonistic activity at selected biogenic amine receptors on smooth muscle of the airways, gastrointestinal tract and vascular system.

Methods: Antagonism of contractions of guinea-pig ileum, trachea and aorta to methacholine (M₃ muscarinic receptors), 5-hydroxytryptamine (5-HT receptors), histamine (H₁ receptors), phenylephrine (α -adrenoceptors) and β -phenylethylamine (β -PEA, trace amine associated receptors) by chloroform and methanol crude extracts of *A. vulgaris* was studied.

Results and conclusions: Chloroform (AV-CHCl₃) and methanol (AV-MeOH) extracts of *A. vulgaris* reduced the maximum contractions of the ileum to 5-HT, methacholine, histamine and β -PEA, and of histamine and β -PEA in the trachea, indicating non-specific smooth muscle relaxing properties. AV-CHCl₃ and AV-MeOH additionally shifted the histamine curves parallel to the right in the ileum and trachea, indicating also a competitive reversible H₁ receptor antagonist. Phenylephrine and β -PEA contractions of the aorta were potentiated in a second curve, which was prevented in the presence of AV-CHCl₃, indicating inhibition of intracellular Ca²⁺. AV-CHCl₃ extracts purified through Sephadex followed by silica gel TLC showed two compounds of molecular mass 244 g/mole and 262 g/mole, which competitively antagonised histamine in ileum and trachea. These properties of *A. vulgaris* might explain its traditional use in asthma and hyperactive gut.

Keywords: *Artemisia vulgaris*, ileum, trachea, aorta, histamine, 5HT, methacholine, phenylephrine.

Acknowledgements: Supported by a studentship to GMN from the Ford Foundation.

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ISE3-P23 The effects of *Lonicera caerulea* berry consumption on the antioxidative status of healthy human volunteers in a one week intervention study

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Background: Consumption of fruit with a high content of color pigment is associated with a decreased risk of CVD. This has been ascribed in part to antioxidants which inactivate the reactive oxygen species underlying CVD.

Objectives: To study whether 7 day consumption of the anthocyanin-rich *L. caerulea* berries alters oxidative stress markers in blood.

Methods: Ten healthy volunteers (female/male aged 20-60 y) consumed 165 g/day fresh berries (500 mg/day anthocyanins) for one week. The phenolic acids, quercetine and anthocyanines were determined in berries and plasma/urine by HPLC-MS. Total antioxidative capacity, plasma oxidative stress and clinical chemistry safety markers were measured.

Results and conclusions: The levels of hippuric acid and several phenolic acids were significantly increased in plasma and urine of all subjects ($p < 0.05$) but the anthocyanin concentration was under the detection threshold. The berries were well tolerated, but failed to improve the antioxidative status in volunteers.

Keywords: *Lonicera caerulea*, anthocyanins, phenolic acids, clinical chemistry markers.

Acknowledgments: This study was supported by the grant MSM 6198959216.

References: Palíková, I. et al. J. Agric. Food Chem. 2008, 56: 11883-11889.

ISE3-P24 Chemical and anti-inflammatory effect of the methanol extract from *Pimenta racemosa* var. *terebinthina* a Caribbean medicinal plant.

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Background: The genus *Pimenta* (*Myrtaceae*) is widely represented in the Caribbean region and includes a large number of species which are traditionally used in local folk medicine. *P. racemosa* var. *terebinthina* is commonly known in the caribbean basin as "canelilla" and its distribution is limited to the Samaná peninsula (Dominican Republic).

Objectives: to research the chemical composition of the methanol extract of *P. racemosa* var. *terebinthina* and to evaluate the anti-inflammatory activity of this extract on two different acute inflammation experimental models.

Methods: The methanol extract was analysed by chromatographic and spectroscopic methods (TLC, GC, MS, NMR). The anti-inflammatory activity has been evaluated using two experimental models: paw edema in rats, with carrageenan as proinflammatory agent, and ear edema in mice, inducing the inflammation with TPA. Myeloperoxidase activity was also assayed as an indicator of leukocyte migration in the inflamed ears.

Results and conclusions: Fatty acids (palmitic, oleic, stearic, and cerotic) diterpenes (abietic and dehydroabietic acids) triterpenes (α - and β -amyrin and lupeol), sterols (α - and β -sitosterol and (24S)-5 α -stigmast-7-en-3 β -ol) and squalene were isolated. Results showed that *P. racemosa* var. *terebinthina* is effective against acute inflammation processes, by oral route and when was topically applied. The MPO activity was strongly reduced and this indicates that the extract has strong effects on the neutrophil migration. The results provide a scientific basis for the utilization of this species in the folk medicine by the treatment of acute anti-inflammatory processes.

Keywords: *P. racemosa* var. *terebinthina*, terpenes, sterols, fatty acids, inflammation.

ISE3-P25 Uterotonic activity of plant species used for abortion in Tanzania

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Background: Abortions in Tanzania are often performed by traditional healers. They help by preparing herbal remedies or providing instructions to the women. A problem is that it can lead to the use of ineffective or potentially toxic plant species.

Objectives: The objective is to screen 21 plant species, collected in Tanzania, for uterotonic activity due to their use as abortifacients by traditional healers.

Methods: Collection of the plant species was based on ethnopharmacological studies conducted during the fall 2007 and 2008. Ethanolic extracts were redissolved with 14 % ethanol in De Jalon solution. The extracts were tested on rat uterus in a cumulative dose response curve experiment⁽¹⁾. Uterus contraction was compared to the maximum contractile effect of acetylcholine.

Results and conclusions: Several of the plant species showed contracting activity on the uterus. Out of the initial screening of 21 plant species six showed good uterotonic activity. The six species were *Desmodium barbatum* (L.) Benth (Fabaceae); *Commelina africana* L. (Commelinaceae); *Oldenlandia corymbosa* L. (Rubiaceae); *Sphaerogyne latifolia* Naudin (Melastomataceae); *Rubia cordifolia* L. (Rubiaceae); *Obetia radula* (Baker) Leandri (Urticaceae).

Keywords: Uterotonic activity, abortifacient, herbal remedies, Tanzania

References: 1. Van Rossum, J.M. (1963). "Cumulative dose-response curves. II. Technique for the making of dose response curves in isolated organs and the evaluation of drug parameters." *Arch Int Pharmacodyn Ther* 143: 299-330.

ISE3-P26 A family of Glucosyltransferases from *Crocus sativus* stigmas

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Plants produce tens of thousands of different natural products also referred to as secondary metabolites. These small organic molecules allow plants to cope with various types of stress, while also carrying out biological activities which are often of high interest to human industries. Although the true role of such metabolites in plants remains mostly unknown, it is evident that plants invest a great deal of resources in synthesizing, accumulating and sorting such metabolites, often produced through complex and highly regulated biosynthetic pathways operating in multiple cellular and sub-cellular compartments. Furthermore, some compounds are restricted to single species or related groups and are often generated only during a specific developmental period of the plant. All these particularities are found in *Crocus sativus* L. Saffron, the dried red stigmas of *C. sativus*, has been used as a flavouring and colouring agent since then and is currently considered the world's most expensive spice. Saffron is made up of a complex mixture of volatile and non-volatile compounds that contribute to its overall aroma and flavour. Glucosylated carotenoids and flavonoids are the main compounds detected in saffron, the different glycosidic structures observed suggest the existence of different families of glucosyltransferases that act on these compounds. These enzymes are involved in defence, lignification, detoxification, floral development and pigmentation. Sugar analysis and glucosidase treatment of saffron confirm the presence of glucosyltransferases in the stigma tissue. Using a PCR approach, several glucosyltransferases have been isolated from saffron, expression analysis and phylogenetic relationships will be presented.



ISE3-P27 Cloning and allergenic reactivity of two minor saffron allergens rCro s 3.01 and rCro s 3.02

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Background: Food allergies affect 6% of young children and 3-4% of adults in westernized countries. Spices are commonly used in cooking in order to add flavour, odour and visual appeal to food. According to the United States Code of Federal Regulations, most spices are recognized as safe for human consumption, although spices considered toxic may provoke allergic reactions, ranging from mild and local to severe systemic. Lipid transfer proteins (LTPs) are relevant allergens, recently proposed as model plant allergens from fruit, vegetables, seeds and pollens. No LTP spice allergen has been characterized to date.

Objectives: To identify and isolate saffron LTPs and to explore their relevance in saffron allergy.

Methods: Six patients with positive skin prick test (SPT) to saffron extract were selected. Two recombinant LTPs from saffron were isolated, cloned into pPIC9 and produced in *Pichia pastoris*. IgE Immunodetection and ELISA assays were performed with the two purified allergens and with the major fruit peach LTP allergen Pru p 3.

Results and conclusions: Full cDNA corresponding to two saffron LTP variants were isolated and expressed in *P. pastoris*. The molecular size of rCro s 3.01 and rCro s 3.02 was 9150Da and 9550Da, respectively. Both proteins were recognised by anti-Pru p 3 antibodies. Specific IgE to the purified allergens was found in 50% for rCro s 3.01 and 33% for rCro s 3.02 and Pru p 3 in the saffron-allergic patients.

rCro s 3.01 and rCro s 3.02 are minor saffron allergens, with this report being the first on the involvement of LTPs in spice allergy. In addition, two allergenic members of the LTP family with a limited amino acid sequence identity (under 50%) have been found in a single plant source. Interestingly, ELISA tests showed cross-reactivity between Pru p 3 and the LTPs isolated from saffron.

ISE3-P28 Scientific publications on animal studies of Chinese Herbal Medicines (CHM)

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Background: A group of scientists interested in *in vivo* studies of CHM have joined the "animal studies" work package of the European Union-funded FP7 Consortium, GP-TCM.

Objectives: To analyze the literature on CHM in animal models of disease, especially, of cancer.

Methods: We searched PubMed using MeSH terms. The impact factor (IF) was analyzed.

Results and conclusions: We retrieved 6328 references (cancer: 665) for 1950-2009. Authors with Chinese names were overwhelmingly dominant (>98%). An intensification in research in 2000-2009 (3487; 55%) was observed (also in non-Chinese plant medicine, 56%) but not in aspirin (31%) or acupuncture (41%). Half of the references on cancer had no impact factor (IF). The other half had more frequently IFs<4. This is not unique to CHM as only 2 out of the top 13 journals publishing antineoplastic phytotherapy in animals had an IF>4. This is in sharp contrast to journals dedicated to antineoplastic agent studies in general: 7 out of top 13 publishing journals had an IF>4. Frequently, herbs of unknown origin were subjected to a variety of extraction procedures to render extracts without any fingerprinting analysis and the stability of the research materials in studies was usually unknown. Therefore, although the past 10 years witnessed a surge of publications on CHM studies, the use of non-standardized research materials could poorly support reproducibility and comparability of research on the same CHM and thus significantly damp the scientific value and impact of these studies. More stringent quality control is highly desirable.

Keywords: Chinese herbal medicine, animal models of disease, cancer

Acknowledgments: European Union-funded Framework Programme 7.

ISE3-P29 Chemical constituents and antibacterial activity of *Rosmarinus officinalis* L. (Labiatae)

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Background: *Rosmarinus officinalis* L. (Labiatae) is an aromatic plant abundant in dry places, rocks and hills of the Mediterranean scrub. Several studies in the last several years show that the oil from the leaves can help prevent the development of cancerous tumours in laboratory animals. The oil is used externally as a rubefacient and an antiseptic and rosemary is also used as a condiment in cooking, but this plant present grand variability in the composition and percentage of the volatile constituents.

Objectives: In the present paper the chemical composition and antimicrobial activity of essential oil obtained from *Rosmarinus officinalis* L. were investigated in relation to their vegetative cycle.

Methods: The oil was processed by hidrodistillation in a Clevenger device. The constituents of the essential oils were identified on the basis of their GC retention index (RI) and by matching their 70 eV mass spectra with our data and reference libraries.

The antibacterial assay was determined by agar dilution method using Mueller-Hinton agar.

Results and conclusions: Four samples (spring, summer, autumn and winter) of the volatile fraction of *R. officinalis* were analyzed. In the samples of spring and winter was camphor the major constituent (22.83% and 27.45% respectively), however the samples of summer and autumn showed a lower content of 1,8 cineole (15,71% and 19,59% respectively).

The winter sample presented a more pronounced antibacterial activity

Keywords: *R. officinalis*, essential oil, camphor, 1,8 cineole, antibacterial activity, seasonal variations.

ISE3-P30 *In vitro* antimicrobial activity and toxicological evaluation of a leaf ethanolic extract of *Diospyros villosa*

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Background: *Diospyros villosa* (L.) De Winter (Ebenaceae) is an African scandent shrub or small straggling tree naturally occurring in Mozambique and commonly known as hairy star-apple. Traditional medicine practitioners use bruised leaves of *D. villosa* laid over painful spots for up to an hour as a counter irritant to any kind of fixed internal pain and vesicant effects were previously reported.⁽¹⁾

Objectives: This study aims simultaneously at the *in vitro* antimicrobial activity and the *in vivo* toxicological evaluation of a *D. villosa* leaf ethanolic extract.

Methods: Minimum Inhibitory Concentrations (MICs) of this extract were determined against *Candida albicans* ATCC 10231, *Enterococcus faecalis* ATCC 43062, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 27853, *Micrococcus luteus* ATCC 10240 and *Staphylococcus aureus* ATCC 25923. Acute and repeated dose toxicities of these extracts were also determined in CD-6 adult male mice. Serum levels of biomarkers, such as ALT, AST, LDH, CK-MB and creatinine were measured.

Results and conclusions: In the range of tested concentrations (19.5 to 312.5 µg/mL) the extract has shown antimicrobial activity against *C. albicans*, *E. coli*, *E. faecalis* and *M. luteus*. The most susceptible microorganism was *M. luteus* (MIC=19.5 µg/mL). The toxicological evaluation revealed some renal and hepatic toxicity.

Keywords: *Diospyros villosa*; Antimicrobial activity; Toxicological evaluation; Ethnopharmacology.

References: 1. Bryant AT. Zulu Medicine and Medicine-Men. Cape Town: C. Struik, 1966.



ISE3-P31 Anti-inflammatory activity of four *Baccharis* species

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Background: Traditional herbal remedies have increased in popularity in recent years. *Baccharis* is a New World genus belonging to the Compositae family, consisting in more than 400 species, about 90% of which are located in South America^(1,2). A screening program for anti-inflammatory activity in higher plants used in Southamerican traditional medicine has been developed in our laboratory.

Objectives: A part of this screening program, we have examined organic and aqueous extracts of four Bolivian *Baccharis* species, plants used in the traditional medicine of South America: *Baccharis potosiensis* H. Rob., *Baccharis capitalensis* Heering, *Baccharis ulicina* Hook. et Arn., and *Baccharis articulata* Pers.

Methods: Mouse peritoneal macrophages stimulated with *Escherichia coli* lipopolysaccharide were used for testing cyclooxygenase-2 (PGE2) and nitric oxide activity.

Results and conclusions: Most of the extracts tested are capable of exerting inhibitory action on enzymes of the arachidonate cascade, although the activity is mainly retained in the dichloromethane and ethanolic extracts. The preliminary results presented here, suggest that some of these extracts contains principles with anti-inflammatory activity.

Keywords: Baccharis, PGE2, NO.

Acknowledgments: This work was supported by Programa de Cooperación Interuniversitaria e Investigación Científica del Ministerio de Asuntos Exteriores y de Cooperación español (Acción Integrada D/011447/07 y D/020523/08).

References: 1. Abad, M.J. et al. Stud. Nat. Prod. Chem. 2005, 30: 703-759. 2. Abad, M.J. et al. Arkivoc 2007, VII: 76-96.

ISE3-P32 New compound of *Artemisia campestris* subsp. *glutinosa*, as inhibitor of nitric oxide

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Background: A body of evidence suggests that Nitric Oxide (NO) is involved in various pathophysiological processes including inflammation⁽¹⁾. The genus *Artemisia* is an interesting group of plants for application in different pathologies, including inflammatory diseases.

Objectives: In our search of anti-inflammatory agents from natural sources, the aim of the study was to investigate the in vitro anti-inflammatory activity of extracts of *Artemisia campestris* subsp. *glutinosa*, with a parallel chromatographic fractionation monitoring this activity.

Methods: A chromatographic fractionation was performed through a column of medium pressure and Flash silica column. IR, NMR, MS, was used for the structural elucidation Mouse peritoneal macrophages stimulated with *E. coli* lipopolysaccharide (LPS) were used to test NO activity.

Results and conclusions: Parallel bioguided-chromatographic fractionation of dichloromethane extract of *A. campestris* subsp. *glutinosa*, allowed us to isolate compound 1. According to the IR, MS and NMR spectra, compound 1 corresponds to an aromatic heterocyclic with a molecular weight of 530 containing a heteroatom. The extract, fractions and the isolated compound showed marked activity as inhibitors of NO, released from LPS stimulated mouse peritoneal macrophages (95% of inhibition at 10 mM).

Keywords: *Artemisia*, Inflammation, NO.

Acknowledgments: This work was supported by Programa de Cooperación Interuniversitaria e Investigación Científica del MAEC/AECID (Acción Integrada D/011447/07 y D/020523/08)

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ISE3-P33 Potential antioxidants and tyrosinase inhibitors from leaf extracts of *Zanthoxylum* spp.

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Background: *Zanthoxylum* is a genus of about 250 species of deciduous and evergreen trees and shrubs in the citrus or rue family, Rutaceae, native to warm temperature and subtropical areas worldwide. The genus *Zanthoxylum* has been credited with a long list of ethnompharmacological properties.

Objectives: In the present study, *in vitro* anti-oxidant and anti-tyrosinase properties of extracts of *Zanthoxylum piperitum* and *Zanthoxylum schinifolium* leaves extracts were evaluated using various assays.

Methods: *Z. piperitum* and *Z. schinifolium* leaves harvested at the mature green stage were collected at Baek-un Mt. Chollanam-do, S. Korea in August 2009. The extracts of *Z. piperitum* and *Z. schinifolium* leaves using methanol, n-hexane, chloroform, ethyl acetate or butanol as solvents were evaluated for their tyrosinase inhibition, anti-oxidant and anti-microbial properties. The anti-tyrosinase and anti-oxidant potentials were determined by *in vitro* mushroom tyrosinase assay and the free radical scaening activity methods.

Results: Both of these results showed the strong inhibition abilities at a dosage of 100.0 µg/mL. Particularly, higher activity was exhibited by *Z. piperitum* with 92.8% and 80.1% inhibition of butanol and ethyl acetate extracts, while 78.2% and 57.8% inhibitions by *Z. schinifolium* respectively. However, both butanol extracts exhibited higher DPPH radical scavenging activity than the corresponding methanol, n-hexane, chloroform, and ethyl acetate extracts. In addition, extracts of *Z. piperitum* leaves showed more potent anti-tyrosinase activity than *Z. schinifolium* leaves. Anti-microbial activities against Gram(+) and Gram(-) bacteria demonstrated good inhibition at 34.8 - 43.6 µg/mL. These results obtained from biological assays showed that extracts of *Z. piperitum* and *Z. schinifolium* leaves possessed multiple bioactivities, including anti-tyrosinase, anti-oxidants, anti-microorganism and cell proliferation. The data exhibited the high potential of applying extracts of *Z. piperitum* and *Z. schinifolium* leaves in cosmoceutical lines.

Keywords: *Z. piperitum*, *Z. schinifolium*, antioxidants, tyrosinase, antimicrobial activity.

Acknowledgements: This work was financially supported by grant no 70004555 from The Ministry of Knowledge and Economy.

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ISE3-P34 Antimicrobial activity of *Panda oleosa* Pierre stem bark against oral microorganisms

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Background: As part of our contribution to phytochemical and biological survey and to validation of traditional uses of pygmies Baka medicinal plants⁽¹⁾, we report herein the study on of *Panda oleosa* stem bark as a remedy for oral cavity affection.

Objectives: Validation of the traditional use of *P. oleosa* stem bark through the evaluation of the antimicrobial activity against oral cavity bacteria.

Methods: Colourimetric assays, Spectrophotometric analyses, Sephadex LH-20 column⁽²⁾.

Results and conclusions: According to the *in vitro* bioassay-guided results the antimicrobial properties of *P. oleosa* stem bark extracts have been demonstrated. Methanol is probably the best solvent for the extraction of bioactive compounds against oral Streptococci; however, all the extracts showed a significant activity, included a decoction in water, prepared following the pygmies original procedure. Preliminary qualitative analyses performed on the most active extract highlighted the presence of phenolic compounds, particularly condensed tannins. In order to isolate condensed tannins the methanol crude extract was chromatographed over Sephadex LH-20 coloumn and two different fractions were collected. The tannin fraction exhibited a pronounced antimicrobial activity (Minimal inhibitory Concentration <200 µg/mL), while the non-tannins fraction resulted inactive against oral microorganisms. Data obtained suggest that tannins could be the chemical family responsible for the biological activity observed.

Keywords: *Panda oleosa* bark extract (Hook.f.) Brenan, tannins fraction, pygmies traditional medicine.

References: 1. J Ethnopharmacol. 2008 Oct 30;120(1):13-6. 2 Hagerman A.E. Tannin Handbook, Ed. Miami University, Ohio, 1995.



ISE3-P35 Evaluation of the antiviral properties of Andes nutritional plants

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Background: Indigenous groups from South America have traditionally used plant tubers and roots as therapeutic agents with anti-infectious or aphrodisiac properties⁽¹⁾ as *Solanum juzepczukii* Buk used for the treatment of warts⁽²⁾.

Objectives: In this work we have focused our interest in the in vitro anti-infectious properties of nutritional plants natives from Bolivia highlands, as chuño (*S. tuberosum* subsp. *andigenum*), tunta (*S. juzepczukii* Buk), caya (*Oxalis tuberosa* Mol) and maca (*Lepidium meyenii* Walp).

Methods: Extracts and compounds were obtained by standard procedures and molecular structures elucidated by spectroscopic methods. HIV inhibition evaluation was performed with two different systems, a classical MTT and a recombinant virus assay.

Results: Just one of the plants tested, *L. meyenii* or Maca, displayed HIV inhibition. The traditionally used aqueous extract was only barely active but hexanic extract was more potent, with an inhibitory concentration 50 (IC₅₀) of 45 µg/mL. Bioguided fractionation of this extract yielded a new pyrrole-imidazole alkaloid with moderate anti-HIV activity (IC₅₀ 40 µM).

Keywords: HIV, *Lepidium*, Andes plants, Maca, alkaloids.

Acknowledgments: This work was supported by Programa de Cooperación Interuniversitaria e Investigación Científica del Ministerio de Asuntos Exteriores y de Cooperación español (Acción integrada D/011447/07 y D/020523/08).

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ISE3-P36 Comparative study on monosaccharide compositions between *Astragalus polysaccharide* and *Hedysarum polysaccharide* by precolumn derivation HPLC

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Background: Radix Astragali (RA), is the dried root of *Astragalus membranaceus* (Fisch.) Bge var. *mongholicus* (Bge.) Hsiao (MGHQ) or *Astragalus membranaceus* (Fisch.) Bge (MJHQ), whereas Radix Hedysari (RH) is the dried root of *Hedysarum polybotrys* Hand.-Mazz. Both RA and RH are claimed to be useful to benefit the deficiency of "Qi" (the vital energy). Generally, RA is more frequently used in China than RH. However, in northwest China and Taiwan, RH is still widely used in clinical practice rather than RA. Polysaccharides are reported to be the activity constituents in both RA and RH in recent years.

Objectives: To develop a precolumn derivation HPLC method to simultaneously separate and identify the monosaccharide compositions of polysaccharides in order to compare the monosaccharide compositions in RA and RH polysaccharides.

Methods: Polysaccharides were isolated by water extraction-alcohol precipitation. They were hydrolyzed by trifluoroacetic acid into monosaccharides and then labeled with 1-phenyl-3-methyl-5-pyrazolone (PMP). The labeled monosaccharides derivatives were separated by a reverse phase C-18 column and monitored by UV absorbance at 245 nm. The composition analysis of monosaccharides could be achieved by using a set of monosaccharide standards.

Results and conclusions: The results demonstrated that the precolumn derivation HPLC method was precise and practice for the analysis of polysaccharides. The ratios of arabinose, galacturonic acid, galactose, glucose, mannose and rhamnose in the MGHQ, MJHQ and RH were respectively 2.72: 7.65: 5.88: 206.64: 1: 5.49, 1.54: 9: 6.7: 311.43: 1: 9.21 and 2.01: 6.8: 3.31: 102.6: 1: 3.05.

Keywords: Radix Astragali, Radix Hedysari, polysaccharides, HPLC, precolumn derivation.

ISE3-P37 An integrated approach to ethnomedicinal research. A case study with an Australian aboriginal community

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Collaborations with Indigenous medicinal knowledge holders can be an invaluable tool for ethnomedicinal research, benefitting all members of the partnership. Anecdotal evidence of traditional remedies can assist scientists in targeting bioactive plants. Communities can benefit from discoveries linked to this knowledge and having this information documented as a perpetual resource for future generations.

The objectives of this project are to evaluate the bioactive potential of traditional remedies used by the Yaegl Aboriginal community in northern New South Wales, Australia, and document this valuable and dying resource. Best ethical practices underpin our integrated methodology.

Interviews with community Elders were guided by questionnaires specifically devised for this project and selected plants were tested for their antibacterial potential based on their customary use. Ongoing in-kind support is provided in the form of resource materials to the community, as well as educational activities with local (including many indigenous) high school students, providing leadership and higher education opportunities.

17 community Elders discussed the use of 56 plants, 42 with a reported medicinal use. This information has been consolidated into a database (www.biolinfo.org/cmkb) with exclusive access to the community, as well as in the form of a booklet co-authored with the Elders. Antibacterial screening of customary preparations and ethanol extracts of plants has revealed activity in six of the 19 plants tested. This integrated approach to ethnomedicinal research has proved valuable to all involved.

Keywords: Australia, Aboriginal, Indigenous, education, antibacterial, benefit sharing, Ethnomedicine, screening, documentation.

ISE3-P38 Benzophenones from the roots of the Popoluca Amerindian medicinal plant *Securidaca diversifolia* (L.) S.F. Blake

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Background: The Sierra Popoluca in southern Veracruz (Mexico) use a maceration of the root bark of *S. diversifolia* to treat feverish diseases, inclusive measles.

Objectives: Strengthening the link between biosciences and traditional knowledge through the isolation and *in vitro* testing of bioactive compounds from *S. diversifolia*.

Methods: The structures of the new compounds were established by means of 1D and 2D spectroscopic data and Q-TOF HRMS analysis. Compounds were evaluated against *Herpes simplex* virus type 1 (HSV-1) and poliovirus Sabin 1 in virus-infected confluent Hela cell monolayers.

Results and conclusions: Three new benzophenones were described. Of these, only 2,4-dihydroxy-3,3 -dimethoxy-benzophenone showed selective activity against HSV-1 with an IC₅₀ of 4 µg/mL and a protection index of 16 (with respect to toxicity towards Hela cells).

Keywords: *Securidaca diversifolia*, Polygalaceae, Benzophenones, Antiviral activity, Herpes

Acknowledgements: We are especially grateful to the Popoluca community of the Sierra Santa Marta (Veracruz, Mexico) for sharing their knowledge.



ISE3-P39 Therapeutic properties of Indigo, alkaloids derived from *Indigofera truxillensis* Kunth in classic models of inflammation

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Inflammation is an important response of the immune system against pathogens, or tissue injury. Interestingly, several of its events, such as cellular infiltration can cause tissue damage. NSAIDS cause side effects, in this context ethnopharmacological studies suggest the use of some compounds with antiinflammatory properties. In this study, Indigo alkaloids derived from *Indigofera truxillensis* Kunth was evaluated in acute and chronic models of Inflammation. For acute inflammatory tests UNIB: WH rats and UNIB: SW mice were separated, receiving Indigo doses of 1,5; 3,0 and 6,0 mg/kg, the negative control received saline (0,9%) and the positive control indomethacin (INDO- 5mg/kg). In chronic tests, Dexamethasone (DEXA - 0,5mg/kg) was used as positive control. On xylene ear model, 1 hour after receiving the drug (20µl of xylene), the mice were euthanized and an 8 mm diameter section was removed from both ears and then weighted, and the differences in weights between the right and left ear discs were recorded as the edema. Hind paw edema: groups of rats received carrageenan (0,2 mL of 500 µg/mL) on sub plantar left hind paw. The swelling was evaluated at four intervals of 1 hour after stimulus using a Plethysmometer. Granuloma cotton pellet model: rats were anaesthetized and incision made on the dorsal surface. A sterilized cotton pellet (20mg) was implanted. The drugs were administered daily (1–7 days). On the 8th day, the rats were sacrificed and pellets were dissected, weighed, dried at 70°C and the dry weights were determined and percentage of inhibition. ANOVA, followed Tukey. These results show that Indigo at three doses inhibit edema formation on both models of acute inflammation (30; 69,7 and 32% respectively), for ear edema the positive control inhibited the edema by INDO 64,6%, on hind paw edema, the alkaloids reduced swelling by (54; 64,4; 64,4 %) respectively, INDO showed 52,7% of inhibition. Indigo reduced cellular infiltration on granuloma cotton pellet model; by 54; 63,5; and 53%. DEXA reduced infiltration by 77%. The results showed that Indigo alkaloids have anti-inflammatory activity in acute and chronic models.

ISE3-P40 Animal models for cancer research in Traditional Chinese Medicine

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Background: Traditional Chinese Medicine (TCM) has been used to treat human cancer diseases for a long time due to its significant efficacy in clinic. A large number of experimental studies on anti-tumor effects of TCM have been carried out by more and more scientists and doctors recently.

Objectives: To analyze the approach of animal models for cancer research in TCM.

Methods: Using MeSH terms PubMed was searched and the related articles were reviewed.

Results and conclusions: Based on the literature in the past ten years, animal models for cancer research in TCM were mainly transplanted tumor models and induced tumor models. The diagnosis of animal models, for example, liver cancer, breast cancer, gastric cancer, prostate cancer and leukemia, was mostly using the criteria of western medicine, and lack of the syndromes of TCM. Only a few signs and symptoms of animal models were determined, such as body weight, food intake, hair, activity, and faeces. They were not evaluated as the specific mark of the therapeutic efficacy of TCM. Mostly the therapeutic efficacy was determined through the following indicators: tumor size and weight, tumor growth inhibition, inhibitory rate of metastasis, living status and survival time of the animals. Despite a large number of experimental studies on animal models of cancer in TCM has been performed, they were not so standardized or not so quantified. Therefore, in the future studies, it is very necessary to concentrate more on standardization of the animal models used in cancer research studies and standardization of quantitative diagnostic criteria is also required. The therapeutic efficacy of TCM needs to be evaluated using more accurated parameters and repeatedly confirmed using multiple methods.

Keywords: Animal model, cancer, traditional Chinese medicine (TCM)

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ISE3-P41 Thai medicinal herbs for anti-inflammatories and anticancers

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Background: Ethnobotanical information about traditionally used anti-inflammatory plants was analysed and the selected plants were investigated for their claim activities. Most of these plants were used as multi-purpose medicinal plants. It is expected that long history of their uses might offer opportunities for the discovery of novel anti-inflammatory and/or anticancer agents.

Objectives: To assess traditional Thai claims about the therapeutic potential of medicinal plants and to select plants for future phytochemical research.

Methods: Nine plant species were selected from Thai textbooks and the plant were collected from Bangkok and the north-eastern part of Thailand. The plants were investigated in vitro for their anti-inflammatory and cytotoxic activities and since redox status has been linked with both inflammation and cancer, antioxidant effects were also assessed.

Results and conclusions: There was a correlation between medicinal claims about the uses of the plants and their in vitro activities found in our experiments, particularly, *Gynura pseudochina* (L.) DC. var. *hispidula* Thv. (Asteraceae), *Oroxylum indicum* (L.) Kurz. (Bignoniaceae) and *Muehlenbeckia platyclada* F., Muell., Meisn. (Polygonaceae) were found to possess anti-inflammatory activity and could serve as leads for the development of future anti-inflammatory drugs. *Pouzolzia indica* (L.) Gaudich. (Urticaceae), which showed potent anti-leukemia activity, might yield novel natural compounds as anticancer products. The results obtained here support the uses of the plants as anti-inflammatory remedies and as anticancer agents in Thai traditional medicine.

Keywords: Anti-inflammatory, NF- κ B, pro-inflammatory cytokines, antioxidant, anticancer, Thai medicinal plants

ISE3-P42 Plants used to treat genito-urinary system disorders in a rural community in the zona da Mata of Minas Gerais, Brazil

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Background: Minas Gerais stands out as the Brazilian state with the largest losses in native vegetation, including medicinal plants. The destruction of vegetation has also brought the loss of traditional knowledge about the therapeutic properties of plants.

Objectives: Analyze the ethnopharmacological characteristics in community of Senador Firmino.

Methods: Fieldwork was conducted from October 2007 and April 2008 in the municipality of Senador Firmino in the Zona da Mata of Minas Gerais. Semi-structured interviews and participant observation were conducted with 20 informants in the rural municipality to do research on medicinal plants used in the region. The informants were identified by the method "snowball".

Results and conclusions: We recorded 130 species of plants used in traditional medicine, whose 24 species were indicated for the treatment genito-urinary disorders, belonging to 22 families. As for the biogeographical distribution of species 66.6% are native and 33.4% are exotic. The indications cited were: kidney, ovary, bladder, diuretic, diseases of sex, testicles, kidney stones, menstrual problems, postpartum, menopause, inflammation of the bladder channel and infection of female reproductive tract. The plant parts most used were the leaves, the aerial parts, the whole plant, bark and flowers, and preparation techniques most used were infusion, syrup, decoction, bath, food. The genera of native species cited were *Echinodorus*, *Schinus*, *Aristolochia*, *Jacaranda*, *Tournefortia*, *Cecropia*, *Tagetes*, *Stryphnodendron*, *Bauhinia*, *Smilax*, *Cuphea*, *Boerhavia*, *Potomorphe*, *Rubus*, *Waltheria* and *Cos-tus*. The people from community know and use the medicinal plants to treat genito-urinary diseases and most of the plants are native.

Keywords: Traditional knowledge, medicinal plants, genito-urinary system, Minas Gerais.



ISE3-P43 Proteínas do látex de *Calotropis procera* modulam a resposta inflamatória na sepse induzida por *Salmonella typhimurium* em camundongos

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Contexto: *Calotropis procera* é uma planta extensivamente utilizada na medicina popular. Diversos estudos descrevem propriedades biológicas de moléculas do látex desta planta, como atividades anti-inflamatória, cicatrizante e anti-câncer^(1,2).

Objetivos: Investigar o efeito de uma fração protéica do látex de *C. procera* (LP) no modelo de sepse induzida por *S. typhimurium* em camundongos *Swiss*.

Métodos: A taxa de sobrevivência dos animais (10/grupo) foi avaliada durante sete dias. Migração de neutrófilos (MN) e níveis de óxido nítrico (NO) foram determinados no sangue e fluido peritoneal dos animais infectados com *S. typhimurium* (10⁷ CFU/mL; i.p.), tratados ou não com **Resultados e conclusões:** A inoculação da bactéria provocou quadro séptico severo nos animais com 100% de mortalidade, falência na MN para o foco infeccioso e aumento de NO sanguíneo. LP 30 mg/Kg (dose única; i.p.) preveniu a morte de 100% dos animais ($p < 0.05$), induziu intensa MN ($p < 0.05$), diminuiu NO no sangue e aumentou no fluido peritoneal dos animais infectados ($p < 0.05$). Estes resultados sugerem que o efeito protetor de LP neste modelo de sepse parece estar relacionado à modulação da resposta inflamatória via redução na síntese de NO com restauração da MN para o local da infecção.

Palavras - chave: *Calotropis procera*, latex, proteins, nitric oxide, sepsis.

Agradecimentos: CNPq, FUNCAP, IFS.

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ISE3-P44 Fraction from *Calotropis procera* latex shows anti-inflammatory and protective effects in models of gastric ulcer and intestinal mucositis in mice.

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Background: *Calotropis procera* (CP) is a plant found in Africa, Asia and South America. constitutively produces abundant latex that is reported to possess bacteriolytic, insecticidal, analgesic, healing on dermal wounds and anti-diarrhea properties

Objectives: The study aimed to evaluate the anti-inflammatory and protective effects of a non-dialysed proteic fraction of latex from CP (LP) in models of gastric ulcer and intestinal mucositis in mice.

Methods: Swiss mice (n = 10) were used. For gastroprotective effects, animals were fasted for 16 h, treated with LP (0.005, 0.5, 50 mg/kg i.v.) or n-acetylcysteine (750 mg/kg i.p.) or saline (Sal i.v.). After 15 min, they received 0.2 mL of ethanol 98% p.o., 35 min later were sacrificed, and ulcer index were measured. For mucositis model, the animals were treated for 4 days with Sal (i.p.) or irinotecan (75 mg/Kg, i.p.). LP (5, 10, 20 mg/kg/day, i.v.) was administered for 6 days, 30 min before the irinotecan. On the 7th day, we evaluated the diarrhea, myeloperoxidase activity (in duodenum, MPO, neutrophils/mg tissue) and total leukocyte count (x10³/mL). Regarding statistics we used ANOVA/Bonferroni's test or Kruskal-Wallis/Dunn. P

Results and conclusions: LP significantly prevented gastric lesion in doses of 5 and 50 mg/kg compared to Sal. It did not change leukopenia induced by irinotecan at doses tested vs group that received only irinotecan but decreased significantly scores for diarrhea and MPO levels only at 5 mg/kg. These findings demonstrate anti-inflammatory and protective activity of LP in both models. New approaches are being undertaken to elucidate the possible mechanism of action involved

Keywords: *Calotropis procera*, gastroprotection, mucositis, irinotecan.

ISE3-P45 Estandarización de un extracto, con actividad antimalárica, de *Abuta grandifolia* (Mart.) Sandw. (Menispermaceae): Fase I

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Antecedentes: *Abuta grandifolia* es una planta utilizada por los indígenas Siona de la región amazónica colombiana, para el tratamiento de la malaria⁽¹⁾. En estudios previos se comprobó la existencia de alcaloides bisbencilisoquinolínicos con actividad antimalárica, en esta especie^(2,3).

Objetivos: Contribuir a la estandarización de un extracto de *A. grandifolia* mediante el establecimiento del órgano a ser utilizado como droga, de las mejores condiciones extractivas, de perfiles cromatográficos y de la evaluación de su actividad biológica y toxicidad.

Métodos: A partir de los tallos, hojas y raíces fueron obtenidos extractos, mediante el empleo de diferentes metodologías. Se realizaron perfiles cromatográficos (CCD y HPLC), se hizo el seguimiento de la actividad antimalárica mediante el ensayo *in vitro* de inhibición del desarrollo de *Plasmodium falciparum* cepa FCB-2 y se evaluó la toxicidad aguda (método de dosis fijas OECD).

Resultados y conclusiones: Se obtuvieron extractos acuoso, etanólicos y una fracción alcaloidal de cada uno de los órganos recolectados. La actividad antimalárica más notoria fue obtenida a partir de las fracciones alcaloidales de tallos (IC₅₀ entre 1.41 y 2.59). Ninguno de los extractos presentó toxicidad aguda significativa. Los perfiles cromatográficos mostraron entre 1 y 4 alcaloides, siendo este parámetro proporcional a la actividad antimalárica y dependiente del método de extracción.

Palabras clave: *Abuta grandifolia*, estandarización de extractos, alcaloides, actividad antimalárica.

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ISE3-P46 Skin protection and skin whitening effects of flowers of *Prunus persica* var. *davidiana*

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Background: *Prunus persica* var. *davidiana*, a wild plant distributed in East Asia, has not yet been reported for its skin protection and skin whitening effect. We are continuously searching for the bioactive extracts or compounds applicable as functional cosmetic ingredients from plants.

Objectives: The present study was carried out to investigate the skin protection and skin whitening effect of the flower extracts of the titled plant, which would contribute further development of the natural functional cosmetics.

Methods: Inhibitory activity on mushroom tyrosinase, cell viability of B16 murine melanoma, analysis of melanin content, antioxidant effects and human keratinocyte inhibitory action of the extract and fractions of the plant material were investigated.

Results and conclusions: Among the tested samples (crude extract and four fractions), hexane fraction containing an essential oil strongly inhibited the tyrosinase activity and showed the proper inhibition on melanin biosynthesis of melanoma cell without cytotoxicity. Moreover, the inhibition of melanin deposition on skin measured by inhibition of B16 murine melanoma cell growth was as strong as positive control, arbutin. Besides that, the hexane fraction and methylene chloride fraction exhibited anti-lipid peroxidation, DPPH scavenging activity and SOD activation.

As a result, the above plant may be chosen for further studies for the natural cosmetics.

Keywords: *Prunus persica* var. *davidiana*, skin protection, skin whitening, melanoma cell.

Acknowledgments: This work was financially supported by SanHak Coporation Program of SMBA in Korea.

References: 1. Kuo-Hsien et al. J. Ethnopharmacol. 2006, 106: 353.



ISE3-P47 Evaluation of the action mechanism of anxiolytic-like effect of essential oil (EO) from *Citrus aurantium* L.

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Objectives: We previously demonstrated ⁽¹⁾ that the acute treatment with EO was effective in experimental procedures against generalized anxiety disorder and obsessive compulsive disorder, in mice. In the present study we investigated the effect of EO after the blockage of gabaergic (GABA) or serotonergic (5-HT) neurotransmission systems.

Methods: Adult Swiss male mice (45 days) received vehicle (TW-Tween® 0,01% – 10mL/Kg, p.o.) or Diazepam (DZP – 1mg/Kg, i.p.) as control groups. To address a possible contribution from the GABA, mice were co-administered EO (5 mg/Kg, p.o.) or DZP 30 min before the test and with Flumazenil (FLU – 2mg/Kg, i.p.) 15 min before testing. To evaluate the interference from the 5-HT, mice received WAY100635 (WAY – 0.5 mg/Kg, i.p.) and 15 min afterwards received EO (5 mg/Kg, p.o.) or DZP (1 mg/Kg, i.p.). After their individual treatment, mice were exposed to the Light-Dark Box (LDB) paradigm for recording of classical parameters, presented as median and interquartile range and compared with Kruskal-Wallis nonparametric ANOVA and post-hoc contrast tests.

Results and conclusions: The time (s) spent in the light side of LDB, the main anxiolytic parameter, was increased by DPZ [135(108-188)] and EO [96(75-107)] when compared with TW group [49(43-60)]. Increased time due to EO treatment was not reversed by FLU [94(72-100)], but was significantly reversed by WAY [63(39-86)], denoting an involvement of serotonergic system in the anxiolytic-like effect. This effect was not accompanied by locomotor impairment.

Keywords: Anxiety, *Citrus aurantium*, GABA, serotonin, mechanism of action, mice

Acknowledgments: FAPESP (Process n° 06/07195-8)

References: 1. Pultrini et al., Life Sci 2006, 78:720-1725.

ISE3-P48 *In vitro* cytotoxic activity of two *Euphorbia* species from Spain

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Background: Several species of the genus *Euphorbia* had been traditionally used as cytotoxic agents, for the treatment of tumours, warts, and other diseases ⁽¹⁾. Cultures with rich tradition of plant-based knowledge in health care, as Chinese, Indian, South American and also Spanish folklore tradition use different *Euphorbia* extracts for various purposes ⁽²⁾. Research work evidence the fact that this genus represent a reservoir of cytotoxic agents ⁽³⁾, however, more studies are required in this respect. There are no bibliographic references about *E. matritensis* and *E. serrata* bioactivity.

Objectives: The present study evaluates the *in vitro* cytotoxic activity of cold and hot, methanolic and chloroformic extracts, of the aerial parts of *E. serrata* and *E. matritensis* over five cell lines (four tumoral and one no tumoral). A preliminary phytochemical analysis was also done.

Methods: To evaluate the cytotoxic capacity of the extracts, the MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] colorimetric assay were used. A preliminary phytochemical analysis was done in order to determine the presence of anthraquinones, terpenes, saponins (triterpenic and steroidal), tannins and flavonoids. HPTLC with appropriated mobile phases and detection reagents were developed for di and triterpenes, saponins and flavonoids.

Results and conclusions: The extracts show a moderate cytotoxic activity. Cold chloroformic extracts were the most active in both species. Differences in activity between species could be attributed to differences in terpene composition.

Keywords: *Euphorbia matritensis*, *Euphorbia serrata*, Cytotoxicity.

Acknowledgments: Univ. CEU San Pablo for financial support.

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ISE3-P49 Actividad anti-inflamatoria de fracciones químicas aisladas de extractos de *Byrsonima crassifolia* y *Vismia cayennensis*

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Antecedentes: El uso de plantas para el tratamiento de enfermedades inflamatorias es bien conocido ⁽¹⁾. *B. crassifolia* ⁽²⁾ y *V. cayennensis* ⁽³⁾ son evaluadas en nuestro laboratorio por su posible actividad anti-inflamatoria. Los macrófagos intervienen en la respuesta inflamatoria, secretando mediadores pro-inflamatorios como: óxido nítrico (NO), TNF- α e IL-6.

Objetivos: Evaluar la actividad anti-inflamatoria de fracciones aisladas de extractos de *B. crassifolia* y *V. cayennensis* *in vitro* e *in vivo*.

Métodos: Las fracciones fueron obtenidas por separación sólido-líquido con solventes de distintas polaridades. La actividad anti-inflamatoria *in vitro* fue ensayada por la inhibición de TNF- α , IL-6 y NO por Elisa y reacción de Griess respectivamente, sobre macrófagos RAW 264.7 estimulados con lipopolisacárido (LPS). Para los ensayos *in vivo*, ratones Balb/c fueron inyectados i.p. con las diferentes fracciones, después de 1 h se inocularon con LPS. Transcurrida 1 h, los animales fueron sangrados para determinar los distintos mediadores en suero.

Resultados y conclusiones: La fracción de acetato de etilo de *B. crassifolia* inhibió la producción de NO *in vitro*, la fracción metanólica de *V. cayennensis* inhibió la producción de TNF- α *in vitro* e *in vivo*. No se observó efecto sobre la producción de IL-6. Continuamos con el fraccionamiento a fin de identificar el o los compuestos responsables del efecto anti-inflamatorio observado.

Palabras clave: Inflamación, *Byrsonima crassifolia*, *Vismia cayennensis*.

Agradecimientos: Proyecto "Alma Mater" (OPSU) y Misión Ciencia, MPPCYT, Venezuela.

Referencias: 1. Calixto, J.B. et al. *Planta Med.* 2004, 70:93-103. 2. Maldini, M. et al. *J. Ethnopharmacol.* 2009, 122:430-433. 3. Nagem, T.J. et al. *Fitoterapia* 1993 64 (4):382-383.

ISE3-P50 Analgesic effect of propolis extract from Zacatecas Mexico: a semi-arid region

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So long ago propolis, a bee product, has been used by its anti-inflammatory and analgesic properties. However, due to its great variety of chemical composition, it is necessary to study the variation of pharmacological properties according to its geographic provenance¹. The objective of this work was to evaluate the analgesic activity of a Mexican native propolis and correlating this to its chemical composition. The propolis sample was collected in Zacatecas (north of Mexico), and the aqueous extract (AE) was prepared at room temperature for 48 h. In order to investigate the analgesic effect, Balb C male mice were used (20-30 g). The mice were treated with AE (1.5 to 200 mg kg⁻¹ body weight) by intraperitoneal route (i.p.) 15 min before injection i.p. of 0.6 % acetic acid saline solution. Afterwards, during 60 min the number of abdominal constrictions was cumulatively counted. AE analgesic activity was antagonised with Naloxone (0.5 to 3 mg kg⁻¹ i.p.)². The results are presented as the mean \pm S.E.M. and the difference between the experimental groups was evaluated using analysis of variance followed by a Tukey multiple comparison test. The AE inhibited acetic acid-induced abdominal contortions with an ID₅₀=66 \pm 6.7 mg kg⁻¹. The time lag was extended from 5 to 15 and 30 min corresponding to 100 and 200 mg kg⁻¹ doses and the greatest inhibition (95.8 \pm 0.63%) was observed at the dose of 200 mg kg⁻¹. Naloxone blocked the AE analgesic effect, it could mean that the endogenous opioid system is involved. The TLC qualitative analysis of EA revealed a high flavonoids and alkaloids content, and the GC-MS study indicated the presence of a morphine derivative. The Zacatecas AE propolis had analgesic activity in a chemically-induced abdominal constriction assay model. This activity could be related to the high amount of flavonoids and alkaloids founded.

Keywords: propolis, analgesic effect, aqueous extract.

Acknowledgments: This study was supported by a grant from PIFI 2008-2009 del PRODES de Ciencias de la Salud de la Universidad Autónoma de Zacatecas, México

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ISE3-P51 Plantas usadas na Etnoveterinária para o tratamento de doenças parasitárias no município de Pocinhos, Paraíba, Brasil.

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Enquadramento: A utilização da biodiversidade pelo homem se confunde com sua própria existência. Associado a domesticação de animais, foram desenvolvidas práticas para tratar doenças que acometiam os mesmos. O conhecimento tradicional, as habilidades, os métodos e as práticas de tratamento das doenças de animais constituem o campo de estudo da Etnoveterinária.

Objectivos: O presente estudo objetivou analisar o uso da flora para tratamento de doenças parasitárias em animais de áreas rurais do Município de Pocinhos, Paraíba, Brasil.

Métodos: As informações foram obtidas entre os meses de agosto de 2007 e julho de 2008 através de formulários semi-estruturados complementados por entrevistas livres e conversas informais. Foram entrevistados 47 especialistas locais.

Resultados e conclusões: Treze plantas são usadas no tratamento das parasitoses, dentre as quais: verminose, sarna, bicheira, bicheira no olho, ameba, piolho, pragas, carrapato. Estas acometem os animais de criação em geral. As plantas medicinais com maior valor de uso são a erva babosa, *Aloe vera* L. (VU=0,94) e o alho, *Allium sativum* L. (VU=0,83). Considerando que produtos oriundos de plantas e animais constituem a base do arsenal terapêutico utilizado em práticas etnoveterinárias, evidencia-se a íntima relação existente entre medicina Etnoveterinária e conservação da biodiversidade, sendo, portanto, imperativo a inclusão de estudos sobre o tema relacionados à conservação.

Palavras-chave: Plantas medicinais, Brasil, Veterinária Tradicional.

Agradecimentos: Ao PIBIC/UEPB/CNPq e João Evangelista (Zominho)

Referências: 1. Confessor, M.V.A, et al. Journal of Ethnobiology and Ethnomedicine 2009. Animals to heal animals: Ethnoveterinary practices in semi-arid region, Northeastern Brazil. 5: 37.

ISE3-P52 The protective effects of propolis ethanol extract on aspirin-induced hepatic inflammation and necrosis in rat

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Background: The incidence of serious hepatic side effects as a consequence of aspirin use (or abuse) is increasing due to the growing number of patients taking it. Aspirin-hepatic injury is quite variable, ranging from mild cholestasis to severe hepatocellular injury that involve metabolic inhibition, oxygen radical toxicity, immunologically mediated damage, or some other mechanism results in predominant aminotransferase elevation¹.

Objectives: The present study was made to validate the hepato-protective activity of ethanol extract of propolis (PE) against aspirin-induced acute hepatotoxicity.

Methods: The propolis was collected from bee-hives located in Zacatecas, México and a PE was obtained. Male Wistar rats (150-200g) were divided in-groups of five and PE at doses of 20 mg kg⁻¹ p.o. was administrated for some of them during 4 weeks, then, acute hepatotoxicity was induced by a high oral dose (170 mg/kg) of aspirin. Eighteen hours after aspirin administration, blood was obtained from all animals for determination of glucose, cholesterol, ALT and AST levels in serum, the animals were killed by decapitation and the livers were immediately removed for the determination of GSH concentration and to study the histopathological changes.

Results and conclusions: Aspirin increased ALT, AST, glucose and cholesterol levels (pa significant protection against aspirin-induced alterations (pation revealed hepatic inflammation, necrosis, degeneration and depletion of hepatic glycogen in aspirin treated rats and confirm the hepato-protection of PE. Our results provide evidence that propolis inhibits significantly acute liver toxicity induced by a high dose of aspirin in rat.

Keywords: propolis, hepatoprotective activity, aspirin.

ISE3-P53 Effect of *Cydonia oblonga* on experimental thrombosis in rats

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Background: The decoction of *Cydonia oblonga* Mill. leaves is used in traditional Uyghur medicine for heart disorders and also for its antidiarrheic, antitussive and sedative properties. Quince leave decoction is also found in Portuguese and Turkish folk medicine (1, 2).

Objectives: To investigate the effects of *C. oblonga* leave extracts as an antithrombotic agent.

Methods: Two models of experimental thrombosis: common carotid artery thrombosis (FeCl₃-induced injury of the carotid artery), and inferior vena cava thrombosis, were used to evaluate the arterial and venous effects of *C. oblonga* leave extracts (CO) in rats. Different doses (80, 40, 20 mg/kg) of CO water and ethanol extract were compared to aspirin (5 mg/kg). The plasmatic levels of thromboxane B₂ (TXB₂) and 6-keto-prostaglandine F₁ alpha (6-keto-PGF₁α) were measured.

Results and conclusions: The occlusion times (OT) were prolonged and the thrombus formation times were reduced in all CO-treated groups ($p < 0.01$). The OT was increased and the thrombus formation reduced in high-dose CO-treated group compared with the aspirin-treated group ($p < 0.05$). The TXB₂ levels were decreased in all CO-treated groups and aspirin-treated group, and the levels of 6-keto-PGF₁α were increased compared with the model group ($p < 0.05$). The anti-thrombotic effects observed, added to the protection against oxidative damage described *in vitro* by Costa, warrant further exploration of the cardiovascular effect of quince extracts.

Keywords: *Cydonia oblonga* Miller, Rosaceae, quince leaves, thrombosis, 6-keto-PGF₁α, TXB₂.

References: 1. Oliveira, A.P. et al. J. Agric. Food Chem. 2007, 55:7926. 2. Alsan, M. et al. J. Ethnopharmacol. 2010, 128:384. 3. Costa, R.M. et al. Food Chem. Tox. 2009, 47: 860.

ISE3-P54 Antidiabetic activity from the infusions of the leaves of *Hintonia latiflora*

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Background: Our research group has previously demonstrated that the organic extract of the leaves of *Hintonia latiflora* (Rubiaceae) exhibited antidiabetic activity⁽¹⁾, being a suitable substitute for the use of the stem bark, which in turn would promote the conservation of this important medicinal plant.

Objectives: Considering that infusions are highly valued in folk medicine, this work was undertaken in order to establish the antidiabetic potential of an aqueous extract of the leaves of *H. latiflora*.

Methods: The antidiabetic potential of the leaf aqueous extract (100, 300 and 500 mg/kg) was evaluated in acute (hypoglycemic effect), sucrose and glucose oral tolerance tests (OSTT and OGTT respectively; antihyperglycemic effect) using normoglycemic and diabetic (NAD 50 mg/kg, i.p.; streptozocin 100 mg/kg, i.p.) male ICR mice (20-25 g)⁽¹⁾.

The acute toxicity of the aqueous extract from the leaves of *H. latiflora* were determined using the Lorke method in male ICR mice (20-25 g)⁽²⁾.

Results and conclusions: The aqueous leaves extract of *H. latiflora* demonstrates a significant hypoglycemic effect in diabetic mice (-37.94 ± 7.79; percent of blood glucose variation). The postprandial peak is inhibited in both OSTT (23.83 ± 4.41 v 48.83 ± 5.82 control percent of blood glucose variation) and OGTT (19.07 ± 7.32 v 50.93 ± 2.26 control percent of blood glucose variation; $p < 0.05$ significantly different ANOVA followed by Dunnet's *t* test in all the cases).

The acute toxicity indicates that the aqueous leaves extract is less toxic than the organic leaves extract (LD₅₀ = > 5000 mg/kg vs 1668 mg/kg).

Keywords: *Hintonia latiflora*, antidiabetic activity

Acknowledgments: DGAPA-UNAM (IN218110-3), Posgrado de Ciencias Biológicas, UNAM.

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ISE3-P55 Antimicrobial activity and Chemical composition of the essential oil of *Hofmeisteria schaffneri*

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Background: *H. schaffneri* (Asteraceae), a Mexican medicinal plant, is used for a variety purposes, including skin infections.

Objectives: This work was undertaken to establish the antimicrobial potential of *H. schaffneri*.

Methods: The essential oils of *H. schaffneri* harvested at six different seasons during a year were prepared by standard procedures and analyzed by GC. The *in vitro* antibacterial activity of the preparations against Gram+ and Gram- bacteria was evaluated by determining MIC using the broth dilution method in 96 microplate wells.

Results and conclusions: Forty four compounds representing ~90 % of the total constituents were identified. A series of thymol analogs were the major components of the oils. The infusion and oils were very active against Gram+ bacteria with an MIC value for the infusion of 64 µg/mL against *S. aureus*, while the oils exhibited MIC values in the range of 48 to 768 µg/mL. (Batches III and VI, with an MIC= 96 and 48 µg/mL, respectively were the most actives. The composition and antimicrobial activity of the oils changed slightly over the year. The results of the present investigation provide an *in vitro* scientific support for the use of the plant against skin infections in Mexican folk medicine.

Keywords: *Hofmeisteria schaffneri*; essential oil; antimicrobial activity; GC-FID; GC-MS.

Acknowledgments: DGAPA UNAM (IN218110) and CONACyT (99395)

References: 1. Pérez-Vásquez A. et al. Phytochemistry 2009, 69: 1339-1347.

ISE3-P56 Evaluation of the anti-inflammatory activity of *Sambucus nigra* extract on TNBS-induced colitis model

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The inflammatory bowel diseases (IBD) are chronic gastrointestinal disorders that comprise two major conditions: Crohn's disease (CD) and ulcerative colitis (UC). Although the pathogenesis of IBD remains unclear, a intestinal hyper-permeability seems to play a critical role in the etiology of the inflammation, by recruiting cells of the immune system. In this context phenolic compounds such as the anthocyanidins are pharmacologically important because of their antioxidant and anti-inflammatory properties. So, we evaluate the effects of *Sambucus nigra* extract over the production of anti-inflammatory interleukin 10 (IL-10) on the colon of rats submitted to the inflammation model of trinitrobenzenesulphonic acid induced colitis. Male unib:WH rats (200-250 g) were separated into four groups (n=8) according the model of acute TNBS- induce colitis (gastroenterology, 96: 795, 1989), with the follow experimental groups: Saline, TNBS and *S. nigra* (5 and 10 mg.Kg⁻¹). 24h after TNBS induction, the rats were sacrificed and the biochemical parameters (IL-10) were evaluated according R&D systems interleukin kit. The results were expressed as mean ± standard error (pg/mL) and submitted to analyses of one-way variance (ANOVA) and a posteriori Dunnett's test with significance level of p<0,05. The production of IL-10 seems to be depleted on the TNBS group when compared with the Salina group (288,1± 31,8 vs. 492,4± 54,6). The 5mg.Kg⁻¹ dose avoids the depletion of the citokin (466,7± 19,9), such as the 10 mg.Kg⁻¹ dose (404,5± 40,5). The results indicate that phenolic compounds of *S. nigra* participate in the modulation of IL-10, providing protection to de colon mucosal against pro-inflammatory agents.

Key words: Inflammatory bowel diseases, TNBS-induced colitis, *Sambucus nigra* and IL-10.

ISE3-P57 Traditional Cree medicines modulate steatosis and antioxidant activity, but not insulin sensitivity in fat-laden H4IIE liver cells

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Background: The Canadian Institute of Health Research Team in Aboriginal Antidiabetic Medicines is evaluating the potential of traditional Cree medicinal plants to develop culturally acceptable strategies to reduce the burden of type 2 diabetes (T2D). Non-alcoholic fatty liver can cause or exacerbate insulin resistance. Reducing fat accumulation in the liver and preventing rises in oxidative stress and insulin resistance can improve T2D and alleviate some complications.

Objectives: Eight antidiabetic plants used by the Cree are evaluated for their efficacy to reduce fat deposition, restore insulin sensitivity, and enhance antioxidant activity in fat-laden liver cells.

Methods: Normal and fatty H4IIE hepatocytes were incubated with maximal nontoxic concentrations of plant crude ethanol extracts for 16 hours. Intracellular triglyceride levels were assessed using AdipoRed. Generation of reactive oxygen species (ROS) was determined with dichlorofluorescein diacetate. Stimulation of the insulin pathway was determined by measuring Akt phosphorylation using an ELISA kit. Appropriate positive and negative controls were also tested.

Results and conclusions: More than 60% of tested extracts significantly reduced intracellular triglyceride deposition compared to nontreated cells. Most (87%) prevented an increase in ROS production in fat-laden cells. However, no effect on Akt phosphorylation was observed. Our model suggests that Cree herbal medicines may be effective in reducing the oxidative stress associated with diabetic steatosis without having an effect on insulin sensitivity.

Keywords: Type 2 diabetes, Canadian Aboriginals, Steatosis, Insulin resistance, Antioxidants.

ISE3-P58 *In vitro* biological activities of plant extracts from several genera used in Puerto Rico as adjuvants for diabetes

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Background: According to the US Center for Disease Control and prevention in 2005, Hispanic adults had diabetes prevalence rates 1.7 times that of non-Hispanic whites. Among Hispanics, Puerto Ricans (12.6%) are the population, with the highest prevalence of diabetes.

Objectives: The current study was designed to identify the medicinal plants used in Puerto Rico as adjuvants for diabetes, and to investigate their safety and *in vitro* biological activities associated with diabetic complications.

Methods: An ethnopharmacological survey covering municipalities in the southeast region of Puerto Rico was conducted. Aqueous decoctions and methanolic extracts of medicinal plants reported during the interviews were evaluated using *in vitro* models such as inhibition of aldose reductase (IAR), free radical scavenging capacity (ABTS+ and HO-) and HepG2 cells viability. Total phenolic content (TPC) of the extracts was determined according to Folin-Ciocalteu.

Results and conclusions: *Tapeinochilus anassae* and *Costus speciosus* (known as insulina by the surveyed population), *Tradescantia spathacea* (sanguinaria) and *Syzygium jambos* (pomarrosa del río) methanolic extracts showed higher activities and TPC than aqueous decoctions. Overall, *S. jambos* and *T. anassae* methanolic extracts showed important biological activities and TPC: IAR (IC₅₀ = 2.44 ± 0.83 and 47.6 ± 10.93 µg/mL), ABTS+ (IC₅₀ = 4.14 ± 0.01 and 17.40 ± 0.01 µg/mL), HO- (IC₅₀ = 58.88 ± 0.26 and 45.71 ± 2.06 µg/mL) and TPC (24.05 and 16.13 mg Q/mg extract), respectively. HepG2 cells exposed to aqueous and methanolic extracts showed no viability decrease at 250 µg/mL after 24h. The *in vitro* bioassays panel tested for diabetes allowed screening of (medicinal) plants used as diabetes adjuvants as radical scavengers and AR inhibitors.

Keywords: diabetes adjuvants, traditional medicine in Puerto Rico, ethnopharmacological survey, herbal medicine, *Tapeinochilus anassae*, *Syzygium jambos*, *Costus speciosus*, *Tradescantia spathacea*.



ISE3-P59 Antihyperglycemic activity of *Allium elburzense* Wendelbo bulbs on normal and streptozotocin-induced diabetic rats

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Background: Diabetes mellitus is the commonest endocrine disorder that expected to affect more than 285 million people worldwide in 2010. There are a lot researches have been focused to find new medication to control of diabetes. *Allium elburzense* Wendelbo is an endemic plant to Elburz mountain area, northern Iran. It is commonly used as an antidiabetic, antirheumatic, aphrodisiac, antidiuretic, and anthelmintic in Iranian Traditional Medicine. In this study we aimed to evaluate anti-hyperglycemic activity of *Allium elburzense* Wendelbo bulbs on normal and streptozotocin-induced diabetic rats.

Methods: We evaluated effects of acute (1, 2, 3, 4, 8 h) and sub acute (11 days) oral and intraperitoneal administration of hydroalcoholic extract and Saponin Rich Fraction (SRF) of *Allium elburzense* bulbs in different doses on blood glucose levels of normal and streptozotocin (STZ)-induced diabetic rats. The effects were compared with those of glibenclamide.

Results and conclusions: Sub-acute treatment of hydroalcoholic extract for 11 days reduced blood glucose level significantly in diabetic rats ($P < 0.001$ & 0.05 in different doses), while saponin rich fraction was effective only in ip mode ($P < 0.001$). The maximal anti-diabetic effect was obtained with the dose of 600 mg/kg for hydroalcoholic extract ($p < 0.001$). Acute administration could not reduce blood glucose in the diabetic rats.

It could be concluded that hydroalcoholic extract of *Allium elburzense* exhibited a significant antihyperglycemic activity. These results provide a rationale for the use of *A. elburzensis* to prevent and treat diabetes mellitus considering its being endemic to Iran, and locating of country in high diabetes prevalence zone.

ISE3-P60 Resin of Pinaceae: natural synthon pharmacological action on the central nervous system

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Oleoresin Pinaceae species is considered since ancient times as a disinfectant substance. In Latin America, indigenous peoples, in the antiseptic used in trepanning of skulls and caesarean section. The oleoresin of two species of Cuban pines: *Pinus caribaea* var. *caribaea* and *Pinus tropicalis* Morelet, coming from the area of Viñales in the province of Pinar del Río, distilled by hydrothermal, surrenders rosin and turpentine oil. The rosin obtained made up of resin acids, series abietane-pimarane, is characterized by means of the spectroscopic methods of FT-IR, RMN ⁻¹H and RMN-¹³C and they constitute an excellent substrate for potential modifications like the obtaining of salts. Salt derivatives are obtained from pure resin acids by the exchange of hydrogenate-carbonates, under conditions equimolar. The salt of sodium of the resin acids is used in different experimental biomodels to determine its effect on the Central Nervous System. The results suggest activity like depressive agents and/or sedative for the treatment of illnesses with excessive activation of the system glutamatergic and for the treatment of illnesses with activation of the catecholamine and indolamine system. They can also be used in a structural quality with precursors" of similar bioisosterics with specific action therapeutic of the neuroprotective and neurogenerate type in the treatment of pathologies ischemic for permanent occlusion of carotids.

Keywords: Rosin, central nervous system, pharmacological action.

Acknowledgments: We thank the Center Investigación colaboración and Drug Development, Ciudad de La Habana, Cuba.

ISE3-P61 Ethnobotany and phytochemistry in a national park of Cuba

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Viñales National Park is one of the most important parks in Cuba for its high endemism of the flora, contains 83 endemic species, which are credited with medicinal properties. The ethnobotanical study was carried out with knowledge of the residents of the communities, El Moncada, Ancon (Valle), Republica de Chile and Los Acuáticos, through a participatory survey, based on a methodology designed to guide forest species of medicinal plants. The phytochemical study was carried out in the ether extracts, ethanol and aqueous from the foliage, at room temperature for 48 h. Using the methodology developed by Nogueira and Spengler. The results showed the loss of traditional knowledge and ethnomedicinal relationship with the communities studied, except Los Acuáticos. It was identified 72 tree species used for medicinal purposes, belonging to 45 botanical families, and the most representative: Rubiaceae, Meliaceae and Boraginaceae, which are collected by the member of the community. The secondary metabolites evaluation of eight species was made. The results showed that there is a relationship between specific metabolites and published for these species in the tropics. We present new data to knowledge to the endemic species. The results suggest the need to establish conservation plans for these species.

Keyword: Ethnobotany, phytochemistry, National Park of Viñales.

ISE3-P62 Control of tropical diseases transmitted by mollusks from cuban pinaceae resins

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Cuban pinaceae resins have been used since ancient times as disinfecting agents. Consider these knowledge and scientific methods of analysis for the control of tropical diseases is important for the cuban pharmacology. Schistosomiasis, tropical disease transmitted by molluscs, ranks second in parasitic diseases after malaria. In Cuba there is a risk of contracting the disease, because in our fauna are species that can act as intermediate hosts of trematode that causes the disease. The objective was to evaluate the rosin powder on larvae of *Biomphalaria havanensis* for vector control spread of schistosomiasis, according to the methodology developed by the World Health Organization and described by Mott for the assessment of plants with molluskicidal action.

The results showed molluscicide action of rosin on *Biomphalaria havanensis* larvae, lethal dose (LD₅₀ and LD₉₀) are 44, 33 mg/L and 141, 76 mg/L, respectively. The corresponding regression equation was: $Y = -0,41 + 1,08 \ln X$ with a correlation coefficient $R = 0,99$ and standard error 0,13. Doses reveal the effectiveness of the components present in the rosin, results comparable to other publications of extracts from plant species.

Keywords: rosin, lethal dose, *Biomphalaria havanensis*.



ISE3-P63 Assessment of ghee mixture and *Prosopis farcta* powder efficacy in dermal wound healing process

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The study of pharmacological effect of pharmaceutical plants and natural components in laboratorial animals is the most important part of ethnopharmacological studies around the world. Ethnopharmacology is a kind of science that studies local tribal pharmacology. Specific therapeutic characteristics of each pharmaceutical plant which are practical in conventional and common medicine, are tested and their results are evaluated. Hence, the fruit of *Prosopis farcta* selected in order to evaluate pharmacological effects (healing skin wounds). Because of conventioned use of *Prosopis farcta* as a therapeutic drug in skin wounds and according to the point that the therapeutic effects of this plant are not investigated in pharmacological studies, this study has been conducted to make pharmacological evidence for the aforementioned effects.

9 heads of male rats (with Sprague strain) were selected and 8 circular holes with the diameter of 4mm were made at two sides of vertical column. Rats were classified randomly into three groups of control, care for ghee and care for pomade. The ghee group and the pomade group were treated with ghee and pomade respectively, twice a day and control one was treated with normal saline until the wounds were closed. Wounds were clinically and microscopically investigated right after punching was done on certain days (namely, day 2, 4, 8, 10, 15).

According to statistical inspection, microscopic results indicated that the holes treated with ghee and pomade, had faster process of healing in comparison with control group, moreover, microscopic studies indicated a significant increase in epithelium thickness, angiogenesis, the percentage of inflammatory cells and the percentage of fibroblastic proliferation in samples of pomade group in comparison with ghee group and ghee group in comparison with control group. It is plausible the positive effect of ghee and/or pomade effect on wound repair can be associated with their component. Ghee contains vitamin A and unsaturated fatty acids. According to recent studies, it has been proven that vitamin A and also unsaturated fatty acids intensify the process of recovery. Due to the fact that *Prosopis farcta* is full of phelavnoides, tannins, polyphenoles, and alkaloids which cause anti inflammatory, anti bacteria and anti oxidant in this plant, it seems that above mentioned plant has a positive effect on wound repair. In spite of this, in order to assess the precise mechanisms and more appropriate usage of this plant in pharmacology, isolation and purification of components of this plant and assessment of the practical dose for wound repair is needed.

Key words: ghee, *Prosopis farcta*, skin wound healing, rat.

ISE3-P64 Immune regulation effects of Abnormal Savda Munziq granules on mice

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Background: Abnormal Savda Munziq (ASMq), a traditional Uighur medicine, which is commonly used for the treatment and prevention of cancer, has been shown to have immunomodulatory effects on stressed mice.

Objectives: To investigate the effects of ASMq granules on cyclophosphamide- induced suppression of the immune system of mice (nonspecific immunity, humoral immunity, cell immunity function).

Methods: Mice were randomly divided into 6 groups (n=14): Group 1 was served as normal control, administered with normal saline. Mice in groups 2-6 were given four times of intraperitoneal injection of cyclophosphamide (75mg/kg, o.d) at 3rd, 5th, 7th and 9th day of the study, to obtain immune suppression. Group 2 was served as negative control, administered with normal saline. Group 3 was served as positive control, administered with Liu-wei-di-huang pills (one kind of Chinese medicine) at 28.8g/kg body weight. Groups 4, 5 and 6 were served as ASMq high-dose, ASMq medium-dose and ASMq low-dose group, administered with ASMq at 8, 4 and 2g/kg body weight, respectively. All the groups were orally administered for 14 days, once a day. Mice were sacrificed at 14th day and the mononuclear phagocyte englobement function, quantity of T-cell subpopulation in peripheral blood, Natural Killer (NK) cyto-activity, interleukin-1 and interleukin-2 activities, TNF- α activity, serum hemolysin and delayed allergy are studied.

Results and conclusions: The mononuclear phagocyte englobement function, quantity of T-cell subpopulation in peripheral blood, serum hemolysin, delayed allergy, and the IgM and IgG values are remarkably increased ($p < 0.05$). The ASMq medium-dose and high-dose groups do increase the NK cytoactivity and TNF- α activity ($p < 0.05$). There is a tendency to increase the activities of IL-1 in ASMq low-dose group and of IL-2 in ASMq medium-dose group ($p < 0.05$). Abnormal Savda Munziq granules improve the immunological function.

Keywords: Abnormal Savda Munziq, herbal formulation, cyclophosphamide- induced immune suppression, immune function.

Acknowledgments: This study was supported by Program for New Century Excellent Talents in University of China (NCET) and Science and Technology Department of Xinjiang, China (No. 200733146-4).

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ISE3-P65 Quality control of *Verbascum thapsus* L. product in the market

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Background: *Verbascum thapsus* L. is included in the list of special registration of medicinal plants preparations (Ministerial Decree, 03/10/1973). This plant is little known in health food stores, in most cases its name is known but ignored its properties. The drug is the flower, so it is difficult to harvest and produce frequent adulteration by foreign parties.

Objectives: 1. Obtaining of the diagnostic characters macromorphological, micromorphological of the drugs. 2. Application of the diagnostic characters to quality control of drugs preparations.

Methods: 1. Morphological and histological study of the drug of the plant collected and herbarium sheets. 2. Application of the diagnostic characters to quality control of commercial products samples (10 samples).

Results and conclusions: Diagnostic characters of the drug (flower and stamen). Morphologically, the flower is characterized by the yellow petals that are fused at the base, 12-35 mm in diameter and 5 stamens with downy filaments and soldered to the corolla. Anatomically, the petals and the stamens are mainly characterized by the presence of dendritic, uniseriate and glandular trichomes, scarce. Identification Analysis of commercial samples We found a high frequency of adulteration in marketed products by other organisms and other parts of the same plant principally by leaves (50-100% weight of the sample). And some have a clear deterioration. Only one sample has 3% of *Verbascum thapsus* flowers.

ISE3-P66 Essential oils of *Salvia blancoana* ssp. *mariolensis* and *S. microphylla*: two taxa from the north of Alicante (Spain) used in traditional herbal liquors

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Background: The Mediterranean and Irano-Turanic region has ca. 40 species of the genus *Salvia*⁽¹⁾. In the Valencian Community we found 15 wild and cultivated taxa, 10 of which have a recognised popular use. Traditionally, *Salvia* species are famous in folk medicine for their sedative, carminative, hypotensive, emmenagogue and antiseptic properties, being popularly used in the treatment of respiratory ailments, dysentery and as antidote for snake bites. They are also appreciated in cultural uses such as a component of vegetal carpets in religious traditions.

Objective: Determination of the composition of the essential oil of two of the most popular sages used in the north of Alicante province: *Salvia blancoana* ssp. *mariolensis* and *Salvia microphylla*, included in common hydroalcoholic macerations called "Salveta" and "Herbero". Special attention is given to the presence of thujones that could be responsible of toxicity of herbal liquors.

Methods: Air-dried plant material was hydrodistilled and analysis of both oils were carried out by GC-FID and GC-MS using fused silica capillary columns of different stationary phases.

Results and conclusions: Main constituents in both taxa were 1,8-cineole, camphor, β -pinene and camphene, which are also the major components previously described in the oils from *S. officinalis* and *S. lavandulifolia*. In contrast, *a*- and *b*-thujone, present in *S. officinalis*, have not been detected in *S. blancoana* ssp. *mariolensis* and *S. microphylla*. These results suggest the security of these less studied taxa, especially the former for its endemism.

Keywords: *Salvia blancoana* ssp. *mariolensis*, *Salvia microphylla*, essential oil, Valencian Community.

Acknowledgments: This work was supported by a grant from the Institut d'Estudis Catalans, Spain.

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ISE3-P67 Epicatechin stimulates gastric mucus production and protects the stomach against ethanol and indomethacin.

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Background: Epicatechin (EC) is an antioxidant substance present in many medicinal plant species used in the treatment of gastrointestinal disorders.

Objective: to investigate EC capacity in preventing gastric ulcers caused by absolute ethanol and indometacin and evaluated the main protective factors stimulated by EC.

Methods: Gastric ulcer was induced by administration of absolute ethanol or indomethacin (100 mg/kg) (p.o.) 1h after the treatments administration (p.o): vehicle, carbenoxolone (100 mg/kg) or EC in doses of 25, 50 and 75 mg/kg. Ulcer area was measured and microscopic analyses (score) were made after ulcer induction. Glutation levels and gastric mucus were quantified by ELISA.

Results and conclusions: All doses of epicatechin protected the stomach against ethanol, presenting significantly lower macroscopic area and microscopic score comparing to control. E25 and E50 presented gastroprotect effect against indomethacin, also presenting significantly lower macroscopic ulcer area and microscopic score comparing to control. Epicatechin also stimulates significantly gastric mucus production and partially maintain glutation levels comparing to control.

Keywords: epicatechin, gastric ulcer, mucus, ethanol, indometacin.

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ISE3-P68 The biologically active substances of *Barbarea vulgaris* R. Br.

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Background: The search of new source of biologically active substances (BAS) in order to create highly-effective medicine is an actual problem now.

Objectives: An object of analysis are leaves, flowers and stems of *Barbarea vulgaris* R. Br., genus *Barbarea*, family of Brassicaceae by Akmola region of Kazakhstan Republik.

Methods: By qualitative analysis on basis of specific reactions of BAS was determined that all parts of the plant contain organic acids, carbohydrates, tannin; leaves and flowers contain flavonoids ⁽¹⁾. The quantitative content of flavonoids ⁽²⁾, tanning agent ⁽³⁾, and carbohydrates ⁽⁴⁾ was determined by spectrophotometric method. Determination of content of free organic acids to conducted by method of titrimetry in recalculation to apple's acid ⁽⁵⁾.

Results: In all parts of the plant there were identified leucine, proline, methionine and aspartic acid by the method of thinlayer chromatography. In flowers there were identified rutinum and quercetin.

Conclusion: In result of analysis was determined qualitative and quantitative composition BAS of *Barbarea vulgaris* R. Br. In the plant there were identified aminoacids, in flowers were found rutinum and quercetin.

Keywords: BAS, organic acids, carbohydrates, tannin, flavonoids, rutinum, quercetin.

Acknowledgements: Eurasian National University named L.N. Gumilev, doctor of chem., professor S.B.Rakhmadieva.

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BAS	Total (%)		
	Leafs	Flowers	Stems
Flavonoids	0,70	2,25	-
Tannin agents	2,03	2,06	0,08
Organic acids	2,59	3,16	0,58
Carbohydrates	3,60	1,01	0,36

ISE3-P69 Ethnopharmacology of ethnic Kichwa and Shuar in the Ecuadorian Amazon

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The Ecuadorian Amazon extends over some 116 000 km². Eight indigenous peoples make up the ethno-cultural diversity of the East. Among the Achuar, Cofan, Huaorani, Quichua, Shiwiar, Shuar, Siona and Zapara, the current indigenous population is around 100 000 inhabitants. Now recognized the importance of traditional medicine and the need to integrate systems to health officials, and recommends the systematic training of human resources in traditional medicine (healers, midwives, shamans, and others), called by the WHO - traditional practitioners to develop with them ways of integration. Medicinal plants rank first in the knowledge of the various ethnic groups in the Ecuadorian Amazon. From ancestral knowledge and dialogue with the Quichua and Shuar communities was possible to develop a community project to train community members in obtaining natural products for medicinal use from a system of Good Product Development Practices Herbalists, allowing a higher added value to plant genetic resources in the region. We obtained eleven new natural products for medicinal use, contributing to the development of an environmental culture aimed at the conservation and cultivation of medicinal plants to avoid the consumption of natural remedies handmade, without the required quality, which is counter to human health and the environment.

Keywords: Medicinal plants, Amazon, Natural Products.

Acknowledgements: Amazon State University, for providing the link with the communities in the Ecuadorian Amazon region.

ISE5-001 German Renaissance herbals from a pharmacological perspective

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Background: In Renaissance Europe in the 16th and 17th centuries medical and botanical knowledge was collected in marvelously illustrated books called herbals (German: Kräuterbücher). For the most part these books have been neglected by modern science as a source of inspiration for drug discovery.

Objectives: To search Renaissance herbals for remedies used for specific diseases and discuss their use from a pharmacological viewpoint.

Methods: We searched eight original herbals in German including Bock (1577), Matthiolus (1590), Lonicerus (1560), Brunfels (1532), Zwinger (1696), Tabernaemontanus (1591 & 1678), and Fuchs (1543) for remedies used specifically to treat rheumatism, malaria and epilepsy, then we did a systematic search of modern phytochemical and pharmacological data relevant to their historic uses.

Results and conclusions: We found 63, 267 and 220 plants, respectively, for the above indications. In the case of rheumatism more than half (63) the plants have shown activity in some test system relevant to the historic use. For epilepsy we found studies on 30 plants and for malaria only 19 plants. Results of a recent screen of Renaissance malaria remedies for antiplasmodial activity and the isolation of active principles by HPLC based activity profiling will be shown. European herbals may be a valuable source for the selection of plants for focussed screening programmes. Information contained in these herbals should be explored in a systematic manner.

Keywords: Renaissance herbals, rheumatism, malaria, epilepsy.



ISE5-002 Prevalence of *Materia Medica* in European medicine along the last third of nineteenth century: the French case

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Background: During the second half of nineteenth century, pharmacotherapy underwent major changes with the development of experimental pharmacology under Claude Bernard's influence, especially in the French world. Until now, research has emphasized just this last one, and payed not much attention to traditional medical remedies which continued in use, either empirically or rationally, as if they had suddenly disappeared of Therapeutics horizon. Only a few and isolated researches point to the prevalence of *Materia medica* during this interesting period of European medicine.

Objectives: We present the analysis of two French journals crucial at that time: *Bulletin Général de Thérapeutique Médicale, Chirurgicale et Obstétricale* (1831-1896) -first edited by Marcel Marie Miquel (1803-1848), continued by Henri-Ferdinand Dolbeau, Apollinaire Bouchadart and Louis Felix J. Behier since 1874, and directed from 1893 onwards by George Dujardin Beaumetz– and Adolphe Gubler's *Journal de Thérapeutique* (1874-1883).

A systematic indexation of both journals yields a total of 2381 original papers (2310 out of the first journal and 271 out of the second one). Their analysis provides an overview of both the convulsions shaking drug therapy and disputes arising at the time. But also, and moreover, can provide an accurate knowledge of the survival and validity of *Materia Medica* at this point of the development of modern pharmacology, concerning especially herbal remedies. This last aspect focuses the objectives of our present research.

Methods: Historical method, including quantitative and qualitative social analysis as well as comparative textual analysis.

Results and conclusions: Results confirm the full validity of *Materia medica* in clinical practice, but also of research on *Materia medica* itself, its uses, effects and therapeutic indications, co-existing with the emerging experimental pharmacology in a sometimes controversial, but in any case natural way, at both clinical practice and laboratory research.

Keywords: *Materia medica*, Therapeutics, European medicine, 19th century, France.

ISE5-003 Western herbal practice in Australia and the US: medicinal plants, colonisation and the transfer of knowledge

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Background: Very few medicinal plants indigenous to Australia are found in the dispensaries of Australian practitioners of Western herbal medicine. In contrast, medicinal plants native to North America are not only widely used by herbalists in the US and Canada, but they have been imported for use by herbalists in Australia over many years.

Objective: To investigate the factors which may have facilitated the transfer of knowledge about medicinal plants between Indigenous and non-Indigenous peoples in Australia and the US.

Methods: Document analysis, archival research.

Results and conclusions: Factors include the nature of the relationship between indigenous and non-indigenous groups at the time of settlement, the timing and nature of the respective colonial settlements, the pattern of settlement and the profile of the settlers. Additional factors include the adaption of previous (European) medicinal plant knowledge and the utilisation of medicinal plant information from earlier botanical explorers. Lastly the development of commercial applications of indigenous plants is suggested as a contributing factor with regard to the transfer of knowledge.

Keywords: history herbal medicine; transfer of knowledge, colonisation.

ISE5-004 *Cannabis* spp. and Ethnopharmacology: historical and anthropological perspectives on plants, consciousness and healing

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Background: Although there is a growing body of research on *Cannabis* spp. and its bioactive constituents in Ethnopharmacology, most of this work involves minimal insight from historical and ethnographic documents regarding the therapeutic use of this plant.

Objectives: To discuss the potential contributions that the historical and anthropological study of cannabis, as a medicinal plant, can make to Ethnopharmacology.

Methods: A review of recent historical work on the therapeutic use of cannabis in both the Old and New Worlds and of work that involves narratives of the experience of using cannabis as medicine.

Results and conclusions: Historical descriptions of the therapeutic use of cannabis are found in a variety of sources ranging from ancient Asian medical texts to 19th Century European and North American medical journals. Such descriptions are often based on careful empirical observations and in some cases clinical trials, which provide a vast source of leads for pharmacological research. However, although cannabis has long held the attention of physicians, it is also an important plant used in self-medication. Emic accounts suggest that while many people first use cannabis for non-medical purposes, they eventually learn to perceive and manipulate therapeutic effects. Due to the effects of cannabis on consciousness, it often enables users to articulate subtle experiences of illness and healing. Combining such phenomenological data with insights derived from historical documents offers ethnopharmacologists a unique opportunity to explore connections among plants, human consciousness and healing.

Keywords: *Cannabis*, history of medicine, phenomenology.

ISE5-005 Five centuries in the Spanish Ethnobotany: from Laguna to Font Quer

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Background: Throughout the history, plant studies have been interested in plant uses. Old agronomists and healers have been the first botanists and have had an excellent plant knowledge. Since the 16th century, the increasing number of botanical works greatly improved plant science.

Objectives: To give an historical view of the plant uses in Spain mentioned by six important botanical authors, five of them Spanish, of the last five centuries.

Results and conclusions: The first botanical and phytotherapeutical work written in Spanish was made by Andrés Laguna in 1555. His translation to Spanish of the Dioscorides' work included many of his own comments and original iconography. He wrote about more than 400 different species. The aim of the author was to be precise in the identifications and descriptions of the simples. Later, Charles de l'Écluse (Clusius), who travelled during 1564-1565 throughout the Iberian Peninsula, wrote in 1576 a book where a lot of new Spanish species were described. He included medicinal uses of 15 species. Nicolás Monardes, a Sevillian physician, wrote a book in 1580 about his experiences with the recently arrived American medicinal plants such as cocoa or tobacco. Bernardo Cienfuegos, a physician and botanist, wrote in the first half of the 17th century a treatise with more than 4000 hand-written pages in seven volumes. They contain about 1000 plant drawings and original data about medicinal plant uses. The Spanish Flora of José Quer, published from 1762 to 1784, described the genera following the Tournefort's system and provided many phytochemical data and their medicinal uses. Finally, Pio Font Quer, one of the most important botanists of the 20th century, published his book about the most important medicinal plants of the Iberian flora in 1962. He wrote about 682 species including historical information.

Keywords: Ethnobotany, medicinal plants, history, 16th-20th centuries, Spain.



ISE5-006 Observations on Ethnobotany as a support for archaeobotanical reconstructions: *Citrullus colocynthis* (L) Schrader, use in Saharan Areas

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Background: Ethnobotanical observations are a key reference to interpretate archaeobotanical data, especially for food and medicinal plants and for the reconstructions of human activity in archaeological sites. *Citrullus colocynthis* grows naturally in semi-desert and desert areas in Sahara, Mediterranean and subtropics. Its medicinal properties are recognized by the pharmacopoeia of dozens of countries but on the traditional use of seeds for food and health the literature shows conflicting informations.

Objectives: The study of Kel Tadrart Tuareg plants use is part of a multidisciplinary research in order to keep information on the human-environment today relationships applying it on the Holocene ethnoarchaeological and archaeobotanical study of Central Sahara sites.

Methods: Observation and open and semi-structured interviews were carried out in a systematic survey among Tadrart Acacus massif (800-1400 m a.s.l.) in south-western Libya following the teachings of an old Kel Tadrart Tuareg. Reference samples were collected.

Results and conclusions: *Citrullus colocynthis* pollen and seeds were found in many African archaeological sites, testifying its long-time use. Nowadays the seeds are still eaten for health maintenance after different treatments in order to eliminate the toxic substances present in the pulp, and the entire fruit has pharmacological applications in many health diseases.

Keywords: Ethnobotany, *Citrullus colocynthis*, Libyan Sahara-archaeobotany, Kel tadrart Tuareg.

Acknowledgments: Missione Archeologica Italo-Libica nell'Acacus e nel Messak (Sahara centrale), Sapienza Università di Roma.

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ISE5-P01 Using traditional pesticides by Iranian and Moslem physicians in combat against harmful animals

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Among the works of the well-known physicians and scientists of Islamic and Iranian Medicine, there exist some texts on how to fight against harmful insects and animals. Such texts can be found in Chapter Five of the second discourse of the Nineth Book of Zakhireh Kharazmshahi, written by Seyyed Esmail Jorjani and other handwritten books including (Tohfeh Hakim Moemn, Makhzanoladvieh, etc). In these texts the traditional pesticides and killers drugs and experiences of the old pharmacists concerning combat against pests have been mentioned. These texts specify the application of the natural (non – synthetic) pest – killers by Iranian and Islamic Old Physicians and Scientists in fighting against some harmful insects such as: fly, ant, termite, flea, tick and other harmful animals. Therefore, taking into consideration the necessity of replacing natural combatants against harmful animals/insects (emphasizing on the use of non – synthetic materials) our assumption is based on the reliance on the above texts and with technical facilities of pharmacology, toxicology, entomology and zoology, the effect of the traditional Pesticides recommended in traditional medicine has to be re-evaluated.

Key word: traditional pesticides, harmful animals, Zakhireh Kharazmshahi.

ISE5-P02 Migration, nutrition and aging across the life-course of Bangladeshi families: Exploring food and medicinal uses of plants across transnational and generational landscapes

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Background: Medicinal and food plant use among Bangladeshis in the UK has important health, nutritional, policy, social and cultural implications. The Bangladeshi community in the UK is thriving; it is both the youngest and fastest growing of all minority populations (2001 census). However many of its members are socially marginalised and suffer disproportionately from diet-related health conditions such as diabetes. While there remain long-standing links between Bangladesh and Britain through the mutual exchange of material, social and cultural capital (Gardner, 2008) there is limited understanding on the impact of these links and migration on diet and medicinal plant use.

Objectives: This project aims to an in-depth understanding of Bangladeshi women's practices regarding plant-foods used for medicinal and health purposes across transnational and generational landscapes. The objectives of the project are to:

1. Explore the interface of food and medicinal plant use.
2. Compare inter-generational food-plant knowledge and use.
3. Compare food-plant knowledge and use between the UK and Bangladesh.
4. Explore the connection and transmission of knowledge regarding food plants between the UK and Bangladesh.

Methods: Research methodology includes qualitative techniques of participant observation, focus group discussions, unstructured interviews and discussions in addition to more quantitative semi-structured interviews. Research participants consist of an estimated 100 Bangladeshi women both in the UK (London and Cardiff) and Bangladesh (Sylhet) from two distinct generations.

Results: Key findings from preliminary research include reports of core plants used for medicinal purposes particularly for illnesses associated with the community, analysis of the transfer of knowledge between mothers and daughters and the reoccurring theme of the food-medicine overlap. Other themes of interest include the association of medicinal knowledge with Bangladesh, networks of knowledge within and across countries, supply chains and symbolic meanings of food-medicine.

Keywords: Food-medicine interface, migration, nutrition, medicinal plants, Bangladesh, UK, generations, transnational landscapes.

ISE5-P03 History, custom and the use of medicinal insects. Blister beetles from the Mediterranean World to Americas

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Background: Four thousands years old written traces inform us of the composition of remedies used in that time and give evidence of the medicinal use of insects. Some of the most ancient entomological medicinal products have been used unceasingly until now in most parts of the Mediterranean World. One of them is the cantharis, a blister beetle. Due to its interesting pharmacological properties, particularly the vesicatory and diuretic ones, cantharis has been mentioned in a remarkably high number of written sources in very different times and places.

Objectives: We will try to understand the different ways of perceiving, conceiving and using cantharis depending on era and culture, and the impact of history on the similarities and divergences that appear in its use.

Methods: The work is essentially based on a bibliographical research (ancient books and pharmacopoeias, and publications on traditional medicine in most parts of the Mediterranean World).

Results and conclusions: Drug denomination intervenes largely in the estimation of the constancy of a medicinal use. This problem is recurrent in all the historical studies carried out on medicinal plants and animals, and may be more specially insects. But according to the custom and the historical background, medicinal, aphrodisiacs and poisons effects of cantharis have been reproved or searched, and scientific knowledge on this medicinal product evolved more or less rapidly.

Keywords: medicinal insects, cantharis, Mediterranean World, Americas.



ISE6-001 Mazatecs Ethnopharmacy 70 years after Schultes: an historical comparison

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Background: At the end of the 1930s Richard E. Schultes carried out ethnobotanical fieldwork in the Sierra Mazateca (Oaxaca, Mexico) to document the use of plants among three ethnic groups living in the area: Chinantecs, Mazatecs and Mije (Mixe). His findings are recorded in his doctoral dissertation "Economic aspects of the flora of Northeastern Oaxaca, Mexico".

Objectives: Our aims are: a) to improve our understanding of the historical development of ethnobotanical knowledge in the context of rapid cultural change; b) to show the value and limitations of neglected historical literature in Ethnobotany and Ethnopharmacology.

Methods: P.G carried out fieldwork in the Sierra Mazateca as part of his doctoral studies and collected data on general concepts of health and sickness and on the pharmacopoeia used in the study site. The methods used include participant observation, unstructured and structured interviews. The data collected during fieldwork, and the data recorded in R.E. Schultes doctoral dissertation were entered in a database and coded according to homogenous criteria in order to allow a quantitative statistical analysis.

Results and conclusions: We found that many of the species documented in our study are also documented in Schultes' dissertation. Examples of commonly used species recorded by us and also reported by Schultes include among others *Piper umbellatum*, *Zingiber officinale*, *Chenopodium ambrosioides* and *Nicotiana tabacum*. However, we found some variation when comparing the reported use categories of the same species. We suggest that the variation observed is the results of intra-cultural variation, historical change, and field research methods.

Keywords: Mazatecs, Medicinal Plants, Oaxaca, Historical Ethnopharmacology, R.E. Schultes.

ISE6-P01 Presencia y distribución de polifenoles en la frutilla chilena (*Fragaria chiloensis* ssp. *chiloensis*): un estudio mediante HPLC-DAD y HPLC-MS/MS

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Antecedentes: La frutilla chilena (*Fragaria chiloensis* ssp. *chiloensis*) es uno de los progenitores de la frutilla cultivada, *F. x ananassa*. Los frutos fueron consumidos desde tiempos precolombinos y la planta está siendo seleccionada como un nuevo cultivo por agricultores del centro-sur de Chile.

Objetivos: Determinar la composición y distribución de polifenoles en distintos órganos de la frutilla chilena y compararlos con los perfiles de la frutilla roja comercial (*Fragaria x ananassa*).

Métodos: HPLC-DAD Merck-Hitachi (bomba L-7100, detector de arreglo de diodos L-7455, integrador D-7000). Columna: C18-RP Luna 250 mm x 4.60 mm i.d., 5 µm. Detección: 254 nm, UV rango: 200-600 nm. MS: Agilent 1100 LC, conectado al sistema Esquire 4000 Ion Trap LC/MS (Bruker Daltoniks). Full scan MS entre m/z 150 y 2000 u en modo ión positivo para antocianinas y modo ión negativo para otros compuestos. Espectros de CID con amplitud de fragmentación de 1.00 V (MS/MS). Gas de colisión: helio.

Resultados y conclusiones: Se identificaron en forma tentativa 50 compuestos en frutilla chilena, incluyendo por primera vez 18 fenólicos en rizomas y otros 18 compuestos en hojas. Los productos fueron principalmente procianidinas, elagitaninos, derivados del ácido elágico y flavonoides. Se observa acumulación de taninos condensados de mayor peso molecular en rizomas. La información presentada puede emplearse para caracterizar cultivares locales y proporciona "huellas dactilares" para estudios de cambios asociados a la respuesta de la planta ante factores ambientales y patógenos.

Palabras clave: *Fragaria chiloensis*, frutilla chilena, fenólicos, flavonoides, taninos, distribución.

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ISE6-P02 A feast of yellow: Notes on safflower use in Alentejo (Portugal)

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Background: *Carthamus tinctorius* L., is a multi-purpose wonder-plant used for centuries for its medicinal proprieties and source of dye for textiles. More recently it is used also as an oilseed crop ⁽¹⁾. Safflower, which is naturalized in south-eastern Portugal ⁽²⁾, is a very popular plant in a restricted area of Alentejo ⁽³⁾ in a surprisingly particular way.

Objectives: To contribute to the knowledge, characterization and understanding of what seems to be a unique tradition, involving a medicinal plant in a peculiar culinary tradition and its associated distinctive folklore.

Methods: Exploratory and semi-structured interviews were carried out at Alter-do-Chão, a small town of about 2600 habitants and at three smaller villages (Chança, Seda and Alter Pedroso) on its neighbourhoods. We met our informants at local markets, restaurants, retirement homes and streets. Beyond that, we visited home gardens, houses and the countryside.

Results and conclusions: Medicinal use of safflower has not been referred by our informants whereas its use as an indispensable source of yellow and a seasoning in the making of a traditional dish is a widespread popular practice considered as a local distinctive tradition. The making of the yellow rice ("arroz amarelo"), traditionally served with lamb in Easter, weddings and feasts and nowadays more widespread seems to be, as far as we know, a unique trait in the country, being associated with a specific folklore. However when and how did safflower dry florets became a local seasoning and a colouring agent for the festive yellow rice is not yet clear nor what are the exact geographic boundaries of this tradition.

Acknowledgments: To local people who shared their time and knowledge with us.

Keywords: *Carthamus tinctorius* L., food colouring, Portugal, safflower, seasoning, yellow rice.

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ISE6-P03 Brain acetylcholinesterase inhibition by *Plectranthus barbatus* herbal tea

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Background: *Plectranthus barbatus* Andr. (Lamiaceae), known in Brazil as "falso boldo", is used in tropical Africa, Asia and Brazil for a wide range of medicinal purposes, including central nervous system disorders. Previous *in vitro* studies¹ showed that *P. barbatus* aqueous extracts, prepared as decoctions, have promising antiacetylcholinesterase properties, being potentially useful in the treatment of Alzheimer's disease symptoms.

Objectives: The aim of the present research was to test if the water extracts of *P. barbatus* leaves could produce a decrease in brain acetylcholinesterase activity when administered to rats.

Methods: *P. barbatus* extracts, prepared as decoctions, were intraperitoneally administered to Sprague-Dawley rats (1000 mg/Kg body weight). Thirty and sixty minutes after administration, the rat brains were collected and analysed by HPLC. In addition, the brain acetylcholinesterase activity was measured by an adaptation of the method previously used¹.

Results and conclusions: The main component of the *P. barbatus* herbal tea, rosmarinic acid, was found in the rat brains in the concentrations 24.1±1.1 and 20.4±0.4 µM, 30 and 60 min after administration, respectively. An inhibition of 29.0±2.3 and 24.9±3.7% in brain acetylcholinesterase activity was observed at the same administration time-points, respectively. The results prove that the administration of *P. barbatus* aqueous extracts may be helpful in alleviating the symptoms of Alzheimer's disease.

Keywords: *Plectranthus barbatus*, acetylcholinesterase inhibition, intraperitoneal administration.

Acknowledgments: P.L. Falé thanks FCT for the PhD Grant (SFRH/BD/37547/2007).

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ISE6-P04 Enrichment study of virgin olive oil with antioxidants phenolic acid from natural food plants.

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Background: Virgin olive oil (VOO), mainly produced in Spain, is the basis of "Mediterranean Diet" and provides a rich source of natural antioxidants which are directly linked to a reduced degenerative diseases such as, coronary heart disease and cancers of the breast, skin and colon ^(1, 2). In the same way, food plants (spices and herbs) are often used for their medical and antiseptic properties since show high antioxidant activity.

Objectives: The aim of this work is enrich VOO using some natural food plants such as thyme, rosemary and garlic and determine if these spices to be able to transfer some of their characteristic antioxidants to VOO. The main antioxidants found in the selected food plants were rosmarinic, caffeic and gallic acids bellowing all them, to phenolic acids.

Methods: A rapid, simple and reliable method for determination of phenolic compounds in VOO previously enriched with food plants using off-line solid phase extraction (SPE) and capillary electrophoresis (CE) with UV detector was optimized and validated.

The enrichment study was carried out steeping VOO with food plants a) over time (more than 30 days), b) stirring at room temperature and c) stirring using temperatures higher 25°C.

Results and conclusions: The results confirmed the presence of rosmarinic acid, caffeic acid and gallic acid, when the enrichment was carried out both stirring and stirring over temperature.

Keywords: antioxidants, capillary electrophoresis, enrichment, food plants, phenolic acids, VOO.

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ISE6-P05 Nutritional and nutraceutical composition of two Lamiaceae traditionally used in Portugal as spices, flavours or medicines

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Background: Medicinal and aromatic plants are highly prized in Portugal. They are a good source of natural preparations containing effective bioactive compounds, including antioxidants which can be used for different applications, particularly as food additives and health promoting ingredients in the formulations of functional foods and nutraceuticals.

Objectives: To study the nutritional and nutraceutical composition and antioxidant properties of aerial parts from two Lamiaceae species (*Mentha pulegium* and *Thymus pulegioides*), often used.

Methods: Determination of proteins, fat, ash, and carbohydrates, and individual profiles in sugars and fatty acids by chromatographic techniques. Phytochemicals such as phenolics, flavonoids, vitamins and carotenoids were also determined. The antioxidant activity was accessed by four in vitro chemical and biochemical assays using animal cells.

Results and conclusions: *M. pulegium* revealed the highest contents of moisture, ash, proteins, fat, energy and sugars, while *T. pulegioides* revealed the highest contents of carbohydrates (89.35 g/100 g). *M. pulegium* have the best antioxidant properties ($EC_{50} < 0.56$ mg/mL), which is in agreement with its highest content in phenolics and in other antioxidants such as reducing sugars (7.99 g/100 g), ascorbic acid (7.90 mg/100 g) and tocopherols, particularly α -tocopherol (69.54 mg/100 g). These compounds could explain its uses as antiseptic, anti-inflammatory and as food preservative and special sauce. Moreover could have great potential in food and in pharmaceutical industries because of its flavouring properties and composition.

Keywords: Lamiaceae, phytochemicals, oxidative stress, Portuguese pharmacopoeia.

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ISE6-P06 Ethnobotany and foraging behaviour: a new approach for an emerging problem. *Lactuca alpina* (L.) A. Gray and unrelated toxic plants consumed as food

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Background: Wild edible plants are found in all climates and terrains. Although most people don't know exactly which wild plant to pick up, there is a new trend known as "foraging behavior", where people called "freegans" search for wild edible plants, not to survive but to be environmentally friendly and "green". But there are many toxic plants that cause serious harm^(1,2).

Objectives: To avoid intoxications when shoots of wild plants are collected during spring time for human consumption. Young shoots of toxic *Aconitum* sp., during the spring, in Northern Italy were picked as alpine lettuce *Lactuca alpina* (L.) A. Gray [*Cicerbita alpina* (L.) Wallr.].

Methods: Data were obtained from anonymous medical files concerning expositions and/or intoxications registered by the Milan Poison Center Niguarda Hospital between 1995 and 2007⁽²⁾ and from an ethnobotanical survey in the alpine northeastern valleys.

Results and conclusions: The typical example of intoxications due to a mistake of *L. alpina* shoots is the misidentification of plant species containing alkaloids, i.e. *Aconitum* sp., as reported by Poison Center of Niguarda Milan Hospital. Juvenile *Aconitum* sp. plants were accidentally collected with the lettuce or as lettuce, resulting in poisoning. In order to preserve wild *L. alpina* in its natural habitat and to avoid severe or fatal intoxications, a research project was started to explore the possibility to domesticate this species. Preliminary results show that *L. alpina* cultivations, starting from seed, gave a high green biomass in open fields at 1500 m. above sea level.

Keywords: *Lactuca alpina*, *Aconitum* sp., cultivation, intoxication.

References: 1. M.L.Colombo et al. (2010) J. Pharm. Sci. & Res., in press - 2. M.L.Colombo et al. (2009) J. Pharm. Sci. & Res., 2, 123-136.

ISE6-P07 Plants Used as Food and Medicine by Polish Immigrants in Misiones, Argentina

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Background: Polish peasant families, migrating from temperate climate settled down in subtropical environment in the north of the province of Misiones, Argentina, between 1936 -1939. New flora which they found in Misiones was the major hindrance in the continuation of their home medicine and phytotherapy, as known from Poland.

Objectives: To investigate changes in traditional health care practices, and in particular the phytotherapy based on plants used also in food context by Polish immigrants in Argentina.

Methods: Semistructured and in-depth interviews, freelistig questionnaires with 87 adults of Polish origin and their descendents living in two settlements, province of Misiones, botanical identification of 43 plant species. The data analysis combines quantitative methods (frequency of occurrence, informant consensus) and qualitative anthropological methods.

Results and conclusions: 43 plant taxa and 5 industrially processed plants are used both as medicine and food. As medicine 188 uses were recorded principally to treat respiratory (20%), gastrointestinal (17,5%), circulatory (15%) and genitourinary (10%) disorders. The internal uses (84%) prevail dramatically over the external ones (16%) and leaves are most frequently administered (55%). In contrast, as food fruits are mostly used (56%). The continuation of Polish pharmacopoeia is observed in the use of 8 cultivated species: *Allium sativum*, *A. cepa*, *Brassica oleracea*, *Petroselinum crispum*, *Mentha* spp., *Anethum graveolens*, *Linum usitatissimum* and *Piper nigrum*. The high percentage of food plants in the pharmacopoeia of Polish immigrants is a result of reliance on mainly cultivated and exotic species, gathered from home gardens and fields. Most of the medicinal uses are strongly influenced by the local Mestizo culture.

Keywords: Medicinal resources, medicinal food, Polish immigrants' pharmacopoeia, Argentina.