Detection of adulterants such as sweeteners materials in honey using near-infrared spectroscopy and chemometrics

Near-infrared (NIR) spectroscopy combined with chemometrics methods has been used to detect adulteration of honey samples. The sample set contained 135 spectra of authentic ($n=68$) and adulterated ($n=67$) honey samples. Spectral data were compressed using wavelet transformation (WT) and principal component analysis (PCA), respectively. In this paper, five classification modeling methods including least square support vector machine (LS-SVM), support vector machine (SVM), back propagation artificial neural network (BP-ANN), linear discriminant analysis (LDA), and $K$-nearest neighbors (KNN) were adopted to correctly classify pure and adulterated honey samples. WT proved more effective than PCA, as a means for variables selection. Best classification models were achieved with LS-SVM. A total accuracy of 95.1% and the area under the receiver operating characteristic curves (AUC) of 0.952 for test set were obtained by LS-SVM. The results showed that WT-LS-SVM can be as a rapid screening technique for detection of this type of honey adulteration with good accuracy and better generalization.

Use of natural noncaloric sweeteners in commercial foods and beverages has expanded recently to include compounds from the plant Stevia rebaudiana. Little is known about the responses of rodents, the animal models for many studies of taste systems and food intake, to stevia sweeteners. In the present experiments, preferences of female Sprague-Dawley rats and C57BL/6J mice for different stevia products were compared with those for the artificial sweetener saccharin. The stevia component rebaudioside A has the most sweetness and least off-tastes to human raters. In ascending concentration tests (48-h sweetener vs. water), rats and mice preferred a high-rebaudioside, low-stevioside extract as strongly as saccharin, but the extract stimulated less overdrinking and was much less preferred to saccharin in direct choice tests. Relative to the extract, mice drank more pure rebaudioside A and showed stronger preferences but still less than those for saccharin. Mice also preferred a commercial mixture of rebaudioside A and erythritol (Truvia). Similar tests of sweet receptor T1R3 knockout mice and brief-access licking tests with normal mice suggested that the preferences were based on sweet taste rather than post-oral effects. The preference response of rodents to stevia sweeteners is notable in view of their minimal response to some other noncaloric sweeteners (aspartame and cyclamate).

Anti-inflammatory and antipyretic effects of Sonchus oleraceus in rats

Sonchus oleraceus Linn. has been used to relieve headaches, general pain, hepatitis, infections, inflammation and rheumatism in Brazilian folk medicine. Nevertheless, scientific information regarding this species is scarce; there are no reports related to its possible anti-inflammatory effects. This study was aimed at evaluating the scientific basis for the traditional use of Sonchus oleraceus using in vivo inflammatory models. Carrageenan-induced paw edema, peritonitis and febrile response induced by lipopolysaccharide tests, as well as fibrovascular tissue growth induced by s.c. cotton pellet implantation were used to investigate the anti-inflammatory activity of Sonchus oleraceus hydroethanolic extract (SoHE) in rats. The SoHE at test doses of 100-300mg/kg p.o. clearly demonstrated anti-inflammatory effects by reduced paw edema induced by carragenan, inhibited leukocyte recruitment into the peritoneal cavity and reduced LPS-induced febrile response, and in the model of chronic inflammation using the cotton pellet-induced fibrovascular tissue growth in rats, the SoHE significantly inhibited the formation of granulomatous tissue. The extract administered at 300mg/kg p.o. had a stronger anti-in-
flamatory effect than indomethacin (10mg/kg) or dexamethasone (1mg/kg). The hydroethanolic extract of Sonchus oleraceus markedly demonstrated anti-inflammatory action in rats, which supports previous claims of its traditional use. The administration of Sonchus oleraceus hydroethanolic extract (SoHE) demonstrated anti-inflammatory effects by reduced inhibited leukocyte recruitment into the peritoneal cavity and febrile response reduced induced by lipopolysaccharide (LPS) from E. coli [Fabiana C. Vilela, Andressa D. Bitencourt, Layla D.M. Cabral, Lidiane S. Franqui, Roseli Soncini and Alexandre Giusti-Paiva* (Department of Biomedical Sciences of Federal University of Alfenas–MG, Alfenas, Brazil), Journal of Ethnopharmacology, 2010, 127(3), 737-741].

NPARR 1(3), 2010-0492, Gastroprotective activity of Trichosanthes cucumerina in rats

All the experiments were conducted using Wistar strain rats (weight: 200-220g). The food and water given to rats was withdrawn for 36 and 12h respectively, before the commencement of the experiment. These rats were randomly divided into 6 groups (n=8 rats/group; 4 males+4 females) and groups 1-3 were orally administrated with hot water extract (HWE) at a dose of 375, 500 and 750mg/kg, respectively. Group 4 was orally treated with equal volume of distilled water (1mL; control), group 5 was orally treated with a reference drug, cimetidine (100mg/kg) while the group 6 was orally treated with another reference drug, sucralfate (400mg/kg). In the indomethacin experiment, only one dose of HWE (750mg/kg) was tested, as this was found to have the maximum effect in the alcohol model also. Results show that the HWE of Trichosanthes cucumerina possesses significant (P<0.05) and dose dependent gastroprotective effects in the alcohol model in terms of the length and number of gastric lesions mediated by alcohol, with a maximum effect at 750mg/kg (inhibition of lesion length by 92%; number of gastric lesions by 88%). The same dose also mediated a significant (P<0.05) gastroprotective activity in the indomethacin model (inhibition of lesion length by 88%; number of gastric lesions by 84%). In both models, the protective effect demonstrated by the HWE was comparable with that produced by cimetidine. The HWE significantly (P<0.05) increased the amount of mucus produced by the rat gastro mucosa (by 39%) and reduced the gastric acidity (total acidity by 36%; free acidity by 40%). pH of the gastric juice increased from 4.1 to 6.0. However, no change in the volume of gastric juice was observed. Further, HWE showed potent antihistamine activity. It may be concluded that HWE of Trichosanthes cucumerina exerts a significant protection against ethanol or indomethacin induced gastric damage. Increasing the protective mucus layer, decreasing the acidity of the gastric juice and antihistamine activity are probable mechanisms by which the HWE of Trichosanthes cucumerina mediates its gastroprotective actions[L.D.A.M. Arawwawala’ M.I. Thabrew and L.S.R. Arambewela (Industrial Technology Institute, Baudhaloka Mawatha, Colombo 07, Sri Lanka), Journal of Ethnopharmacology, 2010, 127(3), 750-754].

NPARR 1(3), 2010-0493, Aqueous extract of Carica papaya leaves exhibits anti-tumor activity and immunomodulatory effects

Various parts of Carica papaya Linn. (CP) have been traditionally used as ethnomedicine for a number of disorders, including cancer. There have been anecdotes of patients with advanced cancers achieving remission following consumption of tea extract made from CP leaves. However, the precise cellular mechanism of action of CP tea extracts remains unclear. The aim of the present study is to examine the effect of aqueous-extracted CP leaf fraction on the growth of various tumor cell lines and on the anti-tumor effect of human lymphocytes. In addition, identification of functional molecular weight fraction in the CP leaf extract was also attempted. The effect of CP extract on the proliferative responses of tumor cell lines and human peripheral blood mononuclear cells (PBMC), and cytotoxic activities of PBMC were assessed by [3H]-thymidine incorporation. Flow cytometric analysis and measurement of caspase-3/7 activities were performed to confirm the induction of apoptosis on tumor cells. Cytokine productions by PBMC were measured by ELISA. Gene profiling of the effect of CP extract treatment was performed by microarray analysis and real-time RT-PCR.
Significant growth inhibitory activity of the CP extract on tumor cell lines was observed. In PBMC, the production of IL-2 and IL-4 was reduced following the addition of CP extract, whereas that of IL-12p40, IL-12p70, IFN-γ and TNF-α was enhanced without growth inhibition. In addition, cytotoxicity of activated PBMC against K562 was enhanced by the addition of CP extract. Moreover, microarray analyses showed that the expression of 23 immunomodulatory genes, classified by gene ontology analysis, was enhanced by the addition of CP extract. In this regard, CCL2, CCL7, CCL8 and SERPINB2 were representative of these upregulated genes, and thus may serve as index markers of the immunomodulatory effects of CP extract. Finally, we identified the active components of CP extract, which inhibits tumor cell growth and stimulates anti-tumor effects, to be the fraction with M.W. less than 1000. Since Carica papaya leaf extract can mediate a Th1 type shift in human immune system, our results suggest that the CP leaf extract may potentially provide the means for the treatment and prevention of selected human diseases such as cancer, various allergic disorders, and may also serve as immunoadjuvant for vaccine therapy [Noriko Otsuki, Nam H. Dang, Emi Kumagai, Akira Kondo, Satoshi Iwata and Chikao Morimoto* (Division of Clinical Immunology, Advanced Clinical Research Center, The Institute of Medical Science, The University of Tokyo, Japan), Journal of Ethnopharmacology, 2010, 127(3), 760-767].

**NPARR 1(3), 2010-0495, Hepatoprotective activity of ethanolic extracts of bark of Zanthoxylum armatum DC in CCl₄ induced hepatic damage in rats**

Zanthoxylum armatum DC is described as a hepatoprotective in Ayurveda, the Indian system of medicine. However, there is no scientific basis or reports in the modern literature regarding its usefulness as a hepatoprotective agent. The present study was carried out to evaluate the hepatoprotective activity of ethanolic extract of bark of Zanthoxylum armatum DC in CCl₄ induced hepatotoxicity in male Wistar rats. Ethanolic extracts at doses of 100, 200 and 400mg/kg were administered orally once daily for 7 days. The hepatoprotective activity was assessed using various biochemical parameters like alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, serum bilirubin, total protein and serum antioxidant enzymes along with histopathological studies of liver tissue. The substantially elevated serum enzymatic levels of serum transaminases, alkaline phosphatase and total bilirubin were significantly restored towards normalization by the extracts. Bark extracts significantly increased the levels of antioxidant enzymes: superoxide dismutase, catalase and glutathione. Phytochemical analysis revealed presence of isoquinoline alkaloid, berberine, as well as flavonoids and phenolic compounds, which have been known for their hepatoprotective activities. *Z. armatum* DC possesses significant protective effect against hepatotoxicity induced by CCl₄ which may be attributed to the individual or combined action of phytoconstituents present in it [Lalitsingh Ranawat, Jigar Bhatt and Jagruti Patel* (Department of Pharmacology, Institute of Pharmacy, Nirma University of Science and Technology, Sarkhej-Gandhinagar Highway, Ahmedabad 382481, India), Journal of Ethnopharmacology, 2010, 127(3), 777-780].

**NPARR 1(3), 2010-0495, Anti-inflammatory and anti-arthritic activity of total flavonoids of the roots of Sophora flavescens**

The roots of *Sophora flavescens* have long been used in Chinese medicine for the treatment of fever, inflammatory disorders, ulcers and skin burns. *Sophora flavescens* contains flavonoids and alkaloids. This study was conducted to develop a plant-based anti-inflammatory agent focused on chronic inflammatory disorders. To accomplish this, the alkaloid-free prenylated flavonoid-enriched fraction (PFS) of rhizomes of *Sophora flavescens* was prepared and its *in vitro* and *in vivo* anti-inflammatory activities were then evaluated for the first time. The inhibitory activity of PFS on PGE₂, NO, IL-6 and TNF-α production of lipopolysaccharide (LPS)-treated RAW 264.7 cells was measured. Additionally, adjuvant-induced arthritis in rats was used as an animal model of chronic inflammation to establish the *in vivo* anti-inflammatory effects of PFS. PFS inhibited cyclooxygenase-2 (COX-2)-catalyzed PGE₂ and inducible nitric oxide synthase (iNOS)-catalyzed NO production by lipopolysaccharide (LPS)-
treated RAW 264.7 cells at 10-50µg/ml, and these effects primarily occurred via COX-2 inhibition and iNOS down-regulation, respectively. PFS also inhibited IL-6 and TNF-α production. When tested against adjuvant-induced arthritis in rats (chronic inflammation), PFS strongly inhibited arthritic inflammation when administered orally at doses of 10-100mg/kg/day. In addition, PFS administered orally potently inhibited acetic acid-induced writhing in mice. The results suggest that PFS inhibits chronic inflammatory response and the inhibition of proinflammatory molecules such as COX-2, iNOS and IL-6 may contribute, at least in part, to the anti-inflammatory activity in vivo. Overall, these results indicate that PFS from *Sophora flavescens* may have the potential for treatment of chronic inflammatory disorders such as rheumatoid arthritis [Jeong Ho Jin, Ju Sun Kim, Sam Sik Kang, Kun Ho Son, Hyun Wook Chang and Hyun Pyo Kim*(College of Pharmacy, Kangwon National University, Chunchon 200-701, Republic of Korea), *Journal of Ethnopharmacology*, 2010, 127(3), 589-595 ].

**NPARR** 1(3), 2010-0496, *Tamarindus indica* Linn. (Fabaceae): Patterns of use in traditional African medicine- Review

To increase the understanding of the ethnopharmacology of a single species, elaboration of dispersed primary data is required. *Tamarindus indica* Linn. (Fabaceae), or tamarind, is a common tree, especially in West Africa, with a good potential to contribute to affordable local health care based on traditional medicine (TM). For this single species review, more than 60 references with detailed information on the ethnopharmacology of *T. indica* in the African context were selected. It showed that most prominently, the fruits are used as laxative or febrifuge throughout the Sahel and Soudan ecological zones. Tamarind bark and leaves are often involved in the treatment of wounds, especially in central West Africa. While the bark is used to treat diarrhoea in West Africa, the leaves are used for this purpose in East Africa. The findings suggest a difference in the way tamarind is used between East and West Africa and we assess the similarities of its uses within those regions. This review demonstrates the capability of literature research to reveal knowledge by mining and compiling information from the growing body of primary ethnopharmacologic data, much of which is published in this journal. By creating a specific profile of tamarind in the context of traditional medicine throughout Africa, the authors contribute to the collection of current ethnobotanic species accounts on *T. indica* that tend to be qualitative and more general [Reinout M. Havinga*, Anna Hartl, Johanna Putsher, Sarah Prehsler, Christine Buchmann and Christian R. Vogl (Working Group for Knowledge Systems and Innovations, Institute of Organic Farming, Department for Sustainable Agricultural Systems, University of Natural Resources and Applied Life Sciences, Vienna, Gregor-Mendel Straße 33, A-1180 Vienna, Austria), *Journal of Ethnopharmacology*, 2010, 127(3), 573-588].

**NPARR** 1(3), 2010-0497, Protective effect of *Calendula officinalis* extract against UVB-induced oxidative stress in skin: Evaluation of reduced glutathione levels and matrix metalloproteinase secretion

*Calendula officinalis* Linn. flowers have long been employed time in folk therapy and more than 35 properties have been attributed to decoctions and tinctures from the flowers. The main uses are as remedies for burns (including sunburns), bruises and cutaneous and internal inflammatory diseases of several origins. The recommended doses are a function both of the type and severity of the condition to be treated and the individual condition of each patient. Therefore, the present study investigated the potential use of *C. officinalis* extract to prevent UV irradiation-induced oxidative stress in skin.

Firstly, the physico-chemical composition of marigold extract (ME) (hydroalcoholic extract) was assessed and the in vitro antioxidant efficacy was determined using different methodologies. Secondly, the cytotoxicity was evaluated in L929 and HepG2 cells with the MTT assay. Finally, the in vivo protective effect of ME against UVB-induced oxidative stress in the skin of hairless mice was evaluated by determining reduced glutathione (GSH) levels and monitoring the secretion/activity of metalloproteinases. The polype-
nol, flavonoid, rutin and narcissin contents found in ME were 28.6mg/g, 18.8mg/g, 1.6mg/g and 12.2mg/g, respectively and evaluation of the in vitro antioxidant activity demonstrated a dose-dependent effect of ME against different radicals. Cytotoxicity experiments demonstrated that ME was not cytotoxic for L929 and HepG2 cells at concentrations less than or equal to 15mg/ml. However, concentrations greater than or equal to 30mg/ml, toxic effects were observed. Finally, oral treatment of hairless mice with 150 and 300mg/kg of ME maintained GSH levels close to non-irradiated control mice. In addition, this extract affects the activity/secretion of matrix metalloproteinases 2 and 9 (MMP-2 and -9) stimulated by exposure to UVB irradiation. However, additional studies are required to have a complete understanding of the protective effects of ME for skin [Yris Maria Fonseca, Carolina Dias Catini, Fabiana T.M.C. Vicentini, Auro Nomizo, Raquel Fernanda Gerlach and Maria José Vieira Fonseca* (Faculdade de Ciências Farmacêuticas de Ribeirão Preto, Universidade de São Paulo, Avenida do Café s/n, 14040-903 Ribeirão Preto, São Paulo, Brazil), Journal of Ethnopharmacology, 2010, 127(3), 596-601].

NPARR 1(3), 2010-0498, Beneficial effect of the administration of Hemidesmus indicus against bromobenzene induced oxidative stress in rat liver mitochondria

To study the beneficial effect of the prior administration of an aqueous extract of Hemidesmus indicus against bromobenzene induced oxidative damage in rat liver mitochondria. Oxidative stress was induced in rats with bromobenzene (10mmol/kg body wt.). The rate of respiration, P/O ratios, lipid peroxides, protein carbonyls and sulphhydrils were studied. When the rats were administered with bromobenzene, the rate of respiration was decreased significantly and the P/O ratio was completely abolished. There was a significant increase on the levels of lipid peroxide and protein carbonyl and a significant decrease on total sulphhydril groups when compared with control. Administration of rats with an aqueous extract (100mg/kg) prior to bromobenzene administration showed significant beneficial effects like, stimulation in respiration, prevented the rise in lipid peroxides and protein carbonyls, increased the level of sulphhydril groups back to control level. Administration of vitamin E could not reverse as effectively as ra:Hemidesmus indicus. This study demonstrates a good protective effect of Hemidesmus indicus against the bromobenzene induced oxidative stress [S. Gopi and O.H. Setty* (Department of Biochemistry, School of Life Sciences, University of Hyderabad, Hyderabad 500 046, India), Journal of Ethnopharmacology, 2010, 127(1), 200-203].

NPARR 1(3), 2010-0499, Effects of Tribulus terrestris on endocrine sensitive organs in male and female Wistar rats

The possible effects of Tribulus terrestris (TT) on endocrine sensitive organs in intact and castrated male rats as well as in a post-menopausal rat model using ovariectomized females were investigated. Three different dose levels of TT (11, 42 and 110mg/kg/day) were administered to castrated males for 7 days and to intact males and castrated females for 28 days. In addition to TT treatment, all experiments also included a group of rats treated with dehydroepiandrosterone (DHEA). In experiments using castrated males and females we also used testosterone and 17α-ethynylestradiol, respectively, as positive controls for androgenicity and estrogenicity. Neither DHEA nor TT was able to stimulate androgen sensitive tissues like the prostate and seminal vesicle in both intact and castrated male rats. In addition, administration of TT to intact male rats for 28 days did not change serum testosterone levels as well as did not produce any quantitative change in the fecal excretion of androgenic metabolites. However, a slight increase in the number of homogenization-resistant spermatids was observed in rats treated with 11mg/kg/day of TT extract. In ovariectomized females, TT did not produce any stimulatory effects in uterine and vaginal epithelia. Tribulus terrestris was not able to stimulate endocrine sensitive tissues such as the prostate, seminal vesicle, uterus and vagina in Wistar rats, indicating lack of androgenic and estrogenic activity in vivo. It showed a positive effect of TT administration on rat sperm production, associated with unchanged levels of circulating androgens [Anderson J. Martino-Andrade*, Rosana
The efficacy of *Viola mandshurica* W. Becker (VM) ethanolic (EtOH) extract in the treatment of bronchial asthma in an ovalbumin (OVA)-induced asthmatic BALB/c mouse model. Female BALB/c mice were sensitized with intraperitoneal (i.p.) ovalbumin (OVA) on days 0 and 14, and were next given intranasal OVA on days 28-30. Randomized treatment groups of sensitized mice received VM EtOH extract, dexamethasone, or placebo, orally, from days 28 to 30. VM EtOH extract significantly inhibited increases in total immunoglobulin E (IgE) and cytokines IL-4 and IL-13 levels in serum and bronchoalveolar lavage fluid (BALF), and also effectively suppressed airway hyperresponsiveness (AHR), eosinophilia, and mucus hypersecretion, in mice with OVA-induced asthma. The results suggest that VM EtOH extract and allied extracts could be useful herbal medicines for asthma treatment, and that VM may also be a valuable lead material for anti-asthma drug development [Mee-Young Lee, Ji-Eun Yuk, Ok-Kyoung Kwon, Hui-Seong Kim, Sei-Ryang Oh, Hyeong-Kyu Lee and Kyung-Seop Ahn*(Immune Modulator Research Center, Korea Research Institute of Bioscience and Biotechnology, P.O. Box 115, Yusung, Daejeon 305-600, Republic of Korea), Journal of Ethnopharmacology, 2010, 127(1), 159-164].

*NPARR* 1(3), 2010-0501. **Value of the ethnomedical information for the discovery of plants with antifungal properties. A survey among seven Latin American countries**

This study reports the antifungal evaluation of 327 plant species (92 families and 251 genera) from seven Latin American countries which were selected on the basis of their reported ethnomedical uses and compared them with plants selected at random. The main aim of this study was to investigate whether the probability of detecting antifungal plants is higher when plants have reports of ethnopharmacological uses related to fungal infections (PAU group) than when they are selected at random (PNAU group). (b) The second objective was to determine, within the PAU group, whether the probability of obtaining a positive result will be higher when the plants are tested against dermatophytes, than against yeasts or *Aspergillus* spp. (c) The third goal was to investigate, within all MICs<1000 mg/mL, if the MICs displayed by the PAU group are comparatively lower than MIC values of the PNAU group; that is to say, if they can be expected more potent antifungal plants within the group of plants that have a history of traditional use related to fungal infections than when they do not have one. A five-stage process of documentation, evaluation and analysis of results was conducted: (1) selection of words that could describe the ethnopharmacological use related to fungal infections; (2) a survey of specialized literature in each country; (3) collection and preparation of an extract of each plant; (4) antifungal evaluation of the selected plants and (5) statistical analysis of the results. For the antifungal evaluation, the microbroth dilution assay recommended by the Clinical and Laboratory Standards Institute (CLSI, formerly NCCLS) was used against a panel of eleven human opportunistic and pathogenic fungi. For the statistical analysis the Pearson’s Chi Square test and the Score’s test were used. (a) A significantly higher probability of detecting plants with antifungal activity against at least one fungus was found within the PAU (40.3%) than the PNAU group (21.3%) (p<0.01); (b) A similar higher probability than in (a) (39.6% vs. 20.8%) was found when plants were tested against dermatophytes (p<0.01) but not against yeasts or *Aspergillus* spp. (p>0.05); (c) Within the detected antifungal plants from both groups, plants of the PAU group displayed higher activities (lower MICs) than those of PNAU group against dermatophytes (p<0.05) but not against yeasts or *Aspergillus* spp.

Considering that dermatophytes are the cause of superficial fungal infections, which can be easily detected and followed by traditional healers, our findings
suggest that the ethnopharmacological approach is useful in guiding the detection of antifungal plants in Latin America mainly for infections in which the pathological expression is obvious and, therefore, the cure can be clearly observed [Laura Svetaz, Federico Zuljan, Marcos Derita, Elisa Petenatti, Giselle Tamayo, Armando Cáceres, Valdir Cechinel Filho, Alberto Giménez, Roberto Pinzón, Susana A. Zacchino* and Mahabir Gupta (Farmacognosia, Facultad de Ciencias Bioquímicas y Farmacéuticas, Universidad Nacional de Rosario, Rosario, Argentina), Journal of Ethnopharmacology, 2010, 127(1), 137-158].

NPARR 1(3), 2010-0502, In vivo antioxidative activity of a quantified Pueraria lobata root extract

Oxidative stress has been associated with many pathological disorders such as atherosclerosis, diabetes and cancer. Supplementation with exogenous antioxidants, including phenolic compounds from plant sources, may help to restore the pro-oxidative/antioxidative balance. To take into account effects of absorption, metabolisation, plasma protein binding, distribution, and elimination, antioxidative research should not be limited to in vitro assays but be extended to in vivo models. In the present work a quantified 50% EtOH root extract of Pueraria lobata (Wildd.) Ohwi (Fabaceae) was selected to determine its in vivo antioxidative activity in a diabetic rat model, where diabetes and the accompanying oxidative stress were induced by intraperitoneal administration of streptozotocin. This root extract was found to contain 10.42 ± 0.15% puerarin as the main constituent and smaller amounts of the related isoflavonoids 32-hydroxy puerarin, 32-methoxy puerarin, 63-xylosyl puerarin, daidzin, genistin, daidzein and genistein, as determined by a validated HPLC method. This extract was administered orally at a daily dose of 500mg/kg root extract, corresponding to 50mg/kg puerarin, during 3 weeks. In addition the effect on the plasma concentration of some fat-soluble antioxidants (co-enzyme Q9, α- and γ-tocopherol) was evaluated. The level of malondialdehyde (MDA) in plasma, used as a marker of oxidative damage to lipids, was reduced to the same level as in healthy control animals, and as in the positive control group treated daily with 50mg/kg α-tocopherol acetate. No obvious signs of toxicity were observed by administration of 10× the treatment dose [Lidiya Bebrevska, Kenne Foubert, Nina Hermans, Shyama Chatterjee, Eric Van Marck, Guido De Meyer, Arnold Vlietinck, Luc Pieters* and Sandra Apers (Laboratory of Pharmacognosy and Pharmaceutical Analysis, Department of Pharmaceutical Sciences, Faculty of Pharmaceutical, Biomedical and Veterinary Sciences, University of Antwerp, Universiteitsplein 1, 2610 Antwerp, Belgium), Journal of Ethnopharmacology, 2010, 127(1), 112-117].

NPARR 1(3), 2010-0503, Analgesic and anti-inflammatory effects of Cassia siamea Lam. stem bark extracts

The present study was carried out to investigate analgesic and anti-inflammatory activities of Cassia siamea Lam stem bark extracts. Cytotoxicity of each extract was also determined. C. siamea, a widespread medicinal plant traditionally used in sub-Saharan Africa, was collected in Congo Brazzaville. Stem bark was extracted with petroleum ether (CSE1), chloroform (CSE2), ethanol (CSE3) and water (CSE4). Analgesic, anti-inflammatory and antipyretic activities of these extracts were assessed in rats with hot plate test, paw pressure and carrageenan induced paw oedema. Cytotoxicity was assessed against KB and Vero cells. At the doses used (100, 200, and 400 mg/kg) ethanol and water extracts showed significant and dose-dependent analgesic and anti-inflammatory effects. None of the extracts had cytotoxic activity on KB and Vero cell lines and the most active extracts (CSE3 and CSE4) had no acute toxicity. The study highlighted the analgesic and anti-inflammatory of C. siamea stem bark. Four major families of compounds present in the plant may explain these activities: triterpenes (lupeol, oleanolic acid, ursolic acid, friedelin, betulin), flavonoids (apigenin, kaempferol, luteolin), anthraquinones (emodin), phytoestrogens (stigmasterol, beta-sitosterol) [G.F. Nsonde Ntandou, J.T. Banzouzi*, B. Mbatchi, R.D.G. Elion-Ito, A.W. Etou-Ossibi, S. Ramos, F. Benoit-Vical, A.A. Abena and J.M. Ouamba (Centre d’Etude et de Recherche Médecins d’Afrique (CERMA), B.P. 45,
Leucas cephalotes (Roth.) Spreng. (Lamiaceae) is an Ayurvedic traditional medicinal plant used in India, Nepal and Pakistan to treat several ailments including diabetes. The aim of the present study is to investigate the antidiabetic, antihyperlipaemic and antioxidant activities of Leucas cephalotes for its purported use in diabetes. The ethanol extract of leaves of Leucas cephalotes was administered (150, 300 and 450mgkg⁻¹ bw) to diabetes induced (IDDM and NIDDM) rats and carbohydrate, lipid, antioxidant, urea and creatinine profiles were assessed. All the three doses of extract decreased plasma glucose and lipid profiles and, improved the antioxidant status of both types of diabetic rats. The extract administration improved hepatic glycogen content and hexokinase activity, decreased glucose-6-phosphatase activity, blood urea, creatinine contents and decreased lipid peroxidation in diabetic rats. Of the three doses used, 450mgkg⁻¹ bw dose was found to be more potent in its effects comparable to those of glibenclamide and metformin. Thus it can be concluded that L. cephalotes regulates both carbohydrate and lipid metabolism and, improves body antioxidant defense systems in both types of diabetes. The extract administration improved hepatic glycogen content and hexokinase activity, decreased glucose-6-phosphatase activity, blood urea, creatinine contents and decreased lipid peroxidation in diabetic rats. Of the three doses used, 450mgkg⁻¹ bw dose was found to be more potent in its effects comparable to those of glibenclamide and metformin. Thus it can be concluded that L. cephalotes regulates both carbohydrate and lipid metabolism and, improves body antioxidant defense systems in both types of diabetes.

Nauclea latifolia Smith is used traditionally in the treatment of uncomplicated malaria and painful conditions among its several other applications. The objective of this study is to investigate the pharmacological activities of the plant relevant to the symptomatic treatment of malaria fever and other painful conditions as an initial step towards developing an effective therapy for the symptomatic management of malaria fever and relief of other painful conditions. Various concentrations of the aqueous extract of the root bark of this plant were evaluated for its anti-nociceptive, anti-inflammatory and anti-pyretic activities in mice and rats. Investigation of the anti-nociceptive activities was performed using the acetic acid-induced abdominal constriction and hot-plate tests in mice and formalin-induced pain test in rats, as models of nociception. The extract was also investigated for its effect against inflammation induced by egg-albumin and pyrexia induced by yeast in rats. Our data showed that the aqueous extract of Nauclea latifolia root bark (50-200mg/kg p.o.) significantly (P<0.05) attenuated writhing episodes induced by acetic acid and increased the threshold for pain perception in the hot-plate test in mice, dose-dependently. The product also remarkably decreased both the acute and delayed phases of formalin-induced pain in rats and also caused a significant reduction in both yeast-induced pyrexia and egg-albumin-induced oedema in rats. These effects were produced in a dose-dependent manner. The results suggest the presence of biologically active principles in the extract with anti-nociceptive, anti-inflammatory and anti-pyretic activities that justifies its use in malaria ethnopharmacy and subsequent development for clinical application [J. Abbah S. Amos, B. Chindo, I. Ngazal, H.O. Vongtau, B. Adzu, T. Farida, A.A. Odutola, C. Wambebe and K.S. Gamaniel (Programme in Neuroscience, Uniformed Services University of the Health Sciences, Bethesda, MD, USA), Journal of Ethnopharmacology, 2010, 127(1), 85-90].

Aqueous extracts from the roots of Althea officinalis Linn. (Malvaceae) are widely used for treatment of irritated mucosa. The clinical proven effects are related to the presence of bioadhesive and mucilaginous polysaccharides from the rhamnogalacturonan type, leading to the physical formation of mucin-like on top
of the irritated tissues. No data are available if the extracts or the polysaccharides from these extract exert an active influence on mucosal or connective tissue cells, in order to initiated changes in cell physiology, useful for better tissue regeneration. *In vitro* investigations of aqueous *A. officinalis* extract AE and raw polysaccharides (RPS) on epithelial KB cells and primary dermal human fibroblasts (pNHF) using WST1 vitality test and BrdU proliferation ELISA. Gene expression analysis by microarray from KB cells. Internalisation studies of polysaccharides were performed by laser scanning microscopy. AE (1, 10µg/mL) had stimulating effect on cell viability and proliferation of epithelial KB cells. RPS (1,10µg/mL) stimulated cell vitality of epithelial cells significantly without triggering the cells into higher proliferation status. Neither AE nor RPS had any effect on fibroblasts. FITC-labeled RPS was shown to be internalised into epithelial cells, but not into fibroblasts. FITC-RPS was shown to form bioadhesive layers on the cell surface of dermal fibroblasts. Microarray analysis indicated an up-regulation of genes related to cell adhesion proteins, growth regulators, extracellular matrix, cytokine release and apoptosis. Aqueous extracts and polysaccharides from the roots of *A. officinalis* are effective stimulators of cell physiology of epithelial cells which can prove the traditional use of Marshmallow preparations for treatment of irritated mucous membranes within tissue regeneration [Alexandra Deters, Janina Zippel, Nils Hellenbrand, Dirk Pappai, Cathileen Possemeyer and Andreas Hensel* (University of Münster, Institute for Pharmaceutical Biology and Phytochemistry (IPBP), Hittorfstraße 56, D-48149 Münster, Germany), *Journal of Ethnopharmacology*, 2010, 127(1), 62-69].

*NPARR* 1(3), 2010-0508, *The antidiabetic plants Tecoma stans* (L.) Juss. ex Kunth (Bignoniaceae) and *Teucrium cubense* Jacq (Lamiaceae) induce the incorporation of glucose in insulin-sensitive and insulin-resistant murine and human adipocytes

*Tecoma stans* (Linn.) Juss. ex Kunth. (Bignoniaceae) and *Teucrium cubense* Jacq (Lamiaceae) are plants extensively used for the empirical treatment of diabetes mellitus, but their antidiabetic mechanisms remain to be clarified. In this study, the effect of aqueous extracts of *Tecoma stans* (TSE) and *Teucrium cubense* (TCE) on the glucose uptake in adipose cells was evaluated. Non-toxic concentrations of TSE and TCE were assayed on the adipogenesis and 2-NBDglucose uptake in insulin-sensitive and insulin-resistant murine 3T3-F442A and human subcutaneous adipocytes.

Both extracts stimulated 2-NBDG uptake by insulin-sensitive and insulin-resistant adipocytes in a concentration-dependent manner. In insulin-sensitive cells, TSE 70µg/ml stimulated 2-NBDG uptake by
193% (murine) and by 115% (human), whereas the same concentration of TCE induced the 2-NBDG uptake by 112% (murine) and 54% (human). In insulin-resistant adipocytes, TSE induced the 2-NBDG uptake by 94% (murine) and 70% (human), compared with the incorporation shown by insulin-sensitive adipocytes stimulated by the hormone, whereas TCE induced the incorporation of 2-NBDG by 69% (murine) and 31% (human). On the other hand, TSE and TCE exerted only minimal or null proadipogenic effects on murine and human preadipocytes. *Tecoma stans* and *Teucrium cubense* exert their antidiabetic effects stimulating glucose uptake in both insulin-sensitive and insulin-resistant murine and human adipocytes without significant proadipogenic or antiadipogenic side effects [Angel Josabad Alonso-Castro, Rocio Zapata-Bustos, José Romo-Yañez, Paul Camarillo-Ledesma, Maricela Gómez-Sánchez and Luis A. Salazar-Olivo*(Instituto Potosino de Investigación Científica y Tecnológica, División de Biología Molecular, San Luis Potosí, SLP, Mexico), *Journal of Ethnopharmacology*, 2010, 127(1), 1-6]

NPARR 1(3), 2010-0510, Physical and biological properties of yam as a saliva substitute

The purpose of this study was to investigate the viscosity and wettability of a water-soluble extract of yam and its effects on lysozyme and peroxidase activities. Human whole saliva, yam tuber, hen egg-white lysozyme, and bovine lactoperoxidase were used. Viscosity was measured with a cone-and-plate digital viscometer, while wettability was determined by measuring the contact angle. Lysozyme activity was determined by the turbidimetric method. Peroxidase activity was determined using the NbsSCN assay. Hydroxyapatite beads were used as a solid-phase. The viscosity of the yam solution was proportional to its concentration, with diluted yam solutions at 1:5 and 1:10 in simulated salivary buffer displaying similar viscosity values to unstimulated whole saliva and stimulated whole saliva, respectively. The contact angle of yam solution was not significantly different according to the tested materials or yam concentrations. Contact angles of yam solutions on acrylic resin were higher than those of human saliva. Yam affected lysozyme and peroxidase activities, and those effects were different on the hydroxyapatite surface versus in solution. Hydroxyapatite-adsorbed yam increased subsequent adsorption of lysozyme and peroxidase. Thus the similarity of the viscoelastic properties of yam and human saliva, suggesting a role for yam in the development of effective saliva substitutes [Moon-Soo Park, Ji-Youn Chang, Yoon-Young Kim, Jeong-Hyun Kang and Hong-Seop Kho* (Department of Oral Medicine and Oral Diagnosis, School of Dentistry and Dental Research Institute, Seoul National University, Yunkeun-Dong 28, Chongro-Ku Seoul, Republic of Korea), *Archives of Oral Biology*, 2010, 55(2), 177-183].

NPARR 1(3), 2010-0510, Potent antibacterial property of APC protein from curry leaves (*Murraya koenigii* Linn.)

A monomeric protein with molecular mass of 35 kDa, isolated from *Murraya koenigii* Linn. (curry leaves) shows potent antibacterial activity. The protein designated as APC (antioxidant protein from curry leaves) demonstrated potent antibacterial activity against all the human pathogenic strains tested. APC effectively inhibited *Escherichia coli, Staphylococcus aureus, Vibrio cholerae, Klebsiella pneumoniae, Salmonella typhi* and *Bacillus subtilis*. The inhibition is comparable to that of commercial antibiotics chloramphenicol, streptomycin and gentamycin. APC inhibited bacterial growth, with MIC values ranging from 13 to 24 µg/ml, which are comparable to MIC values of standard antibiotics. APC is devoid of ribonuclease/deoxyribonuclease and protease activity. APC is non-toxic at tested doses. These results encourage further studies of APC as a potent therapeutic agent [Mylarappa B. Ningappa, B.L. Dhananjaya, R. Dinesha, R. Harsha and Leela Srinivas*(Adichunchanagiri Biotechnology and Cancer Research Institute, Balagangadharanatha Nagara, Mandya District, Karnataka 571 448, India), *Food Chemistry*, 2010, 118(3), 747-750].

NPARR 1(3), 2010-0511, Hepatoprotective effect of the root extract of *Decalepis hamiltonii* against carbon tetrachloride-induced oxidative stress in rats
Decalepis hamiltonii, a climbing shrub, grows in the forests of peninsular India and is consumed for its health promoting properties. The hepatoprotective activity of the aqueous extract of the roots of D. hamiltonii with known antioxidant constituents was studied against carbon tetrachloride (CCl₄)-induced oxidative stress and liver injury in rats. Pretreatment of rats with aqueous extract of the roots of D. hamiltonii, single (50, 100 and 200mg/kg b.w.) and multiple doses (50 and 100mg/kg b.w. for 7 days) significantly prevented the CCl₄ (1ml/kg b.w.) induced hepatic damage as indicated by the serum marker enzymes (AST, ALT, ALP, and LDH). Parallel to these changes, the root extract also prevented CCl₄-induced oxidative stress in the rat liver by inhibiting lipid peroxidation and protein carbonylation, and restoring the levels of antioxidant enzymes (SOD, CAT, GPx, GR, and GST) and glutathione. The biochemical changes were consistent with histopathological observations suggesting marked hepatoprotective effect of the root extract in a dose dependent manner. Protective effect of the aqueous extract of the roots of D. hamiltonii against CCl₄-induced acute hepatotoxicity could be attributed to the antioxidant constituents [Anup Srivastava* and T. Shivanandappa (Department of Pathology, Center for Free Radical Biology, University of Alabama at Birmingham, 901, 19th St. S., Rm #347, Birmingham, AL 35294, USA), Food Chemistry, 2010, 118(2), 411-417].

Fruits of wampee [Clausena lansium (Lour.) Skeels] contain a significant amount of coumarins with many health benefits. The activity-guided separation of an ethyl acetate-soluble fraction on a polyamide column followed by silica gel column and high performance liquid chromatography (HPLC) preparation afforded a pure compound, which was identified to be 8-hydroxypsoralen based on the ¹H, ¹³C NMR (nuclear magnetic resonance), and ESI-MS (electrospray ionisation mass spectrometric) analysis. This isolate exhibited good scavenging activities against DPPH radical and superoxide anion as well as significant reducing power. It also showed potent proliferation inhibitory activity against human hepatocellular liver carcinoma cell line (HepG2), human lung adenocarcinoma epithelial cell line (A549) and human cervical carcinoma cell line (HELA). This is the first report on the antioxidant and cytotoxic properties of C. lansium fruit extract. The food and pharmaceutical industry could be benefited by the usage of this extract containing this constituent [K. Nagendra Prasad, Haihui Xie, Jing Hao, Bao Yang, Shengxiang Qiu, Xiaoyi Wei, Fang Chen and Yueming Jiang* (South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, People’s Republic of China), Food Chemistry, 2010, 118(1), 62-66].

NPARR 1(3), 2010-0512, Antioxidant and anti-inflammatory activity of Caryophyllene oxide from Annona squamosa L. bark

Caryophyllene oxide was isolated from an unsaponified petroleum ether extract of the bark of Annona squamosa and studied for its analgesic and anti-inflammatory activity. Caryophyllene oxide at the doses of 12.5 and 25mg/kg body wt. and unsaponified petroleum ether extract at a dose of 50mg/kg body wt. showed significant central as well as peripheral analgesic, along with anti-inflammatory activity. These activities of caryophyllene oxide were comparable with the standard drug used in the respective experiments [M.J. Chavan, P.S. Wakte and D.B. Shinde* (Department of Chemical Technology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad 431 001, M.S., India), Phytomedicine, 2010, 17(2), 149-151].

NPARR 1(3), 2010-0513, Analgesic and anti-inflammatory activity of Caryophyllene oxide from Annona squamosa L. bark

Caryophyllene oxide was isolated from an unsaponified petroleum ether extract of the bark of Annona squamosa and studied for its analgesic and anti-inflammatory activity. Caryophyllene oxide at the doses of 12.5 and 25mg/kg body wt. and unsaponified petroleum ether extract at a dose of 50mg/kg body wt. showed significant central as well as peripheral analgesic, along with anti-inflammatory activity. These activities of caryophyllene oxide were comparable with the standard drug used in the respective experiments [M.J. Chavan, P.S. Wakte and D.B. Shinde* (Department of Chemical Technology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad 431 001, M.S., India), Phytomedicine, 2010, 17(2), 149-151].

NPARR 1(3), 2010-0514, Rose hip herbal remedy in patients with rheumatoid arthritis – a randomised controlled trial

The study was done to investigate if standardised powder made from rose-hip (Rosa canina) can reduce the symptom score in patients with rheumatoid arthritis. In a double-blind placebo-controlled trial, patients with rheumatoid arthritis (RA) according to ARA/ACR criteria were randomised to treatment with capsulated rose-hip powder 5g daily or matching placebo for 6 months at two outpatient clinics in Berlin and Copenhagen. Primary outcome variable was Health
Assessment Questionnaire (HAQ) at 6 months, secondary outcome included DAS-28, physician’s global evaluation of disease activity, RAQoL, SF-12 and concomitant pain medication. In a total of 89 patients (90% female, mean age 56.6±11.3 years, mean disease duration 12.8±9.6 years) HAQ-DI in the rose-hip group improved by 0.105±0.346, whereas in the placebo group it worsened by 0.039±0.253 (p adjusted=0.032). In the HAQ Patient Pain Scale no significant differences were observed between both groups. In the HAQ Patient Global Scale a trend was seen favouring rose-hip (p=0.078). The DAS-28 score yielded improvement in the rose-hip group of 0.89±1.32 and in the placebo group of 0.34±1.27 (p=0.056) indicating moderate clinical relevance. The Physicians Global Scale demonstrated more improvement in the rose-hip compared to the placebo group (p=0.012). RAQoL and SF-12 physical score improved significantly in the rose-hip group compared to placebo, whereas SF-12 mental score remained unchanged. Intake of pain medication was not different between the groups. Per-protocol analysis confirmed these results. The results indicate that patients with RA may benefit from additional treatment with rose hip powder [S.N. Willich, K. Rossnagel, S. Roll, A. Wagner, O. Mune, J. Erlendson, A. Kharazmi, H. Sörensen and K. Winther* (Frederiksborg Hospital, Department of Clinical Biochemistry, University of Copenhagen, Denmark), Phytomedicine, 2010, 17(2), 87-93].

NPARR 1(3), 2010-0515, Effect of green tea extract (catechins) in reducing oxidative stress seen in patients of pulmonary tuberculosis on DOTS Cat I regimen

The role played by free radicals in pathogenesis of pulmonary tuberculosis and treatment mediated toxicity is well established. Hence, the present study was undertaken to assess the effect of crude green tea catechin in reducing the oxidative stress seen in patients of AFB positive pulmonary tuberculosis. A total of 200 newly diagnosed cases of AFB positive pulmonary tuberculosis, who received CAT I regimen were enrolled consecutively from DOTS center. Out of 200 patients, 100 randomly selected patients received catechin (500µg) with antitubercular treatment (ATT) (cases) and 100 received starch (500µg) with ATT (control). Oxidative stress level in blood samples of cases and controls as compared at the time of enrollment and after one and four months of treatment. Oxidative stress was measured in terms of free radicals (lipid peroxidation, nitric oxide), enzymatic antioxidant (catalase, superoxide dismutase, glutathione peroxidase) and non enzymatic antioxidant (total thiol, reduced glutathione) levels. The results showed significant difference in all the parameters among cases and controls. A significant decrease (p≤0.001) in LPO level was observed in cases as compare to controls during the follow up while the level of NO was significantly increased (p≤0.001) in cases as compare to controls. Significant decrease (p≤0.001) in catalase and GPx level was observed in cases as compare to controls while SOD levels significantly rose (p≤0.001) in cases as compared to controls. Significant decrease (p≤0.001) in SH level was observed in cases as compared to controls while the level of GSH was significantly increased (p≤0.001). These findings suggest that crude catechin extract can play a definite role as adjuvant therapy in management of oxidative stress seen in pulmonary tuberculosis patients. More detailed studies are needed to document use of catechin in reducing the frequency and severity of side effects of treatment [Asthagollar, Rajendra Prasad and Amita Jain* (Department of Microbiology, Chhatrapati Shahuji Maharaj Medical University, Lucknow, UP 226003, India), Phytomedicine, 2010, 17(1), 23-27].

NPARR 1(3), 2010-0516, Insulin mimetic impact of Catechin isolated from Cassia fistula on the glucose oxidation and molecular mechanisms of glucose uptake on Streptozotocin-induced diabetic Wistar rats

Diabetes mellitus is the most common and serious metabolic disorder among people all over the world. Many plants have successfully been used to overcome this problem. Cassia fistula, an ethnomedicinal plant, is widely used in Indian medicine to treat diabetes. Methanol extract of stem of plant, reduced the blood glucose levels in Streptozotocin-induced diabetic rats. Bioassay guided fractionation was followed to isolate Catechin from methanol extract. Catechin was administered
to Streptozotocin (60mg/kg b.w.)-induced diabetic male Wistar rats at different doses (5, 10, 20mg/kg b.w.) for 6 weeks to assess its effect on fasting plasma glucose. The plasma glucose was significantly ($p<0.05$) reduced when compared to the control. Oral administration of Catechin (20 mg/kg b.w.) markedly increased tissue glycogen, and $^{14}$C-glucose oxidation without any change in plasma insulin and C-peptide. Catechin restored the altered Glucokinase, glucose-6 Phosphatase, Glycogen Synthase and Glycogen Phosphorylase levels to near normal. GLUT4 mRNA and protein expression were enhanced after Catechin treatment. The results of this experimental study indicated that Catechin possesses hypo-glycemic, Glucose oxidizing and insulin mimetic activities and hence it could be used as a drug for treating diabetes [P. Daisy*, K. Balasubramanian, M. Rajalakshmi, J. Eliza and J. Selvaraj (PG & Research Department of Biotechnology & Bioinformatics, Holy Cross College (Autonomous), Trichy 620002, Tamilnadu, India), Phytomedicine, 2010, 17(1), 28-36].

**NPARR 1(3), 2010-0517, Wound healing potential of methanolic extract of Trichosanthes dioica Roxb (fruits) in rats**

The present study provides a scientific evaluation for the wound healing potential of methanolic (MeOH) extract of TDR fruits. Excision and incision wounds were inflicted upon three groups of six rats each. Group I was assigned as control (ointment base), Group II was treated with standard silver sulfadiazine (0.01%) cream. Group III was treated with 5% MeOH extract ointment. The parameters observed were percentage of wound contraction, epithelialization period, hydroxyproline content, tensile strength including histopathological studies. It was noted that the effect produced by the extract ointment showed significant ($p<0.01$) healing in both the wound models when compared with control group. All parameters such as wound contraction, epithelialization period, hydroxyproline content, tensile strength and histopathological studies showed significant changes when compared to control. The result shows that TDR extract ointment demonstrates wound healing potential in both excision and incision models [Yogesh Shivhare, Pradeep K. Singour, U.K. Patil and R.S. Pawa* (Division of Phytochemistry and Pharmacognosy, VNS Institute of Pharmacy, Berkheda Nathu, Vidya Vihar, Neelbud, Bhopal 462003, M.P., India), Journal of Ethnopharmacology, 2010, 127(3), 614-619].

**NPARR 1(3), 2010-0518, Neuroprotective activity of Matricaria recutita Linn against global model of ischemia in rats**

Traditionally, the whole plant is used for various diseases, including neuronal disorders. To evaluate the neuroprotective effect of *Matricaria recutita* Linn. against global cerebral ischemia/reperfusion (I/R) injury-induced oxidative stress in rats. Neuroprotective activity was carried out by global cerebral ischemia on Sprague-Dawley rats by bilateral carotid artery (BCA) occlusion for 30min followed by 60min reperfusion. The antioxidant enzymatic and non-enzymatic levels were estimated along with cerebral infarction area and histopathological studies. The *M. recutita* Linn. methanolic extract showed dose-dependent neuroprotective activity by significant decrease in lipid peroxidation (LPO) and increase in the superoxide dismutase (SOD), catalase (CAT), glutathione (GSH) and total thiol levels in extract treated groups as compared to ischemia/reperfusion group. Cerebral infarction area was significantly reduced in extract treated groups as compared to ischemia/reperfusion group. The methanolic extract of *M. recutita* Linn. showed potent neuroprotective activity against global cerebral ischemia/reperfusion injury-induced oxidative stress in rats [V.M. Chandrashekhar*, V.L. Ranpariya, S. Ganapaty, A. Parashar and A.A. Muchandi (Department of Pharmacology, Hanagal Shri Kumareshwara College of Pharmacy, BVVS campus, Bagalkot-587101, Karnataka, India), Journal of Ethnopharmacology, 2010, 127(3), 645-651].

**NPARR 1(3), 2010-0519, Hepatoprotective activity of ethanolic extracts of bark of Zanthoxylum armatum DC. in CCl₄ induced hepatic damage in rats**

*Zanthoxylum armatum* DC. is described as a hepatoprotective in Ayurveda, the Indian system of medicine. However, there is no scientific basis or reports in the modern literature regarding its usefulness as...
a hepatoprotective agent. The present study was carried out to evaluate the hepatoprotective activity of ethanolic extract of bark of Zanthoxylum armatum DC. in CCl\textsubscript{4} induced hepatotoxicity in male Wistar rats. Ethanolic extracts at doses of 100, 200, and 400mg/kg were administered orally once daily for 7 days. The hepatoprotective activity was assessed using various biochemical parameters like alanine aminotransferase, aspartate aminotransferase, serum bilirubin, total protein and serum antioxidant enzymes along with histopathological studies of liver tissue. The substantially elevated serum enzymatic levels of serum transaminases, alkaline phosphatase and total bilirubin were significantly restored towards normalization by the extracts. Bark extracts significantly increased the levels of antioxidant enzymes: superoxide dismutase, catalase and glutathione. Phytochemical analysis revealed presence of isoquinoline alkaloid, berberine, as well as flavonoids and phenolic compounds, which have been known for their hepatoprotective activities. Z. armatum DC possesses significant protective effect against hepatotoxicity induced by CCl\textsubscript{4} which may be attributed to the individual or combined action of phytoconstituents present in it [Lalitsingh Ranawat, Jigar Bhatt and Jagruti Patel* (Department of Pharmacology, Institute of Pharmacy, Nirma University of Science and Technology, Sarkhej-Gandhinagar Highway, Ahmedabad 382481, India), Journal of Ethnopharmacology, 2010, 127(3), 777-780].

**Cassia occidentalis Linn.: A review on its ethnobotany, phytochemical and pharmacological profile**

*Cassia occidentalis* Linn. is an annual or perennial Ayurvedic plant which is used in several traditional medicines to cure various diseases. This weed has been known to possess antibacterial, antifungal, antidiabetic, anti-inflammatory, anticancerous, antimutagenic and hepatoprotective activity. A wide range of chemical compounds including achrosin, aloe-emodin, emodin, anthraquinones, anthrones, apigenin, aurantioiutisin, campesterol, cassiollin, chryso-obtusin, chrysophanic acid, chrysoarbin, chrysophanol, chrysoeriol etc. have been isolated from this plant. The presented review summarizes the information concerning the botany, ethnopharmacology, phytochemistry, biological activity and toxicity of the *C. occidentalis* plant [J.P. Yadav*, Vedpriya Arya, Sanjay Yadav, Manju Panghal, Sandeep Kumar and Seema Dhankhar (Department of Genetics, M. D. University, Rohtak-124001, Haryana, India), Fitoterapia, 2010, 81(4), 223-230].

**NPARR 1(3), 2010-0521. Antidiarrhoeal activity of Zingiber officinale Rosc.**

*Zingiber officinale* (ginger) was studied for its antimicrobial profile and effect on virulent features of diarrhoeal pathogens, viz. colonization of epithelial cells and production of enterotoxins. *Z. officinale* showed no antimicrobial activity. Although it inhibited the production of cholera toxin, it had no effect on the action of this toxin. It also had no effect on the production and action of *E. coli* heat labile and heat stable toxins. However the bacterial colonization of HEp-2 cells was reduced. The results indicate that in the absence of antimicrobial action, *Z. officinale* exhibits its antidiarrhoeal activity by affecting bacterial and host cell metabolism. The present study reports a novel mechanism of action by *Z. officinale* in infectious diarrhea [Poonam G. Daswani, S. Brijesh, Pundarikakshudu Tetali, Noshir H. Antia1, and Tannaz J. Birdi* (The Foundation for Medical Research, 84A, R.G. Thadani Marg, Worli, Mumbai 400 018, India), Current Science, 2010, 98(2), 222-229].

**VEGETABLES**

**NPARR 1(3), 2010-0522. Physico-chemical and pasting properties of starch from stored potato tubers**

Starch was separated from tubers of four potato (*Solanum tuberosum* Linn.) cultivars, viz. ‘Kufri Jyoti’, ‘Kufri Sindhuri’, ‘Kufri Chipsona-1’ and ‘Kufri Chipsona-2’ before and after 90 days of storage at 4, 8, 12 and 16°C and, morphological, physico-chemical and pasting properties were studied. Scanning electron microscopy showed oval and irregular shaped starch granules with average diameter of 15µm, and the granule diameter increased after storage. Peak viscosity was lower after storage at 8°C and higher at 16°C. Hot paste viscosity decreased while breakdown viscosity and set back viscosity increased after storage, and there