

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA

Newsletter

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The **Phytochemical Society of North America** is a nonprofit scientific organization whose membership (currently over 400) is open to anyone with an interest in phytochemistry, the role of plant substances, and related fields. Annual membership dues are \$20.00 for regular members and \$10.00 for student members. Annual meetings featuring symposium topics of current interest and contributed papers by conference participants are held throughout the United States, Canada, and Mexico. A newsletter is circulated to members several times a year to keep them informed of upcoming meetings and developments within the Society.

If you would like additional information about the PSNA or if you have material to be included in the newsletter, please contact the Society secretary. Annual dues and changes in addresses should be sent to the Society treasurer.

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA NEWSLETTER



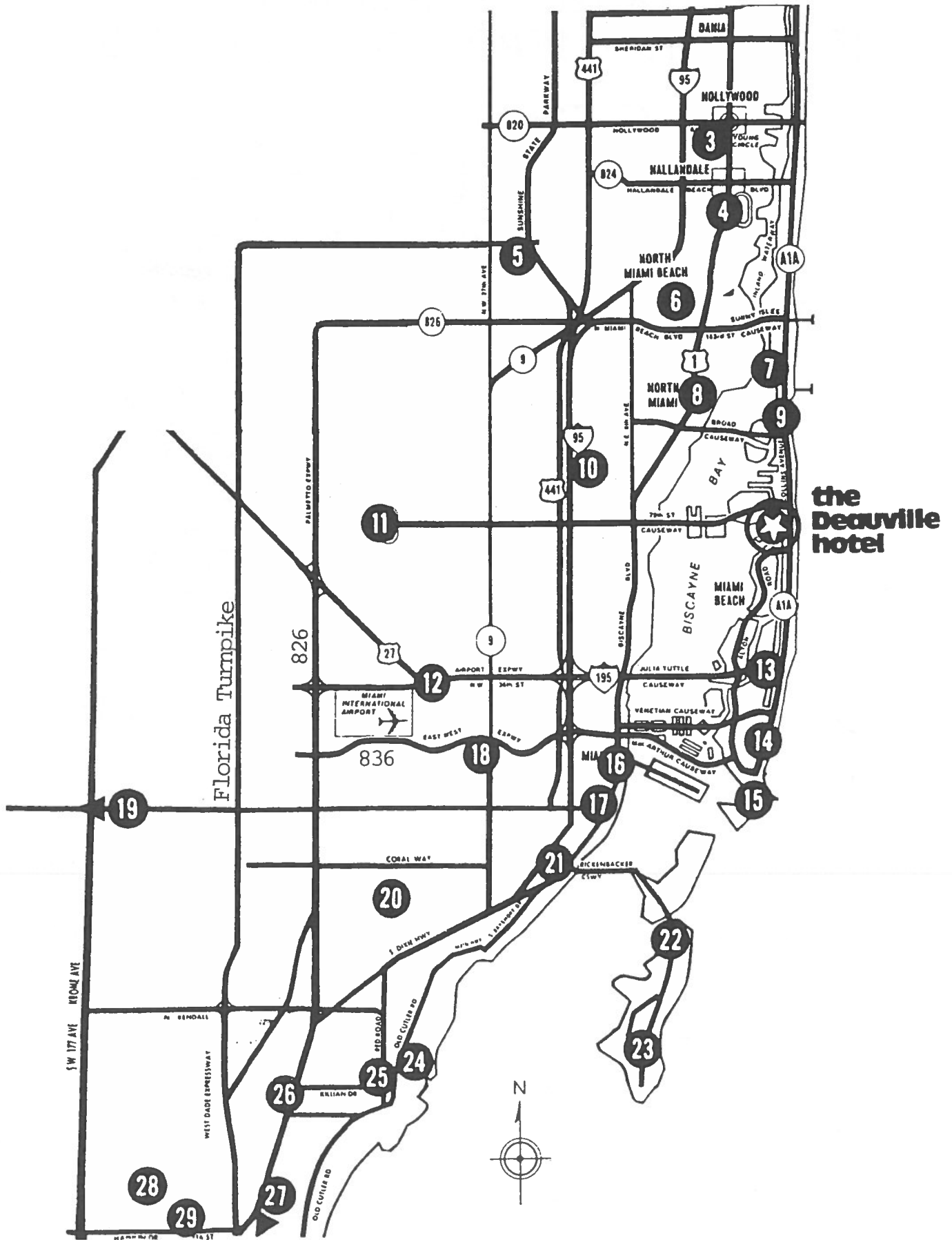
AUGUST, 1992

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MAP OF MIAMI BEACH MEETING AREA



"PHYTOCHEMICAL POTENTIAL OF TROPICAL PLANTS" PROGRAM

SECOND JOINT MEETING OF THE PHYTOCHEMICAL SOCIETIES OF EUROPE AND NORTH AMERICA

SATURDAY, AUGUST 08

4:00 PSNA Executive Committee Meeting

6:00 WELCOME RECEPTION (Richelieu Room) - Registration will be open from 6:00 - 9:00

SUNDAY, AUGUST 09 - Registration will be open from 8:30am - 12:30pm

8:45 WELCOME - PSNA & PSE Presidents (Le Jardin)

SYMPOSIUM SESSION I - Kelsey R. Downum, Chair (Le Jardin)

9:00 **Symposium Paper 1** - FROM SHAMAN TO HUMAN CLINICAL TRIALS: ETHNOBOTANICAL DRUG DISCOVERY, TROPICAL FORESTS AND THE CONSERVATION IMPERATIVE. S.R. King & M.S. Tempesta.

9:50 **Symposium Paper 2** - CHEMICAL STUDIES AND BIOLOGICAL ASPECTS OF SOME MEXICAN PLANTS USED IN TRADITIONAL MEDICINE. R. Mata.

10:40 Coffee Break

11:10 **Symposium Paper 3** - PLANT CELL CULTURE AND CHEMISTRY - ROUTES TO NATURAL PRODUCTS AND RELATED COMPOUNDS. J.P. Kutney.

12:00 Lunch (Posters should be put up during this time)

CONTRIBUTED PAPER SESSION I - C.F. Van Sumere, Chair (Le Jardin)

1:30 **Oral 1** - CHEMICAL SYNTHESIS AND SPECTROSCOPY OF RING A C-PRENYLATED FLAVONES AND FLAVONOLS. D. Barron, C.E. Aidi & A.-M. Mariotte.

1:45 **Oral 2** - DIACLEIN, A NEW FLAVANONE FROM THE ROOTS OF *DIACLEA GRANDIFLORA* MART. ex BENTH. J. Bhattacharyya & J.S. Batista.

2:00 **Oral 3** - CHROMONE ALKALOIDS AND COUMARINS FROM *SCHUMANNIOPHYTON PROBLEMATICUM* (A. CHEV.) AUBREV. P.J. Houghton, E. Abdurahman & T. Woldemariam.

2:15 **Oral 4** - FRIEDELIN, THE MOST PREVALENT COMPONENT OF GRAPEFRUIT WAX. H.E. Nordby & R.E. McDonald.

2:30 **Oral 5** - REGULATION AND ROLE OF SECONDARY METABOLISM IN SOME *CINCHONA* SPECIES. R. Verpoorte, R. van der Heijden & R.J. Aerts.

2:45 Coffee Break

- 3:15 **Oral 6** - INSECTICIDAL CONSTITUENTS OF *AZADIRACHTA INDICA* AND OTHER MELIACEAE SPECIES. W. Kraus, M. Bokel, R. Cramer, H. Gutzeit, B. Herr, I. Kaufmann-Horlacher, R. Keller, H. Pohnl, R. Soellner, R. Stiffens, S. Thiele, B. Vogler, U. Wachendorff, D. Wendisch & Y. Zhou-Halwart.
- 3:30 **Oral 7** - ISOLATION AND IDENTIFICATION OF INSECTICIDAL CONSTITUENTS FROM *AGLAIA ODORATA* (LOUT.) (MELIACEAE). F. Ishibashi, C. Satasook, D.E. Champagne, M.B. Isman, & G.H.N. Towers.
- 3:45 **Oral 8** - PLANT ECOCHEMICALS AND THEIR ROLES IN PLANT-PLANT, PLANT-MICROORGANISM AND PLANT-INSECT/NEMATODE INTERACTIONS. J. Mizutani.
- 4:00 **Oral 9** - THIARUBRINE-A: A MUSHROOM POISONING ANTIDOTE. M. Aregullin & E. Rodriguez.
- 4:15 **Oral 10** - FOOD SPICES: A NATURAL SOURCE OF ANTIPLATELET AND ARACHIDONIC ACID METABOLISM ALTERING DRUGS. K.C. Srivastava.

POSTER SESSION I - Peacock Alley & Upper Convention Lobby

7:30 - 9:30 Authors for Posters 1-26 are asked to be present at their posters during this time.

Poster 1 - VELUTINOL A, AN ANTI-INFLAMMATORY COMPOUND FROM *M. VELUTINA* L. R.A. Yunes, M.G. Pizzolatti, J.B. Calixto, A.E. Goulart Sant Ana & G.E. Hawkes.

Poster 2 - UTILITY OF THE PHYTOCHEMICAL DATABASE. S.M. Beckstrom-Sternberg.

Poster 3 - IDENTIFICATION OF QUERCETIN GLYCOSIDES IN EXTRACTS OF *PSIDIUM GUAJAVA* L. (MYRTACEAE) LEAVES WITH SPASMOLYTIC ACTIVITY. M.M. Abou-Zaid, X. Lozoya, C. Nozzolillo & J.T. Arnason.

Poster 4 - ANTIFEEDANT ACTIVITY OF DIHYDRO- β -AGAROFURAN SESQUITERPENES FROM *MAYTENUS CANARIENSIS* (CELASTRACEAE). I. L. Bazzocchi, I.A. Jaménez, A.G. González, A.G. Ravelo.

Poster 5 - ANTIMICROBIAL ACTIVITY OF LAPACHOL-RELATED NAPHTHOQUINONES. L. Moujir, E.A. Ferro, A. Wildpret, A.G. Ravelo & A.M. Gutiérrez-Navarro.

Poster 6 - COUMARINS AS ANTIMITOTICS. A.M. Zobel, S. Louis, A. Keightley, M. Podbielkowska, E. Kupidlowska, K. Dobrzynska & M. Waleza.

Poster 7 - THE ACCUMULATION OF JATROPHONE AND RELATED COMPOUNDS IN TISSUE CULTURES OF *JATROPHA* SPECIES. M. Pletsch & B.V. Charlwood.

Poster 8 - THE FIRST TRI-C-GLYCOSYLFLAVONOID FROM THE FERN *ASPLENIUM VIVIPARUM*. F. Imperato.

Poster 9 - PHYTOCHEMICAL STUDIES ON TRITERPENOID SAPONINS ISOLATED FROM CELL SUSPENSION CULTURES OF *CALENDULA OFFICINALIS*. S.C. Franca, N. De Tommasi, C. Pizza & B.V. Charlwood.

Poster 10 - NOVEL D:A-FRIEDO-OLEANANE TRITERPENES FROM THE STEM BARK OF *PHYLLOBOTRYON SPATHULATUM*. S. Gibbons.

Poster 11 - R. Pereda-Miranda, L. Hernández, M.J. Villavicencio, M. Novelo & J.M. Pezzuto. PECTINOLIDES A-C, NOVEL ANTIMICROBIAL AND CYTOTOXIC 5,6-DIHYDRO- α -PYRONES FROM *HYPTIS PECTINATA* (LAMIACEAE).

*Poster 12 - ASSESSMENT OF RELATIVE ADVANCEMENT OF LEGUME SPECIES BY THE USE OF THEIR LEAF FLAVONOID AGLYCONE PATTERNS. J.C. Onyilagha & J.B. Harborne.

Poster 13 - INTRAVACUOLAR POOLS OF ANTHOCYANINS AND COPIGMENTS IN GRAPEVINE (*VITIS VINIFERA* L.) SUSPENSION CULTURES. C.B. Do & F. Cormier.

Poster 14 - PHENOLIC CONSTITUENTS OF TROPICAL PROPOLIS. ITS PLANT ORIGIN AND DIFFERENCES WITH PROPOLIS FROM OTHER GEOGRAPHICAL REGIONS. F.A. Tomás-Barberan, F. Tomás-Lorente, C. García-Viguera & F. Ferreres.

Poster 15 - ANTI-VIRAL EFFECTS OF FLAVONOIDS AGAINST POTATO VIRUS X. C.J. French, & G.H. Neil Towers.

Poster 16 - SECONDARY COMPOUNDS AND PLANT SELECTION BY THE LEAF-CUTTING ANT *ACROMYRMEX STRIATUS*. J.P. Pelotto & M.A. Del Pero Martínez.

Poster 17 - ONE HEAVY METAL AS A PHYTOALEXIN INDUCER IN WATER HYACINTH. M.E. Webb & J.S. Olivaira.

Poster 18 - INSECT ANTIFEEDANT ACTIVITY OF SOME NATURAL PRODUCTS ISOLATED FROM INDIAN PLANTS. K. Nagaiah, M. Narayana Rao, R. Jagdish Kumar & G. Srimannarayana.

Poster 19 - ECUADORAN MEDICINAL PLANTS I, PRELIMINARY INVESTIGATION OF THE C. LIMBACH, M.D. COLLECTION OF SHUAR (JIVARO) MEDICINAL PLANTS. C. Limbach, D. Daly, G.W.W. Slywka, N. Newmann, & R.J. Krueger.

Poster 20 - SEMI-PREPARATIVE ISOLATION AND QUANTITATIVE ANALYSIS OF STEROIDAL GLYCOALKALOIDS IN POTATO. K. Fukuhara, I. Kubo & A. Kubo.

*Poster 21 - DISTRIBUTION OF ERGOT ALKALOIDS IN THE GENUS *IPOMOEA* (CONVOLVULACEAE). D. Amor-Prats & J.B. Harborne.

Poster 22 - RELATIONSHIP OF THE PHEROMONES OF SOME PREDACEOUS INSECTS TO GREEN LEAF VOLATILES. J.R. Aldrich.

Poster 23 - CARDENOLIDE BIOSYNTHESIS FROM ACETATE AND MALONATE IN *ASCLEPIAS CURASSAVICA*. H.W. Groeneveld, A. Binnekamp & D. Seykens.

Poster 24 - ALKALOID ACCUMULATION IN *CATHARANTHUS ROSEUS* CELL SUSPENSION CULTURES EXPOSED TO SALT STRESS. F.A. Vazquez-Flota, M. Méndez-zeel & V.M. Loyola-Vargas.

*Poster 25 - TRYPTOPHAN DECARBOXYLASE ACTIVITY AND BIOSYNTHESIS OF AJMALICINE AND CATHARANTHINE IN HAIRY ROOTS FROM *CATHARANTHUS ROSEUS*. I.R. Islas, V.M. Loyola-Vargas & M. de Lourdes Miranda-Ham.

Poster 26 - EFFECT OF GLYCOPROTEINACEOUS ELICITORS ON THE ALKALOID PRODUCTION OF HAIRY ROOTS OF *CATHARANTHUS ROSEUS*. Oscar A. Moreno-Valenzuela & Victor M. Loyola-Vargas.

Poster 27 - EFFECT OF INITIAL PH OF CULTURE MEDIA ON GROWTH AND ALKALOID PRODUCTION IN HAIRY ROOT CULTURES OF *CATHARANTHUS ROSEUS*. R. Ciau-Uitz, O.A. Moreno & V.M. Loyola-Vargas.

MONDAY, AUGUST 10

DAY TRIP TO FAIRCHILD TROPICAL GARDEN (Organized by T. Walters, FTG)

8:45 Leave for FTG by chartered bus

9:30 First tram tour of FTG

10:30 Second tram tour of FTG

11:30 THE ROLE OF THE FAIRCHILD TROPICAL GARDEN IN THE 90'S: SETTING AN AGENDA FOR THE 21ST CENTURY. W. Klein, Director of FTG (FTG Auditorium).

12:30 Lunch (box lunches will be provided) - Corbin Bldg. & Courtyard

SYMPOSIUM SESSION II - Murray B. Isman, Chair (FTG Auditorium)

2:00 **Symposium Paper 4** - RECENT ADVANCES IN THE ACETOGENINS OF ANNONACEAE. A. Cavé.

2:50 **Symposium Paper 5** - PHYTOCHEMICAL DIVERSITY IN THE ORDER RUTALES. P.G. Waterman.

3:30 Return to Deauville Hotel

POSTER SESSION II - Peacock Alley & Upper Convention Lobby

7:30 - 9:30 Authors for Posters 28-55 are asked to be present at their posters during this time.

Posters denoted by (*) are entered in **BEST POSTER COMPETITION**.

Poster 28 - USE OF ACETYLSALICYLIC ACID FOR ANTHOCYANIN PRODUCTION IN *CATHARANTHUS ROSEUS* CELL SUSPENSION CULTURES. G. Godoy-Hernández, Y. Minero-García & V.M. Loyola-Vargas.

Poster 29 - EFFECT OF MODIFYING THE COMPONENTS OF THE CULTURE MEDIUM ON THE GROWTH AND ALKALOID CONTENT OF HAIRY ROOTS OF *DATURA STRAMONIUM*. L.A. Sáenz-Carbonell & V.M. Loyola-Vargas.

Poster 30 - A RAPID PROCEDURE FOR THE ISOLATION OF INDOLE ALKALOIDS FROM CALLUS CULTURES OF *CATHARANTHUS ROSEUS*. M. Monforte-González, L.M. Peña Rodríguez, M.A. Herrera Alamillo, C. De Los Santos Briones & V.M. Loyola-Vargas.

Poster 31 - THE EFFECTS OF ELICITORS AND ABIOTIC STRESSES ON PHYTOALEXIN PRODUCTION BY DANDELION CELL CULTURE. F. Hanawa & J. Mizutani.

Poster 32 - IRIDOIDS AND NAPHTHAQUINOIDS FROM *KIGELIA PINNATA* DC. P.J. Houghton.

Poster 33 - FRACTIONING OF THE OILS FROM *COPAIFERA* SPECIES BY CHROMATOGRAPHY IN SILICA MODIFIED WITH KOH. HRGC/MS AND HRGC/FT-IR ANALYSIS. A.C. Pinto, W.F. Braga, O.A.C. Antunes, V.F. Veiga Jr. & M.L. Patitucci.

Poster 34 - GLUCOSIDES IN THE ANGIOSPERM FAMILY EPACRIDACEAE. S.R. Jensen & S. Damtoft.

- *Poster 35** - TWO POTENT BIOACTIVE COMPOUNDS FROM *ANNONA SQUAMOSA* L. SEED. M.A. Malek & R.M. Wilkins.
- Poster 36 - NEW TAXANES FROM *TAXUS WALLICHIANA* ZUCC. G. Appendino, P. Gariboldi, L. Barboni, B. Gabetta & E. Bombardelli.
- *Poster 37** - SYSTEMIC INSECTICIDE ACTIVITY AGAINST *MYZUS PERSICAE* OF A PYRROLIDINE ALKALOID. A.A. Watson, M.S.J. Simmonds, E.A. Porter, W.M. Blaney & L.E. Fellows.
- Poster 38 - ANALYSIS OF DUTCH *PSILOCYBE SEMILANCEATA* -HY-APATITE AS COLUMN PACKING MATERIAL FOR THE ANALYSIS AND ISOLATION OF PSILOCYBIN AND BEAOCYSTIN. G. Boers, J. Kettenes-van den Bosch & W. van der Sluis.
- Poster 39 - FUNGAL ACTIVITY OF LENTIL (*LENS CULINARIS* MEDIK.) SEED EXUDATES. C. Nozzolillo, M. Bhalla, A. Koul, K. Boutilier & N. Capello.
- Poster 40 - ETHNOBOTANICAL DRUG DISCOVERY BASED ON MEDICINE MEN'S TRIALS IN THE AFRICAN SAVANNA. I. Kubo & M. Taniguchi.
- Poster 41 - FURANOCOUMARINS AS AUTOINHIBITORS OF GERMINATION. A.M. Zobel & A.M. Keightley.
- Poster 42 - PHOTOCHEMICAL ALLELOPATHIC ACTIVATION IN THE FLORIDA SCRUB. N.H. Fischer, H. Tak & G.B. Williamson.
- *Poster 43** - HYDROXAMIC ACIDS: PHYTOCHEMICAL FACTORS INVOLVED IN MAIZE RESISTANCE TO WESTERN CORN ROOTWORM, *DIABROTICA V. VIRGIFERA*. Y. Xie, J.T. Arnason & B.J.R. Philogène.
- Poster 44 - ALKALOID PRODUCTION AND CELL DIVISION IN A HAIRY ROOT CULTURE OF *C. ROSEUS*. L. Terpán-Acuña, V. Loyola-Vargas, A.M. Biña.
- Poster 45 - COUMARINS FROM *PILOCARPUS RIEDELIANUS* (CULTIVAR) RECOGNITION. Adolfo H. Müller, Luis R.O. Degaspari, Paulo C. Vieira, João B. Fernandes and M. Fátima das G.F. da Silva.
- Poster 46 - LIMONIDS AND LIGNANS FROM *TRICHILIA ESTIPULATA* (MELIACEAE). Diógenes A.G. Cortez, João B. Fernandes, Paulo C. Vieira and M. Fátima das G.F. da Silva.
- *Poster 47** - LAMIALES: ETHNOPHARMACOLOGY VS. CHEMISTRY. F. de S. Menezes, M. Auxiliadora, C. Kaplan & O.R. Gottlieb.
- *Poster 48** - CHEMICAL AND ANTIMICROBIAN ANALYSIS OBTAINED OF ESSENTIAL OILS OF *ANNONACEAE*. M. de Q. Paulo, E. de O. Lima, E.F. Queiroz, M.A.C. Kaplan.
- *Poster 49** - CHEMICAL STUDY AND ANTIMICROBIAN ANALYSIS OF ESSENTIAL OILS OBTAINED FROM *CROTON RANGELIANUS*. E. de O. Lima, M. de Q. Paulo, O.F. Gompertz, E. Paul.
- *Poster 50** - UTILIZATION OF MEDICINAL PLANTS FROM THE NORTHEAST REGION OF BRAZIL. J.F.S. Filho, E. de O. Lima, M. de Q. Paulo.
- *Poster 51** - PHYTOCHEMICAL AND BIOLOGICAL ACTIVITY OF POLYPHENOLS IN GERANIACEAE. S.V. Ivancheva & G. Velev.
- *Poster 52** - POLYPHELOLS AND RP-HPLC PLANT (CULTIVAR) RECOGNITION. E. Everaert, L. De Cooman, K. Vande Castele, W. Hutsebaut & C.F. Van Sumere.

*Poster 53 - ALLELOCHEMICALS FROM *AEGIPHILA OBDUCTA*. Suzana G. Leitão, M.A.C. Kaplan, Franco Delle Monache and Edward Nyandat.

*Poster 54 - A NEW ALKALOID N-OXIDE FROM THE STEMS OF *ARISTOLOCHIA GIGANTEA* MART. & ZUCC. Gilda G. Leitão, M.A.C. Kaplan and C. Galeffi.

*Poster 55 - A NEW CLERODANE DITERPENE FROM THE ROOTS OF *ARISTOLOCHIA CYMBIFERA* M. E ZUCC. Gilda G. Leitão, M.A.C. Kaplan and C. Galeffi.

TUESDAY, AUGUST 11

SYMPOSIUM SESSION III - Peter Lea, Chair (Le Jardin)

- 9:00 Symposium Paper 6 - PHYTOCHEMICAL RESISTANCE TO INSECTS IN TROPICAL PLANTS. J. Arnason, S. MacKinnon, C. Hasbun, M. Isman, G.H.N. Towers, P. Wiriyaichitra, J.L. McLaughlin, J.L. Mihm.
- 9:50 Symposium Paper 7 - INSECT CONTROL AGENTS FROM TROPICAL PLANTS. I. Kubo.
- 10:40 Coffee Break
- 11:10 Symposium Paper 8 - PHYTOCHEMISTRY AND BIOLOGICAL ACTIVITY OF METABOLITES FROM TROPICAL MELIACEAE. H. Rembold & I. Puhlmann.
- 12:00 Lunch

CONTRIBUTED PAPER SESSION II - James Saunders, Chair (Le Jardin)

BEST PAPER COMPETITION

- 2:00 Oral 11 - MEDICINAL PLANTS USED BY FISHING COMMUNITIES OF THE ATLANTIC FOREST (SOUTHEAST BRAZIL). A. Begossi, H.F. Leitão-Filho, G.M. Figueiredo, & S.C. Rossato.
- 2:15 Oral 12 - ENZYMATIC PRENYLATION OF ISOFLAVONES IN *LUPINUS ALBUS*. P. Laflamme, H.E. Khouri, P.J. Gulick, R.K. Ibrahim.
- 2:30 Oral 13 - ANTIVIRAL ACTIVITY IN MEDICINAL PLANTS OF YUNNAN PROVINCE IN SOUTHWEST CHINA. L. Yip, G.H.N. Towers & J.B. Hudson.
- 2:45 Oral 14 - A COMPARATIVE STUDY OF THE INFLUENCE OF PLANT CHEMICAL DEFENSES ON AN INSECT PARASITOID. N. Mallampalli & P. Barbosa.
- 3:00 Coffee break
- 3:15 Oral 15 - TISSUE AND SUBCELLULAR LOCALIZATION OF ENZYMES CATABOLIZING (R) - AMYGDALIN IN BLACH CHERRY (*PRUNUS SEROTINA* EHRH.) SEEDS. E. Swain, C.P. Li & J.E. Poulton.
- 3:30 Oral 16 - CHEMICAL STUDIES AND BIOLOGICAL ASPECTS OF TURKISH AMARYLLIDACEAE PLANTS. B. Sener.
- 3:45 Oral 17 - A REPORT ON TOTAL TANNIN LEVELS AND RELATIVE ASTRINGENCY IN TEAS. P.J. Rider, A.D. Marderosian & J.R. Porter.

4:00 Annual PSNA Business Meeting

7:00 - 10:00 PSE/PSNA BANQUET (Richelieu Room)

After dinner talk - TROPICAL PHYTOCHEMISTRY, DRUG DISCOVERY AND HELPFUL HINTS FOR THE UNWARY NOVICE. G.H.N. Towers.

WEDNESDAY, AUGUST 12

SYMPOSIUM SESSION IV - John Romeo, Chair (Le Jardin)

- 9:00 Symposium Paper 9 - TROPICAL PLANTS AS SOURCES OF ANTIPROTOZOAL AGENTS. J.D. Phillipson, C.W. Wright, G.C. Kirby & D.C. Warhurst.
- 9:50 Symposium Paper 10 - BIOLOGICAL AND CHEMICAL POTENTIAL OF TWO VERBENACEAE SPECIES USED IN COSTA RICA AS ANTIDIARRHETIC AGENTS. O. Castro C., I. Castro G., E. Umaña R.
- 10:40 Coffee Break
- 11:10 Symposium Paper 11 - ZOOPHARMACOGNOSY: MEDICINAL PLANTS USED BY WILD APES AND MONKEYS. E. Rodriguez and R. Wrangham.
- 12:00 Lunch

CONTRIBUTED PAPER SESSION III - David Kuhn, Chair (Le Jardin)

- 1:30 Oral 18 - GLYCOSIDASE INHIBITORS IN TROPICAL PLANTS. R.J. Nash, L.E. Fellows, G.C. Kite & E.A. Porter.
- 1:45 Oral 19 - POLYPHENOLS AND RP-HPLC PLANT (CULTIVAR) RECOGNITION. E. Everaert, L. De Cooman, K. Vande, Castele, W. Hutsebaut & C.F. Van Sumere.
- 2:00 Oral 20 - BIOSYNTHESIS OF FLAVOUR COMPOUNDS IN DEVELOPING FRUITS OF *VANILLA PLANIFOLIA*. Peter E. Brodelius.
- 2:15 Oral 21 - PRODUCTION OF TRANSGENIC PLANTS WHICH OVEREXPRESS TRYPTOPHAN DECARBOXYLASE AND WHICH ACCUMULATE TRYPTAMINE. S. Chavadej, J. Basurco, N. Brisson & V. De Luca.
- 2:30 Coffee break
- 3:00 Oral 22 - LARGE SCALE CULTURE OF PLANT ORGANS FOR PRODUCTION OF THE SECONDARY METABOLITES. M. Akita, T. Shigeoka, Y. Koizumi, Y. Kobayashi & M. Kawamura.
- 3:15 Oral 23 - NEW LENTICELLARANE ALKALOIDS FROM *DYSOXYLUM LENTICELLARE*. A.J. Aladesanmi & J.J. Hoffmann.
- 3:30 Oral 24 - SIGNIFICANT BIOLOGICAL ACTIVITIES OF DIFFERENT PARTS OF THE PLANT *NYCTANTHES ARBORTRISTIS* LINN. J.S. Tandon, V. Srivastava, P.Y. Guru, K.C. Srivastava, K.C. Saxena, Z.K. Kahn & P.P. Gupta.

- 3:45 **Oral 25 - DIOXATRIQUINANE DERIVATIVES AS INTERMEDIATES IN THE BIOSYNTHESIS OF AZADIRACTIN.** W. Kraus, M. Bokel, R. Soillner, B. Vogler, D. Wendisch & Y. Zhou-Halwart.
- 4:00 **Oral 26 - ANTIPLATELET CONSTITUENTS OF GARLIC (*ALLIUM SATIVUM*).** K.C. Srivastava.
- 4:15 **MEETING ADJOURNED**

PHYTOCHEMICAL POTENTIAL OF TROPICAL PLANTS

SYMPOSIUM ABSTRACTS

Symposium Paper 1 - Sunday 9:00

FROM SHAMAN TO HUMAN CLINICAL TRIALS: ETHNOBOTANICAL DRUG DISCOVERY, TROPICAL FORESTS AND THE CONSERVATION IMPERATIVE.

Steven R. King & Michael S. Tempesta, Shaman Pharmaceuticals, Inc. 887 Industrial Road, Suite G, San Carlos, Ca. 94070-3312, USA.

People in the tropical forests of the world have utilized plants as part of their primary health care systems for millennia. In the new world tropics archaeological remains of plants utilized as medicine have been dated to 8,000 B.C. This human plant medical interdependency continues today for at least 80% of the worlds population. Both the medicinal plant knowledge systems and tropical forest ecosystems are being erased at an unprecedented and unacceptable rate. The loss of this biocultural diversity is producing the greatest immediate impact on the people of the tropical forest. In the future the loss of biocultural diversity will have a negative effect on the entire global population as we search for treatments for new diseases such AIDS.

Plants used as medicine are often the most accessible and appropriate therapy for a wide diversity of health problems. Indigenous and local people often cultivate and transplant wild medicinal plants in and around their homes and villages. Plant derived medicine is commonly employed to treat fevers, fungal infections, burns, gastrointestinal problems, pain, respiratory problems, wounds, as antidotes to toxic organisms and for many other health problems.

One of the primary causes of tropical forest loss is poverty. People seeking to feed, clothe and care for their families often have no other viable alternative except clearing new areas of forests every 2-3 years. Without reasonable economic alternatives both protected areas such as national parks and unprotected tropical forests will continue to be destroyed.

This pattern of tropical forest destruction has created a global crisis that is stimulating a number of innovative solutions. One of the most effective alternative methods of providing benefits to people and tropical forests involves the marketing of Non-Timber Forest Products (NTFP). This strategy requires that local and indigenous forest dwellers receive a larger portion of the retail market value of a wide diversity of forest products such as oils, foods, spices, nuts, artwork and plants for the herbal and pharmaceutical markets. The value of local indigenous knowledge as it applies to many industrial and agricultural products, must be more systematically recognized and acknowledged with appropriate compensation.

There are many international efforts underway to dramatically increase the marketing of NTFP throughout the tropics as well as North America, Europe and Asia. Local marketing of plant medicines is also increasing in tropical forest countries. Pressure on natural sources creates a simultaneous plant conservation monitoring imperative. The impact of market forces can be destructive to specific plant resources as the international demand increases. These are part of the challenges facing tropical countries, non-profit conservation and human rights organization, international development agencies and all natural products industries.

Research efforts aimed at developing new molecular entities from tropical forest species are yielding a number of promising compounds. One of Shaman Pharmaceuticals anti-viral compounds, SP-303 has recently entered phase 1 human clinical trials. All of the above described benefits and concerns are being integrated and addressed as Shaman Pharmaceuticals develops therapeutic agents from tropical forest species.

Symposium Paper 2 - Sunday 9:50

CHEMICAL STUDIES AND BIOLOGICAL ASPECTS OF SOME MEXICAN PLANTS USED IN TRADITIONAL MEDICINE.

Rachel Mata, Facultad de Quimica, Universidad Nacional Autonoma de Mexico, Coyoacan 04510, Mexico D.G., Mexico.

Notwithstanding the richness and variety of Mexican traditional medicine, its potential as a source for new drugs remains largely unexplored. Therefore a systematic study on plants used in Mexican folk medicine has been initiated, and in this presentation the results of our chemical and biological investigations on some of these plants will be reviewed. The species selected include: four antimalarial plants of the Rubiaceae family [*Hintonia latiflora*, *Exostema mexicanum*, *E. caribaeum* and *Simira mexicana*], *Teloxys graveolens* (Chenopodiaceae), *Amphypterygium adstringens* (Julianaceae), *Dodonaea viscosa* (Sapindaceae), *Anredera scandens* (Basellaceae), *Hippocratea excelsa* (Hippocrateaceae), *Ratibida latipalearis* (Asteraceae) and *Stevia salicifolia* (Asteraceae). The study of these plants has been accomplished by means of bioactivity guided fractionation using simple bench top bioassays or by conventional phytochemical procedures.

Apparently none of the four species of the Rubiaceae family contain compounds with antimalarial properties, however, from these plants some cytotoxic cucurbitacins and a few antimicrobial 4-phenylcoumarins were obtained. From *Hintonia latiflora* a novel phenyl styrene was isolated. It is the first example of this type of compound found in nature. During the course of the investigation of *Exostema caribaeum*, it was demonstrated that 4-phenylcoumarins undergo oxidative cyclization under basic conditions to give 4-phenyl-5,2'-oxido-coumarins.

Bioactivity guided fractionation of *Teloxys graveolens*, using the brine shrimp lethality test, led to the isolation of the flavanone pinocembrine as the only active compound. Pinocembrine also showed anthelmintic and anti-yeast properties. The activities demonstrated by this flavanone could be related to the anthelmintics and antiseptic properties attributed to this plant in folk medicine.

The roots and stem barks of *Hippocratea excelsa* are commonly used for the treatment of skin ailments. The presence of tingenone in this plant could explain these medicinal properties. Additionally, this plant yielded several cytotoxic sesquiterpene evoninoate alkaloids.

The hypocholesterolemic effect of the stem bark of *Amphypterygium adstringens* has been demonstrated on 24-h fasted rats. From the active extract two mixtures of long chain phenols were isolated, one of phenolic acids and a second one of phenolic aldehydes. Some of the components of both mixtures are new naturally occurring substances. Neither mixtures exhibited significant hypocholesterolemic activity but the presence of phenolic acids in the plant, with demonstrated antimicrobial activity, tends to substantiate its ethnomedical use as an antiseptic agent.

Two new bioactive sesquiterpene lactones were isolated from *Ratibida latipalearis*, using the brine shrimp lethality test for activity guided fractionation. The methanol extract of this species also possesses significant activity against *Candida albicans* and *Bacillus subtilis*.

Stevia salicifolia is another Asteraceae widely used as medicinal agent to alleviate gastrointestinal upsets. Conventional phytochemical investigation of this species allowed the isolation of a new *ent*-atisene glycoside, stevisalioside A. The finding of this compound is significant chemotaxonomically, since no atisane derivative has yet been reported from this genus.

The aerial parts of *Dodonaea viscosa* are used in folk medicine against skin infections, fevers, rheumatism and swellings. The significant antimicrobial activity of a methanol extract prompted us to investigate this medicinal species. Fractionation of the active extract by column chromatography led to the isolation of several compounds, including two new natural products: a novel *p*-coumaric acid ester of 1-*L*-*myo*-inositol and an *ent*-labdane diterpenoid. The new diterpenoid as well as the known hautriwaic acid exhibited marginal antimicrobial activity.

Symposium Paper 3 - Sunday 11:10

PLANT CELL CULTURE AND CHEMISTRY - ROUTES TO NATURAL PRODUCTS AND RELATED COMPOUNDS.

James P. Kutney, Department of Chemistry, Univ. of British Columbia, 2036 Main Mall, Vancouver, BC, CANADA V6T 1Z1.

The plant kingdom has, for many years, provided an important source of natural products many of which have formed the basis for development of medicinally important drugs. Unfortunately, Nature often provides such compounds in low yields and the difficulties associated with their isolation from other less interesting co-occurring constituents can present problems particularly when large quantities of the biologically active compound are required. It is possible to alleviate such difficulties by the use of plant cell culture methodology and when these techniques are coupled with chemistry, a powerful route to such natural products and/or their biologically important analogues, is achieved. This lecture will present results to illustrate how the interplay of plant cell culture methodology, in combination with chemistry, can afford interesting routes to clinically important plant derived medicinal agents. A discussion of the various avenues of research will include: i) studies of biosyntheses and application of biosynthetic information toward development of highly efficient syntheses of clinical drugs: ii) use of plant cell cultures or enzymes derived therefrom, as "reagents" in organic synthesis: iii) use of plant cell cultures to produce higher levels of plant derived natural products and novel compounds for pharmacological screening: iv) an illustration to show how well developed cell lines can afford the opportunity to separate pharmacological activities exhibited by complex mixtures generally employed in herbal medicine practices.

The specific experiments relate to studies in the vinblastine-vincristine area (1), well known clinical anti-cancer drugs for treatment of acute leukemia, etc.; etoposide (2), a recently developed clinical drug for the treatment of solid tumors, for example, small cell lung cancer; and triptolide-triptolidide (3), active agents isolated from a chinese herbal plant, for use in treatment of rheumatoid arthritis.

Symposium Paper 4 - Monday 2:00

RECENT ADVANCES IN THE ACETOGENINS OF ANNONACEAE

André Cavé, Université de Paris Sud, Faculté de Pharmacie de Chatenay-Malabry, Rue Jean-Baptiste Clément, 92296 Chatenay-Malabry Cedex.

Acetogenins from Annonaceae are a series of natural products of polyketide origin derived from fatty acids. Their structure is characterized by a long alkyl chain bearing a terminal methyl unsaturated γ -lactone (sometimes rearranged to a propanone γ -lactone), one or two tetrahydrofuran rings, several oxygenated substituents (hydroxyl, acetoxy, keto) and in some cases a double bond. To date, they have only been isolated from the Annonaceae. Annonaceae acetogenins exhibit a broad range of potent biological activities such as antitumor, cytotoxic, antiparasitic, antimalarial, antimicrobial, immunosuppressant, antifeedant and pesticidal. Because they possess significant bioactivity, they have received a great deal of attention and the published results are rapidly increasing. The first isolated acetogenin, uvaricin, was described in 1982. In 1990, J.K. Rupprecht, Y.H. Hui and J.L. McLaughlin published a review on acetogenins quoting 31 compounds belonging to this series. Since then, more than 35 new ones have been described.

Ostensibly, only a few genera of Annonaceae contain acetogenins. In fact they are probably much more numerous, as acetogenins have been evidenced in a lot of species of Annonaceae showing they are widely distributed in this family. Acetogenins, initially isolated from barks, are present in larger amounts in seeds. Indeed, they can exist in all parts of the plant.

Acetogenins of Annonaceae can be classified in 3 main groups according to the number and arrangement of the tetrahydrofuran ring(s):

-type A with one tetrahydrofuran, such as annonacin,

-type B with two adjacent tetrahydrofurans, such as uvaricin,

-type C with two non-adjacent tetrahydrofurans separated by a four-carbon chain, such as gigantecin.

To these three main classes may be linked derived subgroups A2, B2 and C2 which are characterized by a saturated lactonic ring substituted by a propanone group. Acetogenins belonging to these subgroups could be considered as artefacts.

A new group has to be linked up with acetogenins although it does not possess any tetrahydrofuran ring but only a terminal unsaturated γ -lactone. Until now, this group has comprised few members characterized by the presence of epoxides and in some cases double bonds along the chain. These compounds can be considered as biogenetic precursors of acetogenins.

With experience, the extraction and isolation of acetogenins has become easier. Solvent extraction, solvent partition and chromatographies are used, guided either by bioassay or by thin layer chromatography. Activity-guided fractionation using lethality to brine shrimp larvae, according to J.L. McLaughlin, is interesting due to its rapidity, its low cost and its good correlation with the antitumor activity.

Dosage methods includes HPLC and mass spectrometry. This latter method is based on the property of acetogenins to form complexes with lithium.

The structure elucidation of acetogenins is rather complex. Classical methods, such as UV, IR, proton NMR, ^{13}C NMR and mass spectrometry are essential in identifying the structural subunits, such as methyl γ -lactone and tetrahydrofuran rings, but the placement of the substituents along the carbon skeleton involves innovative mass strategies such as mass-tandem or FAB-Li. This last method will be illustrated in the case of rolliniastatin-2. The determination of the stereochemistry of the chiral centres is a very complex problem, and is based on the NMR studies by Hoye and co-workers, but this methodology allows only the determination of the relative configuration. For the absolute configuration, X-ray analyses have been performed on only two derivatives of acetogenins, and one of them allowed the establishment of the absolute configuration of rolliniastatin-1. Chemical degradation served to fix the configuration of the methyl group of the lactonic nucleus of

uvaricin. Some examples of recently-isolated acetogenins will be given, showing the interest of the different methods to solve structural problems in the different parts of the molecules.

Stereospecific synthesis of murisolin has been performed. We have developed a simple and practical route which could easily be generalized to the preparation of further monotetrahydrofuran γ -lactone acetogenins. This synthetic approach allows the determination without ambiguity of the absolute configuration of the stereogenic centres and provides substantial quantities for biological screening.

Finally, biological properties of acetogenins will be tackled, mainly in the field of their cytotoxic and antitumor activities, and preliminary conclusions about structure-activity relationship will be focused.

Symposium Paper 5 - Monday 2:50

PHYTOCHEMICAL DIVERSITY IN THE ORDER RUTALES

Peter G. Waterman, Phytochemistry Research Laboratories, Dept. of Pharmaceutical Sciences, Univ. of Strathclyde, Glasgow G1 1XW, Scotland U.K.

The Rutales are a comparatively small group of families (the most significant are Rutaceae, Meliaceae, Simaroubaceae) totaling little over 3,000 species, yet they are one of the most phytochemically diverse Orders of higher plants.

In this paper I will review the major classes of compounds reported from the family, their distribution and what is known about their biological activity. These will include a wide variety of alkaloids which are derived from several different biosynthetic routes including anthranilic acid, tyrosine, tryptophan and indole, and histidine. Some of these alkaloid types appear to be unique to the Rutales (e.g., acridones, carbazoles). Also mainly (perhaps completely) restricted to the Order are the group of highly oxidized and structurally modified triterpenes known as the limonoids (Meliaceae, Rutaceae) and quassinoids (Simaroubaceae). Other classes of compound that occur widely, notably in the Rutaceae, and prenylated coumarins, prenylated and highly oxygenated flavonoids, acetophenones and chromones. The role of the hemiterpene unit (3-methylbut-2-ene) in modifying quinolone and indole alkaloids, coumarin, flavonoid, chromone and acetophenone structures is highlighted.

In some cases the distribution of secondary metabolites in the order appears to have taxonomic significance. Notable among these is the support it gives to the maintenance of the Flindersioideae as a sub-family of the Rutaceae and the separation of the Ptaeroxylaceae from the Meliaceae. The occurrence of limonoids and chromones in the genus *Harrisonia* highlights the need to reassess the relationship between that genus and the Simaroubaceae.

Symposium Paper 6 - Tuesday 9:00

PHYTOCHEMICAL RESISTANCE TO INSECTS IN TROPICAL PLANTS.

J. Arnason¹, S. MacKinnon¹, C. Hasbun², M. Isman³, G.H.N. Towers³, P. Wiriyaichitra⁴, J.L. McLaughlin⁵ & J. Mihm⁶. ¹University of Ottawa, Ottawa, CANADA, ²National University, Heredia, COSTA RICA, ³University of British Columbia, CANADA, ⁴Chiang Mai University, THAILAND, ⁵Purdue University, USA, ⁶CIMMYT, MEXICO.

Biotic interactions in the tropics are intense and have led to the evolution in plants of a great diversity of phytochemicals which act as deterrents to insect phytophages. Among these are many substances that may be useful as insect control agents or resistance factors in crop plants.

In particular, the recent development of registered neem products has opened the way for standardized botanical insecticides with non-neurotoxic modes of action that promise to provide alternatives to conventional synthetic insecticides, that are likely to be environmentally acceptable and that have a reduced risk of insecticide cross resistance. Other alternatives include light-activated phytochemicals, antifeedants, inhibitors of insect digestion and post-digestive physiology. Collaborative research in Thailand and Costa Rica has suggested possible new sources of insecticides from tropical Meliaceae, Annonaceae, Asteraceae and Piperaceae. Among the more promising materials are *Cedrela odorata* extracts containing the limonoid gedunin, *Aglaia odorata* extract containing the benzofuran rocaglamide and *Asimina triloba* extracts containing the acetogenin asimicin. Gedunin and rocaglamide are potent antifeedants and we have now identified asimicin as an inhibitor of site 1 in electron transport. Studies of light-activated bi- and terthiophenes of the Asteraceae are well advanced and prediction of the mosquito larvicidal activity of these substances can now be made based on a quantitative structure-activity model of their lipophilicity and ability to generate singlet oxygen. Using these examples, development of standardized botanicals will be contrasted with synthetic pesticide leads.

Phytochemically based resistance in tropical crops is especially prominent in indigenous varieties of crops such as the land races of maize of Mexico. These land races have high concentrations of phenolic acid amides located in the aleurone layer of the kernel which are toxic factors or delay the development of stored grain pests such as the maize weevil or larger grain borer. The formation of phenolic acid dimers such as truxinic acids and diferulic acid in tropical multiple borer resistant maize developed at CIMMYT provides resistance to leaf feeding lepidoptera through digestibility reduction of complex carbohydrates. Quantitative imaging techniques detecting maize phenolics can now be employed for rapid assessment and selection of resistant genotypes. Successful application of phytochemicals in insect control has added value in that it will enhance efforts to conserve tropical forests and rare genotypes of crops.

Symposium Paper 7 - Tuesday 9:50

INSECT CONTROL AGENTS FROM TROPICAL PLANTS.

Isao Kubo, Division of Entomology and Parasitology, College of Natural Resources, University of California, Berkeley, Ca 94720, USA.

There is no doubt that many plant secondary-metabolites affect insect behavior, development and reproduction. Identifying these substances is an important first step in understanding the effect of plants on insect life at the molecular level. In our continuing search for alternative insect control agents from tropical plants, we have found various active principles, which had an effect on a variety of test insects, mainly the pink bollworm, *Pectinophora gossypiella* and the tobacco budworm, *Heliothis virescens*. These active principles are mainly highly oxygenated terpenoids and steroids, most of which taste bitter or hot to us.

Symposium Paper 8 - Tuesday 11:10

PHYTOCHEMISTRY AND BIOLOGICAL ACTIVITY OF METABOLITES FROM TROPICAL MELIACEAE.

Heinz Rembold & Ingo Puhlmann, Insect biochemistry group, Max-Planck-Institute for Biochemistry, D-8-33 Martinsried, FRG.

The seeds and other parts of the Indian neem tree, *Azadirachta indica*, have traditionally been used for plant protection and for medicinal purposes. Another most promising African meliaceae is *Melia volkensii*, the seeds of which are highly active against mosquito larvae and against all developmental stages of locusts. The desert locust, *Schistocerca gregaria*, even is arrested in the solitary phase after application of a crude *M. volkensii* seed extract. The seeds of both these species are abundantly available and still are only poorly used.

By use of the *Epilachna varivestis* growth test, nine isomers of azadirachtin A have been isolated from the polar fraction of neem seeds and were structurally identified. All these azadirachtin isomers are strong growth inhibitors for larvae of the Mexican bean beetle and they all have a tetranortriterpenoid structure. Their mode of action is directed against the insect specific neuroendocrine control of growth, development and reproduction. The corpora cardiaca have been identified as primary target for the azadirachtins. Although their molecular mode of action is still unknown, it can be stated that these natural insect growth inhibitors are no general protein synthesis inhibitors. In minute amounts, however, they already strongly interfere with biosynthesis of neurosecretory peptides and of the general brain polypeptide pattern. Even the host-parasite homeostasis can be destroyed forever after a single azadirachtin treatment, as demonstrated for the system of blood sucking bug, *Rhodnius prolixus*, and its parasite, *Trypanosoma cruzi*. For some insects pests, like night moths and desert locust, the azadirachtins are also strong feeding deterrents. The chemical structure of the *M. volkensii* insect growth inhibitors seems to be different from the azadirachtin isomers which have not been found there.

The azadirachtins are a promising new generation of insecticides without any mammalian toxicity. Therefore, studies on the chemistry and biological activity have been undertaken in our laboratory in order to design a minimal bioactive structure which would be less complicated than the tetranortriterpenoid natural compounds. Such investigations also include the synthesis of azadirachtin spacer derivatives for the production of anti-azadirachtin antibodies. These could finally be useful for designing and screening of synthetic compounds with a less complicated structure if compared with the natural products as well as for the isolation of high-affinity azadirachtin binding proteins. Progress in this field will be discussed and a reduced azadirachtin structure be presented. Although these results up to now are primarily based on the *Epilachna* bioassay, they are also supported by similar effects on locusts and thus allow some first generalizations for a practical application of these promising botanical insect control agents.

Symposium Paper 9 - Wednesday 9:00

TROPICAL PLANTS AS SOURCES OF ANTIPROTOZOAL AGENTS.

J. David Phillipson¹, Colin W. Wright¹, Geoffrey C. Kirby² & David C. Warhurst², Dept. of Pharmacognosy¹, School of Pharmacy & Dept. of Medical Parasitology², London School of Hygiene & Tropical Medicine, University of London, UNITED KINGDOM.

Traditional medicines based on plants are used pantropically for the treatment of protozoal diseases including amoebiasis, giardiasis, leishmaniasis, malaria and trypanosomiasis. It is essential that the efficacy and safety of these traditional medicines be verified. The results of such investigations will focus attention on chemical structures which may form the basis for the development of new drugs required for the treatment of these life threatening diseases.

In vitro bioassay guided fractionation of selected plant extracts has resulted in the identification of active compounds representing a wide range of structures which include alkaloids, terpenoids, quinones and phenolic compounds. Current investigations include the search for active compounds, their selectivity and mechanism of action and semisynthetic structural modifications.

Symposium Paper 10 - Wednesday 9:50

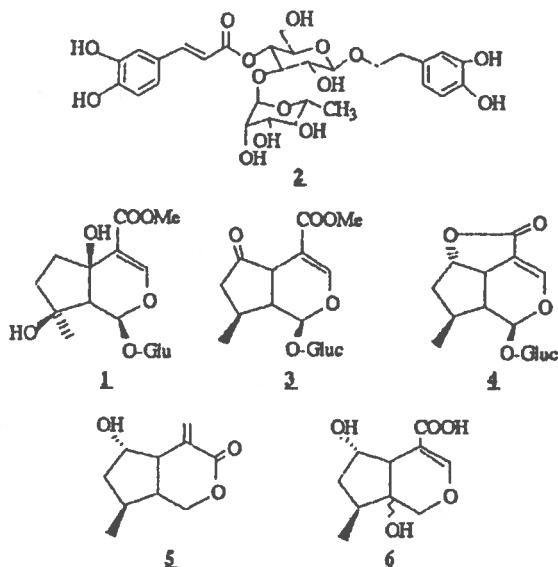
BIOLOGICAL AND CHEMICAL POTENTIAL OF TWO VERBENACEAE SPECIES USED IN COSTA RICA AS ANTIDIARRHETIC AGENTS.

Oscar C. Castro¹, Ian G. Castro² & Eduardo R. Umaña², ¹National Institute of Biodiversity (INBio), Santo Domingo, Apartado 22-3100, Heredia, COSTA RICA, ²University of Costa Rica, School of Chemistry, San José 2060, COSTA RICA.

In the caribbean area *Stachytarpheta* (*S*) and *Verbena* (*V*) species are shrubs widely used in folk medicine as effective antifever and antidiarrhetic agents. The presence of iridoid glucosides, particularly ipolamiide 1 in *Stachytarpheta* and Verbenalin derivatives in *Verbena* have been established in both genera. A chromatographic examination from the cold ethanolic extract obtained by maceration of the fresh aerial part of *S. jamaicensis* and *V. littoralis* revealed one cafeoil glycoside (Verbascoside) 2 as a principal constituent in both plants besides ipolamiide in *S. jamaicensis* and two iridoids, verbenalin 3 and brasoside 4 in *V. littoralis*. Crude extracts of these plants and the pure iridoids gave negative tests *in vitro* against: *Staphylococcus sp.*, *Streptococcus sp.*, *Escherichia coli*, *Klebsiella sp.*, *Proteus sp.*, *Enterobacter sp.*, *Shigella sp.* and *Pseudomonas aeruginosa* (1). Now, we have studied the aqueous extract of these plants by using the traditional preparation (decoction in hot water, 15-20 minutes). Only significant alteration was found in the chemistry of *V. littoralis*, identifying a mixture of two new iridoids 5 and 6 in the CH₂Cl₂ extract, which gave positive preliminary tests *in vitro* against *Shigella sp.*, and *Pseudomonas sp.*

The iridoids present in these two species are similar in structure to Catapol and Geniposide which have antimicrobial activity when hydrolysis *in situ* take place. Inclusive it's been reported that Verbenalin in the presence of β -glucosidase is active against *Staphylococcus aureus*. These investigations indicate that the hemiacetalic structure is indispensable to potentiate the antimicrobial activity. (2,3)

The analgesic and antimicrobial activity of Verbascoside 3 was recently reported (4). Cafeolic acid derivatives common as substituents in this kind of molecules, have shown strong antiviral properties against *Herpes simplex* and type A influenza (5). We believe that these metabolites could be a new alternative to antiviral chemotherapy. Also, previous studies of the aqueous extract of *S. jamaicensis* showed antidiarrhetic activity *in vitro* by diminishing the intestinal peristaltic movement. (6) We believe that these evidences may be the basis of the reputed activity of these plants as antidiarrhetic agents. Structure elucidation was achieved by a combination of one and two dimensional NMR spectroscopy techniques (including long range HETCOR), mass spectrometry and chemical methods.



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Symposium Paper 11 - Wednesday 11:10

ZOO PHARMACOGNOSY: MEDICINAL PLANT USE BY WILD APES AND MONKEYS.

Eloy Rodriguez¹ & Richard Wrangham², ¹Phytochemistry and Toxicology Laboratory, University of California, Irvine CA 92717 USA, ²Anthropology Department, Harvard University, Cambridge, MA 02138 USA.

The term Zoopharmacognosy was introduced by Wrangham and Rodriguez to describe the use of plant products by wild chimpanzees for possible curative properties. Behavioral studies on plant and fruit consumption by wild chimpanzees and monkeys in Africa by Wrangham and associates indicated that wild chimpanzees were using various tropical plant species for medicinal use. The chimpanzees were noted to swallow the young leaves of *Aspilia mossambicensis* in a very particular manner for non-nutritional purposes. Subsequent chemical and pharmacological studies established that the dithiopolycetylenes (thiarubrines) from *Aspilia* were toxic to fungi, bacteria, and plant parasitic nematodes. Thiarubrines A and C were also established to have activity against solid tumors.

Chimpanzees were also observed to swallow leaves of the *Ficus exasperata* in a manner that suggests a medicinal purpose. A bioassay guided fractionation for antibiotic activity led to the isolation of 5-methoxy psoralen. Bioassays with extracts and the purified methoxy psoralen established that the *Ficus* leaf constituents are lethal to the free living nematode *Caenorhabditis elegans*. Numerous studies have established that helminthic infestations are a major problem of chimpanzees in their native habitat. Other constituents of the *Ficus* species have antibiotic activity against *Bacillus cereus* and *Escherichia coli*.

The leaves of *Rubia cordifolia* are also ingested by chimpanzees in a manner that suggest that they derive little or nutritional benefit. Methanolic extracts or *R. cordifolia* have been tested and were shown to contain three oleanane-type triterpenoids six arborane type triterpenoids, and several ursolic and ternane-type triterpenes. Fractions containing the triterpenes are toxic to several species of bacteria. Anthraquinones have also been identified in *R. cordifolia*. A series of four cyclic hexapeptides with the potent *in vitro* activity against a variety of tumor cell lines as established by Japanese scientists were also isolated from *Rubia cordifolia*. Leaves of *Cassipourea ruwenzorensis* were also examined and found to contain a novel series of bioactive 1,2 dithiolanes and unique alkaloids that also contain 1,2 dithiin groups. These compounds have been found to exhibit antibacterial activity. Weak and lethargic chimpanzees have been observed to consume the pith of *Vernonia amygdalina* for a presumed therapeutic purpose. Extracts of the pith were examined by Huffman and associates in Japan and two steroidal glycosides have been purified and tested for biological activity. Previous studies of the leaves had been identified potent antitumor agents (germacrane lactones with hemiacetal moiety) and insect antifeedants (elemanolide lactones).

Although monkeys are not known to swallow medicinal plants like wild chimpanzees, Capuchin monkeys in Costa Rica have been observed to rub an aqueous exudate from *Hymenea coubaril* on their fur (Perry, 1992). Extracts were analyzed and found to contain a mixture of flavonoids, tannins, and other complex phenolics. The extracts have been shown to have repellent properties against ectoparasites. Fur-rubbing behaviour has also been observed in other animals, such as coati and bears, with grizzly bears known to dig out rhizomes of *Ligusticum* and rub the masticated plant material on their fur.

The studies of animals and tropical plants that wild animals consume for medicinal purposes has led to the discovery on novel natural products with potent biological activities. Future studies should establish that these plants offer as much benefit to human health as it offers to wild chimpanzees in the tropical rain forest.

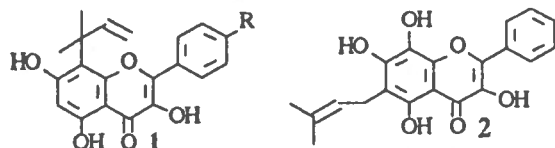
CONTRIBUTED PAPERS

Oral Paper 1 - Sunday, 1:30

CHEMICAL SYNTHESIS AND SPECTROSCOPY OF RING A C-PRENYLATED FLAVONES AND FLAVONOLS.

Denis Barron, Chaféi El Aidi and Anne-Marie Mariotte, Pharmacognosy Laboratory, Joseph Fourier University-Grenoble I, 38706 La Tronche Cédex, FRANCE.

Platanus buds accumulate a number of C-prenylated flavonoids such as 1 or 2, some of them acting as inhibitors of the external NADH dehydrogenase of the inner mitochondrial membrane. The chemical synthesis of type 1 8-C-prenyl flavonols was carried out by Claisen rearrangement of the corresponding 7-O-prenyl ether. Type 2 7,8-dihydroxy-6-C-prenyl flavonoids were synthesized by direct prenylation of flavonoids 8-sulfates using prenyl bromide in presence of 5% aqueous tetramethylammonium hydroxide. The use of recent NMR sequences such as COLOC experiments on carbon assignment and structure elucidation of ring A C-prenyl flavonoids will be presented.



Oral Paper 2 - Sunday, 1:45

DIACLEIN, A NEW FLAVANONE FROM THE ROOTS OF *DIACLEA GRANDIFLORA* MART. ex BENTH.

Inanabrata Bhattacharyya & Josemar S. Batista, Laboratório de Tecnol. Farmaceutica, Universidade Federal da Paraíba, 58.059-João Pessoa, PB, BRAZIL.

Dioclea grandiflora Mart. ex Benth. (Fabaceae) is a vine which grows in the "Caatinga" and the "Cerrado" regions of northeastern Brazil in a not too dry climate. The infusion of the roots of this plant has been used in the treatment of kidney stones and prostate gland disorders. In a preliminary study, the EtOH extract of the roots of *D. grandiflora* showed central nervous system activity in rats.

The CHCl₃ soluble part of the EtOH extract of this plant yielded, *inter alia*, dioclein, C₁₇H₁₆O₇, mp 160-162°. The analysis of the spectral (UV, MS, ¹H and ¹³C NMR) data of dioclein and its derivatives revealed its structure as 5,2',5'-trihydroxy-6,7-dimethoxyflavanone. To our knowledge, dioclein is the only known flavanone with a 2',5'-oxygenation pattern on the ring B. CNPq

Oral Paper 3 - Sunday, 2:00

CHROMONE ALKALOIDS AND COUMARINS FROM *SCHUMANNIOPHYTON PROBLEMATICUM* (A. Chev.) Aubrev.

Peter J. Houghton, Ezzel Abdurahman & Tibebe Woldemariam, Chelsea Department of Pharmacy, King's College London, University of London, London SW3 6LX, UK

Several alkaloids comprised of pyridine and piperidine congeners of noreugenin have been isolated in recent years from *S. magnificum* Harms. These alkaloids show interesting biological activity. A methanolic extract of *S. problematicum* root bark was separated chromatographically by adsorption LC and DCCC and yielded compounds which were identified by spectroscopic

methods and comparison with reference compounds. Eight known chromone alkaloids were isolated of which only one had previously been reported from this species.

Large amounts of the coumarin scopoletin and its 7-glucoside were also isolated.

Oral Paper 4 - Sunday, 2:15

FRIEDELIN, THE MOST PREVALENT COMPONENT OF GRAPEFRUIT WAX.

Harold E. Norby and Roy E. McDonald, USDA, ARS, SAA, Horticultural Research Laboratory, 2120 Camden Rd., Orlando, FL 32803, USA.

A major wax component observed during our chilling injury-grapefruit wax studies the past six years was misidentified, because it has an R_f value on thin layer plates very near that of the secondary alcohol 15-nonacosanol from cabbage wax. By GC-MS, we have determined that this compound is friedelin, a diterpene generally associated as a nonwax component of cork. Mass spectra and GLC retention times of friedelin from grapefruit, orange, lemon, lime, cucumber fruits, orange leaf wax, and cork compared favorably with an authentic friedelin standard. Friedelin was found to constitute 34% of the total wax of grapefruit and 68% of the major wax fraction-labeled terpenoids. The terpenoid fraction also includes squalene, nootkatone, sesquiterpenes, and other diterpenes which have been shown or are believed to be associated with chilling injury of grapefruit.

Oral Paper 5 - Sunday, 2:30

REGULATION AND ROLE OF SECONDARY METABOLISM IN SOME *CINCHONA* SPECIES.

R. Verpoorte, R. van der Heijden and R.J. Aerts, Dept. of Pharmacognosy, Center for Bio-Pharmaceutical Sciences, PO Box 9502, 2300 RA Leiden, THE NETHERLANDS.

Cinchona cell cultures, produce little or no alkaloid, but do produce considerable amounts of anthraquinones. These compounds act as phytoalexins: they have antimicrobial activity, their biosynthesis is induced by microorganisms, they are only found in infected plants.

Studies on the regulation of alkaloid biosynthesis showed that key enzymes (tryptophan decarboxylase, geraniol-10-hydroxylase) in the pathway were not present in non-differentiated cell cultures. Their presence, and thus alkaloid production, are correlated with morphological differentiation as could be shown during the development of seedlings and plants. The production of quinoline alkaloids in seedlings was found to be related with an antifeedant effect against slugs, the production of indole alkaloids in leaves with an antifeedant effect against caterpillars. The levels of alkaloids measured around the roots, are too low to inhibit growth or germination of other plants.

Thus *Cinchona* species have an inducible defence mechanism against infections in the production of anthraquinones and a morphology connected defence mechanism against predators in the alkaloids biosynthesis.

Oral Paper 6, Sunday, 3:00

INSECTICIDAL CONSTITUENTS OF *AZADIRACHTA INDICA* AND OTHER MELIACEAE SPECIES.

W. Kraus¹, M. Bokel¹, R. Cramer¹, H. Gutzeit¹, B. Herr¹, I. Kaufmann-Horlacher¹, R. Keller¹, H. Pohnl¹, R. Soellnery², R. Stiffens², S. Thiele¹, B. Vogler¹, U. Wachendorff¹, D. Wendisch² & Y. Zhou-Halwart¹. ¹Department of Chemistry, University of Hohenheim, 7000 Stuttgart 70, GERMANY; ²Bayer AG, 5090 Leverkusen, GERMANY.

Extracts of certain Meliaceae species are used in folk medicine and also as pesticides in tropical and subtropical areas. We report on isolation by chromatography and structure determination by n.m.r. of a number of novel highly oxidized tetranortriterpenoids related to azadirachtin, vilasinin, nimbolinin, sendanin, and mexicanolide, resp., from methanolic extracts of

Azadirachta indica, *Melia azedarach*, *Melia dubia*, *Melia toosendan*, and *Khaya nyasica*, collected in India, Togo, Indonesia, Greece, Sri Lanka, China, and South Africa, respectively. Some of these compounds show remarkable antifeedant and/or insect growth regulating activities. Structure activity relationships particularly with regard to azadirachtin and its analogues will be discussed.

Oral Paper 7 - Sunday, 3:15

ISOLATION AND IDENTIFICATION OF INSECTICIDAL CONSTITUENTS FROM *AGLAIA ODORATA* (LOUT.) (MELIACEAE).

Fumito Ishibashi¹, Chutamas Satasook², Don E. Champagne¹, Murray B. Isman² & G.H. Neil Towers¹, Depts. of Botany¹ and Plant Science², University of British Columbia, Vancouver, CANADA V6T 1Z4.

Random screening of members of the Meliaceae for bioactivity against insects indicated that the southeast asian tree *Aglaia odorata*, reputed to have medicinal properties in several countries, possessed significant insecticidal action. We have isolated over a dozen compounds from the foliage, twigs and bark of this species, including a series of bis-amides of 2-aminopyrrolidine, dammarane triterpenes, methylated flavonols, and a unique series of cyclopentatetrahydro [b]benzofurans. Bioassay-driven fractionation using the variegated cutworm (*Peridroma saucia*, Noctuidae) led to the isolation of the last named group of benzofurans as the insecticidal principles. One of these, rocaglamide, reduces larval growth of *P. saucia* by 50% at a dietary concentration of 0.9 ppm.

Oral Paper 8 - Sunday, 3:30

PLANT ECOCHEMICALS, AND THEIR ROLES IN PLANT-PLANT, PLANT-MICROORGANISM AND PLANT-INSECT/NEMATODE INTERACTIONS.

Junya Mizutani, Dept. of Applied Bioscience, Hokkaido University, Sapporo, Japan 060, and Plant Ecochemicals Project, JRDC, Eniwa, JAPAN 061-13.

We have been working on the so-called secondary metabolites of green plants, which might be part of defense mechanisms against competing plants, pathogenic organisms and herbivorous insects. Various kinds of terpenoids, phenolics, isothiocyanates and other compounds have been isolated, and identified from many different species of Hokkaido wild plants. To detect physiologically active compounds and evaluate plant ecochemicals, we have devised and developed new bioassay techniques such as bioautographies.

Hirsutin, 8-methylsulfinyloctylisothiocyanate, of *Rorippa sylvestris* as allelopathic substance, rugosal A, a sesquiterpene of *Rosa rugosa* as defense compound, and some other examples will be discussed from the viewpoint of chemical ecology.

Oral Paper 9 - Sunday, 3:45

THIARUBRINE-A: A MUSHROOM POISONING ANTIDOTE.

Manuel Aregullin & Eloy Rodriguez, Phytochemistry & Toxicology Laboratories, Developmental and Cell Biology, University of California, Irvine, CA 92717, USA.

Poisoning by accidental ingestion of mushrooms of the genus *Amanita* is common in North America and Europe. The only clinical treatment of these poisonings available at present is the administration of active charcoal and blood perfusions. Previous studies suggested that Thiarubrine-A, a natural sulfur containing polyacetylene, could be an antagonist of alpha-amanitin, the most active of the amanita toxins. Female Swiss Webster mice were administered a lethal oral dose of alpha-amanitin 30 minutes before administering Thiarubrine-A, as a potential antidote. The liver histopathology of mice sacrificed after 72 hours of treatment, showed a marked protective effect of Thiarubrine-A against the liver toxin, at a concentration of 15 mg/kg. The mechanism of Thiarubrine-A protection appears to be correlated to an

induction of liver cytochrome P-450 enzyme activity and an increase in the rate of metabolism of the toxin. Results will be presented and discussed.

Oral Paper 10 - Sunday, 4:00

FOOD SPICES: A NATURAL SOURCE OF ANTIPLATELET AND ARACHIDONIC ACID METABOLISM ALTERING DRUGS.

K.C. Srivastava, Dept. of Environm. Med., Odense University, Winslowparken 17, DK-5000 Odense C, DENMARK.

During the last several years we have examined the effects of some common food spices (garlic, onion, ginger, clove, omum, cumin and turmeric) on human blood platelet aggregation, on arachidonic acid metabolism and on the synthesis of eicosanoids known to affect platelet activity. Such studies were motivated by the parallels that have been found between the altered synthesis of some eicosanoids in many pathological situations and the claims made in Ayurvedic and Graeco-Arabic systems of medicine that these spices can cure several of the same diseases. Although the exact mechanisms by which these spices show their medicinal effects are not fully known, their effects on arachidonic acid metabolism may suggest at least one of the mechanisms by which they elicit their effects could be related to their action on the formation of eicosanoids. Data will be presented on the above aspects with total extracts, fractions thereof and with isolated and chemically characterized biologically active principles from some of the spices.

Oral Paper 11 - Tuesday, 2:00

MEDICINAL PLANTS USED BY FISHING COMMUNITIES OF THE ATLANTIC FOREST (SOUTHEAST BRAZIL).

A. Begossi, H.F. Leitão-Filho, G.M. Figueiredo, & S.C. Rossato, NEPAM - UNICAMP, CP 1170, Campinas, SP, 13081, BRAZIL.

Five fishing communities located in the edges of the Atlantic forest were studied from 1986 to 1991. Three communities are located on the islands of Búzios, Itacuruçá and Jaguanum and two are on the coast (Picinguaba and Puruba). Procedures included interviews, observations and plant collections. At Búzios, 53 medicinal plants were quoted in 28 interviews, at Gamboa 73 in 58 interviews, at Calhaus 53 in 43 interviews, at Picinguaba 109 in 83 interviews and at Puruba 65 in 21 interviews. Communities on the coast use more plants than on islands. *Coleus barbatus*, *Chenopodium ambrosioides* and *Lippia citriodora* are important plants used in these communities. Older people have a better knowledge on medicinal plants than young people.

Oral Paper 12 - Tuesday, 2:15

ENZYMATIC PRENYLATION OF ISOFLAVONES IN *LUPINUS ALBUS*.

Pierre Laflamme, Henry E. Khouri, Patrick J. Gulick & Ragai K. Ibrahim, Plant Biochemistry Laboratory, Dept. of Biol., Concordia University, Montréal, Québec, CANADA H3G 1M8.

Roots of *Lupinus albus* accumulate a variety of prenylated isoflavones derived from genistein and 2'-hydroxygenistein which are considered pre-infectional fungitoxic agents. This prompted us to study the enzymatic prenylation of isoflavones in the intact root and its cell suspension cultures.

An enzyme assay using [³H]-dimethylallyl pyrophosphate (DMAPP) as the prenyl donor, was optimized and used to study the enzymatic prenylation of both genistein and 2'-hydroxygenistein at positions 6, 8, and 3' of the isoflavone ring system.

The results will be discussed in relation to the prenylated metabolites which accumulate in these tissues.

Oral Paper 13 - Tuesday, 2:30

ANTIVIRAL ACTIVITY IN MEDICINAL PLANTS OF YUNNAN PROVINCE IN SOUTHWEST CHINA.

L. Yip¹, G.H.N. Towers¹ & J.B. Hudson², Depts. of ¹Botany and ²Medical Microbiology, University of British Columbia, Vancouver, B.C. CANADA.

Crude ethanolic extracts from 31 plants, collected in an ethnopharmacological screening of the medicinal plants of Yunnan province in China, were assayed for inhibition of virus infections in mammalian cell cultures. Antiviral activity was observed with extracts of 16 of the plant species. Purification of the antiviral component from one of the species, *Elsholtzia ciliata* (Lamiaceae), is being carried out. Extract from this species showed particularly high antiviral activity and the effect was mediated by the presence of long-wave ultraviolet radiation.

Oral Paper 14 - Tuesday, 2:45

A COMPARATIVE STUDY OF THE INFLUENCE OF PLANT CHEMICAL DEFENSES ON AN INSECT PARASITOID.

Nikhil Mallampalli & Pedro Barbosa, Dept. of Entomology, University of Maryland, College Park, MD, 20742, USA.

Plant allelochemicals have been intensively studied for their effects on the development and behavior of herbivorous insects. Less well known is the impact phytochemicals in the diet of herbivores have on the biology of their natural enemies. We examined the development of the tachinid parasitoid, *Compsilura concinnata*, within larvae of its host, the gypsy moth (*Lymantria dispar*), fed either catalpol, a more directly toxic allelochemical, or partially purified condensed tannin, representative of a digestibility-reducing type of plant defense. Each compound was incorporated into artificial diets over a range of ecologically relevant doses, and parasitoid development time, puparial weights, adult dry weights, and sex ratios were measured.

Oral Paper 15 - Tuesday, 3:30

TISSUE AND SUBCELLULAR LOCALIZATION OF ENZYMES CATABOLIZING (R)-AMYGDALIN IN BLACK CHERRY (*PRUNUS SEROTINA* EHRH.) SEEDS.

Elisabeth Swain, Chun Ping Li & Jonathan E. Poulton, Dept. of Biol. Sci., University of Iowa, Iowa City, IA 52242, USA.

The seeds of mature black cherry (*Prunus serotina* Ehrh.) accumulate the cyanogenic glycoside (R)-amygdalin, which, upon tissue disruption is rapidly degraded to HCN, glucose, and benzaldehyde by the sequential action of amygdalin hydrolase (AH), prunasin hydrolase (PH) and mandelonitrile lyase (MDL). Using immunocytochemical techniques, AH and PH were localized in the protein bodies of the procambium which ramifies throughout the cotyledonary storage parenchyma. While AH occurred within the majority of procambial cells, PH was confined to the peripheral cells of the tissue. Highest levels of MDL were observed in protein bodies of cotyledonary storage parenchyma with lesser amounts in the procambial protein bodies. The implications of this localization pattern for the developmental fate of amygdalin are currently being investigated.

Oral Paper 16 - Tuesday, 3:45

CHEMICAL STUDIES AND BIOLOGICAL ASPECTS OF TURKISH AMARYLLIDACEAE PLANTS.

Bilge Sener, Department of Pharmacognosy, Faculty of Pharmacy, Gazi University, 06330 Ankara, TURKEY.

Many of the Turkish plants are known for their therapeutic properties and contain alkaloids of potential medicinal uses. Continuing our researches carried out on various medicinal plants have been resulted in the

isolation and structure elucidation of several new and known alkaloids. In the context of this work, a project has been initiated which aims to search, identify and develop new biologically active constituents of the Amaryllidaceae plants growing in Turkey. Some chemical and biological studies on the alkaloids from Turkish Amaryllidaceae species are reported.

Oral Paper 17 - Tuesday, 4:00

A REPORT ON TOTAL TANNIN LEVELS AND RELATIVE ASTRINGENCY IN TEAS.

Peter J. Rider¹, Ara Der Marderosian² & John R. Porter², ¹Dept. of Biology, Univ. of South Florida, Tampa, FL, USA 33620, ²Dept. of Biology & Chemistry, The Philadelphia College of Pharmacy & Science, 43rd St. & Woodland Ave., Philadelphia, PA 19104, USA.

Results of our analysis of total tannin levels and relative astringency of 11 commercial teas is reported. Complexation with BSA (bovine serum albumin) is followed by centrifugation and the measurement of residual protein in the supernatant with Coomassie Blue. Tannic acid equivalence (TAE) is calculated by dividing the concentration of tannic acid needed to completely precipitate the BSA with the concentration of tea required to do the same. Absence of BSA is verified by capillary zone electrophoresis (CZE) using a novel buffer system. This method is relatively simple, rapid and custom made for teas.

Oral Paper 18 - Wednesday, 1:30

GLYCOSIDASE INHIBITORS IN TROPICAL PLANTS

Robert J. Nash, Linda E. Fellows, Geoff C. Kite & Elaine A. Porter, Jodrell Laboratory, Royal Botanic Gardens, Kew, Surrey TW9 3DS, U.K.

Simple polyhydroxylated alkaloids which inhibit glycosidase enzymes are common in a number of plant families such as Leguminosae, Moraceae and Araceae. These alkaloids can produce illnesses in livestock by interfering with sugar metabolism but are also proving of interest in research of diseases such as AIDS and diabetes. The distribution and possible medical applications will be discussed.

Oral Paper 19 - Wednesday, 1:45

POLYPHENOLS AND RP-HPLC PLANT (CULTIVAR) RECOGNITION.

Everaert E., De Cooman L., Vande Castele K., Hutsebaut W. & C.F. Van Sumere; Laboratory of Plant Biochemistry, University of Ghent, K.L. Ledeganckstr. 35, 9000 Gent, BELGIUM.

The undisputable description and cataloguing of new and important cultivars poses sometimes serious problems. A new RP-HPLC method, for the analysis of flavonoids results in the production of "Flower (or bark) Flavonoid RP-HPLC Fingerprint(s)" and corresponding "Computer Flower Flavonoid Identity Cards". Both are of immense value for the protection by patent law and for computer filing of old and new cultivars. In addition, the "fingerprints" and "identity cards" may be useful during the production of new cultivars by classical breeding and (or) irradiation technologies. Examples of "Flower (or bark) Flavonoid RP-HPLC fingerprints" and of the corresponding "Identity Cards" will be presented.

Oral Paper 20 - Wednesday, 2:00

BIOSYNTHESIS OF FLAVOUR COMPOUNDS IN DEVELOPING FRUITS OF *VANILLA PLANIFOLIA*.

Peter E. Brodelius, Department of Plant Biochemistry, University of Lund, P.O. Box 7007, S-22007 Lund, SWEDEN.

Beans of *Vanilla planifolia* were collected at 12 different times (4 to 28 weeks) after pollination at a plantation in Papantla, Mexico. The

activity of enzymes of the phenylpropanoid metabolism (e.g. phenylalanine ammonia-lyase, caffeoyl-O-methyl-transferase, 4-hydroxycinnamate CoA-ligase, UDP-glucose: cinnamic acid glucosyltransferase and coniferly alcohol dehydrogenase) and β -glucosidase, as well as the concentration of products (e.g. vanillin, vanillic acid and 4-hydroxybenzaldehyde) have been determined as function of time after pollination. The results will be compared to results obtained with cell suspension cultures of *V. planifolia*. The biosynthetic pathway leading from phenylalanine to vanillin will be discussed.

Oral Paper 21 - Wednesday, 2:15

PRODUCTION OF TRANSGENIC PLANTS WHICH OVEREXPRESS TRYPTOPHAN DECARBOXYLASE AND WHICH ACCUMULATE TRYPTAMINE.

Supa Chavadej¹, Juan Basurco¹, Normand Brisson² and Vincenzo De Luca¹, ¹Dépts de Sciences Biologiques et de ²Biochimie, Université de Montréal, C.P. 6128 Station A, Montréal, Québec, CANADA H3C 3J7.

The pattern and quantity of secondary metabolites produced in plants may be modified by genetic engineering and plant transformation. Recent studies in our laboratory have produced transgenic tryptamine-producing tobacco, Canola and potato by introduction of the tryptophan decarboxylase (TDC) gene. Each transgenic crop species produced differing levels of tryptamine which correlated with the levels of TDC activity but not with the levels of mRNA expression. When transgenic plants having the same TDC specific activity were compared large differences in tryptamine levels could be observed between the different species. These results will be discussed in relation to the availability of tryptophan and the turnover of the new foreign tryptamine product.

Oral Paper 22 - Wednesday, 2:30

LARGE SCALE CULTURE OF PLANT ORGANS FOR PRODUCTION OF THE SECONDARY METABOLITES.

M. Akita, T. Shigeoka, Y. Koizumi, Y. Kobayashi & M. Kawamura, Tsukuba Lab., P.C.C. Technology Inc., 2 Miyukigaoka, Tsukuba, Ibaraki, 305, JAPAN.

We investigated about techniques for scale-up of plant organ cultures.

(1) A culture method for mass propagation of multiple shoots of *Stevia rebaudiana* was developed. The culture could be scale-up to 500-L bioractors successfully.

(2) It is necessary for large scale culture of adventitious roots of *Atropa belladonna* to continuously disperse the roots into the medium. We investigated about some techniques to disperse the cultures without severe stress.

Oral Paper 23 - Wednesday, 3:00

NEW LENTICELLARANE ALKALOIDS FROM *DYSOXYLUM LENTICELLARE*.

A.J. Aladesanmi¹ & J.J. Hoffmann², ¹Dept. of Pharmacognosy, Faculty of Pharmacy, Obafemi Awolowo University, Ile - Ife, NIGERIA, ²Bioresources Research Facility, Office of Arid Lands Studies, University of Arizona, 250 East Valencia Rd, Tucson, Az 85706, USA.

Further phytochemical investigation into the alkaloids of *Dysosyllum lenticellare* (Meliaceae) have yielded two new natural products. The two degraded homoerythrina-type alkaloids have been isolated from the methanol extract of the stem of *D. lenticellare* along with lenticellarine².

²A.J. Aladesanmi, C.O. Adewunmi, C.J. Kelley, J.D. Leary, T.A. Bischoff, X. Zhang and J.K. Snyder, *Phytochemistry*, **27**, 3789 (1988).

Oral Paper 24 - Wednesday, 3:15

SIGNIFICANT BIOLOGICAL ACTIVITIES OF DIFFERENT PARTS OF THE PLANT *NYCTANTHES ARBORTRISTIS* LINN.

J.S. Tandon, V. Srivastava, P.Y. Guru, K.C. Srivastava, K.C. Saxena, Z.K. Khan & P.P. Gupta, Central Drug Research Institute, Lucknow 226 001, INDIA.

During a systematic biological screening program of traditional plants at CDRI for development of drugs from natural sources, the ethanolic extracts of the different parts of *Nyctanthes arbortristis* showed antileishmanial, antiviral, antifungal immunostimulant and antiallergic activities.

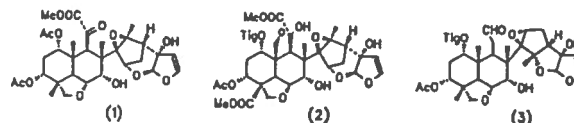
Chemical investigation of the seeds and leaves led to the isolation and characterisation of several iridoid glucosides (based on modern physicochemical techniques) viz. Arbortristosides A-E and Arborsides A-C, respectively. Arbortristosides A and C showed antileishmanial (*L. donovani*), antiviral (SFV, EMCV), antifungal (*C. albicans*, *A. fumigatus*, *S. neoformans*) and immunostimulant activities.

Oral Paper 25 - Wednesday, 3:45

DIOXATRIQUINANE DERIVATIVES AS INTERMEDIATES IN THE BIOSYNTHESIS OF AZADIRACHTIN.

W. Kraus¹, M. Bokal¹, R. Soellner², B. Vogler¹, D. Wendisch², & Y. Zhou-Halwart¹, ¹Dept. of Chemistry, Univ. of Hohenheim, 7000 Stuttgart 70, GERMANY; ²Bayer AG, 5090 Leverkusen, GERMANY.

Recently we reported on keto ester (1) as a possible intermediate in the biosynthesis of azadirachtin (2). Further work up of methanolic extracts from *Azadirachta indica* seeds yielded compound (3), which can be considered to be a very early precursor of (1) and (2). The structure of (3) has been established by n.m.r. and molecular modelling. The conversion of the dioxatriquinane moiety attached to C-8 into the bridged acetale present in azadirachtin (2), and also in keto ester (1), will be discussed.



Oral Paper 26 - Wednesday, 3:30

ANTIPLATELET CONSTITUENTS OF GARLIC (*Allium sativum*).

K.C. Srivastava, Dept. of Environm. Med., Odense University, Winslowparken 17, DK-5000 Odense C, DENMARK.

Undisturbed, the bulb of garlic contains only a few medicinally active compounds. But chopping, steaming and food processing does miraculous things to garlic. Ultimately, a large battery of chemical compounds - at least 100 sulfur-containing compounds - are produced. Data will be presented on the effects of aqueous and organic extracts of garlic, and some fractions thereof together with some garlic-derived components such as ajoene, diallyl disulfide and diallyl trisulfide on the following aspects of platelet physiology: (i) platelet aggregation induced by arachidonate (AA), adrenaline, ADP, collagen, calcium ionophore A23187 and thrombin; (ii) metabolism of exog. AA; (iii) deacylation of platelet membrane phospholipids and subsequent formation of cyclooxygenase and 12-lipoxygenase-derived products (thromboxane B2 and 12-HPETE/12-HETE); (iv) incorporation of AA into platelet phospholipids. Comparative data for the three pure compounds in regard to aggregation and AA metabolism will also be presented.

POSTERS

Poster 1 - Sunday, 7:30 - 9:30

VELUTINOL A, AN ANTI-INFLAMMATORY COMPOUND FROM *M. VELUTINA* L.

R.A. Yunes¹, M.G. Pizzolatti¹, J.B. Calixto¹, A.E. Goulart Sant'Ana² & G.E. Hawkes³. ¹Chem. & Pharm. Dept. of Federal University of Sta. Catarina 88049 Florianópolis SC, Brazil, ²Chem. Dept. of Alagoas 57061-Maceió-AL Brazil, ³Chem. Dept. Q.M. & W College, Mile End Road, London E1 4NS. UNITED KINGDOM.

Mandevilla velutina L. is a native Brazilian plant used in folk medicine to treat snake bites and as an anti-inflammatory agent. We recently showed that some non-peptide compounds extracted from this plant antagonise bradykinin competitively and selectively in a variety of situations and in addition have strong systemic anti-inflammatory and analgesic activity. We report here the isolation and structural determination of a new compound from *M. velutina*. The structure comprises a novel pregnane skeleton, determined by analysis of a combination of 1- & 2-dimensional ¹H and ¹³C spectra, DEPT, 1D, ¹³C ¹H and COSY. CNPq, FINEP.

Poster 2 - Sunday, 7:30 - 9:30

UTILITY OF THE PHYTOCHEMICAL DATABASE.

Stephen M. Beckstrom-Sternberg, USDA: ARS: NGR, Building 003, Room 400-U, Barc-West, Beltsville, MD 20705-2350. USA.

The National Gerplasm Resources Lab's phytochemical/ecogeographic database is a unique combination of phytochemical, taxonomic, ecological, yield, geographic, climatic and germplasm (Germplasm Resources Information Network - GRIN) databases. The phytochemical database contains detailed information concerning the chemical compounds found in 1100 plants of economic importance, including quantitation where available, as well as localization and specific activities of the compounds. Through use of structured query language (SQL) these disparate databases can be interconnected to answer previously time-intensive questions very rapidly. The combined databases were used to address a number of specific questions: 1) Are antileukemic compounds found in plants with correlated life zones? 2) What specific antihypertensive compounds are found in *Citrus* species and what other plants contain these same compounds? 3) What plants are highest in pectins? 4) Do any anticholeric plants grow in Peru? 4) What plants contain greater than 100 ppm selenium? 5) What is the value of the chemical constituents of a hectare of sunflowers?

Poster 3 - Sunday, 7:30 - 9:30

IDENTIFICATION OF QUERCETIN GLYCOSIDES IN EXTRACTS OF *PSIDIUM GUAJAVA* L. (MYRTACEAE) LEAVES WITH SPASMOLYTIC ACTIVITY.

M.M. Abou-Zaid¹, X. Lozoya², c. Nozzolillo³ & J.T. Arnason², ¹Forestry Canada, FPMI, Sault Ste. Marie, Ont., Canada P6A 5M7, ²Mexican Social Security Institute, Argentina No. 1, C.P. 62790, Xochitepec, Mexico, ³University of Ottawa, Dept. of Biol., Ottawa, Ont., CANADA K1N 6N5.

A traditional herbal remedy prepared from guava leaves, which has been medically proposed in Mexico as effective treatment of acute diarrhoea was subjected to a bioassay-guided isolation of the active constituents. Six fractions were separated on a (PVPP) column using a water-methanol gradient. A fraction containing flavonols inhibited peristalsis of Guinea pig ileum *in vitro*. Five flavonol glucosides were isolated from this active fraction (together with a trace of quercetin aglycone) and identified. Biological activity of each pure quercetin glycoside and the aglycone was studied in the same bioassay and revealed that quercetin was the most active compound in the bioassay.

Poster 4 - Sunday, 7:30 - 9:30

ANTIFEEDANT ACTIVITY OF DIHYDRO- β -AGAROFURAN SESQUITERPENES FROM *MAYTENUS CANARIENSIS* (CELASTRACEAE).

Isabel L. Bazzocchi, Ignacio A. Jiménez, Antonio G. González & Angel G. Ravelo. CPNO "Antonio González", Instituto Universitario de Química Orgánica, Universidad de La Laguna, La Laguna, Tenerife 38206, SPAIN.

Five new dihydro- β -agarofuran sesquiterpenes were isolated from *Maytenus canariensis* and elucidated by means of ¹H-¹³C spectroscopic studies (COSY, ¹H-¹H, ¹H-¹³C, NOE). Their antifeedant activity was assayed against Egyptian cotton leafworm *Spodoptera littoralis* larvae, using the leaf disk method and the activity was evaluated by calculating the feeding ratio (FR). In general, the compounds exhibited moderate antifeedant activity. Compound 4 (9 α -benzoiloxi-1 α ,2 α ,6 α ,8 α ,15 α -pentaacetoxi-4 β -hydroxy-dihydro- β -agarofuran) was the most active of the series. At a dose of 0.1 μ g cm⁻², this compound gave a FR₅₀=0.40 and in non-choice test conditions nearly 100% leaf disk protection.

Poster 5 - Sunday, 7:30 - 9:30

ANTIMICROBIAL ACTIVITY OF LAPACHOL-RELATED NAPHTHOQUINONES.

L. Moujir, E.A. Ferro, A. Wildpret, A.G. Ravelo & A.M. Gutiérrez-Navarro, Dept. Microbiología, Univ. La Laguna, 38206 La Laguna, SPAIN.

Lapachol isolated from *Tabebuia rosea* (Bignoniaceae) and synthesized naphthoquinone derivatives have been assayed for activity against Gram-positive and Gram-negative bacteria as well as *Candida utilis*. As a rule the products were more active on bacteria than on the yeast and the sole activity on Gram-negative bacteria was observed from *Salmonella typhimurium* and β -lapachone which was seen to be the most active product (MIC against *B. subtilis*, 3-5 μ g/ml and against *S. typhimurium*, 8 μ g/ml). The activity was dependent on the existence of two ketonic groups and it was higher as these groups in were o-position. The activity of those products having O=C-groups in p-position was increased by the presence of conjugate double bonds in tricyclic system.

Poster 6 - Sunday, 7:30 - 9:30

COUMARINS AS ANTIMITOTICS.

Alicia M. Zobel¹, Sharon Louis², Angela Keightley², Maria Podbielkowska³, Ewa Kupidowska³, Kasia Dobrzynska³ & Maria Waleza³. Departments of Chemistry¹ and Biology², Trent University, Peterborough, ON K9J 7B8, ³Plant Anatomy and Cytology, Warsaw University, 00-927 Warsaw, POLAND.

In darkness and under UV, two plant furanocoumarins affected mitoses and morphology of mitotically active cells. Embryonic meristem of *Allium cepa* root tips and animal cell cultures showed fewer mitoses, but more chromosomal aberrations and blockage of some phases of mitosis. Even after 1h in the presence of UV, psoralen and xanthotoxin caused abnormal chromosome separation leading to chromosomal aberrations in sister cells, and complete cessation of mitosis after 3h. In darkness mitotic spindle aberrations were visible after 3h, but the primary mechanism after 1h was on the endomembrane system. The first responses were in the cell membrane, nuclear envelope, and endoplasmic reticulum, changing their structure and causing fragmentation. We suggest that although the effect of UV is on DNA, as is well-known, the primary reaction, which occurs in darkness, is on the endomembrane system. Coumarin and two hydroxycoumarins inhibit mitosis without causing visible chromosomal aberration, suggesting that they may be good antimitotic agents.

Poster 7 - Sunday, 7:30 - 9:30

THE ACCUMULATION OF JATROPHONE AND RELATED COMPOUNDS IN TISSUE CULTURES OF *JATROPHA* SPECIES.

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Extracts of a number of species of the tropical genus *Jatropha* have been shown to contain tumour-inhibiting, anti-neoplastic macrocyclic diterpenes viz jatrophone and its mono- and dihydroxy derivatives, together with jatropholones and phorbol derivatives. Undifferentiated cell cultures of *J. curcas*, *J. multifida*, *J. podagrica*, *J. cinerea* and *J. elliptica* accumulate small amounts of these diterpenes depending on the growth conditions employed. Root-differentiating cultures initiated by treatment of suspensions with certain auxins, show an isoprenoid profile which is qualitatively and quantitatively similar to that of the intact plant. Cell-free systems derived from such cultures, as well as those from *Agrobacterium rhizogenes*-transformed root cultures, have been used to study the biosynthesis and accumulation of the biologically active diterpenes. Details of these investigations will be described.

Poster 8 - Sunday, 7:30 - 9:30

THE FIRST TRI-C-GLYCOSYLFLAVONOID FROM THE FERN *ASPLENIUM VIVIPARUM*.

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Polyphenolic investigations of *Asplenium* ferns have led to interesting data for determining the parental origin of natural hybrids but the chemistry of most *Asplenium* species is not well known.

A new flavonoid has now been isolated by preparative paper chromatography and column chromatography (on Sephadex LH-20) from an ethanolic extract of aerial parts of *Asplenium viviparum*. Preliminary investigations (colour reactions, R_f values, UV spectral analysis with the customary shift reagents, treatment with 3N HCl) suggested that the isolated compound may be a C-glycosylflavone. Further investigations (treatment with hydriodic acid, FeCl₃ oxidation, ¹H-NMR, FAB mass spectrum) showed that the isolated compound is 3,6,8-tri-C-xylosylapigenin. This is the first report of a tri-C-glycosylflavonoid from plants.

Poster 9 - Sunday, 7:30 - 9:30

PHYTOCHEMICAL STUDIES ON TRITERPENOID SAPONINS ISOLATED FROM CELL SUSPENSION CULTURES OF *CALENDULA OFFICINALIS*.

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Extracts of *C. officinalis*, rich in saponins, have proved that these molecules have cytotoxic and antitumoral activity (Raynaud, 1988). Saponins derived from oleanolic acid, have showed antiviral effect against VRV and HRV virus (Pizza, 1991). Callus and cell suspension cultures of *C. officinalis* were established as a source of triterpenoid saponins. Culture development was monitored and controlled in order to induce accumulation of the metabolites of interest. Phytochemical studies were conducted on cell extracts to lead up to fractions and then purified compounds; identified on the basis of spectral and chemical data previously reported (De Tommasi, 1987). Elicitation with fungi extract (*Verticillium dahliae*) and insecticides as Norflurazon was done. Two out of three isolated saponins have been found in extract of *C. arvensis* but those have never been reported before in *C. officinalis*.

Poster 10 - Sunday, 7:30 - 9:30

NOVEL D:A-FRIEDO-OLEANANE TRITERPENES FROM THE STEM BARK OF *PHYLLOBOTRYON SPATHULATUM*.

Simon Gibbons, Flat B5, Andrew URE Hall, High ST, Glasgow, Scotland, G1 1PU, UNITED KINGDOM

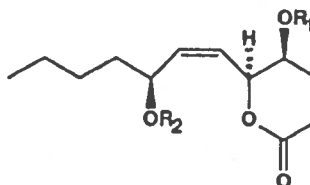
The Flacourtiaceae is a tropical and sub tropical family that is not very well defined chemically, although there have been reports of limonoids and furocoumarins. These metabolites are normally associated with the order Rutales, a taxonomic group with which the Flacourtiaceae has little similarity. A phytochemical investigation of this indeterminate family would yield chemotaxonomic information that would clarify much of the botany of the Flacourtiaceae. Within this study, three D:A friedooleanane triterpenes have been isolated from the bark of *Phyllobotryon spathulatum*. They were characterised by the use of Heteronuclear Multiple Bond Coherence NMR spectroscopy as the known compound odolactone (3-oxo-D:A-friedooleanan-27,15a-lactone), and two novel friedo-oleananes, 3 β -hydroxy-D:A-friedooleanan-27,30-dioic acid and methyl-3-oxo-19 β ,21 β -dihydroxy-30-nor-D:A-friedo-olean-20(29)-en-27-carboxylate.

Poster 11 - Sunday, 7:30 - 9:30

PECTINOLIDES A-C, NOVEL ANTIMICROBIAL AND CYTOTOXIC 5,6-DIHYDRO- α -PYRONES FROM *HYPTIS PECTINATA* (LAMIACEAE).

Rogelio Pereda-Miranda^{1*}, Lourdes Hernández¹, M. Judith Villavicencio¹, Miriam Novelo¹ & John M. Pezzuto², ¹Dept. de Farmacia, Fac. de Química, Univ. Nacional Autónoma de México, Coyoacán 04510 D.F. MÉXICO. ²Dept. of Med. Chem. & Pharmacog., College of Pharmacy, University of Illinois at Chicago, Illinois 60612, USA.

Bioassay-directed fractionation of the CHCl₃ extract of *Hyptis pectinata* L. Poit. resulted in the isolation of pectinolides A-C (1-3). *Staphylococcus aureus* and *Bacillus subtilis* were sensitive to compound 1 in the concentration range of 25-50 μ g/ml. Compounds 1-3 exhibited significant cytotoxic activity (ED₅₀ < 4 μ g/ml) with a variety of tumor cell lines.



1 R₁ = R₂ = AC

2 R₁ = Ac; R₂ = H

3 R₁ = H; R₂ = Ac

*Poster 12 - Sunday, 7:30 - 9:30

ASSESSMENT OF RELATIVE ADVANCEMENT OF LEGUME SPECIES BY THE USE OF THEIR LEAF FLAVONOID AGLYCONE PATTERNS.

Joseph C. Onyilagha & Jeffery B. Harborne, Dept. of Botany, Plant Sci. Laboratories, University of Reading, UNITED KINGDOM

Leaf flavonoid aglycone patterns of some species within the genus *Phaseolus* and other related genera: *Dysolobium*, *Macropitium*, *Strophostyles* and *Vigna* have been surveyed. The results show that while species of the genus *Macropitium* are specialising towards kaempferol, those of the other genera accumulate either quercetin and kaempferol or apigenin and luteolin. However, some species within these other genera show a tendency towards specialisation to one aglycone type.

The theoretical implication of these results with respect to species specialisation to a type of flavonoid aglycone and their relative advancement over others is discussed.

Poster 13 - Sunday, 7:30 - 9:30

INTRAVACUOLAR POOLS OF ANTHOCYANINS AND COPIGMENTS IN GRAPEVINE (*VITIS VINIFERA* L.) SUSPENSION CULTURES.

Chi Bao Do & François Cormier, Food Res. Devel. Ctre, Agriculture Canada, 3600 Casavant Blvd. West, St-Hyacinthe (Québec), CANADA J2S 8E3.

Culture of *Vitis vinifera* cell suspensions in an anthocyanin production medium (high sucrose and low nitrate concentrations) promotes the occurrence of vacuolar anthocyanin-pigmented bodies. Transmission electron microscope observations show that the pigmented bodies are not delimited by a membrane and are thus inclusions. Anthocyanins and copigments from the cells were found in two distinct pools. A first pool of freely soluble compounds was obtained through mild permeabilization using geraniol followed by extensive washing of the cells. Anthocyanins and copigments of the second pool were desorbed from the pigmented bodies using 1% HCl. Freely soluble anthocyanins were mainly cyanidin 3-glucoside and peonidin 3-glucoside whereas those adsorbed to the pigmented bodies were characterized by the predominance of peonidin 3-p-coumaroylglucoside. The nature of the copigments and of the matrix of the inclusions is under investigation.

Poster 14 - Sunday, 7:30 - 9:30

PHENOLIC CONSTITUENTS OF TROPICAL PROPOLIS. ITS PLANT ORIGIN AND DIFFERENCES WITH PROPOLIS FROM OTHER GEOGRAPHICAL REGIONS.

Francisco A. Tomás-Barberán, Francisco Tomás-Lorente, Cristina García-Viguera & Federico Ferreres, Laboratorio de Fitoquímica, CEBAS (CSTC) P.O. Box 4195, 30080, Murcia, SPAIN.

Propolis is a bee-product collected by bees from plants. This is used in pharmacy by its pharmacological properties. In addition it is useful as a marker of the geographical origin of honey. By these reasons, the phenolic constituents of propolis samples from Venezuela have been studied. The main components have been isolated and identified. Flavonoids and other phenolics are the main constituents. Propolis phenolics from Venezuela and other non-tropical regions have been studied by GC-MS and HPLC, and significant differences were found. These results can be used in the determination of the geographical origin of propolis and honey. The plant origin of tropical phenolics is discussed. However, although phenolics from propolis or Northern Hemisphere come from *Populus* bud exudates, the origin of tropical propolis is completely different.

Poster 15 - Sunday, 7:30 - 9:30

ANTI-VIRAL EFFECTS OF FLAVONOIDS AGAINST POTATO VIRUS X.

Christopher J. French¹ & G.H. Neil Towers², ¹Agriculture Canada, 6660 N. W. Marine Drive, Vancouver, B.C., V6T 1X2, Canada. ²Botany Department, University of B.C., Vancouver, B.C. V6T 2B1, Canada.

Quercetin at a concentration of 1 µg/ml inhibited infectivity of potato virus X (PVX) in *Chenopodium quinoa* by 80%. Morin and 3-O-methyl galangin were also strong inhibitors. Increased methoxylation of quercetin reduced inhibition. Quercetin did not induce resistance, affect symptom development or have a prophylactic effect. When purified PVX-RNA was used as an inoculum, quercetin stimulated infectivity by 75%. Quercetin interferes with an early event in infection, possibly by inhibiting a viral coat protein: host receptor interaction.

Poster 16 - Sunday, 7:30 - 9:30

SECONDARY COMPOUNDS AND PLANT SELECTION BY THE LEAF-CUTTING ANT *ACROMYRMEX STRIATUS*.

J. Pablo Pelotto & María A. Del Pero Martínez, Centro de Estudios Farmacológicos y Botánicos, Serrano 665, Bs. As. ARGENTINA.

A field test of leaf-preference with the leaf-cutting and *Acromyrmex striatus* as herbivore was carried out in a dry forest of Argentina. *Acacia praecox* and *Zizyphus mistol* showed the higher and lower preference index values, respectively. Here we report the results of quantitative analyses for condensed tannins, total phenols and saponins, and qualitative analyses for flavonoids and hydrolyzable tannins from mature leaves of both adults and saplings of these species. All chemical analyses were made by standard methods. Major differences were found in saponin content. High values for *Z. mistol* suggest a key role for these secondary compounds in the low palatability of *Zizyphus* leaves to ants. Differences in flavonoid patterns between saplings and adult plants of *Z. mistol* were also noticeable.

Poster 17 - Sunday, 7:30 - 9:30

ONE HEAVY METAL AS A PHYTOALEXIN INDUCER IN WATER HYACINTH.

María E. Webb & J.S. Oliviera, G.D.E.H., Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2825 Monte de Caparica, PORTUGAL.

Eichhornia crassipes (Mart.) Solms is an aquatic vascular plant which constitutes a serious environmental problem in several Portuguese water bodies. Much work has been carried out on the epurative and accumulative capacities of this species, nevertheless its response to environmental stresses (such as the presence of heavy metals) has deserved little attention.

In this study a 0.5% copper sulphate aqueous solution in 0.02% Tween 20 was used as an inducing agent for phytoalexin production. The response of the plant to this abiotic agent, applied as droplets to the adaxial surface of leaves, is denoted by the formation of dark spots. Extraction and separation of the compounds diffused from the stressed plant cells into the droplets, afforded several bands (on a TLC plate) different from those obtained for the control.

Poster 18 - Sunday, 7:30 - 9:30

INSECT ANTIFEEDANT ACTIVITY OF SOME NATURAL PRODUCTS ISOLATED FROM INDIAN PLANTS.

K. Nagaiah, M. Narayana Rao, R. Jagdish Kumar & Prof. G. Srimannarayana, Department of Chemistry, Osmania University, Hyderabad, 500 007, INDIA.

Pure compounds and active fractions isolated from plants known to possess resistance to insect attack such as *Millettia racemosa* (stem without bark), *Pterolobium hexapetalum* (whole plant), *Bauhinia vahlii* (pods without seeds), *Pongamia pinnata* (seeds), *Azadirachta indica* (seeds), *Annona squamosa* (seeds), *Piper longum* (roots), *Xeromphis uliginosa* (bark), were chemically investigated and the resulting products were assessed for insect antifeedant activity. The results will be useful to evolve an environmentally safe botanical pesticide.

Poster 19 - Sunday, 7:30 - 9:30

ECUADORAN MEDICINAL PLANTS I, PRELIMINARY INVESTIGATION OF THE C. LIMBACH, M.D. COLLECTION OF SHUAR (JIVARO) MEDICINAL PLANTS.

C. Limbach, M.D.¹, D. Daly, Ph.D.², G.W.W. Slywka, Ph.D.³, N. Neumann, D.V.M., Ph.D.³, & R.J. Krueger, Ph.D.³. ¹Natividad Hospital, Salinas, California 93912. ²New York Botanical Garden, Bronx NY 10458-5126. ³College of Pharmacy, Ferris State University, Big Rapids, MI 49307, USA.

The Limbach collection, over 50 medicinal plants collected with the assistance of Shuar native healers from the basin of the Rio Morona, Rio Mangosiza near the mission of Miazal, Ecuador, will be described. Results of alkaloid and phenol screening; antimicrobial testing; Brine Shrimp Assay; Potato Disc Agar Crown Gall Tumor Assay; and bioassays involving rabbit/rat ileal segments will be presented. Taxonomic identities, when known will be delineated. A brief discussion of the various assays' results in light of the Shuar uses of the plants is included.

Poster 20 - Sunday, 7:30 - 9:30

SEMI-PREPARATIVE ISOLATION AND QUANTITATIVE ANALYSIS OF STEROIDAL GLYCOALKALOIDS IN POTATO.

Katsuya Fukuhara, Isao Kubo & Aya Kubo, Division of Entomology and Parasitology, College of Natural Resources, University of California, Berkeley, California 94720, USA.

Potato, the tuber of *Solanum tuberosum* (Solanaceae), is one of the most popular and important vegetables in the world. This vegetable is known to be poisonous, especially the Andean bitter frost-resistant varieties.

An efficient semi-preparative isolation of two steroidal glycoalkaloids, α -chaconine and α -solanine, from potato extracts was achieved using rotation locular counter-current chromatography (RLCC) only. A simple quantitative analysis method by high performance liquid chromatography (HPLC) of these two toxic steroidal glycoalkaloids in potato extracts was also established.

***Poster 21 - Sunday, 7:30 - 9:30**

DISTRIBUTION OF ERGOT ALKALOIDS IN THE GENUS *Ipomoea* (CONVOLVULACEAE).

Diego Amor-Prats & Jeffrey B. Harborne, Department of Botany, Plant Science Laboratories, University of Reading, Whiteknights Reading, RG6 2AS, UNITED KINGDOM.

The aim of this work was to evaluate the possible chemotaxonomic use of ergot alkaloids in the infrageneric classification of the genus *Ipomoea* L. Two-dimensional thin layer chromatography and colorimetric estimation of the total ergot alkaloids were carried out on 50 species. Twenty-eight percent of the species were ergot alkaloid positive. Ergot alkaloids proved to be widely distributed within the genus, however, some sections (*i.e.*, *Eripipomoea*, *Tricolor* and *Eriospermum* series *Arborescentes*) are richer than others in species containing ergot alkaloids.

Poster 22 - Sunday, 7:30 - 9:30

RELATIONSHIP OF THE PHEROMONES OF SOME PREDACEOUS INSECTS TO GREEN LEAF VOLATILES.

Jeffrey R. Aldrich, USDA-ARS Insect Chemical Ecology Laboratory, Agricultural Research Center-East, B-467, Beltsville, MD, 20705, USA.

Green leaf volatiles (GLVs) enhance the attractiveness of the pheromones for several phytophagous insects, including boll weevil (Coleoptera), corn earworms (Lepidoptera), and Mediterranean fruit flies

(Diptera) (Dickens *et al.*, 1990). Some parasitoids (Hymenoptera) orient to GLVs induced by the feeding of host larvae (*e.g.* Turlings *et al.*, 1991).

GC-MS analyses and field tests of the pheromones for non-specific predatory bugs (Hemiptera: Heteroptera) indicate that GLVs are synthesized *de novo* as part of the pheromonal blend for these generalized predators. For examples, (E)-2-hexenal and α -terpineol produced by males of *Podisus maculiventris* (Pentatomidae) act synergistically as an attractant pheromone, and males of the assassin bug *Pristhesancus plagipennis* (Reduviidae) produce (Z)-3-hexenol and corresponding esters as an attractant pheromone.

Poster 23 - Sunday, 7:30 - 9:30

CARDENOLIDE BIOSYNTHESIS FROM ACETATE AND MALONATE IN *ASCLEPIAS CURASSAVICA*.

Henri W. Groeneveld¹, Arijan Binnekamp¹ & Don Seykens², ¹Department of Plant Ecology and Evolutionary Biology, University of Utrecht, P.O. Box 800.84, 3508 TB Utrecht, THE NETHERLANDS, ²Bijvoet Center, NMR division, University of Utrecht, THE NETHERLANDS.

Asclepias curassavica plants were grown from seeds in a controlled environment and the composition and accumulation of cardenolides and organic acids was measured over a nine week period after germination. The label from [2-¹³C]-acetate and [2-¹³C]-malonate proceeded to cardenolides, sterols and triacylglycerols. Optimal incorporation conditions produced ¹³C-uscharidin from both ¹³C labelled substrates. In both cases the highest ¹³C enrichments were measured in the dideoxyhexosulose moiety of uscharidin, the butenolide ring appeared to be labeled as expected, but the labeling patterns in the steroid nucleus were not consistent with the ones to be derived from the mevalonate pathway.

Poster 24 - Sunday, 7:30 - 9:30

ALKALOID ACCUMULATION IN *CATHARANTHUS ROSEUS* CELL SUSPENSION CULTURES EXPOSED TO SALT STRESS.

F.A. Vazquez-Flota, M. Méndez-Zeel & V.M. Loyola-Vargas, Centro de Investigación Científica de Yucatán, A.C. Apdo. Postal 87, Cordemex, 97310, MÉXICO.

A *C. roseus* cell culture was submitted to four different NaCl concentrations throughout a culture cycle. Although the salinity shock did not produce a significant increment in the yohimbine, vincamine and ajmalicine levels, it induced that the accumulation peaks occurred before than in the control without salt. In a salt selected cell culture, the alkaloid levels were similar to those detected in the unselected culture, except for a peak in the late stationary phase; however, a higher biomass production was observed and thus resulting in a higher bioproductivity. Our results suggest that salinity could be useful as strategy for secondary metabolites production in *in vitro* systems.

***Poster 25 - Sunday, 7:30 - 9:30**

TRYPTOPHAN DECARBOXYLASE ACTIVITY AND BIOSYNTHESIS OF AJMALICINE AND CATHARANTHINE IN HAIRY ROOTS FROM *CATHARANTHUS ROSEUS*.

Ignacio R. Islas, Victor M. Loyola-Vargas & María de Lourdes Miranda-Ham, Div. Biología Vegetal, C.I.C.Y. Ap. Postal 87, Cordemex 97310, Yucatán, MÉXICO.

The decarboxylation of tryptophan to tryptamine by tryptophan decarboxylase (TDC) has been proposed as one of the main regulation points in the biosynthesis of indolic alkaloids. Nevertheless, the results found in *C. roseus* seem to be contradictory.

The evaluation of TDC during a culture cycle (36 d) showed a peak of maximal activity on day 21, which coincides with a lowering of the tryptamine pool. Later on when this enzymatic activity decreases, there is an accumulation of tryptamine. After the maximum peak of TDC, total alkaloid, ajmalicine and catharanthine contents show an increment which coincides with

the accumulation of tryptamine (Supported by CONACyT Grant 0429N).

Poster 26 - Sunday, 7:30 - 9:30

EFFECT OF GLYCOPROTEINACEOUS ELICITORS ON THE ALKALOID PRODUCTION OF HAIRY ROOTS OF *CATHARANTHUS ROSEUS*.

Oscar A. Moreno-Valenzuela & Victor M. Loyola-Vargas, Division de Biología Vegetal, Centro de Investigación Científica de Yucatán, A.C. Apdo. Postal 87 Cordemex, 97310, Yucatán, MÉXICO.

Hairy roots of *C. roseus* responded to the addition of chitinase and pectinase to the culture medium with an increment in the alkaloid production. Pectinase at a concentration of 0.03 units caused the release of alkaloids to the culture medium, increasing during the whole time of culture. An increase in yield was observed on day 20. In order to know the effect of chitinase, a dose-response experiment was realized on day 20 of culture. Five concentrations of chitinase were used. The optimal concentration was 2.5 milliunits, in which yield of alkaloids was increased 2.4 times that of control. These data suggest that the addition of chitinase is a viable strategy for increasing the production of alkaloids of hairy roots of *C. roseus*.

Poster 27 - Sunday, 7:30 - 9:30

USE OF ACETYLSALICYLIC ACID FOR ANTHOCYANIN PRODUCTION IN *CATHARANTHUS ROSEUS* CELL SUSPENSION CULTURES.

G. Godoy-Hernández, Y. Minero-García & V.M. Loyola-Vargas, Departamento de Biotecnología, División de Biología Vegetal, Centro de Investigación Científica de Yucatán, A.C. Apartado Postal 87, Cordemex, Yucatán, 97310, MÉXICO.

This work estimates the effects of acetylsalicylic acid (ASA) on secondary metabolism, particularly in the production of anthocyanins in *C. roseus* cell suspension cultures. Samples extracted of spent medium, presented an increase of 1476% on anthocyanins production when ASA was applied at concentrations of 20 mM. In combination with other elicitors, such as homogenates of *Aspergillus fumigatus* or trans-cinnamic acid, did not increase the anthocyanins production. These results suggest that ASA could act as modulator of phenylpropanoid metabolism, such as a new biotic elicitor for plant cell cultures.

Poster 28 - Sunday, 7:30 - 9:30

EFFECT OF INITIAL pH OF CULTURE MEDIA ON GROWTH AND ALKALOID PRODUCTION IN HAIRY ROOT CULTURES OF *CATHARANTHUS ROSEUS*.

Romualdo Ciau-Uitz, Oscar A. Moreno & Victor M. Loyola-Vargas, División de Biología Vegetal, Centro de Investigación Científica de Yucatán, A.C. Apartado Postal 87 Cordemex, Yucatán, 97310 MÉXICO.

Two lines of hairy root cultures of *C. roseus* were submitted to several initial pH conditions of culture media: 3, 4, 5, 6, 7, and control (5.7), and growth and alkaloid production were analyzed at day 20 of culture. Results indicate that both growth and total alkaloid production were not affected, doubling times of cultures in all treatments had no significant differences. With regard to total alkaloid production, yields and productivity of cultures were not affected by initial pH. Results indicated that ajmalicine accumulation has two peaks at pH 5 and 7. Our results suggest that the modification of initial pH of the culture medium influences particular alkaloid accumulation.

Poster 29 - Monday, 7:30 - 9:30

EFFECT OF MODIFYING THE COMPONENTS OF THE CULTURE MEDIUM ON THE GROWTH AND ALKALOID CONTENT OF HAIRY ROOTS OF *DATURA STRAMONIUM*.

Luis A. Sáenz-Carbonell & Víctor M. Loyola-Vargas, Centro de Investigación Científica de Yucatán, A.C. Apdo. Postal 87 Cordemex, Yucatán 97310, MÉXICO.

We are evaluating the effect of different principal components of the culture medium to enhance the growth and tropane alkaloid content of hairy roots of *D. stramonium*. Our results show a positive correlation between the sucrose concentration and hyoscyamine content from 1% to 6%. The hairy roots of *D. stramonium* did not grow with any other carbon source but sucrose. The treatment without P resulted in the highest release of tropane alkaloids. Increased total nitrogen content of 41.63 and 52 mM with the same B5 medium show the highest growth and yield/flask. Our results suggest that by modifying some of the principal components of the culture medium we can increase the growth and alkaloid content of hairy roots of *D. stramonium*.

Poster 30 - Monday, 7:30 - 9:30

A RAPID PROCEDURE FOR THE ISOLATION OF INDOLE ALKALOIDS FROM CALLUS CULTURES OF *CATHARANTHUS ROSEUS*.

M. Monforte-González, L.M. Peña Rodríguez, M.A. Herrera Alamillo, C. De Los Santos Briones & V.M. Loyola-Vargas, Div. Biología Vegetal, Centro de Investigación Científica de Yucatán, Ap. Postal 87, Cordemex 97310, Yucatán, MÉXICO.

A method for the isolation of ajmalicine, catharanthine and vincamine from callus cultures of *C. roseus* has been developed. The procedure involves a partitioning of the total alkaloid fraction in solvents of different polarities, followed by purification using flash chromatography and preparative TLC. The identification of the different alkaloids was confirmed from their spectroscopic data and by comparison, on TLC, with analytical samples.

Poster 31 - Monday, 7:30 - 9:30

THE EFFECTS OF ELICITORS AND ABIOTIC STRESSES ON PHYTOALEXIN PRODUCTION BY DANDELION CELL CULTURE.

Fujinori Hanawa & Junya Mizutani, Mizutani Plant Ecochemicals Project, JRDC, Megumino Kita-3-1-1, Eniwa, 061-13, JAPAN.

A liquid cell culture of Dandelion (*Taraxacum officinale* Web.) was used to investigate the induction of phytoalexin (Lettucenin A) production. Elicitors from *Cladosporium herbarum* and *Saccharomyces cerevisiae* as well as 1 mM cupric chloride stress induced the production of lettuceenin A within 2 hours. UV light irradiation for 20 min. also elicited the response within 12 hours. Administration of SOD (superoxide dismutase) and catalase showed no effect on the production of lettuceenin A induced by former stress methods, but both enzymes reduced the production induced by UV stress. Ten mM of Ascorbic acid itself induced a small amount lettuceenin A, but it also reduced the effect of elicitor from *C. herbarum*.

Poster 32 - Monday, 7:30 - 9:30

IRIDOID AND NAPIHTHAQUINOIDS FROM *KIGELIA PINNATA* DC.

Peter J. Houghton, Chelsea Department of Pharmacy, King's College London, University of London, London SW3 6LX, UK.

Aqueous and alcoholic extracts of the bark of *K. pinnata* are widely used in Africa for medicinal purposes but no investigation on the polar constituents has been reported. A methanolic extract of *K. pinnata* rootbark was fractionated over silica gel and subsequent preparative TLC yielded five

minor and three major compounds. The structure of the compounds was determined by spectroscopic methods. The major compounds were the iridoids specioside, verminoside and minecoside. The other five compounds consisted of isoprenyl naphthaquinone derivatives of which three are novel compounds.

Poster 33 - Monday, 7:30 - 9:30

FRACTIONING OF THE OILS FROM *COPAIFERA* SPECIES BY CHROMATOGRAPHY IN SILICA MODIFIED WITH KOH. HRGC/MS AND HRGC/FT-IR ANALYSIS.

A.C. Pinto, W.F. Braga, O.A.C. Antunes, V.F. Veiga Jr. & M.L. Patitucci, Instituto de Química, Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, BRAZIL, 21910.

The preparation of silica modified with KOH for column chromatography was optimized and utilized for the fractioning of the oils from *Copaifera cearensis*, *C. officinalis* and *C. multijuga*. Three fractions eluted with $n\text{C}_6\text{H}_{14}$, CH_2Cl_2 and CH_3OH were obtained. Sesquiterpene hydrocarbons (hexanic fraction) and sesquiterpene alcohols (medium polar fraction) were identified by HRGC/MS analysis. The methanolic fraction was analyzed by HRGC/MS, HRGC/FT-IR an NMR and six diterpene acids were identified: eperuic, copalic, agathic, kolavenic, hardwickiic, and its saturated form.

Poster 34 - Monday, 7:30 - 9:30

SIGNIFICANT BIOLOGICAL ACTIVITIES OF DIFFERENT PARTS OF THE PLANT *NYCTANTHES ARBORTRISTIS* LINN.

J.S. Tandon, V. Srivastava, P.Y. Guri, K.C. Srivastava, K.C. Saxena, Z.K. Khan & P.P. Gupta, Central Drug Research Institute, Lucknow 226 001, INDIA.

During a systematic biological screening program of traditional plants at CDRI for development of drugs from natural sources, the ethanolic extracts of the different parts of *Nyctanthes arbortristis* showed antileishmanial, antiviral, antifungal immunostimulant and anti allergic activities.

Chemical investigation of the seeds and leaves led to the isolation and characterisation of several iridoid glucosides (based on modern physicochemical techniques) viz. Arbortristosides A-E and Arborsides A-C, respectively. Arbortristosides A and C showed antileishmanial (*L. donovani*), antiviral (SFV, EMCV), antifungal (*C. albicans*, *A. fumigatus*, *S. neoformans*) and immunostimulant activities.

Poster 35 - Monday, 7:30 - 9:30

TWO POTENT BIOACTIVE COMPOUNDS FROM *ANNONA SQUAMOSA* L. SEED.

M.A. Malek & R.M. Wilkins, Department of Agricultural and Environmental Science, University of Newcastle, Newcastle upon Tyne, NE1 7RU, UNITED KINGDOM.

Crude extracts of the seeds of *Annona squamosa* L. showed insecticidal activities. Two compounds were isolated from the extracts and were potent in causing mortality in *Tribolium castaneum* H. These two compounds were also active on a wide range of insect pests and other organisms. It was found that one of the compounds showed selective toxicity against mammalian cell lines and inhibited cancer cell growth in human lung carcinoma (A549) and in normal mouse fibroblast cell lines (3T6).

Poster 36 - Monday, 7:30 - 9:30

NEW TAXANES FROM *TAXUS WALLICHIANA* ZUCC.

G. Appendino¹, P. Gariboldi², L. Barboni², B. Gabetta³ & E. Bombardelli⁴, ¹Dipartimento di scienza e Tecnologia del Farmaco, Via Giuria 9, Torino, ITALY, ²Dipartimento di Scienze Chimiche, Via S. Agostino 1,

Camerino, ITALY, ³Laboratori Ricerca e Sviluppo, Inverni della Beffa, Via Ripamonti 99, Milano, ITALY, ⁴Indena s.p.a., Via Ripamonti 99, Milano, ITALY.

Besides known compounds, the needles of *Taxus wallichiana* Zucc. gave a series of novel oxygenated derivatives of 10-desacetylbaicatin III and brevifoliol, whose structure was assessed by spectral data and chemical reactions.

Poster 37 - Monday, 7:30 - 9:30

SYSTEMIC INSECTICIDE ACTIVITY AGAINST *MYZUS PERSICAE* OF A PYRROLIDINE ALKALOID.

Alison A. Watson¹, Monique S.J. Simmonds¹, Elaine A. Porter¹, Wally M. Blaney² & Linda E. Fellows, ¹Jodrell Laboratory, Royal Botanic Gardens, Kew, Surrey TW9 3DS, UNITED KINGDOM, ²Dept. of Biology, Birkbeck College, Malet Street, London, UNITED KINGDOM.

The pyrrolidine alkaloid 2R,5R-dihydroxymethyl-3R,4R-dihydroxypyrrolidine (DMDP), which occurs in the Central American legume *Lonchocarpus costaricensis*, has been shown to affect insect behaviour and development. DMDP has efficacy as a systematic insecticide in tomatoes against *Myzus persicae*. It is translocated to young leaves and can persist for at least 12 weeks in the plant without causing any phototoxicity.

Poster 38 - Monday, 7:30 - 9:30

ANALYSIS OF DUTCH *PSILOCYBE SEMILANCEATA* -HY-APATITE~ AS COLUMN PACKING MATERIAL FOR THE ANALYSIS AND ISOLATION OF *PSILOCYBIN* AND *BAEOCYSTIN*.

Gerrit Boers, Jantien Kettenes-van den Bosch & Willem van der Sluis, Faculteit der Farmacie, Rijksuniversiteit Utrecht, P.O. Box 80082, NL-3508 TB Utrecht, THE NETHERLANDS.

Specimens of Dutch *Psilocybe semilanceata* (Fungi) populations were screened semiquantitatively for the presence of tryptamine derivatives with TLC and HPLC. The results are in agreement with literature data reported for this species from various European countries and from the USA: about 1.5 % psilocybin and 0.3 % baeocystin and small amounts of psilocin. A standardized *Psilocybe semilanceata* methanol extract was also investigated on HY-APATITE columns. HY-APATITE is a high-purity calcium hydroxyapatite, which is so far primarily used in the medical field for bone implants. Sintered HY-APATITE (particle size 4-20 f) is a suitable column packing material for HPLC (acetonitrile/water= 83+17 as eluent), whereas regular, unsintered HY-APATITE (particle size 53-90 f) can be used in preparative low pressure liquid chromatography for the isolation of psilocybine and baeocystine using methanol/water mixtures as eluent. HY-APATITE is the registered trademark of Euro Crystals BV, Emmastraat 11, NL-6373 HM Landgraaf, THE NETHERLANDS.

Poster 39 - Monday, 7:30 - 9:30

FUNGAL ACTIVITY OF LENTIL (*LENS CULINARIS* MEDIK.) SEED EXUDATES.

C. Nozzolillo, M. Bhalla, A. Koul, K. Boutilier, & N. Capello, Department of Biology, University of Ottawa, Ottawa, CANADA, K1N 6N5.

Seeds of five tannin-containing lines and one non-tannin line were surface sterilized and imbibed in sterile water for 6 or 24 hours. The crude exudates and fractions prepared by passage through a Sephadex LH-20 column were tested for their ability to inhibit the growth of *Fusarium oxysporum* responsible for lentil root rot. Isolated tannin-containing fractions significantly affected spore germination but not hyphal growth. An anthocyanin-containing fraction but not the delphinidin glycosides it contained inhibited both spore germination and hyphal growth.

Poster 40 - Monday, 7:30 - 9:30

ETHNOBOTANICAL DRUG DISCOVERY BASED ON MEDICINE MEN'S TRIALS IN THE AFRICAN SAVANNA.

Isao Kubo & Makoto Taniguchi, Division of Entomology and Parasitology, College of Natural Resources, University of California, Berkeley, CA 94720, USA.

In our continuing search for antimicrobial agents from tropical plants, we have found that "Bwana Mganga" (Swahili or similar terminology meaning medicine man in other languages) possess a wealth of empirical knowledge on local plants. Thus, from 79 extracts, which included 72 species of plants collected, based on information provided by Bwana Mganga, we found that 40 extracts initially gave positive results indicative of antimicrobial activity against one or more of the four representative microorganisms tested. This number represents a much higher probability of finding the active extracts than the plants collected at random in the same area.

Poster 41 - Monday, 7:30 - 9:30

FURANCOUMARINS AS AUTOINHIBITORS OF GERMINATION.

Alicja M. Zobel & Angela M. Keightley, Chemistry Dept., Trent University, Peterborough, ON, CANADA, K9J 7B8.

Furanocoumarins were found on seeds of Rutaceae and on fruits of Umbelliferae (Zobel and Brown, 1991) in substantial concentrations, as well as within the tissue. Using an autofluorescence microscope, we found differences in intensity of emitted light from different compartments of a seed or a fruit: surface, fruit tissue, seed surface, seed tissue, embryo surface and embryo tissue. Isolation of tissues confirmed differences in concentration in various parts of seed and fruit. High concentrations in any of these compartments could be responsible for autoinhibition of germination if coumarins were in contact with embryo cells (e.g., in a wet environment), because we have found that coumarins inhibit mitosis. During several months of successive imbibitions, when water was continually replaced, the removed samples contained decreasing concentrations of these compounds. We suggest that, in nature, a similar scenario exists: during winter and spring thaws, water slowly removes germination-inhibiting compounds, and in this way by renewing mitosis, allows the embryo to protrude from the seed coat.

Poster 42 - Monday, 7:30 - 9:30

PHOTOCHEMICAL ALLELOPATHIC ACTIVATION IN THE FLORIDA SCRUB.

Nikolaus H. Fischer¹, Heekyung Tak¹ & G. Bruce Williamsor², Dept. of Chemistry¹ and Botany², Louisiana State University, Baton Rouge, LA 70803, USA.

During long fire-free periods on Florida scrub, allelopathic action of Florida "Rosemary" (*Ceratiola ericoides*, *Empetraceae*) inhibits germination and growth of fire-facilitation graminoids (*Schizachyrium* and *Leptochloa* spp.) and pines (*Pinus palustris* and *P. elliotii*) of the sandhill community. The dihydrochalcone ceratiolin and related chalcones are leached from fresh leaves and litter of *C. ericoides*. They are photochemically activated by degradation to allelopathic agents, which are known to inhibit the germination and growth of native Florida sandhill grasses and pines.

***Poster 43 - Monday, 7:30 - 9:30**

HYDROXAMIC ACIDS: PHYTOCHEMICAL FACTORS INVOLVED IN MAIZE RESISTANCE TO WESTERN CORN ROOTWORM, *DIABROTICA V. VIRGIFERA*.

Yongshou Xie, J. Thor Arnason & Bernard J.R. Philogène, Dept. of Biology, University of Ottawa, Ottawa, CANADA K1N 6N5.

An accurate high-performance liquid chromatography (HPLC) method was developed for the separation and quantification of hydroxamic

acids in maize root extracts. Four compounds, found in maize roots DIMBOA, DIM₂BOA, HMBOA, and MBOA, were separated and identified within 30 min in a C18 reversed-phase column using a gradient of methanol and phosphoric acid. Hydroxamic acids were found to possess toxic/feeding deterrent action to western corn rootworm larvae. The LC₅₀ (lethal concentration for 50% mortality) values of DIMBOA and MBOA were 153 and 718 ppm, respectively. Host searching behaviour of western corn rootworm neonates was significantly modified when maize roots were treated with various hydroxamic acids.

Poster 44 - Monday, 7:30 - 9:30

ALKALOID PRODUCTION AND CELL DIVISION IN A HAIRY ROOT CULTURE OF *C. ROSEUS*.

L. Terpán-Acuña, V. Loyola-Vargas & A.M. Baíza, Centro de Investigación Científica de Yucatán, A.C., MÉXICO.

Secondary metabolites are produced in tissue cultures either in the stationary or in the exponential phase when the culture is actively growing. Nevertheless little is known about the relationship between alkaloid production and cell division in organ cultures. The hairy root line pBI 121.1 obtained in our laboratory from a root explant of *Catharanthus roseus* shows two peaks of alkaloid production (total alkaloids), the first one between day 6 and 9 and the second between day 24 and 36. Cell division frequency during the growth cycle shows a maximum on day 4 (Mitotic Index = $8.98 \pm 0.498\%$), beyond that day the MI became smaller until day 32 where there is no division at all. These data suggest that there might be a relationship between culture growth, cell division and alkaloid production during the first days of the growth cycle.

Poster 45 - Monday, 7:30 - 9:30

COUMARINS FROM *PILOCARPUS RIEDELIANUS* (RUTACEAE).

Adolfo H. Müller, Luis R.O. Degaspari, Paulo C. Vieira, João B. Fernandes & M. Fátima das G.F. da Silva, Departamento de Química, Universidade Federal de São Carlos, São Carlos, SP, 13560, BRAZIL.

The genus *Pilocarpus* has long been known as the most important source of the alkaloid pilocarpine, a useful medicine for the treatment of glaucoma. Only recently, coumarins have been found to occur in *Pilocarpus* species. Here, we report on the isolation and identification of eight coumarins from the stems of *P. reidelianus*. Among them two were identified as the new compounds 3-methoxyangelicin and 3,6-dimethoxy-angelicin. The positioning of a methoxy group at C-3 was carried out by ¹H NMR NOE experiments. The isolation of coumarins from this genus seems to be an extension of the widespread occurrence of these secondary metabolites, specially in the Rutaceae.

Poster 46 - Monday, 7:30 - 9:30

LIMONOIDS AND LIGNANS FROM *TRICHILIA ESTIPULATA* (MELIACEAE).

Diógenes A.G. Cortez, João B. Fernandes, Paulo C. Vieira & M. Fátima das G.F. da Silva, Departamento de Química, Universidade Federal de São Carlos, São Carlos, SP, 13560, BRAZIL.

The Meliaceae family is well-known as a rich source of limonoids and has also been used to control insect growth in east Asia. We have been studying some Meliaceae from Brazil and among the compounds we have isolated are mainly limonoids. However recently, investigating *T. estipulata* we have isolated a number of lignans glycosides besides known and unknown limonoids. All the compounds were identified based on full spectral analysis. The isolation of lignans are quite unusual in the Meliaceae, however they have been isolated from other Rutales such as Rutaceae and Burseraceae.

***Poster 47 - Monday, 7:30 - 9:30**

LAMIALES: ETHNOPHARMACOLOGY VS CHEMISTRY

Fábio de S. Menezes¹, Maria Auxiliadora C. Kaplan¹ & Otto R. Gottlieb², ¹Núcleo de Pesquisas de Produtos Naturais NPPN-UFRJ/²Instituto de Química USP.

The order Lamiales comprises three families, among which Lamiaceae and Verbenaceae are formed by herbs, shrubs and trees while Callytrichaceae consists almost exclusively of aquatic species. These families consist of about 350 genera with approximately 7000 species distributed mainly in tropical and subtropical regions. Lamiaceae and Verbenaceae encompass highly esteemed Brazilian medicinal plants. Brazilian Indians as well as African tribes use these plants in religious ceremonies. In traditional medicine they are employed as sedative, in the therapy of respiratory ailments, liver and stomach diseases, fevers, rheumatism and as well as antiseptic. However their use against poisonous snake bites and for the treatment of skin disorders, diarrhea and venereal diseases has also been recorded. Indeed the chemistry of this order is quite diversified and it is based chiefly on diterpenoids, flavonoids, essential oils and others. This work correlates the chemical composition with the ethnopharmacological record for this order.

***Poster 48 - Monday, 7:30 - 9:30**

CHEMICAL AND ANTIMICROBIAN ANALYSIS OBTAINED OF ESSENTIAL OILS OF ANNONACEAE.

Marçal de Q. Paulo¹, Edeltrudes de O. Lima¹, Emerson F. Queiroz¹, & Maria A.C. Kaplan², ¹Lab. Tec. Farm. and Inst. Quim. Universidade Federal da Paraíba, ²NPPN/Universidade Federal do Rio de Janeiro.

Many Species of Annonaceae, in the Northeast region of Brazil, have been used on popular medicine against inflammatory processes. The essential oils obtained from *Xylopia frutescens*, *X. nitida*, *Anaxogorea olicacarpa*, *Rollinia pickelli* and *Annona crassiflora*, extracted by hydrodistillation process, were analysed and quantified by GC/MS. The same oils tested on pathogenic and opportune microorganisms, by diffusion method in solid mean. The essay above was incubated at 37 °C during 24-48 hours (bacteria and yeasts), at the room temperature for 10-14 days (mycelian fungi). The essential oils of *X. nitida*, *R. pickelli* and *P. crassiflora* showed inhibitory activity against several microorganisms.

***Poster 49 - Monday, 7:30 - 9:30**

CHEMICAL STUDY AND ANTIMICROBIAN ANALYSIS OF ESSENTIAL OILS OBTAINED FROM *CROTON RANGELIANUS*.

Edeltrudes de O. Lima¹, Marçal de Q. Paulo¹, Olga F. Gompertz², Escola Paul³, Astrea M. Giesbrecht³ & Alain Phillippe⁴, ¹Lab. Tec. Farmaceutica, Universidade Federal da Paraíba, ²Medicina, ³Inst. Cienc. Biomédicas -BRASIL, ⁴Faculté de Pharmacie de Montpellier, FRANCE.

Croton rangelianus (Eupharbiaceae), as a plant have been used in popular medicine of skin disease treatment. The microbiological screening of Chloroformical, ethanolic and aqueous extracts of *C. rangelianus* leaves showed inhibitory activity against several microorganisms. The essential oils of these leaves were extracted by hydrodistillation process, quantified and analysed by GC/MS and tested on bacteria, yeasts and mycelian fungi, in solid mean (Vincent's technique). The essays were incubated at 37 °C 24-48 hours (bacteria and yeasts), and at room temperature for 10-14 days (mycelian fungi). The *C. rangelianus* oil presented potential inhibitory activity on the essayed microorganisms.

***Poster 50 - Monday, 7:30 - 9:30**

UTILIZATION OF MEDICINAL PLANTS FROM THE NORTHEAST REGION OF BRAZIL USED THE ULCERATION THERAPEUTICS.

Jáder F.S. Filho, Edeltrudes de O. Lima & Marçal de Q. Paulo, Seção de Dermatologia, Dep. Cien. Farmacêutica, Univ. Fed. Paraíba, BRASIL.

At this work, a chemical study and an analysis of the biological activity of hydroalcoholic extract and essential oils from medicinal plants was carried out by the hydrodistillation and percolation processes. Species of plants from the Northeast region of Brazil were collected to the experience, having in view, they have been used by that population on skin disease therapeutics, just as the varicose ulcers.

Based on popular medicine and chemical and biological studies, the same products have been used with best results on the varicose ulcer treatment producing a tissue regeneration and a cicatrization of that one.

***Poster 51 - Monday, 7:30 - 9:30**

PHYTOCHEMICAL AND BIOLOGICAL ACTIVITY OF POLYPHENOLS IN GERANIACEAE.

Stephanie V. Ivancheva & G. Velez, Bot. Inst. Bulg. Acad. of Scien., 1113 Sofia, Bulgaria.

Three Bulgarian medicinal plants from family Geraniaceae have been analysed phytochemical and pharmacologically. Different polyphenols-flavonoids and tannins have been found. Their structure has been identified by chromatography and spectral methods. Some products show antiinfection and hypotensive activity. They cause a strong increase of the survival rate in infection in mice and radioprotective effect.

Poster 52 - Monday, 7:30 - 9:30

POLYPHENOLS AND RP-HPLC PLANT (CULTIVAR) RECOGNITION.

Everaert E., De Cooman L., Vande Castele K., Hutsebaut W. & C.F. Van Sumere; University of Ghent (BELGIUM), Laboratory of Plant Biochemistry.

The undisputable description and cataloguing of new and important cultivars poses sometimes serious problems. A new RP-HPLC method, for the analysis of flavonoids results in the production of "Flower (or bark) Flavonoid RP-HPLC Fingerprint(s)" and corresponding "Computer Flower Flavonoid Identity Cards". Both are of immense value for the protection by patent law and for computer filing of old and new cultivars. In addition, the "fingerprints" and "identity cards" may be useful during the production of new cultivars by classical breeding and (or) irradiation technologies. Examples of "Flower (or bark) Flavonoid RP-HPLC fingerprints" and of the corresponding "Identity Cards" will be presented.

***Poster 53 - Monday, 7:30 - 9:30**

ALLELOCHEMICALS FROM *AEGIPHILA OBDUCTA*.

Suzana G. Leitão¹, M.A.C. Kaplan¹, Franco Delle Monache² & Edward Nyanda³, ¹NPPN-UFRJ, CCS,B1. H.Cidade Univ., 21941, Rio de Janeiro, BRAZIL, ²Universita Cattolica S. Cuore - C.N.R. Rome, ITALY, ³ICIPE, Nairobi, KENYA.

The study of the methanolic extract of *A. obducta* is part of a comparative investigation on the chemical composition of different organs of the plant from the methanolic extract from the woods of this species we have isolated apigenin, verbascoside, martynoside and 5 new mono- and diacetylated derivatives of martynoside, named respectively acetylmartynoside A, B, C, D, and E. The structural similarity of these derivatives with myricoside, a phenylpropanoid glucoside isolated from *Clerodendrum myricoides*, which is an antifeedant against *Spodoptera exempta*, prompted us

to verify the occurrence of similar properties for the isolated compounds. The feeding responses of fourth instar larvae of *Chilo partellus* to cellulose disks treated separately with acetylmartynoside A and acetylmartynoside C were averaged. From the results only acetylmartynoside C is an antifeedant while A is a weak stimulant. (CNPq).

***Poster 54 - Monday, 7:30 - 9:30**

**A NEW ALKALOID N-OXIDE FROM THE STEMS OF
ARISTOLOCHIA GIGANTEA MART. & ZUCC.**

Gilda G. Leitão¹, M.A.C. Kaplan¹ & C. Galeffi², ¹NPPN-UFRJ, B1, H, C.C.S. Ilha da cid. Univ., 21941, Rio de Janeiro, BRAZIL, ²Lab. Chim. del Farmaco. Ist. Sup. Sanità, Vle. Regina Elena, 299, 00161, Rome, ITALY.

Plants of the genus *Aristolochia* (Aristolochiaceae) are widespread in tropical and subtropical regions. In Brazil plants of this genus are commonly used in folk medicine. Previous phytochemical investigations on some *Aristolochia* species revealed the presence of some alkaloids of the benzylisoquinoline type. We now report the presence, in the stems of *Aristolochia gigantea* of a new alkaloid N-oxide, Higenamine N-oxide, together with the known alkaloids coclaurine and magnoflorine. The presence of a glycosidic alkaloid has been determined. Together with these compounds we have also isolated the amide N-p-hydroxyphenyl-N-β-ethyl-p-hydroxycinammide, p-hydroxycinamic acid, p-hydroxybenzoic acid, β-sitosterol and the lignans (-)-hinokinin, methylpiperitol and (±)-eudesmine. This is the first record of an alkaloid N-oxide in the genus *Aristolochia*.

Poster 55 - Monday, 7:30 - 9:30

**A NEW CLERODANE DITERPENE FROM THE ROOTS OF
ARISTOLOCHIA CYMBIFERA M. E. ZUCC.**

Gilda G. Leitão¹, M.A.C. Kaplan¹ and C. Galeffi², ¹NPPN-UFRJ, B1, H, C.C.S., Ilha da cid. Univ., 21941, Rio de Janeiro, R.J. BRAZIL, ²Lab. Chim. del Farmaco. Ist. Sup. Sanità, Vle. Regina Elena, 299, Rome, 00161, ITALY.

The genus *Aristolochia* (Aristolochiaceae) comprises about 600 species of tropical and subtropical distribution. Previous phytochemical investigation on some Brazilian *Aristolochia* (*A. birostris*, *A. brasiliensis*, *A. cymbifera*, *A. esperazae*, *A. galeata* and *A. triangularis*) revealed the presence of diterpenes of the kaurane, clerodane and labdane types. From the leaves of *Aristolochia cymbifera* only labdane diterpenes were isolated. We now report the occurrence in the roots of the latter species of populifolic acid, and its new epimer in C-5, named *epi*-populifolic acid, together with other known diterpenes, 2-oxo-populifolic acid, kolavelool; three lignans - cubebin, (-)-hinokinin and fargesin; a quaternary alkaloid - magnoflorin and allantoin. (CNPq)

MEETINGS AND PROGRAMS OF INTEREST

18th IUPAC INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF NATURAL PRODUCTS: Strasbourg, France, August 31-September 4, 1992. This symposium will cover the chemistry of the molecules of Nature from the smallest to the largest and from the oldest to the newest: Organic Cosmo- and Geochemistry, Prebiotic Chemistry, Organic aspects of Biotechnology, Synthetic Chemistry, Biosynthesis, Chemical Interactions between organisms, Chemistry of Biologically or Biomedically active substances. The programme will comprise plenary sessions (no parallel sessions), invited posters and proposed posters. Please register your interest in attending with the General Secretariat: Ms. M.Cl. Dillenseger and A.M. Cheminat, Centre de Neurochimie, 5 rue Blaise Pascal, F-67084-Strasbourg, France. (FAX +[33]88607620).

IXTH INTERNATIONAL CONGRESS ON PHOTOSYNTHESIS: Nagoya, Japan, August 30-September 4, 1992. For further information, contact Prof. Noria Murata, Secretariat, IXth International Congress on Photosynthesis, National Institute for Basic Biology, Ozaki 444, Japan. (Phone/Fax 81 (JAPAN) 564-54-4866).

INTERNATIONAL SYMPOSIUM: CELLULAR AND MOLECULAR ASPECTS OF THE BIOSYNTHESIS AND ACTION OF THE PLANT HORMONE ETHYLENE: Agen, France, August 31-September 4, 1992. Sessions and roundtable discussions include: Ethylene Biosynthesis and its Regulation, Ethylene Action, Stress Ethylene, Role of Ethylene in Senescence Processes, and Ethylene in Plant Growth and Development. For further information contact Dr. Jean-Claude Pech, ENSAT, 145 Av. de Muret, 31076 Toulouse Cedex, France. (Tel. 33-61 42 98 10; FAX 33-61 42 30 29).

ENVIRONMENTAL STRESS AND REGULATION OF CARBON METABOLISM: Kashikojima, Mie, Japan. September 5-7, 1992. This satellite symposium will be held immediately after the 9th International Congress on Photosynthesis at Kashikojima on Ago Bay in Isehim National Park. Its aim is an intense and informal exchange of information and ideas on the regulation of carbon metabolism in plants both under environmental stress and non-stressed conditions. For information contact Dr. H. Usuda, Laboratory of Chemistry, Faculty of Medicine, Teikyo University, Ohtsuka, Hachioji, Tokyo, Japan 192-03. (Tel. 0426-76-8211, ext. 252; FAX 0426-749190).

THIRD INTERNATIONAL SYMPOSIUM ON INORGANIC NITROGEN ASSIMILATION: Tiberias, Jerusalem, September 6-11, 1992. The symposium is open to scientists dedicated to different aspects of uptake and assimilation of inorganic nitrogen by autotrophic organisms. For further information contact Dr. Herman Lips, Institute for Desert Research, Ben-Gurion University, Sede Boger 84990, Israel. (Tel. 972-57-565071; FAX 972-57-555058; Bitnet LIPS@BGUM.BGU.AC.IL).

FIRST ASIA-PACIFIC CONFERENCE ON PLANT PHYSIOLOGY: Kuala Lumpur, Malaysia, November 10-12, 1992. The Malaysian Society of Plant Physiology (MSPP) in collaboration with the International Association of Plant Physiology (IAPP) and the Malaysian Agricultural Research and Development Institute (MARDI) is organizing a regional Asian-Pacific Conference on plant physiology with the theme Physiological and Molecular Approaches to Plant Improvement in the Tropics and Subtropics. For further information contact The Secretariat, Organizing Committee ASPACOPP 1992, Malaysian Society of Plant Physiology, c/o Department of Botany, University of Malaya, Lembah Pantai, 59100 Kuala Lumpur, Malaysia. (Tel. 603-7555466, FAX 603-7573661, Telex MA 37453).

TWELFTH ANNUAL SYMPOSIUM: CURRENT TOPICS IN PLANT BIOCHEMISTRY, MOLECULAR BIOLOGY AND PHYSIOLOGY: University of Missouri-Columbia, March 31-April 3, 1993. Topics: Plant Protein Phosphorylation, Plant Protein Kinases and Phosphatases, Plant G-Proteins. For further information contact Dr. Doug Randall, 117 Schweitzer Hall, University of Missouri-Columbia, Columbia, MO 65211. (Tel. 314-882-7796, FAX 314-882-5635).

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA: Asilomar, CA, June 27-30, 1993. The symposium topic will be "Genetic Engineering of Plant Secondary Metabolites." For further information contact Dr. Brian E. Ellis, Department of Plant Science, University of British Columbia, Vancouver, B.C., Canada V6T 2A2 (Tel. 604-228-3451) or Dr. Gary Kuroki, DNA Plant Technology Corp., 6701 San Pablo Ave., Oakland, CA 94608-1239 (Tel. 415-547-2345).

SEVENTH INTERNATIONAL SYMPOSIUM ON IRON NUTRITION AND INTERACTIONS IN PLANTS: Zaragoza, Spain, June 27-July 2, 1993. The aim of this symposium is to bring together scientists from a broad range of disciplines related to iron nutrition and interactions in plants in order to provide opportunities for researchers to exchange new knowledge, ideas, experiences and techniques. For further information contact Dr. Javier Abadia, Aula Dei Experimental Station (SIC, Apdo 202, 50080 Zaragoza, Spain (FAX (+34)-76-575620).

XV INTERNATIONAL BOTANICAL CONGRESS: Tokyo, Japan, August 28-September 3, 1993. The scientific program will include about 240 symposia and more than 1,000 posters in the following divisions: 1. Systematics and Evolution, 2. Structure and its Dynamics, 3. Phytochemistry and Natural Products, 4. Metabolism and Bioenergetics, 5. Developmental Botany, 6. Ecology and Environmental Botany, 7. Genetics, 8. Biotechnology and Breeding. For further information, contact the Congress Secretariat, XV International Botanical Congress Tokyo, c/o Department of Botany, Faculty of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113, Japan.

REQUEST FOR INFORMATION EXCHANGE FROM ARGENTINA.

Dr. Ricardo Bartol is studying a rose species found in some parts of Argentina (*Rosa Canina*, *Rosa rubiginosa*). He requests an exchange of information with anyone having information about

the production and use of such plants in medicine or cosmetics, or with bibliographic information on these subjects. Please contact Dr. Ricardo F. Bartol, Brandsen 366, 1834 Temperley, Buenos Aires, Argentina.

INDIAN SOCIETY OF ALLELOPATHY PUBLISHES FIRST PROCEEDINGS AND ANNOUNCES A NEW JOURNAL.

The first symposium of the Indian Society of Allelopathy was held February 12-14, 1992 at Haryana Agricultural University, Hisar, India. Delegates from India and abroad numbered 76 and 101 research papers were presented. The 220 page Proceedings, *Allelopathy in Agroecosystems (Agriculture and Forestry)* is available for US \$20.00 per copy plus \$5.00 postage and handling surface mail, \$10.00 air mail. Orders should be sent to Prof. S.S. Narwal, Secretary, Indian Society of Allelopathy, Department of Agronomy, CCS Haryana Agricultural University, Hisar - 125004, India.

The *International Journal of Allelopathy* will begin publication in January, 1993 and will initially produce two issues per year (January and July). Papers on any aspect of allelopathy and related areas are invited. Manuscripts from India, Nepal or Bhutan may be submitted to Prof. S.S. Narwal. Manuscripts from all other countries should be sent to Prof. J.V. Lovett, Department of Agronomy and Soil Sciences, University of New England, Armidale, NSW-2351, Australia or to Dr. M. Nair, Associate Professor, Department of Horticulture, Michigan State University, East Lansing, MI 48824, U.S.A. Instructions to authors may be obtained from the regional editors listed above or from the PSNA Secretary.

POSITIONS AVAILABLE

U.S. DEPARTMENT OF AGRICULTURE, BELTSVILLE, MD. POSTDOCTORAL RESEARCH ASSOCIATE. Position is available to study efficacy of innovative gene transfer techniques involving electroporation and pollen transformation. Marker genes and genes related to plant defensive responses will be utilized in alfalfa, corn and tobacco. Background in molecular biology, biochemistry and genetics is required. Position is available immediately at a GS-11 (\$32,423) annual salary. For additional information contact: Dr. James A. Saunders, USDA, Building 9, Room 5, Beltsville, MD 20705, (Tel. 301-504-7477). AA/EOE.

ESTEE LAUDER, INC., MELVILLE, NY. SENIOR SCIENTIST: NATURAL PRODUCTS CHEMISTRY AND PHARMACOLOGY. Individual will be responsible for identifying functional ingredients from botanical and marine sources for inclusion in skin care products and will be accountable for their safety and efficacy. Excellent written and verbal communication skills and ability to work in a team environment are essential. The position reports to the Director of Biological Research. Applicant should have a Ph.D. in Pharmacology or related Biological Science/Industrial experience. Send c.v. to Professional Recruitment - K.M., Estee Lauder, Inc., 350 South Service Road, Melville, NY 11747.

PHYTON CATALYTIC, INC., ITHACA, NY. Positions at the Ph.D., M.S. and B.S. levels in the areas of somaclonal variation, new plant-derived targets, plant cell culture art and secondary plant biochemistry and physiology. Experience with the production of secondary metabolites preferred. Successful candidates are expected to be self-starters, independent and creative thinkers, and not afraid of hard work. Competitive salary benefits and unlimited opportunity for growth. For further information contact: Laurie Sedgwick, Phyton Catalytic, Inc., 175 Langmuir Lab, 95 Brown Rd., Ithaca, NY 14850-1257, (Tel. 607-257-5058, FAX. 607-257-5515).

PHYTON CATALYTIC, INC., ITHACA, NY. Plant Cell Culture Supervisor to coordinate and oversee technical and nontechnical staff involved with establishment, maintenance and storage of thousands of plant cell lines. Candidates should possess BS/MS degree in Plant Sciences and/or Biotechnology, at least 3 years of relevant technical and industrial experience, familiarity with database management, experience in cell genetics and analytical biochemistry, familiarity with natural products chemistry and bioreactor technology. Competitive salary, benefits and unlimited opportunity for growth. Phyton Catalytic produces pharmaceuticals and other fine chemicals from plant cell cultures. For further information contact: Laurie Sedgwick, Phyton Catalytic, Inc., 175 Langmuir Lab, 95 Brown Rd., Ithaca, NY 14850-1257, (Tel. 607-257-5058, FAX. 607-257-5515).

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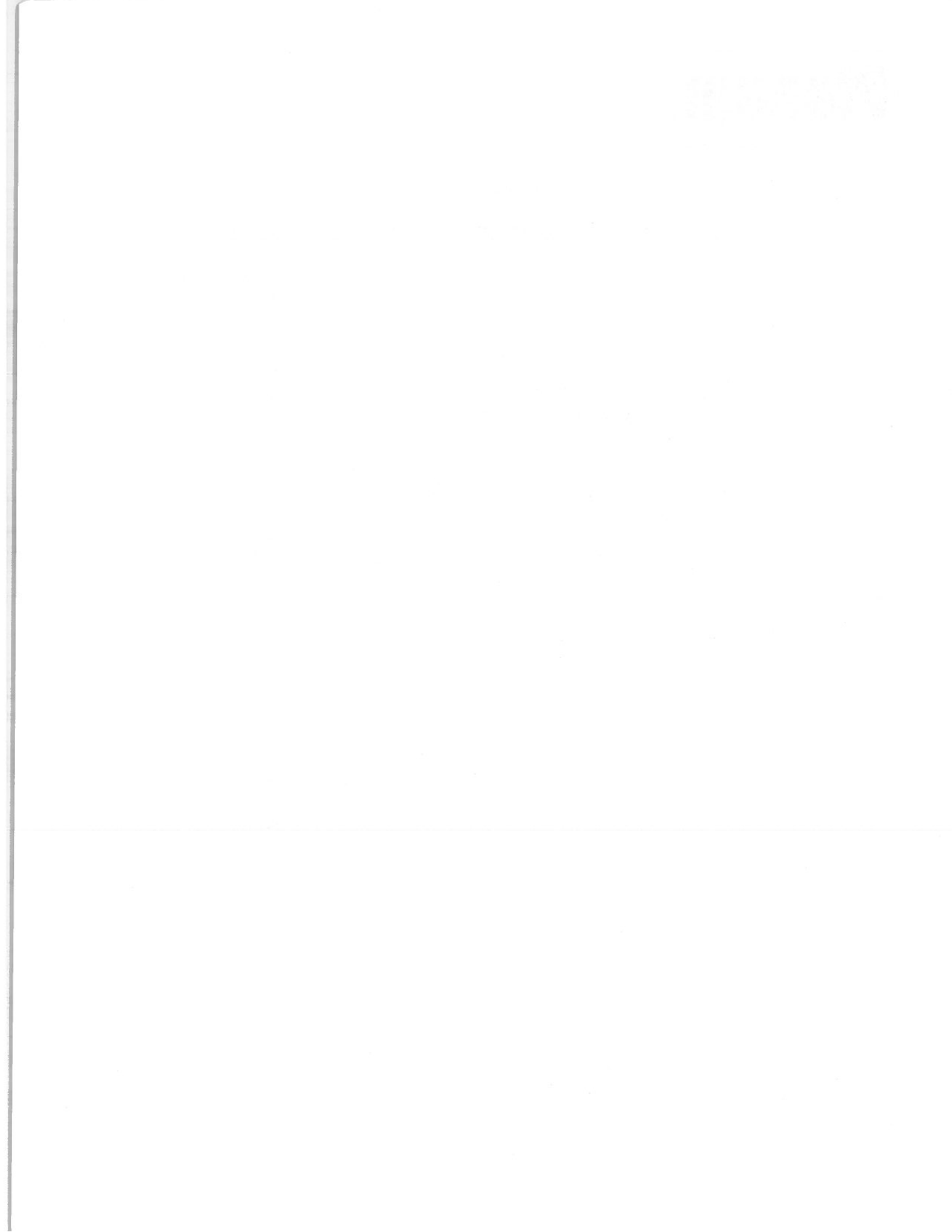
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PHYTOCHEMICAL SOCIETY OF NORTH AMERICA

Newsletter

Volume 32
Number 2

November 1992

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Dr. Constance Nozzolillo (1993, Chair) **Dr. G.H. Neil Towers** (1994)

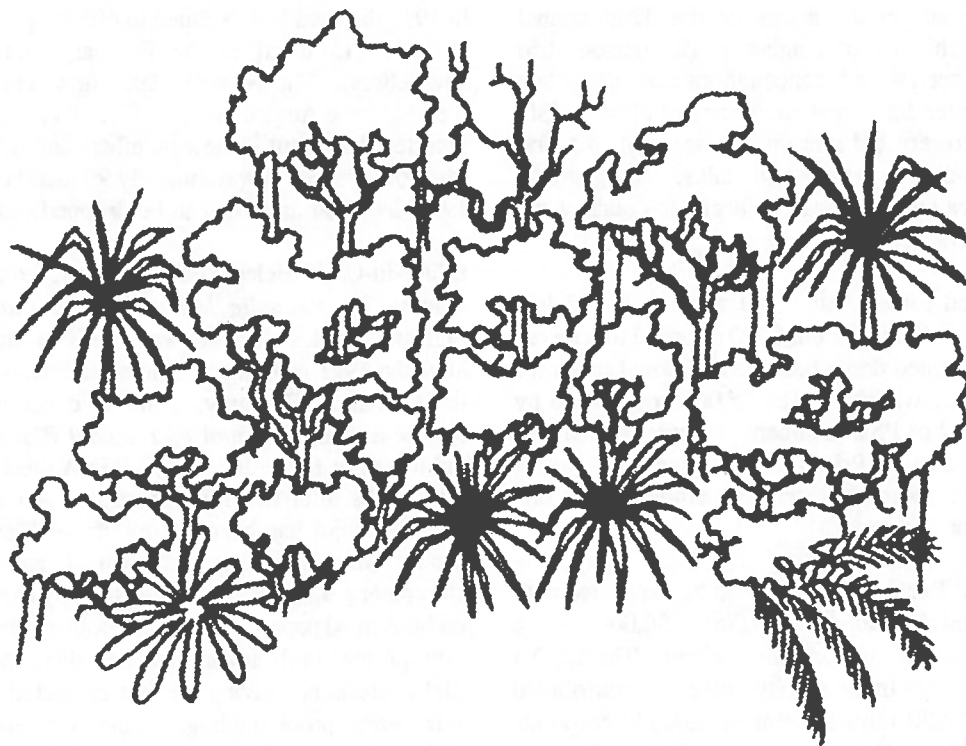
Dr. Jonathan Poulton (1995) **Dr. David Seigler** (1996)

Dr. Brian Ellis (1997)

The **Phytochemical Society of North America** is a nonprofit scientific organization whose membership (currently over 400) is open to anyone with an interest in phytochemistry, the role of plant substances, and related fields. Annual membership dues are \$20.00 for regular members and \$10.00 for student members. Annual meetings featuring symposium topics of current interest and contributed papers by conference participants are held throughout the United States, Canada, and Mexico. A newsletter is circulated to members several times a year to keep them informed of upcoming meetings and developments within the Society.

If you would like additional information about the PSNA or if you have material to be included in the newsletter, please contact the Society secretary. Annual dues and changes in addresses should be sent to the Society treasurer.

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA NEWSLETTER



NOVEMBER, 1992

VOLUME 32, NUMBER 2

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SUMMARY OF THE EXECUTIVE COMMITTEE MEETING

The executive committee meeting was called to order at 4:15 P.M. on August 8, 1992 by President Murray Isman. Helen Stafford, Susan McCormick and Helen Habermann were present. Jim Saunders arrived shortly after the meeting began.

Kelsey Downum reported on the status of the 32nd annual meeting at Miami Beach. As of August 8, 123 persons had registered. There had been 4 or 5 cancellations and a few late registrations were expected for a total attendance of close to 130. There would be 62 posters (31 per poster session), 40 oral contributed papers and 11 symposium talks. Registrants represented 23 countries but there was no accurate count of the number of PSE members.

Of the \$2,000 budgeted for student travel awards, \$1885 had been designated for ten individuals, but \$500 awarded to a recent Ph.D. from Brazil was turned down because additional funds for travel to Miami were not available. The \$5,000 contributed by the PSNA to assist travel of PSE members to Miami Beach was distributed by Peter Lea. Priority was given to young researchers, with larger awards to graduate students and one grant to a professor from Turkey.

As expected, the Miami Beach meeting would be expensive with costs expected to exceed the budget by \$5,000 to \$6,000. There were two sizeable grants to support this meeting: The USDA provided \$2,000 and Florida International University contributed \$5,000. Approximately 30 requests sent to possible corporate contributors yielded two small grants: \$100 each from PC, Inc. and Environmental Growth Chambers. One item contributing to this meeting's high costs was the more than \$4.00 per person cost of coffee breaks. Meeting rooms were provided without charge by the Deauville Hotel.

PSNA Secretary Helen Habermann reported that there were no major changes during the past year in the format of the Newsletter. More input from members would be welcome. News about members (awards, travel, etc.) can be included in the Newsletter only if the secretary is informed. Positions available and positions wanted are listed at no cost as a service to members and it is hoped that these listings might be expanded. Information about meetings of other organizations has always been much appreciated when provided by PSNA members. During the past year there have been several requests from abroad for information on research plants, literature, etc. These have been included in the newsletter if space was available. If any PSNA members have responded to these requests, the secretary would be interested in their comments on the resulting interactions.

The costs of printing and mailing the PSNA newsletter continue to increase and now average about \$2.50 per copy. The total cost per member of 3 newsletters plus the election mailing is now about \$8.00 per year. Postage is based on the weight of each newsletter (i.e., number of pages). During the past year membership brochures have been inserted in newsletters at times

when their added weight did not require additional postage. They will continue to be mailed in this way in the future.

There has been a disturbing decline in PSNA membership during the past two years. The number of members in 1990 was 425. In 1991 the total had declined to 403 in spite of 67 new members in 1991 (15 listed in the February and 52 in the October newsletters). The February 1992 newsletter was mailed to 363 members, the August issue to 377. Treasurer Susan McCormick reported that about 20 new members had joined in the last month (the good news). Approximately 90 members have not paid their 1992 dues and are about to be dropped (the bad news).

Editor-in-Chief Helen Stafford reported that the 411 page *RAP* volume 26, *Phenolic Metabolism in Plants*, edited by H.A. Stafford and R.K. Ibrahim was published in June, about one year after the 1991 meeting. Camera ready copy had been submitted to Plenum in February. She is concerned that volume 27, *Phytochemical Potential of Tropical Plants* may be difficult to publish prior to the June, 1993 PSNA meeting at Asilomar, only 10 months after the 1992 meeting. A major problem for our editor-in-chief has been the failure of Plenum to provide page proofs (they have never provided galley or page proofs). Computer generated camera ready copy (rather than typed copies on blue-lined paper) entail extra problems because computer print outs present both advantages and disadvantages. A persistent nightmare is not saving the last corrected file and not realizing this during proof reading. Authors receive the first formatted copy with spaces left for figures at the tops or bottoms of pages. If there are even minor changes, lines sometimes have to be moved in order to place the figures correctly. This year, Helen finally was sent a set of page proofs with figures in place, but was given only two days to check them as the originals had already been sent to the printer. Members of the executive committee agreed that the editor-in-chief should insist that page proofs of volume 27 be provided earlier so that there will be adequate time for proof-reading and corrections. A further problem with *RAP* volume 26 involved symposium speakers. Two attempted to pull out of the Fort Collins meeting shortly before it was scheduled to begin, others failed to provide manuscripts on time, some requested extensive revisions of text and figures after camera ready formatted versions had been prepared. Symposium organizers, Helen Stafford and Ragai Ibrahim, arranged one substitute chapter based on an oral paper presented at the meeting.

The editor-in-chief noted that the annual meeting posters for the past two years did not include the names of the organizers of the symposium when they differed from those responsible for local meeting arrangements. Some authors have questioned the excessive expense of reprints of their individual *RAP* chapters.

Total editorial expenses for the 1991-92 *RAP* volume 26 were \$1920.36. Helen Stafford's five year appointment as editor-in-chief and the current contract with Plenum will end with volume 28 based on the 1993 symposium at Asilomar. She indicated her

willingness to continue as editor-in-chief and suggested that the executive committee begin consideration of the editorship and the new contract with Plenum. All agreed that the contract should specify that page proofs will be provided with adequate time for proof-reading and needed corrections. A final problem raised by the editor was the aesthetic consequences of excessive multiple authorship. One symposium paper submitted this year has 19 authors and with present *RAP* title page format, listing them would require more than a page. It appears that only a few of the authors were involved in preparing the manuscript while the rest contributed data, manuscript review, etc. The executive committee unanimously approved a policy which permits the editor-in-chief to set a maximum number of authors for each symposium paper (5 was suggested as a reasonable limit). Others involved could be listed in a footnote on the title page. The executive committee also endorsed the policy of adding additional papers if some symposium manuscripts are not submitted by the deadline specified by the editor-in-chief or if the number or lengths of submitted manuscripts would result in an abnormally short volume of the *Recent Advances in Phytochemistry*.

The PSNA treasurer Susan McCormick reported a decrease in the financial reserves of the society which are largely a consequence of the higher than normal cost of the Miami meeting. The most recent count of members is 396.

There was a transition to higher annual dues during the fall of 1991 after the decision of last year's executive committee at the Fort Collins meeting to increase dues. Jim Saunders questioned the procedures followed by the executive committee at the Fort Collins meeting with respect to the dues increase. There was a discussion of dues at the business meeting which followed the executive committee meeting at which a majority had approved the increase. A motion had been made at the business meeting requesting a reconsideration by the new executive committee which had two new members. Past president Brian Ellis and president Murray Isman decided in the fall of 1991 to implement the higher dues. A factor in this decision was the need to print revised PSNA brochures (because of the change in the treasurer, the application portion had to be revised and by changing the dues structure at the same time, the printing of 2000 copies would remain useable for the two to three years until they are all distributed. The PSNA constitution states that the executive committee should set dues. A new PSNA directory will be distributed later this year.

Susan McCormick also reported that 90 PSNA members had not yet paid dues for 1992 and were about to be purged from the membership rolls of the society. All members are urged to pay their dues as soon as possible after statements are mailed in January. After this year only one reminder will be mailed. Those members who are retiring are reminded that they may remain members of the society. If they inform the treasurer, retired members do not have to pay dues.

President Murray Isman reported on plans for future meetings of the PSNA. The 1993 meeting will be held June 27 to July 1 at Asilomar in Pacific Grove, CA. The symposium topic will be

"Genetic Engineering of Plant Secondary Metabolism." Symposium organizers are Brian Ellis (U.B.C) and Gary Kuroki (DNA Plant Technology Corporation). Local organizers are Eric Conn (Univ. Cal. Davis) and Gary Kuroki. Anticipated room and board cost will be a very reasonable \$60 per day. PSNA members are urged to register early because only 150 spaces will be available at Asilomar. It may be possible to arrange an evening at the Monterey aquarium during the meeting.

The 1994 meeting will be held at Cuernavaca, Mexico. Thor Arnason will chair the program committee. Dates for this meeting have not yet been set. The proposed symposium topic is "Chemistry of Medicinal Plants." A possible location for the 1995 meeting is Sault Ste. Marie, Ontario, Canada.

The results of this spring's election were forwarded from Brian Ellis via Murray Isman. Kelsey Downum is our new president-elect. The proposed change in by-laws concerning time of mailing of dues notices and reminders passed.

Murray Isman passed along to the secretary the last missing *RAP* volume which was donated to the PSNA archives by Victor Runecles. That part of the collection is now complete.

Murray Isman reported that the Indian Society of Allelopathy has held its first symposium and will begin publication of the *International Journal of Allelopathy* in January (see August newsletter for details). The PSNA provided announcements in our newsletter, a copy of our directory, information about PSNA support of student travel and best student paper awards.

Murray reported that there had been no progress on establishing the Phytochemical bank that was discussed at several of the past PSNA meetings. Stewart Brown and Warren Steck of the Plant Biotechnology Institute at Saskatoon, Sask., are still working on this project.

Murray Isman summarized the exchange of correspondence with Pergamon Press that resulted in an affiliation of the PSNA with the journal *Phytochemistry*. Of the several proposed arrangements, the executive committee approved the option that PSNA members could subscribe to *Phytochemistry* at the much reduced rate of \$145 U.S. per year (subscribing to the journal would be non-compulsory, see order form in this issue of the newsletter). The PSNA will name two members to the editorial board and announcements of PSNA meetings will be published in *Phytochemistry*. The meeting was adjourned at 6:30 p.m.

Because added time was needed for further discussion the executive committee agreed to meet again at noon on Tuesday, August 11. At its second meeting, president elect Jim Saunders reported that he had conferred with members of the advisory committee concerning possible symposium topics and locations for future PSNA meetings. There were varied degrees of enthusiasm for the topic proposed for the 1994 meeting in Mexico, "Phytochemistry of Medicinal Plants." The possibility of changing the emphasis from medicinal to pharmacologically active plants was discussed as was the possibility of emphasis on plant metabolism and enzymology. Other suggested topics

included "Plant/Microbe Interactions" and "Secondary Nitrogen Metabolism." Thor Arnason agreed to work on organizing the symposium for the Mexico meeting in collaboration with scientists in the Mexico City area. It was agreed that the official language of the meeting would be English.

The possible locations suggested for meetings in 1995 or later included Sault Ste. Marie, Ontario; Montreal, Quebec; Niagara Falls (whether Canada or U.S. was not specified); Woods Hole, MA; Hawaii (joint meeting with the Japanese Society) and New Orleans.

The number of editors in addition to the editor-in-chief to be named on RAP volumes was discussed. It was agreed that only those symposium organizers participating in the editing of a significant number of manuscripts were to be included and that the editor-in-chief could establish a maximum number of editors.

A number of potential editors of *Phytochemistry* were suggested by members of the executive and advisory committees. Based on a vote by members of the executive committee the top two candidates were chosen. After the executive committee meeting, Professor Harborne was informed and accepted both individuals for 5 year terms. Klaus Fischer was present at the meeting and agreed to serve.

A final topic discussed was the composition of the advisory committee. It was unanimously agreed that David S. Seigler would be appointed for a four year term ending in 1996, and Brian Ellis for a five year term ending in 1997. The meeting was adjourned at 1:45 P.M.

Respectfully submitted,

Helen M. Habermann

MINUTES OF THE 31ST ANNUAL BUSINESS MEETING

The 1992 PSNA business meeting was called to order at 4:00 p.m. by President Murray Isman who called for approval of the minutes of the 1991 business meeting as printed in the October newsletter. The motion was moved by Thor Arnason and seconded by Neil Towers.

Secretary Helen Habermann reported that there had been no changes in format for the newsletter in the past year. Members were again asked to supply news items for the newsletter (reports of honors, awards, travel, meetings, etc.). Listings of positions available and positions wanted are printed without charge and members were urged to take advantage of this service. The secretary also welcomes information from members about upcoming meetings for inclusion in the newsletter. Deadlines for newsletter items are about a month before newsletters reach you (September 30, December 31, April 30). There have been several communications from overseas during the past year requesting information about uses of specific plants or bibliographic information. The secretary is curious about the reactions of PSNA members to these items. Should they continue to be included? Has anyone ever responded to these requests?

Printing costs continue to increase. Each copy of the newsletter costs about \$2.50 to print and mail. Per member cost of three newsletters plus the election mailing is currently about \$8.00 per year. Revised brochures were printed this year (necessitated by dues increases and a change in treasurer). They have been shipped to members with newsletters at times when their additional weight did not require additional postage. This will continue next year.

At last year's business meeting it was moved that the secretary should contact those who had attended the tannin conference in Michigan just prior to the meeting at Fort Collins to invite them to join the PSNA. Seventy individuals from North America who

had attended the tannin conference but were not PSNA members were sent copies of the PSNA brochure and a covering letter. Unfortunately the yield of new members was zero. It seems that those who were interested in the PSNA were already members of the PSNA and/or had attended the Fort Collins meeting. The number of PSNA members has declined since 1990 (when there were 425 members) to 403 in 1991 and 363 in early 1992. It is obvious that members should encourage their colleagues, students and postdocs to join and remain members of the PSNA. Retired members were reminded that they are encouraged to remain active members and may do so without paying annual dues if they inform the treasurer of their emeritus status. Connie Nozzolillo moved to accept the secretary's report as presented and Jim Saunders seconded her motion.

Treasurer Susan McCormick distributed copies of the Interim Financial Report. She pointed out that the balance of PSNA funds as of August 8, 1992 was \$51,806.14 but the balance had been reduced considerably during the Miami meeting. Dues had been raised in the fall of 1991 and there was a period when checks for either the old or new rates were being accepted. A final accounting of the 1991 PSNA meeting at Fort Collins, Colorado showed income of \$17,495.00, expenses of \$9,033.44, and a balance of \$8,461.56 returned to the treasurer. Royalties for 1991 were \$3,455.20. Volume 23, of *Recent Advances in Phytochemistry* still holds the record for most royalties.

A tabulation of PSNA membership data for 1979 to 1992 indicated that the highest total membership was reached in 1990. The number of U.S. members peaked at 317 in 1989, Canadian at 64 in 1990, foreign at 52 in 1991 (remaining the same in 1992) and student membership was greatest at 53 in 1989 and 1990.

Susan reported that new directories will be distributed in the near future. Bruce Stowe moved acceptance of the Treasurer's report

and Ragai Ibrahim seconded.

Editor-in-chief Helen Stafford reported that Volume 25 of *Recent Advances in Phytochemistry* had been published in time to be on display for this year's meeting. The late meeting in 1992 (August) and an earlier meeting next year will mean that there will be less time to complete publication of volume 26 in time for the Asilomar meeting. A new five-year contract will be negotiated with Plenum Press next year. Kelsey Downum moved that the editor's report be accepted and Bob Krieger seconded the motion.

Kelsey Downum announced that ten student travel awards had been granted in amounts up to \$500 and equal to up to 50% of economy airfare. \$1885 was committed out of the \$2000 budgeted. Unfortunately one person was not able to accept an award because no additional funds were available to support travel from Brazil. Therefore only \$1385 was spent and 9 awards were given. The \$5000 granted by the PSNA to support travel by PSE members was distributed by Peter Lea. Ten awards were made and all 10 recipients came to Miami. Most of these grants were given to graduate students and postdocs with a few to young investigators.

A report on the 1993 meeting being organized by Gary Kuroki and Vincent DeLuca was summarized by Murray Isman. The meeting will be held at Asilomar, CA from Sunday, June 27 through Thursday, July 1. The anticipated cost of room and meals is \$60 per day. Early registration is imperative because the number of spaces is limited to 150. Registration forms should arrive at Asilomar at least 60 days in advance (by April 27, 1993). Twelve speakers have accepted invitations to participate in the symposium on "Genetic Engineering of Plant Secondary Metabolism." There is a possibility that the local organizers will be able to arrange a banquet and private evening at the Monterey Bay Aquarium for those attending the Asilomar meeting.

Murray Isman noted that the PSNA has not met in Mexico since 1971. Thor Arnason has agreed to work with phytochemists in the Mexico City area on a symposium and local arrangements for the 1994 PSNA meeting. Sites in the Cuernavaca area are possible but none has yet been selected. A major interest of Mexican phytochemists is the phytochemical potential of medicinal plants.

Members were asked to suggest sites and symposium topics for PSNA meetings in 1995 and beyond. Kelsey Downum suggested that the possibility of another joint meeting with the PSE be explored soon so that such joint meetings could be held more frequently.

President Murray Isman reported on the negotiations that resulted in an affiliation of the PSNA with the journal *Phytochemistry* published by Pergamon Press. Pergamon approached the PSNA about this possibility early in 1992. After some exchanges of correspondence about the nature of the affiliation, Murray Isman contacted members of the executive committee in late spring about the alternatives that had been proposed by Pergamon.

Members of the executive committee agreed that affiliation would be mutually advantageous. It will be announced in the January, 1993 issue of *Phytochemistry* that it will be the official journal of the PSNA (a comparable affiliation with the PSE has been in effect for eight years). Announcements of the PSNA annual meeting and symposium will appear in the journal and the PSNA was asked to nominate two individuals to serve on its editorial board (in addition to five members already on the board). The advisory committee was asked to suggest well-qualified individuals to serve and the executive committee at its meeting on August 11, selected two, both of whom were acceptable to Dr. Jeffrey Harborne, editor of *Phytochemistry*. Klaus Fischer, who was present at the meeting, accepted the position; the second candidate, Brian Ellis, was not in Miami.

Murray assured PSNA members that the society will incur no expenses as a result of its affiliation with the journal *Phytochemistry* and that subscriptions will not be mandatory. There will be a substantial savings for PSNA members who choose to subscribe to the journal (\$145 per annum for 18 issues). Subscriptions may be paid by check or credit card (see order form elsewhere in this newsletter).

This affiliation of the PSNA with the journal *Phytochemistry* published by Pergamon in no way conflicts with the contract with Plenum (now in the fourth year of a five year contract) for publication of the *Recent Advances in Phytochemistry* volumes resulting from PSNA annual meeting symposia.

Murray Isman next reported on the results of the PSNA election as submitted to him by Brian Ellis. 124 ballots were returned. Kelsey Downum is our new President elect. The proposed change in bylaws was approved. Article II, section 4 now states that the treasurer will issue dues notices in January and reminders in May to members not current in dues. Murray Isman then turned over the presidency of the PSNA to Jim Saunders.

A number of questions and comments from members followed. Jonathan Poulton questioned the status of the Phytochemical Bank. Murray Isman replied that this facility had been approved in principle in past meetings, and the project is still being explored by Warren Steck and Stewart Brown, but that progress is slow for a number of reasons including the state of the economy.

Jonathan then observed that there appeared to be fewer PSNA members than usual at the Miami meeting and wondered whether this was related to holding the meeting in a hotel with its relatively high cost for housing. Kelsey Downum pointed out that the \$55.00 per day room cost (which could be shared by up to three persons) was the same or less than the cost of dormitory rooms at recent meetings. The cost of meals was probably higher than on a university campus. Thor Arnason felt that the small number of students could be a result of the recession and generally tight funding. The cost of flights to Miami seemed relatively cheap. Neil Towers expressed his surprise that there were so few students in spite of the beautiful organization of the meeting. Jim Saunders felt that all members should encourage their students to attend our annual meetings. A number of

societies met the week before the PSNA meeting in Miami. Saunders suggested that more support should be available for students. Kelsey Downum noted that no requests from students or recent postdocs for travel grants were turned down this year. He suggested that graduate students could be given a greater percent of economy air fare (current maximum is 50%). He felt that postdocs have more money than graduate students and that the 50% of economy fare is probably adequate for them. Helen Stafford noted that support of postdocs in the form of travel grants might persuade them to join and remain members of the PSNA.

Harold Nordby suggested that the location of the meetings might be a factor that affects attendance and that it might be less expensive for most members to travel to the center of the continent. Klaus Fischer noted that airline fare structures are such that it is sometimes no more expensive to fly coast to coast than between a coast and the center of the continent. John Romeo supported the suggestion of increased support for students.

Bob Krieger urged that industries be more involved in PSNA meetings and suggested that there should be more symposium speakers from industry. Kelsey Downum pointed out the danger in industrial participation. An author in the Miami Beach symposium was not able to divulge the name of a chemical or

the name of the plant from which it was extracted. In corresponding with possible sources of industrial support, a number of companies were interested until the size of the meeting was revealed. Jim Saunders noted that the symposium topic is critical in drawing people to attend the meeting. John Romeo suggested that the society seek corporate members and support. Bob Krieger suggested that the PSNA seek corporate sponsorship and that such sponsorship be recognized in the meeting program as supporting a symposium speaker, coffee break, etc. Kelsey Downum reported that 32 companies had been solicited for support of the Miami meeting. Contributions totaling only \$200 had been received from two of those solicited. Many of these corporations had been approached before and the lack of response appears to be at least in part a consequence of the state of the economy.

Murray Isman moved a vote of appreciation for the excellent work of meeting organizers Kelsey Downum and John Romeo. Jim Saunders moved a vote of thanks for the efforts of Murray Isman as PSNA president. The meeting was adjourned at 5:00 p.m.

Respectfully submitted,

Helen M. Habermann

REPORT FROM MIAMI ON THE HURRICANE AND ITS AFTERMATH

Kelsey Downum, whose home is in Homestead, reports that life has been fairly rough over the past months. There was no electricity for three weeks and as of early October he still had no phone at home. He and his wife Julie survived hurricane Andrew as did most of their 80 animals (mostly birds). Their house was heavily damaged with 75% of the roof blown off. Living room, garage and workshop were destroyed as was all of the landscaping which included seven large ficus trees (banyans), a number of exotic palms and various citrus, lychee, avocado and mango trees. They expect to be working on replanting for some years.

Florida International University was out of the hardest hit area, but still experienced \$19 million in damages. Classes were delayed for two weeks but the university is now back to normal operations. Fairchild Tropical garden is in the area that was devastated by hurricane Andrew. According to Science magazine, Director William Klein estimated that 50 to 75% of the plant collection was damaged and much of it was destroyed. A more recent report from Kelsey estimates that 90% of the garden was destroyed. Some plants were salvaged but most were

lost. Fairchild's collections of palms and cycads, most of which are rare, are also part of the Center of Plant Conservations national collection of endangered plants. A large number of emergency collections were done immediately after the storm by researchers from NCI and NIH and others interested in extracting the material to assay for medicinal activity. Loss of any of the endangered plants could have a permanent impact on the genetic diversity of these species. PSE and PSNA meeting participants were the last official group to tour the garden before Andrew. Fairchild has established a restoration fund to help replant the destroyed collection.

Our joint meeting headquarters, the Deauville Hotel, was closed until October 1 because of storm damage. The hurricane windows that were being installed during the meeting were blown in and the lobby and dining rooms were destroyed. The hotel is open for business again but only on a limited basis. The beach around the hotel was not much eroded and Kelsey expects that they will be able to recover from business lost during the time they were closed.

BIOGRAPHIES OF BEST STUDENT PAPER AWARD WINNERS



From left to right: Elisabeth Swain, Gilda Guimaraes Leitaó, and Suzanna Guimaraes Leitaó

ELISABETH SWAIN received her B.S. in Microbiology from the University of Iowa in 1981. After working as a research assistant in neurology and pharmacology labs for several years, she entered the UI graduate program in Botany and received her M.S. in 1986. She then spent a year working in Malaysian rainforests as a tree identifier on the Pasoh forest demographics project. She and her entomologist husband also spent a year teaching at the Centre for Rainforest Research in Queensland,

GILDA GUIMARAES LEITAO studied Pharmacy at the Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil from 1981 to 1984. In 1985 she received a degree in Industrial Pharmacy at UFRJ and in March, 1986 began graduate studies under the supervision of Dr. Maria Auxiliadora C. Kaplan. She received a Master's degree in Natural Products Chemistry in 1989. The title of her thesis was "Chemistry and Pharmacology of Brazilian Species from the Genus *Aristolochia*."

In March, 1990 Gilda began work on a Ph.D. at UFRJ with Dr. Kaplan. She received a Brazilian government fellowship to do research in Italy at the Laboratorio di Chimica del Farma co-Reparto delle Sostanze Naturali of the Istituto Superiore di Sanità-Ministero della Sanità in Rome from May, 1990 to January, 1992. She worked with Dr. Corrado Galeffi, studying the chemistry of two *Aristolochia* species (Aristolochiaceae).

SUZANA GUIMARAES LEITAO studied Pharmacy at the Universidade Federal do Rio Jeneiro (UFRJ), Rio de Janeiro, Brazil, from 1981 to 1984. In 1985 she received a degree in Industrial Pharmacy at UFRJ and in 1986 began graduate studies under the supervision of Dr. Maria Auxiliadora Coelho Kaplan. She earned a Master's degree in Natural Products Chemistry in 1989. The title of her thesis was "Chemical and Pharmacological Study of *Aegiphila lhotzkyana* Cham."

In 1990 Suzana began work on a Ph.D. at UFRJ with Dr. Kaplin. She was granted a Brazilian government fellowship to do research in Italy at the Instituto di Chimica of the Università Cattolica del Sacro Curore, in Rome, from May, 1990 to January, 1992. She worked with Dr. Franco Delle Monache, studying the chemistry of two *Aegiphila* species (Verbenaceae). This fellowship, called a "sandwich," makes it possible for Ph.D. candidates to spend up to two years

Australia. Now in her third year of the Ph.D. program in Biological Sciences at the University of Iowa, she currently works in Jonathan Poulton's laboratory. Her research focuses on the temporal and spatial mechanisms regulating cyanogenesis in *Prunus serotina*. She received the best student paper award (oral) for her paper, "Tissue and subcellular localization of enzymes catabolizing (R)-Amydalin in Black Cherry (*Prunus serotina* Ehrh.) seeds."

This Brazilian government "sandwich" fellowship allows Ph.D. candidates to spend up to two years abroad doing experimental work for the thesis. Gilda's thesis will be defended in September, 1992.

Since 1986 she has attended nine national meetings in Brazil and seven international meetings, presenting 16 communications, including the "A New Clerodane Diterpene from the Roots of *Aristolochia cymbifera*" and "A New Alkaloid N-Oxide from the Stems of *Aristolochia gigantea*," presented at the PSNA/PSE meeting in Miami which received a best poster award. She has four scientific publications (two of them in press).

Her fields of interest are Natural Products Chemistry (isolation; purification and structural elucidation of natural compounds and pharmacognosy).

abroad, doing the experimental work for the thesis. Her thesis will be defended in September, 1992. While in Rome, Suzana met Dr. Edward Nyandat from the International Centre of Insect Physiology and Ecology, Nairobi, Kenya. At that time he was a fellow at the "Istituto Superiore di Sanità" in Rome. They initiated collaborative investigations of the allelochemical properties of compounds isolated from *Aegiphila* species.

Since 1986 Suzana has attended nine national meetings in Brazil and seven international meetings, presenting 13 communications, including "Allelochemicals from *Aegiphila obducta* Vell" presented at the PSNA meeting at Miami which received a best poster award. She has three publications (one in press).

Her fields of interest are Natural Products Chemistry, Plant-plant and Plant-insect interactions and Pharmacognosy.

PSNA ANNUAL MEETING CENTERFOLD



MIAMI BEACH, FL. AUGUST 8-12, 1992



TRAVEL AWARD WINNERS

At the PSE/PSNA banquet on Tuesday, August 11 in the Richelieu Room of the Deauville Hotel, two groups of travel awards were presented. A total of \$7,000 was budgeted this year (\$2,000 for student travel awards to be presented by the PSNA and \$5,000 to assist the travel of PSE members to Miami Beach).

The following nine graduate students and recent post-doctoral members of the PSNA received awards of \$60 to \$200. An award of \$500 to a recent Ph.D. in Brazil could not be accepted because additional travel funds were not available.

Yongshou Xie
Department of Plant Science
University of British Columbia
Vancouver, B.C. V6T 1Z4, Canada

Shona Ellis
Department of Botany
University of British Columbia
Vancouver, B.C. V6T 1Z4, Canada

Nikhil Mallampalli
Department of Entomology
University of Maryland
College Park, MD 20742-5575

Peter Rider
Department of Biology
University of South Florida
Tampa, FL 33620

Lynn Yip
Department of Botany
University of British Columbia
Vancouver, B.C., Canada V6T 2B1

L. Terpan-Acuña
CICY
Apdo. Postal 87, Cordemex
Merida, Yucatan 97310 Mexico

Maria de Lourdes Miranda-Ham
CICY
Apartado Postal 87, Cordemex
Merida, Yucatan 97310, Mexico

Elisabeth Swain
308 Chemistry-Botany
University of Iowa
Iowa City, IA 52242

Pierre Laflamme
Concordia University
1455 de Maisonneuve Blvd., West
Montreal, P.Q., Canada H3G 1M8

Peter Lea distributed funds for travel of PSE members giving priority to young researchers and larger awards to graduate students. One grant was given to a professor from Turkey. The following nine individuals received awards of \$300 to \$650.

Marcia Pletsch Hoff
King's College London
Plant Biotechnology Group
Division of Biosphere Sciences
Campden Hill Road, London
U.K.

Abdul Malek
Dept. of Agric. & Env. Science
University of Newcastle
Newcastle upon Tyne, NE1 7RU
U.K.

J.C. Onyilagha
Dept. of Botany
Plant Science Laboratories
University of Reading
Whiteknights, Reading, RG6 2AS,
U.K.

Simon Gibbons
Flat B-5 Parsonage Row
High Street
Glasgow, G1 1PU
U.K.

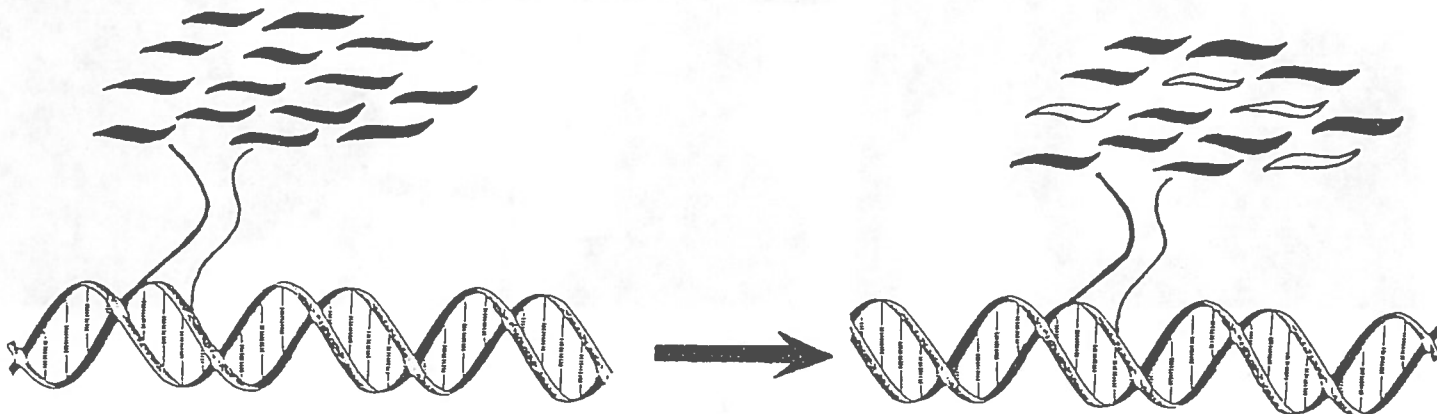
Bilge Sener
Dept. of Pharmacognosy
Faculty of Pharmacy
Gazi University
Ankara, TR-06330
Turkey

Denis Barron
Maitre de Conferences
Joseph Fourier University
38606 La Tronche CEDEX France

Diego Amor-Prats
Botany Department
Plant Science Laboratories
University of Reading
Whiteknights, Reading RG6 2AS
U.K.

R.J. Nash
17 The Beeches
Boughrood, Llyswen
POWWYS, LD3 OYJ
U.K.

Peter Brodelius
Dept. of Plant Biochemistry
University of Lund
P.O. Box 7007, S-22007 LUND
Sweden



MEETINGS AND PROGRAMS OF INTEREST

TWELFTH ANNUAL SYMPOSIUM: CURRENT TOPICS IN PLANT BIOCHEMISTRY, MOLECULAR BIOLOGY AND PHYSIOLOGY: University of Missouri-Columbia, March 31-April 3, 1993. Topics: Plant Protein Phosphorylation, Plant Protein Kinases and Phosphatases, Plant G-Proteins. For further information contact Dr. Doug Randall, 117 Schweitzer Hall, University of Missouri-Columbia, Columbia, MO 65211. (Tel. 314-882-7796, FAX 314-882-5635).

MOLECULAR GENETICS OF PLANT-MICROBE INTERACTIONS: East Brunswick, New Jersey, April 21-25, 1993. For further information, contact Rutgers' Center for Agricultural Molecular Biology, Rutgers, The State University of New Jersey, Cook College, New Brunswick, NJ 08903-0231. (Tel. 908-932-8165; FAX 908-932-6535).

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA: Asilomar, CA, June 27-July 1, 1993. The symposium topic will be "Genetic Engineering of Plant Secondary Metabolites." For further information contact Dr. Brian E. Ellis, Department of Plant Science, University of British Columbia, Vancouver, B.C., Canada V6T 2A2 (Tel. 604-228-3451) or Dr. Gary Kuroki, DNA Plant Technology Corp., 6701 San Pablo Ave., Oakland, CA 94608-1239 (Tel. 510-547-2395).

SEVENTH INTERNATIONAL SYMPOSIUM ON IRON NUTRITION AND INTERACTIONS IN PLANTS: Zaragoza, Spain, June 27-July 2, 1993. The aim of this symposium is to bring together scientists from a broad range of disciplines related to iron nutrition and interactions in plants in order to provide opportunities for researchers to exchange new knowledge, ideas, experiences and techniques. For further information contact Dr. Javier Abadia, Aula Dei Experimental Station (SIC, Apdo 202, 50080 Zaragoza, Spain (FAX (+34)-76-575620).

PLANT GROWTH REGULATOR SOCIETY 20TH ANNUAL MEETING: St. Louis, MO, August 6-9, 1993. The meeting will feature symposia and research reports. A symposium on "Plant Growth Regulators in Post-harvest Biology and Technology of Horticultural Crops" will be organized by A. Kader, Univ. California, Davis. A second symposium on "The Role of Plant Growth Regulators in the Development and Reproduction of Cereal Plants" will be organized by D. Ho, Washington Univ., St. Louis. Research reports are invited in all areas of plant growth regulation and will be published in the Society's proceedings. Prizes of \$300 and \$100 will be awarded for the two best student papers. For further information, contact Dr. Louise Ferguson, Program Chair, Univ. California, Kearney Agricultural Research Center, 9240 S. Riverbend Ave., Parlier, CA 93648. (Tel. 209-891-2500).

XV INTERNATIONAL BOTANICAL CONGRESS: Tokyo, Japan, August 28-September 3, 1993. The scientific program will include about 240 symposia and more than 1,000 posters in the following divisions: 1. Systematics and Evolution, 2. Structure and its Dynamics, 3. Phytochemistry and Natural Products, 4. Metabolism and Bioenergetics, 5. Developmental Botany, 6. Ecology and Environmental Botany, 7. Genetics, 8. Biotechnology and Breeding. For further information, contact the Congress Secretariat, XV International Botanical Congress Tokyo, c/o Department of Botany, Faculty of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113, Japan.

FOURTH INTERNATIONAL CONGRESS ON PLANT MOLECULAR BIOLOGY: Amsterdam, The Netherlands. June 19-24, 1994. The Congress will be composed of Plenary Sessions, Concurrent Symposia, Poster Sessions and Interactive Workshops. The first program announcement will be mailed in the fall of 1992. For further information, contact the Congress Secretariat, RAI Organisatie Bureau Amsterdam by Europaplein 12, 1078 GZ Amsterdam, The Netherlands. (Tel. 31-0-20-549-12-12; FAX 31-0-20-646-44-69).

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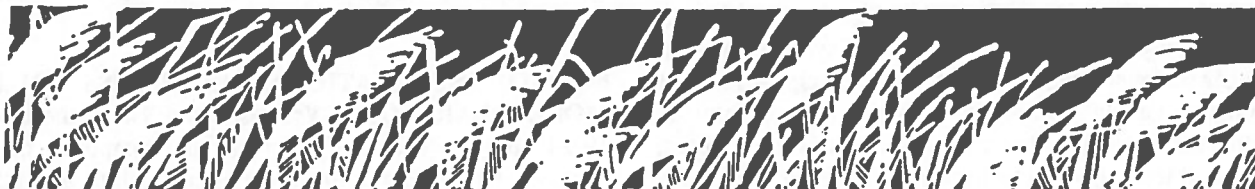
GRADUATE ASSISTANTSHIP. Interested in a Ph.D. program focused on bioactive phytochemical field detection and/or specific field testing in conjunction with portable database development. ACS certified B.S. in Chemistry and B.S. in Biology. Please contact Kurt Potgieter, 1278 Glenneyre St. #152, Laguna Beach, CA 92651. Tel/Fax: 714-262-0417.



SUMMARY OF PSNA MEMBERSHIP, 1979-1992

Year	Total Membership	USA	CANADA	FOREIGN	STUDENTS
1979	290	241	34	32	17
1980	315	245	36	34	29
1981	344	270	37	37	41
1982	364	278	46	40	46
1983	358	264	49	45	*
1984	367	273	52	42	38
1985	373	282	50	41	31
1986	359	279	40	40	38
1987	334	258	42	34	35
1988	391	297	49	45	51
1989	411	317	43	51	53
1990	425	311	64	50	53
1991	403	294	57	52	45
1992	396	289	55	52	50

* Data not available



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14 Swain/Kleiman	46.82	19.29	7.51	6.59	4.74	761	1908.91
15 Loewus/Ryan	91.30	53.08	13.62	3.56	3.56	898	3389.66
16 Creasy/Hrazdina	78.97	59.35	15.05	34.23	15.40	854	3116.91
17 Nozzolillo et al.	182.23	95.11	45.17	22.43	11.29	755	3167.80
18 Timmermann et al.	329.84	183.15	42.72	76.10	31.40	812	3897.72
19 Cooper-Driver et al.	347.30	194.17	80.20	84.51	46.63	766	3266.92
20 Conn	280.77	234.50	114.53	85.58	67.19	648	3558.58
21 Saunders et al.	2287.89	135.60	102.36	49.56	32.98	533	2608.39
22 Conn		2236.98	339.61	158.14	61.71	584	2796.44
23 Poulton et al.			3566.17	683.34	175.00	557	4424.51
24 Towers et al.				2898.08	175.98	461	3074.06
25 Fischer					3455.22	457	3455.22

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N. SAITO & J. B. HARBORNE (UK), Correlations between anthocyanin type, pollinator and flower colour in the Labiatae.

E. VILLARREAL-ROSALES, P. METZGER & E. CASADEVALL (France), Ether lipid production in relation to growth in *Botryococcus braunii*.

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