

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA

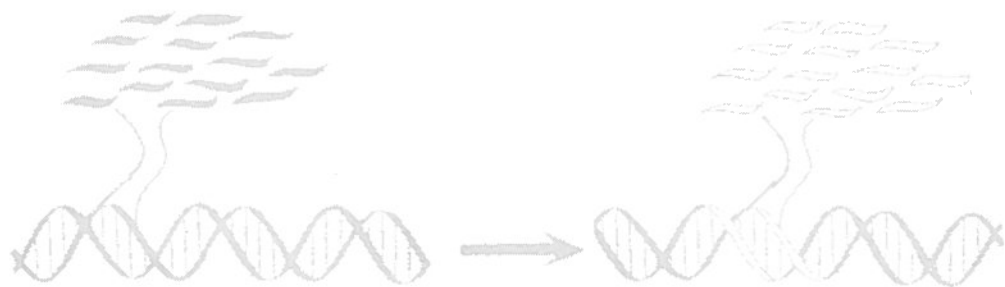
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Newsletter

• Volume 35, Number 3 • March 1996 •

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PSNA Newsletter

Editor: **Dr. Alicja M. Zobel**
Associate Editor: **Dr. Stewart A. Brown**



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 U.S. \$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 to the Society Secretary. Annual dues and changes in addresses should be sent to the Society Treasurer.

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From the Editor

It's "call for papers" time again for the 1996 annual meeting in New Orleans. The blue centre section of this issue contains the projected schedule for the meeting, including the symposium on **Food phytochemicals: Flavors, stimulants and health promoters**, together with the annual call for abstracts, and the forms for abstract submission, meeting registration, and hotel registration. Please note the **deadlines** indicated on these sheets.

Your executive regrets to have to inform you that, owing to difficulties in getting funding, it will not be possible to schedule a mini-symposium this year. This is especially unfortunate in that last year's experiment at the Soo with our first "mini" was a success, and there was every hope that it could become a regular feature of the meetings. However, the idea is not dead, and will certainly be explored for future meetings.

This issue's research report is from one of last year's symposium speakers, May Berenbaum of the University of Illinois, who summarizes her current studies on plant-insect interactions.

In this issue you will also find the annual report of the Treasurer with an interim financial report, as well as an updated partial list of our members' E-mail addresses, which will be continued in subsequent issues.

The Editor

Research Report

May Berenbaum

Department of Entomology, University of Illinois

I frequently have difficulty characterizing what it is exactly I do for a living. While I can rightly be considered an entomologist (I am, in fact, head of an entomology department), I've probably spent more time over the past twenty years working with plants, specifically plant chemistry, than I have with insects. If I've learned anything from my research over the past two decades, it's that there's no point, really, in trying to set up rigid boundary lines between disciplines; organisms have a disconcerting way of ignoring any such boundary lines.

Herbivorous insects are a case in point; to understand them well it is almost invariably necessary to understand what they're eating. In many respects herbivorous insects can be viewed, chemically at least, as nonphotosynthetic, extraordinarily mobile little plants. My current research addresses insect-plant interactions at many levels, but one recurrent theme through all projects is a focus on furanocoumarins, plant secondary compounds restricted primarily to plants in the Rutaceae and Apiaciae. One project addresses the effects of sunlight, particularly in the near ultraviolet range, on plant-insect interaction; of particular interest are the biochemical, physiological and behavioral adaptations displayed by insects restricted to feeding on phototoxic plants. Our investigations of insect resistance to plant toxins potentiated by ultraviolet light, including furanocoumarins, have recently demonstrated the importance of cytochrome P₄₅₀-mediated detoxification, antioxidant enzyme disposition of toxic oxyradicals, and sequestration of plant carotenoids in ameliorating phototoxicity of plant allelochemicals. As well, studies on the genetic and physiological bases of resistance to UVB radiation in several plants and the effects of UVB-induced alterations in allelochemical and nutritional content of foliage on specialist and generalist insects are being conducted with a view toward anticipating ecosystem impacts of enhanced UVB resulting from stratospheric ozone depletion.

Another project focuses on *Depressaria pastinacella*, the parsnip webworm, and *Pastinaca sativa*, the wild parsnip. We are using techniques of quantitative genetics to evaluate the likelihood of reciprocal genetic changes between interacting and ostensibly coevolving species. We have demonstrated that variation in furanocoumarin detoxification ability in parsnip webworms is partially under genetic control and, as well, that wild parsnip plants that are

not attacked in the field by parsnip webworms contain levels of furanocoumarins that are deleterious to webworm growth. A new focus to this work is to establish the extent to which variation in plant primary metabolites is a function of selection exerted by herbivores. In connection with this new project we have also recently initiated an investigation into the ecological and evolutionary costs and benefits of web spinning by parsnip webworms, a behavior that reflects high protein demands on the part of the webworm.

A third project revolves around the evolution of host specialization in swallowtail butterflies (Papilionidae). In collaboration with Mary Schuler, a molecular biologist in our plant biology department, we are characterizing cytochrome P₄₅₀ monooxygenases of these insects at biochemical and molecular levels. We have determined the quantitative genetic basis for variation among black swallowtail caterpillars in the ability to metabolize both linear and angular furanocoumarins. Variation in the relative ratios of angular to linear furanocoumarins suggest at least two furanocoumarin-metabolizing P₄₅₀s exist, one of which may be specialized for the angular isomers. We have succeeded in expressing two different allelic variants of this enzyme (CYP6B1.1 and CYP6B1.2). While minor differences exist between these alleles, both P₄₅₀s are primarily restricted to metabolism of linear furanocoumarins. We have initiated studies in two other swallowtail species, paralleling those in the black swallowtail, to identify related P₄₅₀s involved in furanocoumarin metabolism and have also initiated studies aimed at characterizing furanocoumarin metabolites generated by these apparently substrate-specific enzymes.

If you're at all curious as to how I came to work at the interface of three fields – phytochemistry, ecology and entomology – I have to confess it was not due to any deep insight into the value of interdisciplinary research in opening up new paradigms; rather, it was the result of a character flaw. As an undergraduate, I became fascinated with all three of these subjects and found myself, as graduate school approached, unable to choose among them. Accordingly, I took up the approach I still practice today – working in three fields at once. I still have difficulties making decisions sometimes, but at no other time has this indecisiveness served me so well; I've never regretted not making up my mind! ♦

Report of the Treasurer

The treasury of the Phytochemical Society of North America ended the year with \$40 664.81 in accounts in Peoria. The financial statement below shows that the major sources of receipts during 1995 were from membership dues (\$5799.55) and royalties from the sales of *Recent Advances in Phytochemistry* (\$4136.80). As of February 20, approximately \$2000 was still outstanding from Plenum for last year's secretarial expenses and page charges. Savings are currently in rising CD accounts.

The largest expenditures during 1995 were directed toward expenses of the annual meeting and production of the *Newsletter*. This year's meeting in Sault Ste. Marie actually netted about \$1000, thanks largely to support for the mini-symposium raised by Vince De Luca and cost control measures by Mamdouh Abu Zaid and the symposium organizers. This compares very favorably with recent meetings which have incurred expenditures of \$8000 to \$10 000.

There are 335 members current in their dues through 1995. During 1995, 55 new members joined PSNA. Although 150 members with dues in arrears were dropped from the membership at the end of last year, 76 of these had become members only as a result of attendance at the Mexico City meeting.

Included in this *Newsletter* is a current E-mail address list. This is based on information provided by the membership. Please let me know if errors have occurred. Members that expect to retire during 1996 are reminded that they are eligible for "emeritus status" and exemption from annual dues. Please notify me if you are retiring but wish to remain a member of PSNA. ♦

Respectfully submitted,

Susan P. McCormick,
Treasurer

Interim Financial Report

(01 January 1995 - 31 December 1995)

Receipts

Membership dues	5799.55
Plenum Publishing: royalties on RAP	4136.10
Plenum Publishing: secretarial expenses and page charges	(outstanding)
Interest on checking account	112.76
Rental of mailing lists	100.00
Industry contribution to mini-symposium	1500.00
Reimbursement from 1995 meeting	7693.08
Late registration for 1995 meeting	175.00
Total Receipts	19 516.49

Expenditures

Meetings	
Advance for 1996 meeting	2000.00
Speaker travel, 1995	5203.00
Student travel awards, 1995	1500.00
Best paper/poster awards, 1995	300.00
Executive Committee expenses	
Secretarial	4000.00
Treasurer	63.80
Editor	1000.00
Checking account service charges	49.95
Total Expenditures	14 116.75

Assets

Checking	10 794.27
Savings	29 870.54
Total	40 664.81

Upcoming Meetings

Phytochemical Society of North America

The countdown is well under way for the 1996 annual meeting to be held at the Intercontinental Hotel in New Orleans August 11-14. See the centre section of this issue for the call for papers, and registration and abstract forms.

The 1997 meeting, to be held in conjunction with the Phytochemical Society of Europe, will be in Leiden, The Netherlands, April 20-24, and is being organized by Rob Verpoorte. The symposium topic will be "Plants and their interaction with the environment. For more information contact Rob Verpoorte at the Institute of Chemistry, Leiden University, Einsteinweg 55, Box 9502, 2300RA Leiden. (Telephone 31 71 27 4400, E-mail verpoort@chem.leidenuniv.NL)

The 1998 meeting, to be held at Pullman, Washington, is being organized by Norman Lewis. Details will be forthcoming in future issues.

Other Meetings of Interest

Phytochemical Society of Europe, Young Scientist Symposium: Future Trends in Phytochemistry

Rolduc, Kerkrade, The Netherlands, 1996 May 12-15. (This meeting replaces the one originally planned for Dublin, Ireland.) There will be eight invited speakers, and younger scientists working in the fields of secondary metabolism and phytochemistry are invited to participate. Contact Prof. Dr. R. Verpoorte, Division of Pharmacognosy, Leiden/Amsterdam Center for Drug Research, Box 9502, 2300 RA Leiden, The Netherlands. (Telephone 31 71 527-4528, FAX 527-4277, E-mail verpoorte@chem.Leiden Univ.NL)

5th Conference on Application of Chromatographic Methods in Phytochemical and Biochemical Analysis

Lublin, Poland, 1996 June 21-22. Main scientific themes will include all chromatographic techniques used in phytochemical, biochemical and biological research for analytical and preparative purposes. One-page summaries of contributions should be sent before April 15. Contact Prof. Dr. Kazimierz Glowniak, Dept. of Pharmacognosy, Medical Academy, Peowiaków 12, 20-007 Lublin. (Telephone 48 81 23314, FAX 28903)

Breeding Research on Medicinal and Aromatic Plants. International Symposium

Quedlinburg, Germany, 1996 June 30-July 4. Emphasis in the program will be on genetic resources, genetics, methods and results of conventional breeding, biotechnology, quality analytics, and economic and juridic aspects of medicinal and aromatic plant breeding. Contact Dr. Friedrich Pank, Federal Centre for Breeding Research on Cultivated Plants, Neuer Weg 22/23, D-06484 Quedlinburg. (Telephone (49) 03846/47259, FAX (49) 03946/47255)

Groupe Polyphénols, XVIII International Conference on Polyphenols

Bordeaux, France, 1996 July 15-18. There will be 12 plenary lectures and over 150 other communications. The six main topics will be food products, tannins, nutrition and toxicity, oxidation, phenols and the environment, and extraction, analysis and technology. Deadline for abstracts has passed. Contact Joseph Vercauteren, Laboratoire de Pharmacognosie, 3 ter Place de la Victoire, 33076 Bordeaux

Cedex, France. (Telephone 33-65 92 96 57, FAX 33-56 91 23 72)

Society for Medicinal Plant Research, 44th Annual Congress

Prague, Czech Republic, 1996 September 3-7. Main topics will be natural compounds with anticancer activity, plant cell cultures and biotechnology, with the further topics of structural elucidation, analytics and quality control, and biological activities of natural products. Deadline for abstracts March 15. Contact Dr. Tomas Vanek, Institute of Organic Chemistry and Biochemistry, Czech Academy of Sciences, Flemingovo nám. 2, 166 10 Praha 6, Czech Republic. (Telephone +422 33 12 574, FAX +422 243 10 503; E-mail vanek@uochb.cas.cz)

Federation of European Societies of Plant Physiology, 10th Congress

Florence, Italy, 1996 September 9-13. Organized by the Società Italiana di Fisiologia Vegetale. There will be six plenary lectures. Sessions are scheduled on plant growth and development; photosynthesis, respiration, carbon and nitrogen metabolism; cell transport and long distance transport; signal perception and transduction: hormone metabolism; eco-physiology, crop productivity and biotechnological approaches. Submission deadline March 31. Contact ENIC ITALIA, Via S. Caterina d'Alessandria, 12, 50129 Firenze. (Telephone 055/477871, FAX 055/495348)

3rd European Congress of Pharmaceutical Sciences

Edinburgh, U.K., 1996 September 15-17. Jointly organized by European Federation for Pharmaceutical Sciences, U.K. Association of Pharmaceutical Scientists and Pharmaceutical Sciences Group of the

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New product information

A new catalogue of special interest to researchers in the area of phytochemicals is now conveniently accessible through a web site on the worldwide Internet.

A range of sample phytochemicals, analogues and derivatives, in amounts useful for spectroscopic and chromatographic studies, direct comparisons and other laboratory research purposes is being offered in this phase of the development of a new Canadian company.

Fytokem Products Inc., based in Saskatoon, Saskatchewan, the heartland of Canada's burgeoning agricultural biotechnology industry, is in the vanguard of phytochemical researching, processing and supply. Combining materials from plants native to western Canada, an ecologically pristine and verdant farm and forest region, with those obtained worldwide, Fytokem is poised to become a major processor and supplier to the global market.

Founded in 1994, the firm has assembled a technical staff of highly dedicated phytochemists, analysts and technical information people. Most of the bio-organic molecules Fytokem supplies are rare, and some are even unreported in the chemical literature. As well as dealing with specialty phytochemicals, Fytokem will also market

some unique North American botanicals for use as ingredients in dietary supplement, pharmaceutical and cosmetic formulations.

The current on-line catalogue is part of a marketing strategy that will ultimately offer some 20,000 products through the Internet. For those who do not have Internet access and cannot download a copy of the catalogue, Fytokem will mail out its most current inventory listing. Call to enquire. This spring, the firm will produce a major resource book, *Natural Chemicals from Canada's Prairie Plants*, which will be directed to specialty markets in therapeutics, health foods, cosmetics, pharmaceuticals and research.

In the first on-line catalogue offering, the samples are research tools and not for manufacturing. In some cases, Fytokem will offer important synthetic intermediates as well as the plant-based substances. The product range will be built on this initial offering by the addition each month of over 100 new materials with the aim of eventually spanning the entire range of phytomolecules: alkaloids, flavonoids, phenols, coumarins, lipids, carbohydrates, plant acids, peptides, terpenoids, sterols and other substances.

A new group of phytomolecules will be featured each month. March's materials will be of special interest to lignin chemists since the

Royal Pharmaceutical Society of Great Britain. Phytochemistry is one of the included themes. Deadline for abstracts March 15. Contact the congress secretariat at Marshwood Events Management, 52 Gresham Road, Staines, Middlesex TW18 2AN. (Telephone 44 178 44 64 106, FAX 44 55 078)

Principles Regulating Biosynthesis and Storage of Secondary Products

Halle (Saale), Germany, 1996 September 26-28. Sponsored by European Society of Phytochemistry and Martin-Luther-University Halle-Wittenberg. Scientific topics will be genetics of secondary metabolism, enzymology of secondary metabolism, compartmentation and channeling, integration of secondary metabolism into the programmes of cell differentiation and organ development, and expression of secondary metabolism in heterologous organisms. Contact Prof. Dr. Beate Diettrich, Universität Halle-Wittenberg, Institut für Pharmazeutische

Biologie, Weinbergweg 15, D-06120 Halle (Saale). (Telephone 49)

Fourth International Conference on the Biochemistry of Trace Elements

Berkeley, California, 1997 June 23-26. Sponsored by the Soil Science Society of America. The following topics will be featured: advancements in analytical methods and their applications; ecotoxicological risk assessments, public policy, and management decisions; trace element issues in agricultural production systems and other food chains; chemical speciation, surface chemistry, and modeling; science and technology of remediating trace element-contaminated soils and sediments; trace elements in forest, aquatic, and other natural ecosystems; identification, quantification, and characterization of sources of trace elements in natural and managed ecosystems. Contact Dr. I.K. Iskandar, U.S. Army Cold Regions Research and Engineering Laboratory, 72 Lyme Road, Hanover, NH 037755, U.S.A.

(Telephone 603 646-4198, FAX 646-4561, E-mail iskandar@crrel.usace.army.mil) ♦

Plant Growth Regulator Society Changes Name

The Plant Growth Regulator Society of America was formed in 1973 as a forum for scientists from very diverse disciplines to exchange ideas and information on the many different facets of plant growth regulation. To better reflect the broad scope of research activities and interests of the society, the members of the Plant Growth Regulator Society of America have changed its name to the **Plant Growth Regulation Society of America**. This new name more accurately reflects the society's continuing mission to exchange and disseminate information concerning all aspects of regulating plant growth. ♦

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(continued on page 8)

**Phytochemical Society of North America
Société Phytochimique de L'Amérique du Nord
Sociedad Fitoquímica de América del Norte**

1996 Meeting, New Orleans, Louisiana

August 10 -14 , Hotel Inter-Continental

PRELIMINARY PROGRAM

The program will include symposium sessions, contributed paper and poster sessions. The meeting site is in the Hotel Inter-Continental, which is about a 1 minute walk from the Hampton Inn, in Downtown New Orleans, both places being 2 blocks from the French Quarter. A registration form is enclosed. The organizers suggest the use of a credit card for hotel reservation payment.

Urge your students to apply for travel grants and best student paper awards. Now is a good time to encourage students to join the Phytochemical Society of North America. An application form is on the inside back cover of every newsletter and copies of the PSNA brochure are available from the organizers. For further information, contact Dr. Nikolaus H. Fischer.

PROJECTED SCHEDULE

Saturday, August 10	3: 00 - 6: 00 pm	Registration
	7: 00 - 10: 00 pm	Mixer
Sunday, August 11	AM	Opening session Symposium presentation (2 talks) Contributed papers (session 1)
	PM	Symposium presentation (1 talk) Contributed papers (session 2) Posters (session 1)
Monday, August 12	AM	Symposium presentation (2 talks) Contributed papers (session 3)
	PM	Symposium presentation (2 talks) Posters (session 2)
Tuesday, August 13	AM	Symposium presentation (3 talks)
	Evening	Banquet
Wednesday, August 14	AM	Symposium presentation (2 talks) Contributed papers (session 4) Contributed papers (session 5)
	PM	Symposium presentation (1 talk)

IMPORTANT DEADLINES

May 06, 1996	Deadline for submission of abstracts Deadline for submission of registration forms (without late charge)
July 06, 1996	Deadline for submission of hotel reservation form

Please note that abstract submission and registration forms should be mailed to: Nikolaus H. Fischer, Dept. of Chemistry, Louisiana State University, Baton Rouge, LA 70803, U.S.A.

Hotel reservation forms should be mailed directly to: Hampton Inn, 226 Carondelet Street, New Orleans, LA 70130
Phone: (504) - 529-9990; FAX: (504)-529-9996

Welcome to New Orleans, also called the "Big Easy"

The PSNA will host the 1996 annual meeting in New Orleans, Louisiana. This location was chosen by the membership of the society for a good reason: it is one of the America's most exciting and interesting cities. The prevailing attitude in Louisiana is rather laissez-faire and "Big Easy" is world-famous not only for the entertainment in the Vieux Carre" (French Quarter) but is filled with many historic places, parks and museums. For instance, the Audubon Zoo is one of the best in the country and the Aquarium of the Americas is among the best in the world. In spite of the tropical climate during the summer months, New Orleans can be great fun and it need not be expensive. One can find more free entertainment than in any other American city. Stroll down the streets of the French Quarter and listen to street musicians or watch fire-eaters, jugglers and artists on Jackson Square. Visit the French Market and have a cup of coffee at the Café du Monde.

When many people think "Louisiana," they automatically think "Cajun." Yes, Cajun culture is alive and well here, complete with its famous food and wonderful outlook on life; but there is also much more to this state. Louisiana actually has four distinct regions, each with its own personality and character: Greater New Orleans, Plantation Country, Cajun Country and Sportsman's Paradise. Plantation Country is only a short drive from New Orleans but feels like worlds away. Tranquil gardens, a place where traditions reign and longtime values still hold true. No matter where your travels take you in Louisiana, you'll find nearly everyone in the state has a zest for life and a penchant for good food and good music.

Climate:

The weather in the coastal region may be as diverse as anything else about Louisiana. The moody Gulf of Mexico is the state's weather-maker and gives Louisiana its subtropical climate. In August, daily maxima are in the low 90° F (30 - 34° C) and afternoon thundershowers are common with high humidity. We strongly recommend dressing in cool, casual clothes and comfortable shoes.

Travel:

Most major US hubs have direct flights to New Orleans. The New Orleans International Airport is approximately 14 miles (22 kilometres) from the city center. Travellers should allow ONE HOUR for driving time as traffic is sometimes congested. As in any major city, rental cars are not recommended because of high parking fees. At the airport use the Hotel Shuttle, or a Taxi. **Public bus** - \$ 1.10 one-way to the Central Business District. Limited hours. **Airport shuttle** - \$ 10.00 one-way. Continuous 24-hour service to and from all downtown hotels. **Phone:** (504)- 465-9780. **Taxicab:** \$ 23.00 one-way (regulated flat rate) for one or two persons to or from the Central Business District. The cost for three or more persons is \$ 8.00 per passenger. No extra charge for luggage. Most places within the city can be reached on foot, by streetcar or bus. Pre- and/or post-meeting travel arrangements can be made with Omega World Travel (attn. Dewayne Gill) (504)-525-8900; FAX: (504)-525-0164.

General Information:

New Orleans is a major city with many of the problems common to large urban areas around the world. The best way to avoid difficulties is to use common sense: pay attention to your surroundings, deposit unneeded money, credit cards and documents in the hotel's safe, and don't leave personal possessions unattended or visible in a parked car. Remember to be careful when socializing with strangers.

International visitors may wish to take advantage of Louisiana's "Tax Free Shopping" program. Information about the program is available from participating businesses, many hotels and the Louisiana Office of Tourism on Jackson Square. Phone: (504)-568-5661.

Accommodation and Conference Location:

Accommodations for participants of the meeting will be at the Downtown Hampton Inn. Guest rooms are newly constructed and include complimentary continental breakfast. Non-smoking rooms, safe deposit box, health club and jacuzzi as well as childcare referrals are available. The conference will be held at Hotel Inter-Continental which is located about one block from the Hampton Inn. Both places are only 3 short blocks from the French Quarter, the Aquarium and other major areas of shopping and entertainment. For your convenience at lunch time (Monday to Friday), there is a food court with very good samples of various dishes and quick service at the Place St. Charles, which is connected to the Hampton Inn.

Tour Information for daily sightseeing tours is available at the Tour Desk in the Hampton Inn lobby.

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samples include most of the monomeric products obtained from lignins upon oxidative or reductive degradation, along with some structural analogues and important synthetic intermediates.

Fytokem offers a straightforward pricing policy, providing samples for uniform fees of US\$20 for most materials. Sample amounts will vary from 2 mg to 20 mg or more, with most falling into the 5-15 mg range. Any customers requiring compounds not yet listed in the catalogue or wanting quantities larger than milligram sample amounts are invited to make a special request. Fytokem may have them in stock or under preparation. Details on ordering, shipping and other general policies can be found at Fytokem's web site.

Fytokem offers research and consultation services in natural products chemistry. Fytokem's consultation services and database of compounds and applied uses would be invaluable to anyone in need of expertise in phytochemistry or product development with natural materials.

We invite researchers who possess stocks of unique or uncommon phytochemicals, in gram-or-greater amounts in excess of their current needs, to contact our company regarding co-marketing arrangements to make small samples of these substances available to other researchers through the Fytokem catalogue. We can help you to put surplus phytochemicals back into research action, and perhaps to find new applications for some of your materials.

For information

The on-line address is <http://cyber.maxinfosys.com/fytokem>.

For additional information contact:

Greg Dutka, Market Development
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(to be continued)

PHYTOCHEMICAL SOCIETY OF NORTH AMERICA

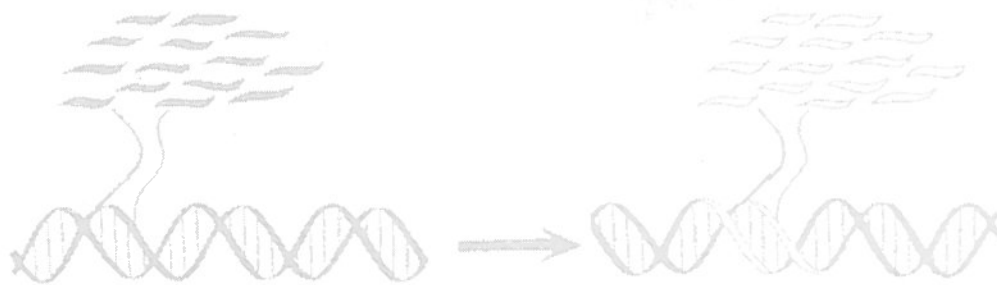
Vol. 36, No. 1 • Jul. 96

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• Volume 36, Number 1 • July 1996 •

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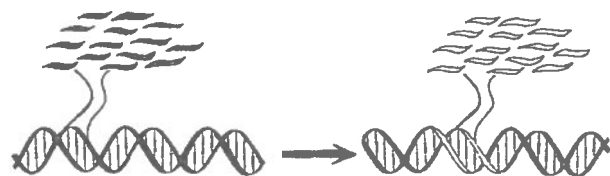
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Dr. Murray Isman (1998)

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Dr. Kelsey Downum (2000)

PSNA Newsletter

Editor: **Dr. Alicja M. Zobel**
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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 U.S. \$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 to the Society Secretary. Annual dues and changes in addresses should be sent to the Society Treasurer.

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From the Editor

This is the summer pre-meeting issue which, as always, features the program for the current annual meeting, to be held this year in storied New Orleans. Our president, Klaus Fischer, has been in charge of organizing the meeting and, from the looks of the program, those attending will be served an interesting and worthwhile bill of fare. I hope to see as many of you there as possible.

It is a pleasure to have to contradict the statement made in this column last issue, that it would not be possible, owing to lack of funds, to schedule another minisymposium at this meeting. Organizer Klaus Fischer, with admirable determination and ingenuity, has been able after all to put together a minisymposium on the future of phytochemistry, by inviting as participants potential speakers who had already registered for the meeting. However, it will not be possible to publish abstracts of their presentations.

Those planning to drive to or in New Orleans might note that Alamo Rent-a Car, Inc. offers special convention daily and weekly rates (10% discount) for our meeting. For reservations phone 800-732-3232 and request group I.D. no. 372255 Rate Code 9G.

We are saddened to have to carry in this issue an obituary for Gestur Johnson. Old-time members of the PSNA or its precursor society, the Plant Phenolics Group of North America, will remember Gestur well as the man who organized the meeting at Fort Collins, Colorado, in 1961, at which the society was formed. Although he had not been active in the PSNA for over ten years, he holds a permanent place as one of our Society's founding fathers, and will be very much missed. ♦

The Editor

Gestur Johnson

1909-1996

Gestur Johnson, one of the founders of the Society, died March 14 in Fort Collins, Colorado, at age 86. He had been a member of the faculty at Colorado State University for 29 years.

A native of North Dakota, he began his career there as a high school teacher and principal in the dustbowl years of the mid-thirties. He was then appointed research assistant at the Colorado Agricultural Experiment Station for four years before moving to Montana State College in 1941 as an Instructor and later Assistant Professor. Continuing westward, he served as Assistant Chemist at the Western Regional Research Laboratory in Albany, California, from 1943 to 1946. After World War 2 he returned to CSU and remained in the Chemistry department there until retirement in 1975, becoming a full Professor in 1964. He also held a joint appointment in Food Science.

Gestur's research interests were in the area of food science and natural products. He was author or coauthor of about 50 research papers, and he registered four patents for the university. He was well known for developing powdered fruit juices and apple sauce, and cold processed fruit toppings.

An active interest in the phenolic compounds of food led Gestur to apply for a grant from the National Science Foundation to fund a meeting of North American and foreign specialists in plant phenolics in the summer of 1961. During this meeting was founded the Plant Phenolics Group of North America, from which developed five years later the present Phytochemical Society of North America. Although he never held elected office in the society he has always been acknowledged, because of his pivotal role in organizing this initial meeting, as one of the founding fathers of the PSNA. In recognition of this and his contributions to phytochemistry Gestur was awarded one of the early life memberships in the Society. ♦

1996 PSNA Annual Meeting

General Information

Location:

The PSNA will host the 1996 annual meeting in New Orleans, Louisiana, which is one of the America's most exciting and interesting cities. The prevailing attitude in Louisiana is rather *laissez-faire* and "Big Easy" is world-famous not only for the entertainment in the Vieux Carré (French Quarter) but is filled with many historic places, parks and museums. For instance, the Audubon Zoo is one of the best in the country and the Aquarium of the Americas is among the best in the world. In spite of the tropical climate during the summer months, New Orleans can be great fun. One can find more free entertainment than in any other American city. Stroll down the streets of the French Quarter and listen to street musicians or watch fire-eaters, jugglers and artists on Jackson Square. Visit the French Market and have a cup of coffee at the Café du Monde.

New Orleans is a major city with many of the problems common to large urban areas around the world. The best way to avoid difficulties is to use common sense: pay attention to your surroundings, deposit unneeded money, credit cards and documents in the hotel's safe, and don't leave personal possessions unattended or visible in a parked car. Remember to be careful when socializing with strangers.

International visitors may wish to take advantage of Louisiana's "Tax Free Shopping" program. Information about the program is available from participating businesses, many hotels and the Louisiana Office of Tourism on Jackson Square. Phone: (504)-568-5661.

Further information about New Orleans and Louisiana will be provided during registration.

Climate:

The weather in the coastal region maybe as diverse as anything else about Louisiana. The moody Gulf of Mexico is the state's weather-maker and gives Louisiana its subtropical climate. In August, daily maxima are in the low 90° F (30 -34° C) and afternoon thunder-showers are common with high humidity. We strongly recommend dressing in cool, casual clothes and comfortable shoes.

Air Travel:

Most major US hubs have direct flights to New Orleans. The New Orleans International Airport is approximately 14 miles (22 kilometers) from the city center. Travellers should allow ONE HOUR for driving time as traffic is sometimes congested. As in any major city, rental cars are not recommended because of high parking fees. At the airport use the Hotel Shuttle, or a Taxi. Public bus - \$ 1.10 one-way to the Central Business District. Limited hours. Airport shuttle - \$ 10.00 one-way. Continuous 24-hour service to and from all downtown hotels. Phone: (504)- 465-9780. Taxicab: \$ 23.00 one-way (regulated flat rate) for one or two persons to or from the Central Business District. The cost for three or more persons is \$ 8.00 per passenger. No extra charge for luggage. Most places within the city can be reached on foot, by streetcar or bus.

Pre-and/or post meeting travel arrangements can be made with Omega World Travel (attn. Dewayne Gill) (504)-525-8900; FAX: (504)-525-0164.

Travel by Car:

Take I-10 to Downtown; take Poydras/Superdome exit, go towards the river on Poydras, turn left on Carondelet (~6 blocks). From Canal, turn right on Baronne, then left on Gravier. Hotel is at corner of Carondelet and Gravier.

Accommodation and Conference Location:

Accommodations for participants of the meeting will be at the Downtown Hampton Inn. Guest rooms are newly constructed and include complimentary continental breakfast. Non-smoking rooms, safe deposit box, health club and jacuzzi as well as childcare referrals are available. The conference will be held at the Hotel Inter-Continental which is located about one block from the Hampton Inn. Both places are only 3 short blocks from the French Quarter, the Aquarium & other major areas of shopping and entertainment. For your convenience at lunch time (Monday to Friday), there is a food court with very good samples of various dishes and quick service at the Place St. Charles, which is connected to the Hampton Inn.

Tour Information for daily sightseeing tours is available at the Tour Desk in the Hampton Inn Lobby. ♦

1996 PSNA Annual Meeting Program

Saturday, August 10

2:00 - 7:00 pm - Registration at the Hampton Inn Carondelet Club (located on 4th floor).

7:00 - 9:00 pm - Mixer, Hampton Inn, Carondelet Club (located on 4th floor).

Sunday, August 11

All sessions will be held in the Vieux Carré Room at the Hotel Inter-Continental.

Registration will be open from 8:00 to 12:30 in front of the Vieux Carré Room at the Hotel Inter-Continental

8:45 - 9:00 am - Welcome- Nikolaus H. Fischer, PSNA President & Meeting Organizer

Symposium Session I - Nutraceuticals
Chair, Timothy Johns

9:00 - 9:50 am - Symposium Paper 1
ORGANOSULFUR AND -SELENIUM
PHYTOCHEMICALS IN GARLIC, ONION AND OTHER
GENUS *ALLIUM* PLANTS.
Eric Block

9:50 - 10:40 am - Symposium Paper 2
CHEMOPREVENTIVE AGENTS IN FOODS.
Bobo Stavric

10:40 - 11:10 am - Coffee Break

11:10 - 12:00 am - Symposium Paper 3
HEALTH-PROMOTING PHYTOCHEMICALS IN
CITRUS FRUIT AND JUICE PRODUCTS.
Steven Nagy, W. W. Widmer and A. M. Montanari

12:00 - 1:30 pm - Lunch Break

Posters 1 - 15 should be put up during the lunch break in the Front Section of the Vieux Carré Room, for viewing at 3:30 - 6:00 pm.

Oral Presentation Session I
Chair, Constance Nozzolillo

Student Oral Presentation Competition

1:30 - 1:50 pm - Contributed Paper 1
NOVEL BICYCLIC PHOTOPRODUCTS FROM
THIARUBRINE (1, 2-DITHIIN) ANTIBIOTICS.
Jon Page, Eric Block and G. H. Neil Towers

1:50 - 2:10 pm - Contributed Paper 2
GC-MS EVALUATION OF COMPOUNDS IN DRY AND
CONDITIONED *STRIGA* SEEDS.
Joseph K. Rugutt, Rostem J. Irani, Nikolaus H. Fischer,
Dana K. Berner and Tracy D. McCarley

2:10 - 2:30 pm - Contributed Paper 3
POSSIBLE MECHANISM FOR NEMATODE INVASION
OF PLANT TISSUES.
Edward A. Yingling and Karel R. Schubert

2:30 - 3:00 pm - Coffee Break

3:00 - 5:00 pm - Poster Session I
Best Poster Competition
Chair, Maryam Foroozesh

Poster 1: DETAILED FAB-MS AND HIGH
RESOLUTION NMR INVESTIGATIONS OF
TRICOLORINS A-D, INDIVIDUAL CONSTITUENTS
FROM THE RESIN GLYCOSIDES OF *IPOMOEA*
TRICOLOR.
M. Moustapha Bah and Rogelio Pereda-Miranda

Poster 2: ISOLATION BY HPLC AND STRUCTURAL
CHARACTERIZATION OF A NEW GLYCOLIPID
ESTER TYPE DIMER FROM *IPOMEA TRICOLOR*.
M. Moustapha Bah and Rogelio Pereda-Miranda

Poster 3: IN-MIXTURE ANALYSIS OF TRITERPENES
FROM *RAPHIODON ECHINUS*.
Fábio de Sousa Menezes and Maria Auxiliadora C. Kaplan

Poster 4: ANTHELMINTIC PROPERTIES OF A-
SANSHOOL FROM *ZANTHOXYLUM LIEBMANIANUM*
(RUTACEAE).
Andrés Navarrete and Enrique Hong

Poster 5: ANTIPROTOZOAL PROANTHOCYANIDINS
FROM *GERANIUM NIVEUM*.
Fernando Calzada, Mariana Meckes, Roberto Cedillo-
Rivera and Rachel Mata

Poster 6: BIOACTIVITY GUIDED ISOLATION AND PURIFICATION OF AN ANTIMICROBIAL CONSTITUENT FROM THE ROOTS OF *SISYRINCHIUM SCABRUM*.

L. Hernández, M. Alcibar, E. Escamilla, V. Rodríguez, J. Tamariz, G. Zepeda and B. Hernández

Poster 7: ANTI-MYCOBACTERIAL SESQUITERPENE LACTONES FROM *RUDBECKIA SUBTOMENTOSA*.

Charles L. Cantrell, L. Quijano, S. G. Franzblau and N. H. Fischer

Poster 8: PURIFICATION AND EVALUATION OF IMMUNOLOGICAL ACTIVITIES OF SAPONINS FROM *POLYGALA SENEGA* L.

George Katselis, Branka Barl and Alberto Estrada

Poster 9: NOVEL LABDANE DITERPENES FROM THE INSECTICIDAL PLANT *HYPTIS SPICIGERA*.

M. Fragoso-Serrano, E. González-Chimeo, R. Pereda-Miranda and T. Arnason

Poster 10: INSECTICIDAL LIMONOIDS FROM *SWIETENIA HUMULIS* AND *CEDRELA SALVADORENSIS*. (MELIACEAE)

A. Jiminez, R. Mata, R. Pereda-Miranda, J. Calderon, R. Nicol and J. T. Arnason

Poster 11: EFFECT OF COUMARINS FROM *ESENBECKIA YAXHOOB* AND *STAURANTHUS PERFORATHUS* (RUTACEAE) ON SEVERAL PHOTOSYNTHETIC ACTIVITIES.

Martha Macías, Susana Rojas, Blas Lotina-Hennsen and Rachel Mata

Poster 12: EFFECT OF THE MAJOR COMPOUNDS FROM *HELIANTHELLA QUINQUENERVIS* ON SEVERAL PHOTOSYNTHETIC ACTIVITIES ON ISOLATED SPINACH CHLOROPLASTS.

Perla Castañeda, Rachel Mata and Blas Lotina-Hennsen

Poster 13: ANNONACEOUS ACETOGENINS AS ATP-SYNTHESIS INHIBITORS ON SPINACH CHLOROPLASTS.

Daniel Chávez, Blas Lotina-Hennsen and Rachel Mata

Poster 14: PHYTOTOXIC COMPOUNDS FROM *ESENBECKIA YAXHOOB* (RUTACEAE).

L. Susana Rojas, Martha L. Macías, Rachel Mata, Ana L. Anaya and Blas Lotina-Hennsen

Poster 15: ISOLATION OF THE MOST ABUNDANT STORAGE PROTEIN FROM TUBERS OF *OXALIS TUBEROSA* M.

Teresita Flores and Hector E. Flores

5:00 - 7:00 pm - Executive Meeting

Monday, August 12

Symposium Session II - Nutrition
Chair, François Cormier

9:00 - 9:50 am - Symposium Paper 4
CONSTITUENTS OF WILD FOOD PLANTS.
Angela Sotelo

9:50 - 10:40 am - Symposium Paper 5
BEHAVIORAL EFFECTS OF PHYTOCHEMICALS IN
FOOD AND HERBAL SUPPLEMENTS.
Timothy Johns

10:40 - 11:10 am - Coffee Break

11:10 - 12:00 am - Symposium Paper 6
PHYTOCHEMICALS AND SENSORY PROPERTIES OF
WINE.

Susan E. Ebeler and Ann C. Noble

12:00 - 1:30 pm - Lunch Break

Posters 16 - 37 should be set up during this period.

Mini - Symposium:
"The Future of Phytochemistry "
Chair, Rachel Mata

1:30 - 2:00 pm - Mini Symposium - Paper 1
REFLECTIONS ON THE PAST THIRTY YEARS OF
THE PSNA AND A LOOK INTO THE FUTURE.
G. H. Neil Towers

2:00 - 2:30 pm - Mini - Symposium - Paper 2
THE HISTORICAL DEVELOPMENT OF NATURAL
PRODUCTS IN PLANT SYSTEMATICS: THE PAST
AND THE FUTURE.
David S. Seigler

2:30 - 3:00 pm - Mini Symposium - Paper 3
PLANT NATURAL PRODUCTS AND THEIR
POTENTIAL AS BIOCIDES AND MEDICINAL DRUGS.
John Thor Arnason

3:00 - 3:30 pm - Coffee Break

3:30 - 4:00 pm - Mini Symposium Paper 5
THE FUTURE OF NATURAL PRODUCTS IN
AGRICULTURAL RESEARCH.
James A. Saunders

4:00 - 5:30 pm - Roundtable Discussion

Chair, Kelsey Downum

5:30 - 7:30 pm - General Poster Session II

Chair, Maryam Foroozesh

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Melita L. Morton, Kelsey R. Downum and Kevin E. O'Shea.

Poster 17: CLERODANE DITERPENES OF *CROTON HEMIARGYREUS*.

Ana Claudia F. Amaral and Roderick A. Barnes

Poster 18: DIARYLHEPTANOIDS AND LIGNANS FROM BEARTWOOD OF *BETULA MAXIMOWICZIANA* REGAL.

Hanawa Fujinori

Poster 19: CHEMICAL INVESTIGATION OF BRAZILIAN *SIPARUNA* (MONIMIACEAE).

Simone S. V. Soares, Naomi Kato, Thelma B. M. Brito and Gilda G. Leitão

Poster 20: PHYTOCHEMICAL INVESTIGATIONS OF *PIPER ADUNCUM* L.

D. L. Moreira, A. Silva, E. C. Santos, Bergmann, E.F. Guimarae and M.A.C. Kapland

Poster 21: NEW FERN CONSTITUENTS FROM *PTERIDIUM AQUILINUM*.

Filippo Imperato

Poster 22: BIOMIMETIC TRANSFORMATIONS OF DIHYDROPARTHENOLIDE IN PRESENCE OF THIOPHENOL.

José Castañeda-Acosta, David Vargas and Nikolaus H. Fischer

Poster 23: MONILIFORMIN, FUMONISIN B₁ AND TWO β -D-FRUCTOSE ANALOGS PRODUCED BY *FUSARIUM* SPP: BIOLOGICAL ACTIVITIES TOWARDS *LEMNA MINOR* AND PRIMARY CHICK HEPATOCYTES.

Ronald F. Vesonder, Weidong Wu and Cesaria E. McAlpin

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Susan McCormick, Anne Desjardins, Robert Plaisted and B. B. Brodie

Poster 25: LIGHT-INDEPENDENT EFFECTS OF XANTHOTOXIN ON TRICHOHECENE PRODUCTION IN *FUSARIUM SPOROTRICHIOIDES* LIQUID CULTURES.

Susan McCormick

Poster 26: PHYTOCHEMICAL REDUNDANCY IN *RUPTILIOCARPON CARACOLIRO* (LEPIDOBOTRYCEAE).

I. Cameron, R. Ming, S. MacKinnon, J. T. Arnason and T. Durst

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Monica Ramm, Luciene Ferreira, Luciene Ribeiro, Gilda G. Leitão, Suzana G. Leitão, Sonia N. Pereira, Vania Limeira and Luiz F. B. Oliveira

Poster 28: GLYCOSAMINOGLYCAN MODULATORS FROM PLANTS.

Ikhlaz A. Khan, William H. Taylor, Julie R. Mikell, Larry A. Walker and Jeffrey D. Esko

Poster 29: EFFECT OF CALCIUM ON THE CELL WALL COMPOSITION OF *BOTRYTIS CINERA*.

C. O. Chardonnet, C. E. Sams and W. S. Conway

Poster 30: SURFACE DEPOSITION OF UV-ABSORBING COMPOUNDS ON *EUPATORIUM MACULATUM* AND *ACHILLAE MILLEFOLIUM*.

J. A. Doran and A. M. Zobel

Poster 31: PLANT SURFACE EXTRACTS REACT DIFFERENTLY ON NUMBER OF MITOSIS THAN MIXTURE OF INTERIOR COMPOUNDS.

K. E. Murphy, J. Lynch and A. M. Zobel

Poster 32: RELATIONSHIPS AND VOLATILE ASPECTS BETWEEN KERNEL POSITION ON THE MAIZE EAR AND AFLATOXIN FORMATION.

H. J. Zeringue, Jr.

Poster 33: PELLITORINE, A HILL REACTION INHIBITOR.

Antonia Ramírez, Perla Sánchez, Rachel Mata and Blas Lotina-Hennsen

Poster 34: ISOLATION AND CHARACTERIZATION OF FLAVANONE 7-O-GLUCOSYLTRANSFERASE FROM *PETUNIA HYBRIDA* AND *ANTIRRHINUM MAJUS*.

Randy L. Durren and Cecilia McIntosh

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G. D. Davis, B. O. Phinney, J. MacMillan, P. Hedden and P. Gaskin

Poster 36: USE OF DNA ANALYSIS FOR CULTIVAR IDENTIFICATION IN OPIUM POPPY.

James A. Saunders, George N. Ude and William. J. Kenworthy

Poster 37: ANTHOCYANIN PIGMENTS IN COLD-STRESSED JACKPINE SEEDLINGS.

Constance Nozzolillo

Tuesday, August 13

Symposium Session III - Plant Constituents

Chair, Vincenzo De Luca

9:00 - 9:50 am - Symposium Paper 7
TRANSGENIC MANIPULATIONS OF EDIBLE OILSEEDS.

Toni Voelker

9:50 - 10:40 am - Symposium Paper 8
UNDERGROUND BLUES: PHYTOCHEMISTRY AND PHYSIOLOGY OF PLANT STORAGE ORGANS.

Hector E. Flores

10:40 - 11:10 am - Coffee Break

Oral Presentation Session II

Chair, Rogelio Pereda-Miranda

11:10 - 11:30 am - Contributed Paper 4
SHORT AND LONG-TERM RESPONSE OF *BRASSICA OLERACEA* TO ULTRAVIOLET RADIATION.

A. M. Zobel and J. M. Lynch

11:30 - 11:50 am - Contributed Paper 5
SUPERCRITICAL FLUID EXTRACTION OF DIHYDROPARTHENOLIDE FROM *AMBROSIA ARTEMISIIFOLIA*.

José Castañeda-Acosta, Andrew W. Cain, F. Carl Knopf and Nikolaus H. Fischer

11:50 - 12:10 pm - Contributed Paper 6
CLONING OF SOLANIDINE UDP-GLUCOSE GLUCOSYLTRANSFERASE FROM POTATO BY FUNCTIONAL EXPRESSION IN YEAST.

Charles P. Mochs, Paul V. Allen, Mendel Friedman and William R. Belknap

12:10 - 12:30 pm - Contributed Paper 7
ROOIBOS TEA AS A LIKELY HEALTH FOOD SUPPLEMENT.

Daneel Ferreira, Charlene Marais and Jacobus A. Steenkamp

12:30 - 1:30 pm - Lunch Break

Symposium Session IV - Bioprocesses

Chair, Hector E. Flores

1:30 - 2:20 pm - Symposium Paper 9
FLAVOR BIOGENERATION.

Jean Crouzet

2:20 - 3:10 pm - Symposium Paper 10
FOOD COLORANTS FROM PLANT CELL CULTURES.

François Cormier

3:10 - 3:40 pm - Coffee Break

3:40 - 5:00 pm - Annual Business Meeting

7:00 pm - Social Hour on the Cajun Queen Steamboat, at the Aquarium of the America's Dock

8:00 - 10:00 pm - Banquet on the Cajun Queen

Wednesday, August 14

Symposium Session V - Analytical Tools

Chair, Nikolaus H. Fischer

9:00 - 9:50 am - Symposium Paper 11
QUANTITATIVE IMAGING APPROACHES TO CARBOHYDRATE CHARACTERIZATION AND DISTRIBUTION.

R. Gary Fulcher

9:50 - 10:40 am - Symposium Paper 12
MOLECULAR MODELLING IN FOOD RESEARCH: THEORY AND APPLICATIONS.

Marie-Rose Van Calsteren

Symposium Abstracts

Symposium Paper 1 - Sunday, 9:00 am

ORGANOSULFUR AND -SELENIUM PHYTOCHEMICALS IN GARLIC, ONION AND OTHER GENUS *ALLIUM* PLANTS.

Eric Block, Department of Chemistry, State University of
New York at Albany, Albany, New York, 12222, USA

Recent discoveries resulting from our exploration of the chemistry of sulfur- and selenium-containing natural products from genus *Allium* plants will be presented. These discoveries, involving detection and characterization of trace amounts of unstable, reactive components of mixtures, rely on powerful spectroscopic and chromatographic techniques including coupled gas chromatography with atomic emission detection (GC-AED), liquid chromatography-inductively coupled plasma-mass spectrometry (LC ICP-MS), Fourier-transform pulsed beam microwave (FT-MW) spectroscopy, and liquid chromatography-mass spectrometry (LC-MS). With GC-AED and LC ICP-MS, naturally occurring organosulfur-selenium odorants have been detected and identified in the headspace above cut Alliums and in human garlic breath, while selenoamino acids have been detected and identified in intact *Allium* plants. The use of FT-MW techniques has allowed characterization of both the geometric isomers of the onion lachrymatory factor, (*Z,E*)-propane-thial *S*-oxide, in vapors from cut onions. LC-MS techniques have facilitated identification of the novel, less volatile organosulfur compounds formed on cutting garlic, onion and other Alliums.

Symposium Paper 2 - Sunday, 9:50 am

CHEMOPREVENTIVE AGENTS IN FOODS.

Bobo Stavric, Food Research Division, Health Protection
Branch, Health Canada, Tunney's Pasture, Banting Bldg.
Ottawa, Ontario K1A 0L2, Canada

In recent years the attention has been directed toward promoting and achieving long-term health benefits, through prevention of certain chronic diseases, like cancer or cardiovascular disorders. It is believed that this can be achieved by combination of several factors: e. g. avoiding smoking, exercising regularly and consuming proper diet. Chemical composition of the diet appears to play an important part in promoting human health. In addition to the ingredients with nutritional values, certain non-nutritional components in foods can also exhibit long-term health-promoting attributes. These are phytochemicals which play essential roles as chemopreventers. Chemopreventive agents control the occurrence of diseases by blocking and/or controlling the formation of components in the diet or from the environment, which may be responsible for disease initiation. The latest achievements in the search for chemoprevention will be illustrated by using selected foods or chemical entities in

foods. Additional attention will be given to the ongoing controversy about the yet unproven benefits from the food supplementation by antioxidants. These will be compared with the benefits obtained from regular diet containing naturally present antioxidants.

Symposium Paper 3 - Sunday, 11:10 am

HEALTH-PROMOTING PHYTOCHEMICALS IN CITRUS FRUIT AND JUICE PRODUCTS.

Steven Nagy, W. W. Widmer and A. M. Montanari, Florida
Department of Citrus, Lake Alfred, FL 33850, USA

Dietary components present in citrus have been shown to exert beneficial effects on the circulatory system and to possess antiinflammatory, antiallergic, antiviral, and, most importantly, anticancer properties. The components with the most anticarcinogenic activities are mainly naturally occurring secondary metabolites and include flavonoids, limonoids, phenolic compounds, essential oils and vitamins. The focus of this paper is to report the newest findings on the health-promoting phytochemicals in citrus products. To this end, we will stress the effects of flavonoids, limonoids, and their bound forms on cancer prevention and, secondly, stress the effects of citrus fiber and folic acid on blood circulatory problems.

Symposium Paper 4 - Monday, 9:00 am

COSTITUENTS OF WILD FOOD PLANTS.

Angela Sotelo, Departamento de Farmacia, Facultad de
Química, Universidad Nacional Autónoma de México, Cd.
Universitaria, 04510 México D.F., México

While wild plants have an adequate nutrient composition, the presence of antinutritional factors preclude their use as food sources. Edible legumes represent a very small percentage of the approximately 17000 species spread out all over the world and the about 1700 of them growing in Mexico constitute a large potential source of protein. Most of the known natural antinutritional factors like enzyme inhibitors, phytohaemagglutinins, cyanogenic glucosides, alkaloids and tannins can be found in the legume family and their concentration is usually higher in wild than in cultivated legumes. A review of the nutrient composition and the antinutritional factors present in some Mexican wild plants, mainly legume seeds, is presented.

Symposium Paper 5 - Monday, 9:50 am

BEHAVIORAL EFFECTS OF PHYTOCHEMICALS IN FOOD AND HERBAL SUPPLEMENTS.

Timothy Johns, School of Dietetics and Human Nutrition,
McGill University, Ste. Anne de Bellevue, Quebec, H9W
5B6, Canada

Nutrients and non-nutrients with pharmacological activity from plants have effects on the behavior and mood of animals and humans. Specific amino acids affect neurotransmission, and carbohydrates and protein may also alter mood. Caffeine is the most widely used stimulant. Conscious response to the benefits promoted for herbal supplements and health foods accounts for much of their growing utilization by consumers. Most nutraceuticals and herbal supplements have non-specific pharmacological activity and only subtle physiological effects. However, direct actions of constituents in them on neural receptors or conditioned preference from subtle homeostatic effects may account for some of the appeal of these products.

Symposium Paper 6 - Monday, 11:10 am

PHYTOCHEMICALS AND SENSORY PROPERTIES OF WINE.

Susan E. Ebeler and Ann C. Noble, Department of Viticulture and Enology, University of California, Davis, Davis, CA 95616, USA

Naturally occurring polyphenolic compounds contribute both bitter and astringent attributes to many foods and beverages, including wine. Without these attributes, these foods would be considered "flat" or "insipid". Bitterness is a taste sensation perceived by receptors in the mouth and tongue. Astringency is a mouthfeel characterized by a "drying" sensation in the oral cavity, probably as a result of the precipitation of salivary proteins. Recent research has led to a better understanding of factors which affect the bitterness and astringency of polyphenolic compounds, including the absolute structure of the polyphenolic, the formation of polymeric compounds, and interactions with other food and beverage components such as sugars, acids, and ethanol.

Symposium Paper 7 - Tuesday, 9:00 am

TRANSGENIC MANIPULATIONS OF EDIBLE OILSEEDS.

Toni Voelker, Calgene Inc., 1920 Fifth Street, Davis, CA 95616, USA

Directed metabolic engineering of fatty acid composition of seed storage oils, facilitated by the advent of plant transformation, has become a reality. For example, high-18:1 oils or high 18:0 oils were engineered using antisense or co-suppression of the respective desaturases (soybean, canola). Saturated (C8-C18) fatty acid synthesis was engineered in canola by expressing genes for chain-length specific acyl-ACP thioesterases from plants which accumulate such fatty acids. A high laurate canola is already in the market place. Also the engineering of acyl position in the triglycerides has been demonstrated. In this talk I will summarize the current status of plant oils engineering and discuss examples as models for metabolic engineering in higher plants in general, as well as the impact of novel oils on the consumer.

Symposium Paper 8 - Tuesday, 9:50 am

UNDERGROUND BLUES: PHYTOCHEMISTRY AND PHYSIOLOGY OF PLANT STORAGE ORGANS.

Hector E. Flores, Plant Pathology Department and Biotechnology Institute, The Pennsylvania State University, University Park, PA 16802, USA

The storage organs evolved by higher plants present a wealth of largely unexplored and underutilized phytochemistry. Familiar examples such as carrots, radishes and potatoes illustrate the capacity of these underground organs to accumulate large amounts of carotenes, glucosinolates and starch, respectively. The metabolic flexibility of such organs is also remarkable, best exemplified by the domestication of *Beta vulgaris* roots in two vastly different directions, as pigment or sucrose accumulators. Underground storage organs such as cassava (*Manihot esculenta*) and sweet potato (*Ipomoea batatas*) also provide staples for over a billion people in developing countries. In spite of their actual and potential uses as food and medicine, we still know little about the regulation of storage organ development and biochemistry. This talk will provide an overview of the phytochemistry of plant storage organs. In particular, we will discuss two sets of bioactive proteins produced by roots of Cucurbitaceae and Nyctaginaceae, and a unique set of tuber and root crops domesticated in the central Andes of South America.

Symposium Paper 9 - Tuesday, 1:30 pm

FLAVOR BIOGENERATION.

Jean Crouzet, Laboratoire de Génie Biologique et Sciences des Aliments. Unité de Microbiologie et Biochimie Industrielles associée à L'INTRA, Université de Montpellier II - F. 34095 Montpellier Cedex 05, France

Aroma compounds responsible of fruit and vegetable flavor are generated according to several pathways. Some of these compounds are generated during ripening and maturation processes. The synthesis of these secondary metabolism compounds is under the dependence of several environmental factors such as climate, soil, nutrition and water disponibility. The aroma of fruits and vegetables is also dependent on the cultivar. Several metabolic pathways are involved in the biosynthesis of esters, methylketones, lactones and pyrazines from fatty acids and/or aminoacids. On the other hand, several aroma compounds are released by the action of enzymes on precursors. Among them are saturated and unsaturated C₆ and C₉ aldehydes and alcohols produced from polyunsaturated fatty acids. In vegetables, volatiles can be generated from precursors during tissues homogenization through enzymatic and chemical reactions like in plants of the genera *Allium* and *Brassica*. The role of glycosylated secondary metabolites as flavor precursors in plants has been emphasized during the last 15 years. Numerous analytical and structural studies have been

developed with the purpose to determine the nature of the enzymatic systems required in their hydrolysis. One other mechanism involved in the formation of aroma compounds is the carotenes oxidative pathway. The primary degradation products obtained are generally odorless, free or bound compounds and several reaction steps are needed for the production of aroma compounds such as damascenone.

Symposium Paper 10 - Tuesday, 2:30 pm

FOOD COLORANTS FROM PLANT CELL CULTURES.
François Cormier, Food Research and Development Centre, Agriculture and Agri-Food Canada, Saint Hyacinthe, Quebec J2S 8E3, Canada

Various pigments which can serve as food colorants, are being produced by plant cell suspension cultures. In most instances, the pigments are being synthesized *de novo* from the carbon and nitrogen sources. Here, the selection of highly productive cell lines is being facilitated by the "obvious" nature of the metabolites. The best pigment production is often achieved under conditions which limit cell growth. Both quantitative and qualitative changes in pigments occur and may be explained by a differential expression in enzymes. The production of anthocyanins by a grape (*Vitis vinifera* L.) cell suspension culture will be presented as an example. Elsewhere, plant cell cultures may be used as a catalysis to carry out a limited number of reactions on an exogenously-fed substrate. Such strategy is being used in the production of hydrosoluble carotenes from crocetin by a saffron (*Crocus sativus* L.) cell culture.

Symposium Paper 11 - Wednesday, 9:00 am

QUANTITATIVE IMAGING APPROACHES TO CARBOHYDRATE CHARACTERIZATION AND DISTRIBUTION.
R. Gary Fulcher, Department of Food Science and Nutrition, University of Minnesota, St. Paul, MN 55108, USA

The association between structure and functionality is especially apparent in endosperm and bran cell walls in cereal grains. The component polymers (β -glucans, pentosans, proteins and phenolic compounds) are highly compartmentalized in individual cell walls, and their various associations are determinants of functionality. We have examined a number of grain and cereal products using conventional extractive techniques, scanning microspectrophotometry and related imaging systems in order to assess variation in the structure and processing quality of cereals. Gas chromatography has been used to define the arabinoxylan variation in a wide range of US, Canadian, New Zealand, and European wheats, and both enzymatic and flow injection methods have been employed for mixed-linkage β -glucan determination. These polymers have been related to cellular structure and process variation. Phenolic acids have

also been evaluated in a range of North American and European barleys, which show nearly two-fold differences in ferulic acid concentrations in several malting barleys. Parallel studies are also underway to assess the utility of several of these compounds in the diet.

Symposium Paper 12 - Wednesday, 9:50 am

MOLECULAR MODELLING IN FOOD RESEARCH: THEORY AND APPLICATIONS.
Marie-Rose Van Calsteren, Food Research and Development Centre, Agriculture and Agri-Food Canada, Saint-Hyacinthe, Quebec J2S 8E3, Canada

The most important computational chemistry techniques which could be used in the modelling of food ingredients or systems will be presented. These include techniques for visualization and presentation of molecules, for the determination of three-dimensional structure, for building molecules, for potential energy calculation and optimization using molecular mechanics with various force fields, semi-empirical and *ab initio* quantum mechanical methods, for conformational searching, molecular dynamics structure-activity or structure-property relationships and for the calculation of spectroscopic parameters. Selected applications will be presented in various areas of food research, such as aminoacids, peptides and proteins, oligo- and polysaccharides, sweeteners and food colours.

Abstracts of Oral Contributed Papers

Oral Paper 1 - Sunday, 1:30 pm

NOVEL BICYCLIC PHOTOPRODUCTS FROM THIARUBRINE (1, 2-DITHIIN) ANTIBIOTICS.
Jon Page¹, Eric Block² and G. H. Neil Towers¹, ¹ Dept. of Botany, University of British Columbia, Vancouver, B.C., Canada, V6T 1Z4; ²Dept. of Chemistry, State University of New York, Albany, New York 12222, U.S.A.

Thiarubrines, wine-red 1, 2-dithiin polyenes found in the Asteraceae, possess potent antimicrobial and antifungal activities. Such compounds are light sensitive and a red solution of thiarubrine rapidly becomes colourless upon exposure to visible light. Irradiation of thiarubrines A, B and D isolated from *Ambrosia chamissonis* (Less.) Greene was found to result in the formation of novel 2, 6-dithiabicyclo [3.1.0]hex-2-ene photoproducts which yield thiophenes and elemental sulfur upon standing at room temperature. The structure of the bicyclic photoproducts were determined by reversed-phase HPLC with PDA and AP-CI mass spectral detection, and extensive 1D and 2D cold temperature NMR.

Oral Paper 2 - Sunday, 1:50 pm

GC-MS EVALUATION OF COMPOUNDS IN DRY AND CONDITIONED *STRIGA* SEEDS.

Joseph K. Rugutt, Rostem J. Irani, Nikolaus H. Fischer, Dana K. Berner¹, and Tracy D. McCarley, Department of Chemistry, Louisiana State University, Baton Rouge, Louisiana 70803, U.S.A.; ¹International Institute of Tropical Agriculture, PMB 5320, Oyo Road, Ibadan, Nigeria

Striga (Scrophulariaceae) is a genus of obligate root-pathogenic flowering weeds. For the first time, we have analyzed the dichloromethane extracts of seeds of dry and conditioned *Striga hermonthica* (Del.) Benth., *S. aspera* (Willd.) Benth. and *S. gesnerioides* (Willd.) Vatke by means of thin-layer chromatography (TLC) and gas chromatography (GC) coupled to mass spectrometry (MS). Sixteen compounds were identified on the basis of their mass spectra and their retention indices. All *Striga* extracts contained tetradecanoic acid, *cis,cis*-9,12-octadecadienoic acid, *cis*-9-octadecenoic acid and sitosterol. Also, 2,6-dimethoxy-p-benzoquinone (2,6-DMBQ) and several long chain aldehydes and n-hydrocarbons were detected in some of the extracts. The nature of the chemical changes induced by seed conditioning are discussed.

Oral Paper 3 - Sunday, 2:10 pm

POSSIBLE MECHANISM FOR NEMATODE INVASION OF PLANT TISSUES.

Edward A. Yingling and Karel R. Schubert, University of Oklahoma, Dept. of Botany and Microbiology, 770 Van Vleet Oval, Norman, Oklahoma 73019

Plant parasitic nematodes can have devastating effects on many economically important crops. One of their negative effects is the way in which they burrow into plant organs. These regions of penetration can increase other opportunistic infections by other pests like bacteria and fungi. There are likely two mechanisms that nematodes use to invade plant tissues. The most conceivable mechanism seems to be via mechanical or enzymatic means and it is likely that they use a combination of the two. Stylet probing and penetrating activities have been captured on photomicrographs by our group and others. The presence of proteolytic activities in extracts made from nematodes have also been detected. These activities appear to be that of cysteine protease. Evaluation of this protease's activity from nematodes was carried out using cystatin and E-64, known inhibitors of cysteine protease. We have also constructed hydroponic chambers for mass production of nematodes to aid in these studies.

Oral Paper 4 - Tuesday, 11:10 am

SHORT AND LONG-TERM RESPONSE OF *BRASSICA OLERACEA* TO ULTRAVIOLET RADIATION.

AM. Zobel and J.M. Lynch, Department of Chemistry, Trent University, Peterborough, Ontario, Canada K9J 7B8

Brassica oleracea var. *acephala* contained UV-absorbing compounds on the surface of the leaves and in their interior. Ultraviolet radiation changed concentrations of these compounds and enhanced extrusion after 48 hours of continuous radiation. After 7 days concentrations were both on surface and inside similar to controls thus, we discuss possibilities of mechanisms involved in the recovery process. There were differences in leaves irradiated with 366 nm and leaves left in darkness.

Oral Paper 5 - Tuesday, 11:30 am

SUPERCRITICAL FLUID EXTRACTION OF DIHYDROPARTHENOLIDE FROM *AMBROSIA ARTEMISIIFOLIA*.

José Castañeda-Acosta¹, Andrew W. Cain², F. Carl Knopf² and Nikolaus H. Fischer¹, ¹Department of Chemistry and

²Department of Chemical Engineering, Louisiana State University, Baton Rouge, LA 70803, USA

The sesquiterpene lactone dihydroparthenolide (DHP) is known to act as a potent germination stimulant of *Striga* in a wide range of concentrations from 10^{-4} to 10^{-9} M. The leaves of *Ambrosia artemisiifolia* are an excellent source of DHP and can be found through the south of the United States during the growing season. We have studied the extraction of DHP from the leaves of *Ambrosia artemisiifolia* by supercritical fluid extraction with carbon dioxide and by near-critical extraction with propane. Extractions were carried out at 40 and 50 °C with carbon dioxide and 40 and 75 °C with propane. DHP was identified by ¹H-NMR and quantified by HPLC. Results indicate that supercritical carbon dioxide selectively removes more DHP than near-critical propane, while both of them prove to have a much higher selectivity towards the extraction of DHP when compared to conventional liquid dichloromethane extraction. HPLC traces show that extraction of polar compounds as well as total mass are enhanced by higher pressures of carbon dioxide. A comparison with the previously described extraction of parthenolide from *Magnolia grandiflora* leaves with supercritical carbon dioxide and near-critical propane will be presented.

Oral Paper 6 - Tuesday, 11:50 am

CLONING OF SOLANIDINE UDP-GLUCOSE GLUCOSYLTRANSFERASE FROM POTATO BY FUNCTIONAL EXPRESSION IN YEAST.

Charles P. Moehs, Paul V. Allen, Mendel Friedman and William R. Belknap, United States Department of Agriculture, Agricultural Research Service, Western Regional Research Center, 800 Buchanan St., Albany, CA 94710

Solanaceous steroidal alkaloids inhibit the growth of the yeast, *Saccharomyces cerevisiae*, while their associated glycosylated forms do not. This observation was used as the basis for a genetic screen to isolate a cDNA encoding Solanidine UDP-Glucose Glucosyltransferase by functional expression in yeast. A library of potato cDNAs in an expression vector was transformed into yeast. A cDNA that permitted growth on inhibitory concentrations of a solanaceous alkaloid was found to encode an enzyme exhibiting alkaloid-glycosylating activity. The mRNA encoding SGT is strongly induced in wounded potato tubers and to a lesser extent in wounded leaves. SGT antisense constructs have been introduced into potato cultivars and are currently being evaluated.

Oral Paper 7 - Tuesday, 12:10 am

ROOIBOS TEA AS A LIKELY HEALTH FOOD SUPPLEMENT.

Daneel Ferreira, Charlene Marais and Jacobus A. Steenkamp, Department of Chemistry, University of the Orange Free State, P.O. Box 339, Bloemfontein, 9300 South Africa

Rooibos tea contains a variety of substances possessing the functional groups that are required for these compounds to act as antioxidants, i.e. scavengers of active oxygen species which adversely affect human health. In addition some of these compounds also exhibit other physiological and therapeutic properties which are beneficial for a healthier life.

Abstracts of Best Poster Competition

Best Poster Competition

3:30 - 6:00 pm

Authors of Posters 1 -15 are asked to be present at their posters.

Poster 1

DETAILED FAB-MS AND HIGH RESOLUTION NMR INVESTIGATIONS OF TRICOLORINS A-D, INDIVIDUAL CONSTITUENTS FROM THE RESIN GLYCOSIDES OF *IPOMOEA TRICOLOR*.

M. Moustapha Bah and Rogelio Pereda-Miranda*, Dept. de Farmacia, Fac. de Química, Universidad Nacional Autónoma de México, 04510, México, D.F.

Four new glycolipids, tricolorins A-D {1-4}, were isolated from *Ipomoea tricolor* Cav. by HPLC, and characterized by high resolution NMR and FAB-MS. Their general structure consists of a linear tetrasaccharide glycosidically linked to the 11(S)OH hexadecanoic acid forming a macrolactone with the C-3 hydroxyl group of the glucose unit. Short chain acids esterify the oligosaccharide core at different positions.

Poster 2

ISOLATION BY HPLC AND STRUCTURAL CHARACTERIZATION OF A NEW GLYCOLIPID ESTER TYPE DIMER FROM *IPOMEA TRICOLOR*.

M. Moustapha Bah, and Rogelio Pereda-Miranda*, Dept. de Farmacia, Fac. de Química, Universidad Nacional Autónoma de México, 04510, México, D.F.

Two macrolactones, tricolorins H {1} and I {2} were isolated by HPLC from the polar portion of the crude resin glycosides of *T. tricolor*. By chemical and spectral analysis, compound 2 has been determined to be an ester type dimer of tricolorin H {1} and tricoloric acid C.

Poster 3

IN-MIXTURE ANALYSIS OF TRITERPENES FROM *RAPHIODON ECHINUS*.

Fábio de Sousa Menezes#* and Maria Auxiliadora C. Kaplan, # Núcleo de Pesquisas de Produtos Naturais, C.C.S., Bloco H, UFRJ. Ilha da Cidade Universitária, Rio de Janeiro, Brazil. CEP=21941-590; * Departamento de Farmacognosia, Faculdade de Farmácia, C.C.S., Bloco A, Sala 44, UFRJ. Ilha da Cidade Universitária, Rio de Janeiro, Brazil. CEP=21941-590

Raphiodon echinus belongs to the family Lamiaceae, superorder Lamiiflorae (*sensu* Dahlgren). This plant is classified in the subfamily Ocimoideae which is characterized by the production of terpenes (mono-, sesqui-,

di- and tri-), steroids and a great number of flavonoids especially flavones. In Brazil, *Raphiodon echinus* is used by the rural population to treat cough. Dried aerial parts of this plant, collected in João Pessoa - PB, Brazil, were extracted either with acetone or ethyl acetate. From these two extracts it was possible to isolate several mixtures of pentacyclic triterpenes. The constituents of these mixtures were identified by a methodology using ¹³C-NMR spectroscopy (decoupled, APT or DEPT) and confirmed by GC-MS and correlation with previously published data. CNPq-Brazil.

Poster 4

ANTHELMINTIC PROPERTIES OF α -SANSHOOL FROM *ZANTHOXYLUM LIEBMANNIANUM* (RUTACEAE).

Andrés Navarrete¹ and Enrique Hong². ¹Area de Química, Universidad Autónoma Chapingo AP 74, Chapingo Estado de México 56230. ²CINVESTAV IPN AP 22026 México D.F. 14000, México

The decoction of the stem bark of *Zanthoxylum liebmannianum* decreased the count of intestinal nematode eggs in naturally infected sheep. Fractionation of the chloroformic extract guided by the *Ascaris suum* lethality test led to the isolation of α -sanshool (LC₅₀ = 83.4 x 10⁻⁵ M) as the only active compound. On the other hand, α -sanshool induced tonic-clonic seizures when it was injected intraperitoneally to mice.

Poster 5

ANTIPROTOZOAL PROANTHOCYANIDINS FROM *GERANIUM NIVEUM*.

Fernando Calzada^{1,2}, Mariana Meckes¹, Roberto Cedillo-Rivera¹ and Rachel Mata², ¹Hospital de Pediatría, Centro Médico Nacional siglo XXI, IMSS, México, D.F. 06725. ²Facultad de Química, Universidad Nacional Autónoma de México, México, D. F. 04510, México

Geranium niveum S. Wats (Geraniaceae), known by the Tarahumara as "makiki", is an endemic species from the state of Chihuahua, Northern Mexico. The roots of this plant are employed for the treatment of diarrhea diseases. The MeOH extract of *G. niveum* exhibited *in vitro* antiprotozoal activity against *Entamoeba histolytica* and *Giardia lamblia*. Bioassay-guided fractionation of the active extract allowed the isolation of two new proanthocyanidins (type A), as the major active principles. The structure elucidation of the novel antiprotozoal compounds will be described.

Poster 6

BIOACTIVITY GUIDED ISOLATION AND PURIFICATION OF AN ANTIMICROBIAL CONSTITUENT FROM THE ROOT OF *SISYRINCHIUM SCABRUM*.

L. Hernández, M. Alcibar, E. Escamilla, V. Rodríguez, J. Tamariz, G. Zepeda and B. Hernández, Dept Farmacia, Microbiología y Química Orgánica, Escuela Nacional de Ciencias Biológicas, IPN, Carpio y Plaqn de Ayala, 11340 Mexico, D.F.

The qualitative evaluation of the antimicrobial activity of the CHCl₃ extract from the root of *S. scabrum* exhibited good result against Gram positive and Gram negative bacteria. Bioactivity-guided fractionation of the extract led to the isolation of one active principle, identified as 7-hydroxy-(3H)-isobenzofuranone, which showed significant activity against *A. sobria* and *L. monocytogens*.

Poster 7

ANTI-MYCOBACTERIAL SESQUITERPENE LACTONES FROM *RUDBECKIA SUBTOMENTOSA*.
Charles L. Cantrell¹, L. Quijano², S. G. Franzblau³, and N. H. Fischer¹, ¹Department of Chemistry, Louisiana State University, Baton Rouge, Louisiana 70803, ²Instituto de Química, UNAM, Circuito Exterior, Ciudad Universitaria, 04510 Mexico, and ³G.W.L. Hansen's Disease Center, P.O. Box 25072, Baton Rouge, LA 70894, USA

In a bioassay guided search for anti-mycobacterial compounds from higher plants of the south-eastern United States, the dichloromethane crude extract of *Rudbeckia subtomentosa* (Asteraceae) was chemically investigated. From active chromatographic fractions two eudesmanolides, alloalantolactone and 3-oxo-8-epialloalantolactone, were isolated and their minimum inhibitory concentrations (MIC) against *Mycobacterium tuberculosis* determined to be 32 µg/ml and 128 µg/ml, respectively. In addition, the MIC's of two lactones previously isolated from *R. subtomentosa*, tamaulipin-A-angelate and gazaniolide, were also determined and shown to both be 128 µg/ml.

Poster 8

PURIFICATION AND EVALUATION OF IMMUNOLOGICAL ACTIVITIES OF SAPONINS FROM *POLYGALA SENEGA* L.

George Katselis, Branka Barl and Alberto Estrada¹
Department of Horticulture Science, University of Saskatchewan, Saskatoon, SK, S7N 5A8, Canada, ¹Animal Biotechnology Centre, Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon SK, S7N 5B5, Canada

Use of saponins from different plants is receiving increased attention for their medicinal properties. The objectives of this work were to isolate, chemically characterize and evaluate immune properties of saponins from the root of *Polygala senega* L., an indigenous plant to the Canadian prairies. Hemolytic activity guided fractionation yielded 23 saponin peaks as determined by HPLC. Chemical structures of three dominant saponin peaks using IR, NMR and LC-MS are being determined. The specific immune effects of saponins to the model protein ovalbumin were evaluated. T cell functions were tested by the cytokine IL-2, INF-g and IL-4 production of spleen cells and sera were quantified by ELISA for IgG, IgG1 and IgG2a antiovalbumin antibodies. The results indicated potential for using *Polygala senega* L saponins to increase immune response to vaccination.

Poster 9

NOVEL LABDANE DITERPENES FROM THE INSECTICIDAL PLANT *HYPTIS SPICIGERA*.

M. Fragozo-Serrano¹, E. González-Chimeo¹, R. Pereda-Miranda^{1*} and T. Arnason², ¹Departamento de Farmacia,, Facultad de Química, Universidad Nacional Autónoma de México, Coyoacán 04510, D.F., México. ²Department of Biology. University of Ottawa, Ottawa, Ontario K1N 6N5, Canada

Biological activity-guided fractionation of aerial parts of *Hyptis spicigera* Lam. (Lamiaceae) has led to the isolation by HPLC of six new insecticidal labdane diterpenes: 19-acetoxy-2 α ,7 α ,15-trihydroxyladba-8(17), 13Z-diene, 19-acetoxy-2 α ,7 α -dihydroxyladba-8(17), 13Z-dien-15-al, 15,19-diacetoxy-2 α ,7 α -dihydroxyladba-8(17), 13Z-diene, 7 α ,15,19-triacetoxy-2 α -hydroxyladba-8(17), 13Z-diene, 19-acetoxy-2 α ,7 α -dihydroxy-14,15-dinorladba-8(17)-en-13-one and 19acetoxy-7 α ,15-dihydroxyladba-8(17), 13Z-dien-2-one. The absolute configuration of the diterpene skeleton was established as 10-Me β -labdane by application of the Mosher's method and spectral evidences.

Poster 10

INSECTICIDAL LIMONOIDS FROM *SWIETENIA HUMULIS* AND *CEDRELA SALVADORENSIS* (MELIACEAE).

A. Jiminez¹, R. Mata¹, R. Pereda-Miranda¹, J. Calderon¹, R. Nicol² and J.T. Arnason², ¹Dept. de Farmacia y Instituto de Química, UNAM, Coyoacan, D.F., ²Dept. of Biology, U. of Ottawa, Ottawa, Ontario, Canada

Four limonoids, humilinolides A-D from *Swietenia humilis* (Meliaceae) and cedrelanolide from *Cedrela salvadorensis* were evaluated for their effect on the European corn borer, *Ostrinia nubilalis* Hübner (Lepidoptera : Pyralidae). When incorporated into artificial diets of neonates, all compounds

caused larval mortality as well as growth reduction and an increase in the development time of survivors with comparable activity to toosendandin, a commercial insecticide from *Melia azedarach*.

Poster 11

EFFECT OF COUMARINS FROM *ESENBECKIA YAXHOOB* AND *STAURANTHUS PERFORATHUS* (RUTACEAE) ON SEVERAL PHOTOSYNTHETIC ACTIVITIES.

Martha Macías, Susana Rojas, Blas Lotina-Hennsen and Rachel Mata, Facultad de Química, Universidad Nacional Autónoma de México, México, D. F. 04510, México

The effect of imperatorin (1), chalepentin (2), xanthyletin (3) and 3(1',1'-dimethylallyl)-xanthyletin (4), obtained from *E. yaxhoob* and *S. perforates*, on different photosynthetic activities on isolated spinach chloroplasts was investigated. The results have demonstrated that 1 acts as a Hill reaction inhibitor in the span between cytb₆/f and PC while 4 behaves as an uncoupler-Hill reaction inhibitor; coumarin 2 inhibits and uncouples photophosphorylation but 1 acts as an uncoupler agent.

Poster 12

EFFECT OF THE MAJOR COMPOUNDS FROM *HELIANTHELLA QUINQUENERVIS* ON SEVERAL PHOTOSYNTHETIC ACTIVITIES ON ISOLATED SPINACH CHLOROPLASTS.

Perla Castañeda, Rachel Mata and Blas Lotina-Hennsen Facultad de Química, Universidad Nacional Autónoma de México, Coyoacán 04510, México, D.F.

Enecaline, euparin and demethylencecaline, isolated from *Helianthella quinquerervis* (Hook.) A. Gray (Asteraceae), significantly inhibited the radicle growth of *Amaranthus hypochondriacus* and *Echinochloa crusgalli*.

Demethylencecaline also caused the inhibition of ATP synthesis, proton uptake and electron transport on isolated spinach chloroplasts, therefore acting as a Hill reaction inhibitor. Euparin and enecaline inhibited ATP synthesis but did not affect electron transport. Euparin showed a moderate inhibition of ATP-ase activity, thus behaving as an uncoupler-energy transfer inhibitor.

Poster 13

ANNONACEOUS ACETOGENINS AS ATP-SYNTHESIS INHIBITORS ON SPINACH CHLOROPLASTS.

Daniel Chavez¹, Blas Lotina-Hennsen², and Rachel Mata¹

¹Departamento de Farmacia, ²Departamento de Bioquímica, Facultad de Química, Universidad Nacional Autónoma de México, D. F. 04510, México

Bullatacin, squamocin and squoamocin C, tree known annonaceous acetogenins, were obtained from the seeds of *Annona purpurea* Moc. & Sesse ex Dunal (Annonaceae). The effect of the three compounds in several photosynthetic activities, including ATP-synthesis, proton uptake and electron transport, on isolated spinach chloroplasts, was investigated. The three acetogenins inhibited significantly the ATP-synthesis, being squamocin the most active compound.

Poster 14

PHYTOTOXIC COMPOUNDS FROM *ESENBECKIA YAXHOOB* (RUTACEAE).

I. Susana Rojas¹, Martha L. Macias¹, Rachel Mata¹, Ana L. Anaya² and Blas Lotina-Hennsen¹, ¹Facultad de Química, ²Instituto de Fisiología Celular, Universidad Nacional Autónoma de México, México, D. F. 04510, México

The investigation of aerial parts of *Esenbeckia yaxhoob* Lundell (Rutaceae) led the isolation of a new dammarane type of triterpene, namely dammar-20,25-dien-24-methyl-3 β -acetoxy. In addition, three aliphatic ketones (2-tridecanone, 2-pentadecanone and 6,10,14-trimethylpentadecanone), imperatorin, asarinin, β -lupeol, and hesperidin were obtained. Natural products caused a significant inhibition of the germination and radicle growth of seedling of *Amaranthus hypochondriacus*, *Echinochloa crusgalli*, *Lactuca sativa*, and *Lycopersicum esculentum*. The most active compound was coumarin. In order to further explore the potential herbicidal activity of coumarin.

Poster 15

ISOLATION OF THE MOST ABUNDANT STORAGE PROTEIN FROM TUBERS OF *OXALIS TUBEROSA* M.

Teresita Flores^{1,2} and Hector Flores^{1,2,3}

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Oxalis tuberosa (Oca) is an Andean tuber-crop cultivated from Venezuela to Argentina between 2000 to 4000 m. In spite of the fact that people of the highlands in South America consume oca on a daily basis, there are no studies on the chemical composition of oca tubers. We were able to obtain tubers from oca plants grow under hydroponic conditions. After 4 months tubers were obtained, harvested and proteins from these tubers were analyzed. The studies show that there is a major protein present in oca tubers with a molecular weight of 18 kDa. This protein was not present in leaves, stems or roots of oca plants suggesting that it is a tuber-specific protein. The protein has a pI of 4.8 and we were able to separate it by a rotaphor separation and reverse phase HPLC. Amino acid content of the protein will be analyzed to determine the nutritional value of oca clones.

Poster 16

ISOLATION AND PURIFICATION OF THIARUBRINE A FROM *AMBROSIA ARTEMISIIFOLIA*.

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Thiarubrine A is a member of a unique class of phytochemicals that are of significant interest due to their promise of therapeutic applications resulting from light-mediated bioactivity. The thiarubrines easily convert to the corresponding thiophene with light or heat and under acidic or alkaline conditions. The reaction mechanism for the conversion is currently unknown. A significant amount of the natural product has been isolated and purified using liquid-liquid extraction, flash column chromatography, and HPLC for use with photochemical studies. The structure and purity of the compound was confirmed by UV-Vis spectroscopy and H-NMR. Studies are underway to develop a better fundamental understanding of the conversion process. The methods used to isolate and purify thiarubrine A and initial spectroscopic and photochemical results will be presented.

Poster 17

CLERODANE DITERPENES OF *CROTON HEMIARGYREUS*.

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Croton species (Euphorbiaceae) are well known for their ability to produce various classes of diterpenes, which possess antiulcer, anticancer and cocarcinogenic properties. Investigations of the methanolic extract of the bark of *Croton hemiargyreus* Muell. Arg., a tree of moderate size growing in the mountains of southeast Brazil at altitudes of about one thousand meters, has afforded two new furano-diterpenes belonging to the rare clerodane-type compounds. Structural determinations were made by spectroscopic methods. Data leading to the structures of the new compounds will be presented.

Poster 18

DIARYLHEPTANOIDS AND LIGNANS FROM HEARTWOOD OF *BETULA MAXIMOWICZIANA* REGAL.

Hanawa Fujinori, Forestry and Forest Prod. Res. Inst. Tsukuba, 305, Japan

Most trees accumulate higher amounts of secondary metabolites in heartwood than in sapwood. These compounds are believed to be produced during heartwood formation and often show antifungal activity. However, there are few reports on the heartwood constituents of *B. maximowicziana*, and the heartwood constituents of the plant were of interest. Here we report the isolation and structural determination of lignans (rel-7R,8S, 8'S -lyoni-resiol, and rel-7S, 8R -dihydrodehydrodiconiferyl alcohol) in racemic forms respectively and two diarylheptanoids [aS, 9S, 11S -alnusdiol and rel-pR, 9S, 11S -maximowicziole A (1)]. The structures of the isolates were determined by MS, NMR, UV, CD, $[\alpha]_D$, and X-ray analysis. All compounds were isolated for the first time from the plant and the last one was new. Biosynthetic pathways of the isolates were informative for the heartwood formation in the plant.

Poster 19

CHEMICAL INVESTIGATION OF BRAZILIAN *SIPARUNA* (MONIMIACEAE).

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Plants of the genus *Siparuna*, the largest of Monimiaceae, are tree shrubs or climbers that inhabit tropical or subtropical regions. Various species of this genus are used by local people in the treatment of gastrointestinal disorders, skin diseases, in the modification of female sterility, in the therapy of colds, snakebites, fevers, headaches and rheumatism, while some of these species are known to be poisonous to cattle. The presence of benzyloquinolinic alkaloids in the Monimiaceae family allied to the lack of chemical data on Brazilian *Siparuna* led us to investigate this genus. The plant material used in this study consisted of leaves, wood, wood bark, fruits and seeds of *Siparuna apiosyce* D.C. and fruits of *S. arianae* Pereira, collected in Rio de Janeiro and Minas Gerais, respectively. The dried, ground plant material was extracted with hexane and methanol. The resulting methanolic extracts were fractionated by liquid-liquid partition. Further purification of these extracts, by silica gel column chromatography resulted

in the isolation of 3,7,4'-trimethoxy-kaempferol in all organs of *S. apiosyce* but not in *S. arianae*. Glucosyl sitosterol however could be found in both *S. apiosyce* (leaves) and *S. arianae* (fruits). Additionally, tyleroside and benzyloisoquinolinic alkaloids were found in *S. apiosyce* (leaves, wood and wood bark). CNPq

Poster 20

PHYTOCHEMICAL INVESTIGATION OF *PIPER ADUNCUM* L.

D. L. Moreira*, A. Silva*, E. C. Santos**, Bergmann**, E.F. Guimarães***, and M. A. C. Kaplan*, *Núcleo de Pesquisas de Produtos Naturais, UFRJ. ** Instituto de Biofísica Carlos Chagas Filho, UFRJ, *** Jardim Botânico do Rio de Janeiro, Rio de Janeiro, Brazil

The Piperaceae with its five genera *Piper*, *Photomorphe*, *Peperomia*, *Sarchorachys* and *Ottonia* are found commonly in Brazil. *Piper* and *Peperomia* are the most representative genera with 700 and 600 species, respectively. *Piper aduncum* is used in folk medicine to treat trachoma, vaginitis and stomachaches. Previous phytochemical investigation of this species has shown the presence of benzoic acid derivatives and flavonoids with citotoxic and anti-bacterial activities. *Piper aduncum* (leaves, stems and fruits) was collected near Carmo-RJ (Brazil) and submitted to successive extractions with hexane, dichloromethane and methanol. The crude hexane extract of stems purified on a silica gel column followed by Sephadex LH-20 column, yielded 5-hydroxy-7-methoxyflavone and a mixture of sitosterol and stigmaterol. The dichloromethane extract of fruits chromatographed on a silica gel column, yielded 5-methoxy-7-hydroxydihydroflavone and 2', 6'-dihydroxy-4'-methoxychalcone. Spectrometric analysis by ¹H and ¹³C NMR, UV and MS were used in order to confirm these substances. The chalcone has shown *in vitro* leishmanicidal activity against *Leishmania amazonensis*.

Poster 21

NEW FERN CONSTITUENTS FROM *PTERIDIUM AQUILINUM*.

Filippo Imperato, Dipartimento di Chimica, Università della Basilicata, Potenza, Italy

From an ethanolic extract of aerial parts of the fern *Pteridium aquilinum* (L.) Kuhn subspecies *aquilinum* the following flavonoids were isolated: apigenin (1), kaempferol (2), kaempferol 3-O-(6"-p-coumaroylglucoside) (3), kaempferol 3-O-(6"-feruloylglucoside) (4) and kaempferol 3-O-(caffeoylglucoside) (5). Flavonoids 1 and 2 were identified by comparison with authentic samples; compounds 3-5 were characterized by chemical and spectral methods. Free aglycones 1 and 2 are reported for the first time in Dennstaedtiaceae. Flavonoid 3 has previously been found in *P. aquilinum* but the position of an acyl group is here reported for the first time. Compounds 4 and 5 are new

fern constituents and have only recently been reported as new natural products. The author thanks C.N.R. (Rome) for financial support.

Poster 22

BIOMIMETIC TRANSFORMATIONS OF DIHYDROPARTHENOLIDE IN PRESENCE OF THIOPHENOL.

José Castañeda-Acosta, David Vargas and Nikolaus H. Fischer, Department of Chemistry, Louisiana State University, Baton Rouge, LA 70803, USA

The presence of an α , β -unsaturated lactones moiety has been long thought to be a requisite for the activity of sesquiterpene lactones but *Striga* germination bioassays show that 11 β H, 13-dihydroparthenolide (DHP) to be as active as other α , β -unsaturated lactones, in some cases with a percentage of germination even higher than parthenolide. It seems that the cationic intermediate in the cyclization process could be responsible for the biological activity of the molecule, acting as an acceptor of biological nucleophiles. We carried out the cyclization of DHP in the presence of a nucleophile such as thiophenol with the objective to isolate the possible substitution products formed in the reaction. Treatment of DHP with thiophenol and BF₃ yielded, besides the expected DHP cyclization products, two substitution compounds: 9 α -thiophenoxy-11 β H, 13-dihydromichelolide and the 10 thiophenoxyguaianolide derivative. When the reaction was performed using thiophenol and formic acid two substitution products were isolated and identified: the 10-thiophenoxy guaianolide derivative obtained before, and a 10-thiophenoxy bicyclo[6.2.0] decanolide.

Poster 23

MONILIFORMIN, FUMONISIN B₁ AND TWO β -D-FRUCTOSE ANALOGS PRODUCED BY *FUSARIUM* SPP: BIOLOGICAL ACTIVITIES TOWARDS *LEMNA MINOR* AND PRIMARY CHICK HEPATOCYTES.

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Metabolites isolated from *Fusarium* spp. by means of duckweed (*Lemna minor* L.) bioassay-directed fractionations are: 2,5-anhydro-D-mannitol (ADM), 2,5-anhydro-D-sorbitol (ADS) and moniliformin (MON) from *F. solani*; fumonisin B₁ (FB₁) from *F. moniliforme*; and MON and FB₁ from *F. proliferatum*. ADM has been reported as a regulator of carbohydrate metabolism in hepatocytes isolated from diabetic, fasted rats. Since the above compounds inhibited duckweed [IC₅₀ (μ g/mL) MON (100), ADM (55), ADS (69), FB₁ (0.7)], all were tested for their abilities to inhibit gluconeogenesis (GLN) in hepatocytes

isolated from 15-18-day chick embryo. ADM, ADS and MON inhibited GLN from the substrate lactate plus pyruvate at IC₅₀ of 6 mM, 12 mM and 0.2 mM, respectively. Under these same conditions, FB₁ did not inhibit GLN at 1 mM. This is the first observation of MON and the fructose analogs ADM and ADS as carbohydrate metabolism regulators in chick hepatocytes. Since the *Fusarium* strains were isolated either from toxic chicken feeds or from roots of soybean plants exhibiting necrosis, production of carbohydrate metabolism regulators may in part explain the observed toxicities.

Poster 24

POTATO SESQUITERPENES AND RESISTANCE TO GOLDEN NEMATODE (*GLOBODERA ROSTOCHIENSIS*)

Susan McCormick¹, Anne Desjardins¹, Robert Plaisted², and B.B. Brodie³, ¹Mycotoxin Research Unit and Bioactive Agents Research Unit, USDA, ARS, NCAUR, Peoria IL 61604, ²Plant Breeding Dept., Cornell University, Ithaca NY 14850, ³USDA, ARS, Dept. Plant Pathology, Cornell University, Ithaca NY 14853

Our recent study of phytoalexin production in 46 potato cultivars showed that accumulation of high levels of the sesquiterpene solavetivone was strongly correlated with derivation from *S. tuberosum* spp. *andigena* CPC 1673. Cultivar CPC 1673 was identified as a source of resistance to golden nematode (*Globodera rostochiensis*). Although its biochemical basis is not known, golden nematode resistance is due to a single dominant gene H1 which has been mapped on potato chromosome V, which also contains the R1 locus for race-specific resistance to late blight and a region of quantitative resistance to late blight. The cosegregation of high solavetivone ratios with the H1 gene suggested that loci controlling sesquiterpene biosynthesis are linked to the H1 locus on potato chromosome V. This hypothesis was tested by analyzing sesquiterpene profiles and nematode resistance of segregating F1 progeny of crosses between suitable parental lines that differ in nematode resistance and solavetivone production.

Poster 25

LIGHT-INDEPENDENT EFFECTS OF XANTHOTOXIN ON TRICHOECENE PRODUCTION IN *FUSARIUM SPOROTRICHIOIDES* LIQUID CULTURES

Susan McCormick, Mycotoxin Research Unit, USDA, ARS, NCAUR, Peoria IL 61604

Liquid cultures of *Fusarium sporotrichioides* normally produce oxygenated sesquiterpene trichothecene mycotoxins. Addition of P450 inhibitors results in blockage of trichothecenes and accumulation of the parent sesquiterpene hydrocarbon, trichodiene. Several furanocoumarins were previously reported to act as P450 inhibitors at 5-10mM and block trichothecene biosynthesis.

In some cases there was accumulation of trichodiene. In this study, cultures were treated with the furanocoumarin xanthotoxin at much lower concentrations (0.1-1mM); T-2 toxin biosynthesis was suppressed and trichodiene accumulated. These cultures appeared to accumulate trichodiene at levels higher than would be accounted for by merely blocking the oxygenation steps of trichothecene biosynthetic pathway. In order to test this hypothesis, a mutant strain of *F. sporotrichioides* which produces no oxygenated trichothecenes and accumulates only trichodiene was treated with low concentrations of xanthotoxin. This mutant also had up to a ten fold increase in trichodiene accumulation when grown in the presence of xanthotoxin. This suggests that xanthotoxin not only blocks trichothecene oxygenation at low concentrations, but also acts as a positive effector of the sesquiterpene cyclase, trichodiene synthase.

Poster 26

PHYTOCHEMICAL REDUNDANCY IN *RUPTILIOCARPON CARACOLITO* (LEPIDOBOTRYCEAE).

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The rainforest endemic, *Ruptiliocarpon caracolito* is the only known tropical American species in the family Lepidobotryaceae. Over a dozen novel C,D spiro-triterpenoids have now been isolated from the bark. We administered the compounds alone and in mixtures to polyphagous European corn borer larvae. Mixtures caused greater reductions in growth and development parameters of the insects than individual compounds, suggesting that phytochemical redundancy is an effective defensive strategy.

Poster 27

ALOUATTA FUSCA FOOD SELECTION X PHENOLIC CONTENT OF PLANTS OF THEIR HABITAT.

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The howling monkeys (genus *Alouatta*) are the second heaviest of the New World monkeys and also the most widely distributed genus in the Americas. The diet choice for herbivores may be constrained by the need to avoid ingesting too much of particular secondary compounds. Essential oils, resins and condensed tannins are, in general, considered as quantitative defence against herbivory. Tannins may reach as much as 60% of a plant dry weight. They form insoluble complexes with protein lowering digestive enzyme activity. Dietary fiber and nitrogen

nutrition are other important factors and the ratio between plant nitrogen content and phenolic plant constituents may be the best guide to selection. In a two year study on the phenolic composition of the plants of the diet of *Alouatta fusca* we have observed that total phenolic and condensed tannin content of these plants did not obey the same variation pattern along these two years. This work presents a comparison between the phenolic and protein contents of the plants most eaten by the howlers and those rarely consumed during the wet season. Only 4 out of the 10 plants rarely consumed were very rich in condensed tannin. The results so far obtained, demonstrate a possible energy benefit in consuming large quantities of *B. guianense*, despite the high tannin content of this plant. Additionally, phytochemical work is being done for some of these plants. CNPq, Brazil

Poster 28

GLYCOSAMINOGLYCAN MODULATORS FROM PLANTS.

Ikhlas A. Khan^{1,2}, William H. Taylor³, Julie R. Mikell¹, Larry A. Walker¹, Jeffrey D. Esko³, ¹National Center for the Development of Natural Product, Research Institute of Pharmaceutical Sciences, ²Department of Pharmacognosy, School of Pharmacy, The University of Mississippi, MS 38677, ³Department of Biochemistry and Molecular Genetics, The University of Alabama at Birmingham, Birmingham, AL 35294

Proteoglycans (PG) are a heterogeneous class of macromolecules which consist of long, linear polymers of sugars called glycosaminoglycans (GAG) that are covalently attached to a protein core. The biological properties of PGs are highly diversified ranging from relatively simple mechanical support systems to various complex cellular processes such as cell adhesion, motility, proliferation, differentiation, and tissue morphogenesis. Inhibitors of the enzymes involved in proteoglycan synthesis would provide powerful tools for defining the biological roles for proteoglycans in cells and tissues. A screening of 175 plants from the Peruvian Amazon was done to measure the modulation of proteoglycans in animal cells. Plants from two different genera (*Alchornea*, *Psittacanthus*) primed glycosaminoglycan synthesis. The isolation and structure elucidation of some of the isolates and their activity will be presented.

Poster 29

EFFECT OF CALCIUM ON THE CELL WALL COMPOSITION OF *BOTRYTIS CINERA*.

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Increasing the calcium content of fruits and vegetables has been shown to reduce decay caused by *Botrytis cinera*, an important postharvest pathogen. The goal of this study was to determine whether calcium can decrease the pathogenicity of this fungus by altering the chemistry of the fungal cell wall. *B. cinera* was grown on Richard's solution containing increasing amounts of CaCl₂ and cell walls were extracted from the mycelium after 7 days of growth. Concentrations of calcium, uronic acid, protein and total neutral sugars in the cell walls were determined. The calcium concentration in the culture media did not significantly affect the growth of the fungus, even though the calcium content of the cell walls increased up to 400 times that of the control. Calcium accumulation in the cell wall resulted in less protein but had no significant effect on uronic acid or neutral sugar content. Further studies are needed to determine if increasing calcium concentration has any effect on pectolytic enzyme production or activity.

Poster 30

SURFACE DEPOSITION OF UV-ABSORBING COMPOUNDS ON *EUPATORIUM MACULATUM* AND *ACHILLAE MILLEFOLIUM*.

J. A. Doran and A. M. Zobel, Trent University, Peterborough, Ontario, Canada, K9J 7B8

Eupatorium maculatum is said to be a plant that is stimulating to the human immune system. *Achillae millefolium* is known by Native Americans to be a natural mosquito repellent and useful in folk medicines. The plants contained different concentrations of UVA-absorbing compounds on their surface and in their interiors, amounting to only 1-2 % on the leaf surface and over 10% on the flower surface. Ultraviolet radiation (366 nm) caused an increase in total production of UV-absorbing compounds after two weeks, as well as an increase in extrusion to the surface. As darkness influenced biosynthesis of UV-absorbing compounds and drastically increased extrusion of such compounds, we postulate that plants' immediate reaction to UVA radiation is extrusion of compounds, forming a shield on the surface. Most likely, when compounds are extruded under UVA a large proportion might be degraded. Therefore, we should look for possible molecules arising from such destruction.

Poster 31

PLANT SURFACE EXTRACTS REACT DIFFERENTLY ON NUMBER OF MITOSIS THAN MIXTURE OF INTERIOR COMPOUNDS.

K. E. Murphy, J. Lynch and A. M. Zobel, Trent University, Peterborough, ON, Canada, K9J 7B8

Ruta graveolens surface furanocoumarins, removed by 1-2 seconds of dipping with 96°C water (to melt wax and include in it mixtures of compounds) purified and analyzed by HPLC, were found to be in concentration 190 µg/µL

(psoralen), 415 µg/µL (xanthotoxin) and 570 µg/µL (bergapten). The interior extract contained almost similar concentrations of psoralen, xanthotoxin and bergapten, 190 µg/µL, 390 µg/µL and 580 µg/µL respectively. Almost similar to those in the surface extract. We previously found that xanthotoxin itself in concentration of 100 ppm retarded mitosis both in promeristem cells and cultured cancer cells (Louis and Zobel, 1989; Zobel and Louis, 1990; Podbielkowska *et al.*, 1994). A second plant species *Brassica oleracea* was chosen because it contains no furanocoumarins but some mixtures of UV-absorbing compounds are extruded to the surface of leaves. Surface compounds retarded the number of mitosis by approximately 40% while interior concentrations reacted in opposite ways. Interior extracts of *Ruta* retarded mitosis almost in comparable percentages to the *Ruta* surface extracts. Interior extracts for red cabbage stimulated mitosis by approximately 30%. In the case of cabbage, there were drastic differences in the reaction on mitosis between surface compounds which usually would be a barrier against microbes and the interior fraction, which, if inside the cells could stimulate cell physiology. Compounds in *Ruta* were in similar amounts both on the plant surface and on the surface of the mesophyll cells inside the leaves, thus on mitosis these two fractions reacted similarly. There are visible differences in reactivity of surface extracts in comparison to interior extracts depending upon the species.

Poster 32

RELATIONSHIPS AND VOLATILE ASPECTS BETWEEN KERNEL POSITION ON THE MAIZE EAR AND AFLATOXIN FORMATION.

H. J. Zeringue, Jr., SRRC, ARS, USDA, New Orleans, LA 70124

Volatiles generated from ground maize kernels extracted from 3 different zonal areas of the maize ear resulted in varied influences on growth of aflatoxigenic *Aspergillus flavus* and aflatoxin production in a sealed, inverted lid, Petri plate culture bioassay. Volatiles originating from kernels extracted from the center of the maize ear resulted in 75% inhibition of *A. flavus* radial growth and a 76% inhibition of aflatoxin contamination compared to top zonal area inhibitions of 19% and 33% aflatoxin contamination, and to base zonal area inhibitions of 23% and 37% aflatoxin contamination. Volatiles from ground kernels extracted from all zonal sections were purged on Tenax columns and analyzed by GC/MS. Compounds highly toxic to *A. flavus* were found more concentrated in volatiles generated from ground kernels extracted from the center zonal area. These results demonstrate a direct relationship between volatile fungitoxic compounds generated from ground maize kernels extracted from separate zonal areas on the maize ear and aflatoxin contamination.

Poster 33

PELLITORINE A HILL REACTION INHIBITOR.

Antonia Ramirez¹, Perla Sánchez², Rachel Mata² and Blas Lotina-Hennsen¹, ¹Dept. of Biochemistry, UNAM, ²Dept. of Pharmacy, UNAM

Pellitorine (N-isobutyldeca-*trans*-2-*trans*-4-dienamide) isolated from *Stauranthus perforathus* (Rutaceae), behaves as a Hill reaction inhibitor on spinach chloroplasts, because it inhibits both ATP synthesis and electron flow (basal, phosphorylating and uncoupled) from water to methyl viologen.

Poster 34

ISOLATION AND CHARACTERIZATION OF FLAVANONE 7-O-GLUCOSYLTRANSFERASE FROM *PETUNIA HYBRIDA* AND *ANTIRRHINUM MAJUS*.

Randy L. Durren and Cecilia McIntosh, Dept. of Biol. Sci., East Tennessee State University, Johnson City, TN 37614

Many plant families show different flavonoid profiles. One contributing factor is the utilization of flavanones in the production of flavanone glycoside vs. other flavonoids. Because *Petunia hybrida* and *Antirrhinum majus* are known to accumulate large amounts of anthocyanins, we set out to determine if they also possess flavanone glycosylating enzymes. Young leaves and buds from petunia and snapdragon were assayed using naringenin and UDP-[14C]-Glucose. Results showed that snapdragon buds had incorporated 28 pmoles/min/mg protein and the leaves 26 pmoles/min/mg protein. Petunia buds incorporated 9 pmoles/min/mg protein and the leaves 10 pmoles/min/mg protein. The reaction product cochromatographed with prunin (naringenin-7-O-glucoside) in two different TLC systems. An acetate derivative of the product cochromatographed with pruin acetate. An (NH₄)₂SO₄ fraction from petunia leaves was run on a Superose 12 FPLC column. The activity was purified approximately 10x and eluted at an approximate M_r of 51 kDa. This enzyme will be purified, characterized, and compared to the flavanone 7GT in grapefruit.

Poster 35

THE POSITION OF THE DWARF-3 GENETIC BLOCK IN THE GIBBERELLIN (GA) BIOSYNTHETIC PATHWAY.

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The *d3* mutant of maize responds by normal growth to exogenous GAs. Bioassay studies (Phinney and Spray, 1982) and studies on the endogenous levels of GAs (Fujioka

et al., 1988) suggest that the genetic block is early in the pathway. The *D3* gene has been cloned (Winkler and Helentjaris, 1995); on the basis of homology, it probably codes for a cytochrome P450 enzyme. In order to determine the specific metabolic step blocked by the *d3* lesion, we have fed [¹³C,³H]*ent*-kaurenoic acid, [¹³C,³H]*ent*-7- α -hydroxy-kaurenoic acid, and [¹³C,³H]GA₁₂-aldehyde to mutant and wild-type seedlings. GC-MS data for the metabolites from the feeds will be reported.

Poster 36

USE OF DNA ANALYSIS FOR CULTIVAR IDENTIFICATION IN OPIUM POPPY.

James A. Saunders¹, George N. Ude² and William J. Kenworthy², ¹CSL, USDA, Bldg. 9, Rm 5, Beltsville, MD 20705, ²Agronomy Dept., University of Maryland, College Park, MD 20742

Many plant species and cultivars are difficult to distinguish from related germplasm on the basis of morphological or anatomical characteristics alone. The use of DNA analysis by rapid and reliable procedures offers a possible alternative for differentiating close relatives. We are using a new DNA analysis technique, Amplified Fragment Length Polymorphisms (AFLP) to analyze an opium poppy collection containing more than 200 different accessions of *Papaver somniferum* in an attempt to identify a genetically distinct core germplasm collection. We have compared the AFLP DNA analysis technique to the other widely accepted procedures of RFLP and RAPD DNA analysis. Our results indicate that AFLP DNA analysis provides significantly more polymorphic marker bands than either of the other procedures in the same time frame. The utility of AFLP DNA analysis techniques to other species will be shown.

Poster 37

ANTHOCYANIN PIGMENTS IN COLD-STRESSED JACKPINE SEEDLINGS.

Constance Nozzolillo, Department of Biology, University of Ottawa, Ottawa, Canada K1N 6N5

Jackpine (*Pinus banksiana* Lamb) seedlings are readily identified in nursery plantings by their deep purple color in late autumn. This color remains throughout the winter and disappears with warmer weather in spring. Purple needles were collected at the G. Howard Forest Nursery Station in Kemptville, Ontario and extracted with hot MeOH: EtOH (1:1). The concentrated extract was taken up in 1% HCl in water and separated on a PVPP column. Major pigments isolated were cyanidin 3-glucoside and cyanidin 3-arabinoside. Several minor pigments are tentatively identified as glycosides of delphinidin, malvidin and pelargonidin.

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PHYTOCHEMISTRY

The International Journal of Plant Biochemistry

**The Official Journal of the Phytochemical Society of Europe and the
Phytochemical Society of North America**

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Upcoming Meetings

Phytochemical Society of North America

Organizational work is continuing for the 1997 annual meeting, which will be a joint meeting with the Phytochemical Society of Europe and will be held in Leiden, The Netherlands, April 20-24. There will be a symposium with 27 invited speakers plus poster sessions, but no oral contributed papers. Registration will cost US\$200, and accommodation about \$500. Watch future issues for updated information on this meeting.

Other Meetings of Interest

Groupe Polyphénols, XVIII International Conference on Polyphenols

Bordeaux, France, 1996 July 15-18. There will be 12 plenary lectures and over 150 other communications. The six main topics will be food products, tannins, nutrition and toxicity, oxidation, phenols and the environment, and extraction, analysis and technology. Deadline for abstracts has passed. Contact Joseph Vercauteren, Laboratoire de Pharmacognosie, 3 ter Place de la Victoire, 33076 Bordeaux Cedex, France. (Telephone 33-65 92 96 57, FAX 33-56 91 23 72)

Society for Medicinal Plant Research, 44th Annual Congress

Prague, Czech Republic, 1996 September 3-7. Main topics will be natural compounds with anticancer activity, plant cell cultures and biotechnology, with the further topics of structural elucidation, analytics and quality control, and biological activities of natural products. Deadline for abstracts has passed. Contact Dr. Tomas Vanek, Institute of Organic Chemistry and Biochemistry, Czech Academy of Sciences, Flemingovo nám. 2, 166 10 Praha 6, Czech Republic. (Telephone +422 33 12 574, FAX +422 243 10 503; E-mail vanek@uochb.cas.cz)

Federation of European Societies of Plant Physiology, 10th Congress

Florence, Italy, 1996 September 9-13. Organized by the Società Italiana di Fisiologia Vegetale. There will be six plenary lectures. Sessions are scheduled on plant growth and development; photosynthesis, respiration, carbon and nitrogen metabolism; cell transport

and long distance transport; signal perception and transduction: hormone metabolism; eco-physiology, crop productivity and biotechnological approaches. Submission deadline has passed. Contact ENIC ITALIA, Via S. Caterina d' Alessandria, 12, 50129 Firenze. (Telephone 055/477871, FAX 055/495348)

3rd European Congress of Pharmaceutical Sciences

Edinburgh, U.K., 1996 September 15-17. Jointly organized by European Federation for Pharmaceutical Sciences, U.K. Association of Pharmaceutical Scientists and Pharmaceutical Sciences Group of the Royal Pharmaceutical Society of Great Britain. Phytochemistry is one of the included themes. Deadline for abstracts has passed. Contact the congress secretariat at Marshwood Events Management, 52 Gresham Road, Staines, Middlesex TW18 2AN. (Telephone 44 178 44 64 106, FAX 44 55 078)

First World Congress on Allelopathy

Cádiz, Spain, 1996 September 16-20. Organized by the International Allelopathy Society to cover all current aspects of allelopathy. Topics will include allelopathy in Nature, methodology in allelopathy studies, physiology and chemistry of allelopathic processes, and applications of allelopathy. Deadline for abstracts July 31. Contact Prof. Francisco A. Macías, Dept. of Organic Chemistry, University of Cádiz, Apartado 40, 11510 - Puerto Real (Cádiz). (Telephone 34 56 830217, FAX 834924, E-mail famacias@galeon.uca.es)

Principles Regulating Biosynthesis and Storage of Secondary Products

Halle (Saale), Germany, 1996 September 26-28. Sponsored by European Society of Phytochemistry and Martin-Luther-University Halle-Wittenberg. Scientific topics will be genetics of secondary metabolism, enzymology of secondary metabolism, compartmentation and channeling, integration of secondary metabolism into the programmes of cell differentiation and organ development, and expression of secondary metabolism in heterologous organisms. Contact Prof. Dr. Beate Dietrich, Universität Halle-Wittenberg, Institut für Pharmazeutische Biologie, Weinbergweg 15, D-06120 Halle (Saale). (Telephone 49 345 5 52 52 00, FAX 51 19 66)

Second International Conference on Environmental and Industrial Toxicology: Research and Application

Bangkok, Thailand, 1996 December 9-13. This conference has been organized to promote multidisciplinary approaches to the global environmental and human health problems that result from the use of chemicals. Topic areas will be toxicology of environmental and industrial chemicals and pollutants, mechanisms of toxicity, cancer risks by environmental factors, factors modifying toxicity, evaluation of toxicity, detection and detoxification of chemicals in the environment, and risk assessment and management. Deadline for abstracts of contributed papers October 1. Contact the conference secretariat, Chulabhorn Research Institute, Office of Scientific Affairs, Vipavadee Rangsit Highway, Bangkok 10210 (Telephone (66-2) 247-1900. FAX 247-1222)

Fourth International Conference on the Biochemistry of Trace Elements

Berkeley, California, 1997 June 23-26. Sponsored by the Soil Science Society of America. The following topics will be featured: advancements in analytical methods and their applications; ecotoxicological risk assessments, public policy, and management decisions; trace element issues in agricultural production systems and other food chains; chemical speciation, surface chemistry, and modeling; science and technology of remediating trace element-contaminated soils and sediments; trace elements in forest, aquatic, and other natural ecosystems; identification, quantification, and characterization of sources of trace elements in natural and managed ecosystems. Contact Dr. I.K. Iskandar, U.S. Army Cold Regions Research and Engineering Laboratory, 72 Lyme Road, Hanover, NH 037755, U.S.A. (Telephone 603 646-4198, FAX 646-4561, E-mail iskandar@crrel.usace.army.mil)

10th International Rapeseed Congress

Canberra, Australia, 1999 September 26-29 (held quadrennially). Theme: New Horizons for an Old Crop. Contact Bryce Bell, Box 94, Wilberforce 2756, NSW, Australia. (Telephone 61 45 75 2008, FAX 75 2003) ♦