

ISCE NEWSLETTER

Vol. 5, No. 2, May, 1988

International Society of Chemical Ecology

From the Editor

In the February, 1988 issue of the *Journal of Chemical Ecology* ISCE councilor Dr. Clive Jones, asked us to reconsider our definition of the scope of the society and the journal. As a result of the work he did preparing his letter to the journal editors, Clive Jones is proposing that we amend the society bylaws to reflect a broader interpretation of chemical ecology. Specifically, he proposes that the definition or scope of the society and journal be changed from:

"The International Society of Chemical Ecology is devoted to promoting an understanding of the origin, function, and significance of natural chemicals that mediate interactions within and between organisms." to:

"The International Society of Chemical Ecology is devoted to promoting ecological understanding of the origin, function and significance of naturally occurring chemicals and the interactions that they mediate."

To give the membership at large a perspective on this resolution, his letter to the editors of the *Journal of Chemical Ecology*, which appeared in Volume 14 on pages 727-730, is being reprinted (with permission) in its entirety.

Action on this will be of considerable importance to the society. The resolution will be discussed and perhaps voted on at the society business meeting on 25 June. I urge you to give this resolution careful consideration prior to the meeting. If you are unable to attend the meeting, please forward your comments to the newsletter editor who will inturn convey your message at the meeting.

Nancy M. Targett

What Is Chemical Ecology?*

Clive G. Jones
Institute of Ecosystem Studies
The New York Botanical Garden
Mary Flagler Cary Arboretum
Box AB, Millbrook, New York 12545

What is chemical ecology; what direction should it take in the future; and what can chemical ecologists do to promote, facilitate, and advance the science? I will present a personal viewpoint and do not seek consensus. A debate on these issues may be valuable and would indicate what diversity of opinions exists about our science. Pluralism in opinion and approach usually promotes vigorous science when the issues are aired openly. My comments should not be construed as criticism of past work or approaches. Here I will suggest that the body of studies in the *Journal of Chemical Ecology* reflects the current definition of chemical ecology stated in the journal and in the statement of purpose of the *International Society of Chemical Ecology*. I will argue for a broadening of our approach and for the explicit inclusion of more ecology.

Let me first state my personal perspective. I do not consider chemical ecology to be an autonomous discipline, but see it rather as an approach to ecology—viewing ecological interactions from a chemical perspective. Chemistry is a valuable tool or probe for increasing ecological understanding because it frequently plays a crucial role, is discrete and quantifiable, and is often manipulable. This approach is not necessarily restricted to

any one level of ecological organization, and it strives to understand the role of the chemistry together with the diversity of physical, biotic, and historical factors that shape ecological interactions. Although such an approach is integrated within ecology, the science remains clearly identifiable because of its unique perspective—much in the same way that physiological ecology and ecological genetics retain their identities.

In order to examine some current emphases in chemical ecology, I surveyed a total of 305 papers published in the *Journal of Chemical Ecology* in 1985 and 1986. I categorized papers into approaches or areas of study that constituted their main focus (Table 1). The bulk of papers (84%) dealt with methods, natural-products chemistry, biochemistry, pharmacology, toxicology, behavior, and organismal biology. These papers contained very little reference to ecology. The remainder dealt with some ecological aspects; the majority (12%) concerned studies of autecology or species pair interactions. There were very few papers dealing with higher levels of ecological organization, such as population or community ecology, and none addressing ecosystem ecology. The few papers on community ecology all dealt with allelopathy. Evolutionary ecology papers (primarily plant-insect coevolution) were limited in number (1%); there was only one review paper, and there were no papers that were primarily conceptual or theoretical. Studies that attempted to examine the relative importance of chemical factors versus other ecological factors were very rare

(1%). Almost all studies dealt with identified or partially characterized and/or isolated organic compounds (92%). A few were nonchemical (7%), where no specific compounds were directly involved or no isolation and/or fractionation was attempted; and only 1% addressed inorganic compounds.

Clearly, studies of natural-products chemistry, studies within organisms, behavior, and organismal-level studies dominate over ecological studies in the journal. The current balance of papers appears to reflect the statement of purpose of the *Journal of Chemical Ecology*, the official organ of the International Society of Chemical Ecology (ISCE). "The *Journal of Chemical Ecology* (and ISCE) is devoted to promoting an understanding of the origin, function and significance of natural chemicals that mediate interactions within and between organisms." The statement of purpose recognizes that the study of chemical interactions is central to our science. Isolation and identification of compounds and determining their mode of action, are also explicitly stated. The word "significance" implies that we should also examine non-chemical phenomena in order to understand the importance of the chemical phenomena. "Interactions within...organisms" validates suborganismal and behavioral approaches; and "interactions...between organisms" may imply some aspects of autecology or species interactions. There is no reference to ecology in the statement.

It is ironic that a journal and a society that use the word ecology in their titles should have statements of purpose that lack any specific reference to ecology. Perhaps the

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Editor: Nancy M. Targett
University of Delaware
College of Marine Studies
Lewes, DE 19958 U.S.A.

ISCE Newsletter, which is published tri-annually, in September, January, and May, is financed through contributions from members of the *International Society of Chemical Ecology, Inc.* None of the material contained herein may be reprinted without the proper written acknowledgement of the editor. Address all correspondence and newsletter submissions to the editor. Deadline for the next issue is August 1, 1988.

*Work done while on sabbatical at the Department of Biology, University of York, England.

**Fifth Annual Meeting
International Society of Chemical Ecology
24-27 June 1988
Georgia Center for Continuing Education
University of Georgia, Athens, GA., U.S.A.**

Registration for the fifth annual meeting begins at noon on 24 June. That evening, from 6:00 to 8:00 p.m., there will be a welcome reception at the Georgia Center. Symposia (highlighted below) and contributed papers will begin on the 25th and run through the 27th. Slide projectors and overhead projectors will be available. If you need other audiovisual equipment, please contact Murray Blum with your request. Contributed papers will be limited to 10 minutes. Posters should be planned so that they occupy no more than one square meter of space. Questions regarding contributions can be addressed to the meeting host Dr. Murray Blum, Department of Entomology, University of Georgia, Athens, Ga. 30602.

Symposia Highlights

25 June

**SENSORY BEHAVIOR OF
MICROORGANISMS:**

M.D. Manson, coordinator

Introduction, M.D. Manson, Department of Biology, Texas A&M University.

Bacterial chemotaxis: How genetics and molecular biology can be used to study a sensory system, M.D. Manson.

Physical constraints on microbial behavior: How you act if you are very small, H.C. Berg, Department of Cellular & Developmental Biology, Harvard University.

Methyl-accepting chemotaxis proteins: Transmembrane receptors present throughout the diversity of bacteria, G.L. Hazelbauer, Biochemistry/Biophysics Program, Washington State University.

Motility and chemotaxis in an aquatic spirochaete, E.P. Greenberg, Department of Microbiology, Cornell University.

The role of bacterial chemotaxis in the legume-*Rhizobium* symbiosis for nitrogen fixation, K. Bergman, Department of Biology, Northeastern University.

Autoinduction of bacterial luminescence: A mechanism for environmental sensing, K. Neelson, Center for Great Lakes Studies, University of Wisconsin-Milwaukee.

Cell-cell interactions in *Myxococcus*, D. Kaiser, Department of Biochemistry, Stanford University.

Pheromone interactions and ionic communication in gametes of aquatic fungus *Allomyces*, J.C. Pommerville, Department of Biology, Texas A & M University.

Ion channels of *Paramecium*, yeast, and *Escherichia coli*, C. Kung, Laboratory of Molecular Biology and Department of Genetics, University of Wisconsin.

Application of the computer-assisted dynamic morphology system in assessing the role of temporal mechanisms in *Dictyostelium* chemotaxis, D.R. Soll, Department of Biology, University of Iowa.

25 June*

**CHEMICAL ECOLOGY OF
REPTILES:**

Paul J. Weldon, coordinator

Introduction, P.J. Weldon, Department of Biology, Texas A&M University.

Femoral gland secretions and chemical signaling in desert iguanas, Allison Alberts, Department of Biology, University of California at San Diego.

Chemicals Eliciting Predatory Attack in Garter Snakes, Gordon M. Burghardt, Department of Psychology, University of Tennessee.

Trail following of prey by new world pit vipers, David Chiszar, Department of Psychology, University of Colorado.

Comparative Aspects of pre-chemical detection by squamate reptiles, William Cooper Jr., Department of Biology, Auburn University at Montgomery.

Chemical detection of snakeskin substances by the banded gecko *Coleonyx variegatus*, Benjamin Dial, Department of Biology, Chapman College

Sources and origins of skin lipid pheromones in rattlesnake *Crotalus viridis*, David Duvall* and Brent Graves, Department of Zoology and Physiology, University of Wyoming,* Department of Anatomy, Program in Biological Psychology, Downstate Medical Center.

Chemicals from earthworms eliciting predatory behavior in garter snakes, Mimi Halpern, Department of Anatomy, Program in Biological Psychology, Downstate Medical Center.

Elucidation of the sex pheromone of the garter snake *Thamnophis sirtalis*, Robert T. Mason, NHLBI, Heart Lung and Blood.

Natural products chemistry and micro-biology of crocodylian skin glands, Paul J. Weldon and James W. Wheeler,* Department of Chemistry, Howard University.

Pheromones in competitive interactions between snakes, Neil B. Ford, Department of Biology, University of Texas at Tyler.

26 June*

ARTHROPOD SEQUESTRATION OF NATURAL PRODUCTS:

Murray S. Blum, coordinator

Introduction, Murray S. Blum, Department of Entomology, University of Georgia.

Sequestration, signal secretion, and sexual selection: Possible factors in the evolution of a chemical communication system?, Jerrold Meinwald, Department of Chemistry, Cornell University.

Cardenolide processing during metamorphosis of Lepidoptera, Sakuzo Nishio, 1786 Takeori, Takenami-cho Ena-shi, Gifu-ken 509-71, Japan.

Sequestration of sesquiterpene lactones by Lepidopterous larvae, Maunuel Aregullin, Department of entomology, University of Arizona.

Sequestration in chrysomelids: Facts and fallacies, Jacques M. Pasteels, Laboratoire de Biologie Animale et Cellulaire, Universite Libre de Bruxelles.

Patterns, evolution, and ecological significance of car-denolide sequestration, L.P. Brower, Steven B. Malcolm, and Barbara cockrell, Department of Zoology, University of Florida.

Sequestration of natural products by a generalist herbivore, Murray S. Blum.

Pyrrolizidine alkaloids: Sequestration and functions in moths and grasshoppers, Michael Boppre, Fortzoologisches Institut der Universitat Freiburg.

Host plant iridoid-based chemical defense of an aphid, Ritsuo Nishida, Pesticide Research Institute, Kyoto University.

Utilization of iridoid glycosides by Lepidoptera, Frank R. Stermitz, Department of Chemistry, Colorado State University.

Implications of cardenolide sequestration by first generation monarchs on milkweeds in the southern United States, Steven P. Lynch and Ronald A. Martin, Department of Chemistry

**Note date change.*

and Biological Sciences, Louisiana State University.

Saponadaceae, cyanolipids, and bugs, Jeffrey R. Aldrich, Insect and Nematode Hormone Laboratory, USDA-ARS.

27 June*

CHEMICAL ECOLOGY IN THE AQUATIC ENVIRONMENT:

Don Gerhart, coordinator

Peptide pheromones of marine invertebrates, Dan Rittschof, Duke University Marine Laboratory.

Polyphenols and interactions between aquatic invertebrates and macrophytes, Charles Kerfoot, University of Michigan.

Settlement induction in marine invertebrate larvae, Dan Morse, University of California at Santa Barbara.

Chemical defense and allelopathy in octocorals of the Great Barrier Reef, Australia, Paul Sammarco, Australian Institute of Marine Science.

Georgia Meeting Information on Accommodations and Travel

Accommodations: The Georgia Center for Continuing Education, located on the University of Georgia campus will house most of the meeting participants. Rates are \$21.32/person/night for a double and \$35.36/person/night for a single. If you plan to stay at the Georgia Center just send in the pre-registration and accommodation form that was included in the last newsletter. Note that the accommodation fees do not have to be paid in advance. However, the meeting registration fee is payable in advance.

Alternate accommodations are available at the Downtowner Motor Inn located at 1198 S. Milledge Ave., Athens, Ga., phone number 404-549-2626 (rates are \$26.00 for a double). This motel is a 15 minute walk from the Georgia Center. If you choose to stay at the Downtowner, identify that you are with the ISCE conference when you make your reservations so that you will be sure to get the conference rate.

To insure that accommodations are available it is best to reserve your room by 1 June, although after that you will be accommodated as long as there is space.

Travel by car: Athens is accessible from a number of interstate feeder routes (I-20, I-75, I-85), depending upon your direction of approach. These interstate routes feed to routes 78 or 29, both of which go through Athens.

Travel by bus: Athens is served by both Greyhound and Southeastern Stages.

Travel by plane: It is most convenient to travel to the Atlanta, Georgia airport. From there, it is possible to use the Fulcher's airport shuttle service. The shuttle service departs 7 times a day from the Atlanta airport and will take you directly by van or bus to the Georgia Center or the Downtowner Motor Inn in Athens. The cost of the shuttle is \$25.00 one way or \$45.00 round trip. If you plan to use the service, it is best to make reservations by calling Fulcher's at 404-

725-5573. This can be done after arrival at the Atlanta airport, and will assure you a seat on the shuttle as well as allow you to get directions to their nearest airport non-metro bus stop for shuttle pick-up. It is also possible to reach the Athens directly from certain airports via Piedmont airlines.

Telephone: The telephone number of the Georgia Center is 404-542-1585. Mr. Andrew Little is organizing the conference for the Georgia Center and can be contacted at the above number with urgent messages if necessary.

Profile: Wittko Francke



Candidate for ISCE Vice President/President-Elect

Professor Wittko Francke is the Head of the Laboratory of Microanalyses in Organic Chemistry in the Department of Chemistry at the University of Hamburg, F.R. Germany. His main research field includes the chemistry of systems of odour communication. He is particularly interested in the identification and synthesis of naturally occurring, behaviour mediating compounds both from animals and plants. Principles of structure-activity relationships in attractants and deterrents as well as insect-plant or predator-prey relationships are topics of further investigations. Working in the field of microanalyses he carried out basic research in separation techniques and mass spectroscopy of organic compounds. Among many other new natural products he identified spiroacetals as a new class of insect volatiles, an interesting group of compounds which has called much

attention both in chemical and biological research labs.

Originating from a family of biologists and educated as a chemist (who also studied basic biology), Professor Francke closely cooperates with biologists. Aiming on the solution of ecologically interesting phenomena—not necessarily the economically most important ones—he carries out investigations on communication systems of bark beetles, sex pheromones of female moths and pheromones of male butterflies as well as on multicomponent/multifunctional secretions of bees and wasps. Comparative studies including aspects of chemotaxonomy focus on species specificity and geographic variation in volatile signals of social insects.

Recently, he started an extensive research project on environmental analyses, and in this context a new lab was installed for him at the University of Hamburg.

Professor Francke is the author or coauthor of about 100 papers in analytical organic chemistry and ecological chemistry. He is a member of several scientific associations both in chemistry and biology. His research is financially supported by the German Ministry of Science and Technology, the Deutsche Forschungsgemeinschaft and funds of the chemical industry. In recognition of his contributions he received the Carl-Christiansen Award in 1980.

1988 ISCE BALLOT

Office of Vice-President/President Elect

Wittko Francke Other

Please take time to vote! Return your ballot to Dr. Nancy M. Targett, ISCE Secretary, University of Delaware, 700 Pilottown Rd., Lewes, DE. 19958 U.S.A.

Continued from page 1

relative dearth of ecological papers in the journal is a reflection of the statement. Authors of manuscripts involving chemistry that have a more ecological emphasis may not consider submitting to the journal as a consequence. A brief examination of such journals as *Ecology* and *Oecologia* over the last three years shows that an increasing number of more ecologically oriented papers involving chemistry are appearing there, rather than in the *Journal of Chemical Ecology*. Although studies of natural-products chemistry or biochemistry are essential to chemical ecology, they are not necessarily, in themselves, chemical ecology, just as an ecological study alone is not chemical ecology. While the *Journal of Chemical Ecology* cannot, nor should,

publish all papers that cover the entire range of studies from natural products chemistry to ecology, our science may be better served if there was a broader and more balanced representation of approaches in the journal, and if the journal contained the very best examples of chemical ecology.

Chemical ecology is a new and relatively small area of science that can ill afford fragmentation into different camps. Much more is to be gained by broadening our science and encouraging a multiplicity of approaches and perspectives. A broad approach might increase membership of the society and readership of the journal. We would all gain additional insight and perspective that would improve our own studies. Ultimately we might increase the impact of our field of science to both basic and applied research. I argue that this can be done without diluting our discipline or excluding scientists whose individual contributions to chemical ecology may lie at opposite ends of the spectrum.

How could these lofty goals be accomplished? A few suggestions come to mind, and no doubt the creative readership of the *Journal of Chemical Ecology* and members of ISCE can come up with many better ideas. We could alter the statement of purpose of the journal and the society to broaden scope and more explicitly include ecology (e.g., "...devoted to promoting ecological understanding of the origin, function, and significance of naturally occurring organic and inorganic chemicals and the interactions that they mediate.") We could increase the editorial board of the journal to reflect a wider range of approaches. We could change our statement of editorial policy to explicitly welcome submission of papers in areas that we feel are currently underrepresented and actively solicit submission of papers in these areas. Outside of the journal, we could find ways to promote broad, multidisciplinary interest and collaboration, such as occasional joint meetings of ISCE with organizations of similar size and scope that have mutually beneficial aims. We could provide funds to students through ISCE to attend meetings, do research in underrepresented areas, or build

bridges between different approaches within our science. We could carefully balance the structure of ISCE meetings to reflect our diversity and actively solicit the attendance of scientists who do not currently attend.

Chemistry is important in most ecological interactions. Roles include: exploitation of resources by producers, consumers and decomposers; communication and defense within and between species; dynamics of populations; organization of communities; and structure and function of ecosystems. Exploring, understanding, and integrating the diverse roles of chemistry in the operation of ecological systems is an exciting, important challenge and a new frontier in chemical ecology. The approach to these complex problems is necessarily diverse, multidisciplinary, and collaborative. It includes a mixture of approaches with techniques ranging from elucidation of the structure of natural products, biochemical and behavioral assays, to quantitative analysis and experimental manipulation of such parameters as organismal, population, community, or ecosystem characteristics. Most importantly, it requires the interaction of scientists with diverse talents and backgrounds. Chemical ecology grew out of the mutualistic desires of the chemist and ecologist to work together, and we have been very successful at developing these collaborations. As our discipline matures, we should not lose sight of the reasons for and benefits from these interactions and continue to keep a broad perspective that is the essence of our future productivity and success.

Acknowledgments—I thank Gunnar Bergström, Murray Blum, Thomas Eisner, Brad Hawkins, Jean Langenheim, John Lawton, Gene Likens, Wendell Roelofs, and other members of ISCE for discussion and critical comment; John Lawton and Richard Firt for their hospitality at York. Funding was provided by a British Ecological Society Travelling Fellowship and the Mary Flagler Cary Charitable Trust to CGJ, and a Nuffield Foundation Small Grants Scheme for Research in the Sciences award to CGJ via J.H. Lawton. Contribution to the program, Institute of Ecosystem Studies, The New York Botanical Garden.

Table 1. Distribution of Papers (N=305) published in *Journal of Chemical Ecology* in 1985 and 1986. Classified by approach or area of study.

Subject area	Papers (%)
Methods	6
Natural-products chemistry (isolation, characterization, synthesis)	29
Biochemistry/pharmacology/toxicology (including biosynthesis, growth, inhibition effects, physiology, chemoreception)	19
Behavior (primarily assays and behavioral roles of chemicals)	23
Organismal biology	7
Autecology (ecology of species, including social ecology)	4
Species interactions	8
Population ecology	1
Community ecology	2
Ecosystem ecology	0
Evolutionary ecology	1
General chemical ecology (reviews, theory, concepts)	1

Dr. Nancy M. Targett, Editor
ISCE Newsletter
University of Delaware
College of Marine Studies
Lewes, DE 19958
U.S.A.

