

# sip

# newsletter

society for invertebrate pathology

Volume IX, Number 2  
April 1977

X<sup>th</sup> ANNUAL MEETING  
SOCIETY FOR INVERTEBRATE PATHOLOGY  
Michigan State University, East Lansing, Michigan  
August 22-26, 1977

#### ADDITIONAL DETAILS

Our plea for contributed papers in the last issue of the Newsletter was very rewarding. The Society now has a full program of invited papers for the symposia and contributed papers for the afternoon sessions. We regret that several papers were submitted after the deadline. The authors of these late papers are encouraged to contact the contributor paper session chairmen for including their reports on the program as time may permit basis.

The membership is reminded to register early. Registration fees increase by \$5.00 after July 22, 1977. Please consult the April issue of the Newsletter for deadline on registration, housing, etc.

In connection with the annual meeting of the SIP Working Group on Safety of Microbial Control Agents, chaired by M. Laird, a panel discussion is being arranged on aspects of B. t-environmental safety which will be chaired by T. Angus.

#### RESULT OF DUES BALLOT

The recent ballot on the proposed increase in dues for regular members of the SIP was overwhelmingly approved 170 to 42. As a result, membership dues as of 1978 will increase by \$3.00 to \$7.00 per year. Your cooperation in the transaction of this matter was appreciated.

Wayne M. Brooks

#### INTERNATIONAL COLLOQUIUM ON INVERTEBRATE PATHOLOGY

The International Colloquium on Invertebrate Pathology and the XI Annual Meeting of the Society for Invertebrate Pathology will be held in Prague, Czechoslovakia at the Agricultural Campus, from September 11-17, 1978.

The following dates will also be of interest to SIP members who may wish to attend one or more of these meetings:

International Congress of Parasitology, Warsaw  
Aug. 19 - Aug. 26, 1978

International Congress of Virology, Holland  
Aug. 30 - Sept. 6, 1978

International Congress of Microbiology, Munich  
Sept. 3 - Sept. 8, 1978

#### ANNOUNCEMENTS

##### Request for Research Grant Proposals

The World Health Organization, in collaboration with United Nations Development Program and other national and international funding sources, has initiated a new Special Programme for Research and Training in Tropical Disease. The Programme will stress six selected parasitic infections: malaria, schistosomiasis, filariasis (including onchocerciasis), trypanosomiasis (African and South American), leishmaniasis and leprosy.

A major intensification of research and training to improve disease control techniques will be launched on a global scale with an initial emphasis on the African continent.

For each of the selected diseases a Scientific Working Group (SWG), composed of scientists of international eminence, is being created to plan the broad outlines of research programmes. Vector control in general is included as an important component of the Special Programme and a specific Scientific Working Group is to be established in the field of biological control of vectors, with emphasis on microbial pathogens and parasites of important vector species.

Within the area of biological control, eight main areas of research effort are specified:

1. search for and isolation of potential biological control agents as defined above;

2. characterization and taxonomy of candidate vector pathogens and parasites;
3. efficacy of insect pathogens and parasites against specific vector species of importance in the major disease areas mentioned above;
4. studies leading to techniques for the mass-production and stability of products involving biological control agents;
5. safety of candidate agents to man, as represented by studies on appropriate laboratory mammalian models and development of serological tests to determine interaction between invertebrate pathogens and parasites, and higher vertebrates;
6. mode of pathogenicity and possible effect of vector pathogens and parasites on non-target invertebrate species and lower vertebrates;
7. preliminary field trials to determine the effects of biological control agents on larval and adult populations of vector or related species;
8. studies on the possible means of biological control of the snail intermediate hosts of schistosomiasis, according to each of the categories mentioned above.

The First Scientific Working Group on Biological Control of Insect Vectors of Disease will meet in early September 1977. Proposals for research grants in the field of biological control are invited. These will be considered for funding and ranked for priority by the Scientific Working Group. Individuals interested in applying for a grant in one or more of the areas of research specified, can receive copies of the application forms from:

The Secretary  
 Scientific Working Group on Biological  
 Control of Insect Vectors of Disease (TDR)  
 World Health Organization  
1211 Geneva 27  
 Switzerland

Completed applications must be received by 15 August 1977 to ensure review by the Scientific Working Group in September. Submissions should be in duplicate. One copy of the application should be retained by the applicant for reference.

John D. Briggs

UNESCO/UNEP/ICRO Regional Training Course on  
 Microbial Control of Insect Pests

Department of Microbiology, University of Otago,  
 P.O. Box 56, Dunedin, New Zealand, 8 - 19  
 August, 1977

The objective of the Training Course is to acquaint young scientists, especially from the developing countries with the latest developments in the use of microbial agents in the control of insect pests. The role of viruses, bacteria, rickettsia, protozoa, fungi and nematodes in microbial control of insects will be considered. The information will enable the students from the region to become familiar with the latest information in microbial control of insects.

The knowledge gained by participants in the course will enable them to take a modern approach to their teaching and/or research work at their home institution. The contact with international experts in the field will present opportunity for discussion of specific problems and to obtain advice as to how to tackle them.

The Course is organized by the Department of Microbiology, University of Otago, and the Entomology Division of the New Zealand Department of Scientific and Industrial Research, in cooperation with United Nations Educational Scientific and Cultural Organization (UNESCO), United Nations Environment Programme (UNEP), International Cell Research Organization (ICRO), New Zealand Department of Scientific & Industrial Research, University of Otago, and a panel of international experts.

Teaching Staff:

Prof. Edouard Kurstak, Faculty of Medicine, University of Montreal, Canada; Dr. S.R. Dutky, Insect Pathology Laboratory, Agriculture Research Service, U.S. Dept. of Agriculture, Beltsville, Maryland, U.S.A.; Drs. J. Kalmakoff and J.S. Pillai, Department of Microbiology, University of Otago, Dunedin, N.Z.; Drs. J. Longworth, W. Wouts, H.C. Wearing, P.J. Wigley and Mr. J.S. Dugdale of Entomology Division, Department of Scientific and Industrial Research, New Zealand; Dr. R.J. Milner, Council of Scientific

and Industrial Research, Australia; Miss A. Miln, Ministry of Agriculture and Fisheries, New Zealand; Prof. M. Alexander, international coordinator.

Programme:

The programme will consist of lectures, discussions, demonstrations and practical work dealing with insect pathogens with emphasis on the following:

Types of insect diseases, recognition, symptoms; identification, purification and characterization of microbes; mass propagation, storage and application of microbial pesticides; biological control and insect pest regulation. Pest sampling: pre and post microbial pesticide application; evaluation of pest control systems.

General Information:

The language of the course will be English. The number of participants is restricted to 18. Applicants should be actively engaged in microbiological work. Preference will be given to candidates (maximum 35 years) from developing countries, who will be in a position to use and disseminate the knowledge acquired. If necessary, travel and/or living expenses will be partially or fully paid by the organizers within the limits of the funds available.

The International Symposium on Microbial Ecology will be held in Dunedin, New Zealand, from 22-26 August, 1977, and candidates are expected to attend this Conference.

#### Applications:

Applications should be air-mailed before 4 June 1977 to:

Dr. J.S. Pillai  
Department of Microbiology  
University of Otago  
P.O. Box 56  
Dunedin, New Zealand

1. Name, address and academic affiliation
2. Age and nationality
3. Proficiency in the knowledge of the English language
4. Previous scientific training
5. List of scientific publications
6. A brief statement indicating how this course would be of benefit to the applicant
7. Information concerning travel and/or living expenses which the applicant can secure
8. Any information that may be useful to the teaching staff in evaluating the application

Accepted participants will be notified by 1 July 1977.

note from Newsletter editor: Interested candidates are urged to send in their applications despite the indicated deadline dates, since the information reached us very recently.

#### Catalog of Viral Diseases of Insects and Mites

Second Edition "A Catalog of Viral Diseases of Insects and Mites." M. E. Martignoni and P. J. Iwai, 1977. U.S.D.A. Forest Service General Technical Report PNW-40. Copies of this second edition (which new covers about 1,000 viruses-host records) are available, free of charge, from:

Dr. Mauro E. Martignoni  
Forestry Science Laboratory  
3200 Jefferson Way  
Corvallis, Oregon 97331, USA

#### Conference Report Available

A review of the NIAID Biological Regulation of Vectors special emphasis program by the National Institute of Allergies and Infectious Diseases National Advisory Council resulted in recommendations for program improvement which include the organization of small working conferences on aspects of the Program.

"Biological Regulation of Vectors - the saprophytic and aerobic bacteria and fungi" is a report of a three-day conference/workshop which was held in Easton, Maryland, 6-8 October 1975. The volume includes complete text and illustrations for presentations by eleven participants, text of discussions of each contribution, and summary statements by participants and more than a score of observers.

Centering attention on certain bacteria and fungi affecting the invertebrates which can transmit human diseases, microbiological considerations include isolation, identification, nutrition, growth conditions, mode of action of these biological control agents and the significance of this action to the taxonomy of microorganisms.

#### Topics and Contributors:

- Isolation and Development of Bacterial Pathogens of Vectors - Samuel Singer
- Pathogenesis of Bacterial Diseases of Vectors - Elizabeth Davidson
- Toxins of Bacillus thuringiensis - Robert Faust
- Secondary Metabolites and their Production by Bacteria and Fungi - Eugene Weinberg
- Some Taxonomic Observations on the Genus Bacillus - Ruth Gordon
- Isolation and Development of Fungal Pathogens of Vectors - Donald Roberts
- Biochemical Basis of Pathogenesis of Fungal Diseases of Vectors - Thomas McInnis, Jr.
- The Systematic Significance of Pathogenicity of Fungi for Animals and Plants - Roland Seymour
- Pathogenicity as a Consideration in the Systematics of Fungus Pathogens of Invertebrates - Clyde Umphlett
- Mycotoxins as Insecticides - Alex Ciegler
- Management and Analysis of Microbiological Data - Rita Colwell

#### Available from:

The Superintendent of Documents  
United States Government Printing Office  
Washington, D.C. 20402 USA

Stock #017-044-0028-1  
Price \$2.50  
174 pp.

#### A Report on the Culture Collection of Entomogenous Bacteria - The First Twenty Years.

In 1955 a collection of bacteria isolated from insects was founded in the laboratory of insect pathology of the former Institute of Biology, Czechoslovak Academy of Sciences in Prague, Czechoslovakia. The collection encompassed approximately one hundred strains of bacteria isolated from aquatic insects and midges, and pests and other insects submitted for routine bacteriological examination. The initial objective for maintaining the isolates was for comparative taxonomic purposes. The identification of an unknown isolate was not too difficult in the early years of the collection. If a strain did not fit a description in Bergey's manual, it was quite natural to claim that it was a new bacterial species. If it came from insects, it was "entomogenous." This thinking characterized the time when the opinion prevailed that "insects have special bacteria." As a corollary, my personal experience in bacterial taxonomy was limited, and I was pleased to adopt the idea because it gave me confidence in my determinations. We had several strains of Pseudomonas septica, strains of Proteus insecticola, Streptococcus bombycis and others in the collection. It would be interesting to investigate the background and consequences of these simplifications and inaccuracies which influenced insect pathology initially; it is enough to state that it persists today. I believe that the reasons for this difficulty are an overestimation of the specialization of microorganisms associated with insects, and a lack of general knowledge of microbiology.

Within two years after the founding of the collection, the number of strains increased to 405. In addition to strains isolated in this laboratory, isolates were obtained from other scientists. During the years 1955 and 1956 we responded to approximately two hundred requests for strains to be sent abroad. The first mimeographed catalogue was issued in connection with the First International Conference on Insect Pathology and Biological Control, Prague, August 13-18, 1958, entitled "Catalogue of Strains of Bacteria Deposited in the Collection of the Laboratory." In the same year a supplement of the catalogue was issued, and both publications were sent to bacterial collections and to individual cooperators as well as to those who requested them.

The importance of keeping bacteria isolated from insects as resources for reference laboratory work was discussed as early as the Prague conference. In the resolutions of the conference (2,A): "It is necessary to organize determinative centers and regional collections of strains." A proposal was made to form a center based on the collection of entomopathogenic bacteria in the Laboratory of Insect Pathology, Institute of Biology of the Academy, Praha, naming Dr. Oleg Lysenko as Curator. An additional center was proposed for the Laboratory of Insect Pathology, University of California, Berkeley with Professor E. A. Steinhaus as Curator. Further, an agreement was developed to designate a similar collection also in the Institute Pasteur, Paris. The resolutions provided for an organization within which to cooperate, encouraged us to continue our efforts to maintain bacteria which were isolated from insects, and to provide determinative services and training. The other centers were not created, consequently, for two decades the collection in Prague has been an isolated resource for the scientific community.

The current name, "Culture Collection of Entomogenous Bacteria" (CCEB) has been used since 1959, incorporating a favorite word of the late E. A. Steinhaus: "entomogenous." I am not certain how many of our strains are exclusively "entomopathogenous" bacteria, even though over 70% of the strains we retain are from insects. In 1962 the Laboratory of Insect Pathology was incorporated into the Institute of Entomology of the Czechoslovak Academy of Sciences and the collection is now within the Department of Insect Pathology.

During the first twenty years of its existence the CCEB has provided over 3000 subcultures of strains to researchers internationally. There are 754 strains (freeze dried) in the collection; the last accession number was 907 in June 1975. For various reasons approximately 150 strains have been lost. The entire collection is supervised by a Technical Assistant, Mrs. J. Nohavova for 50% of her time since 1964, and by the Curator. The collection is a dividend of other scientific activities. Under these circumstances the loss of the strains is an acceptable attrition. In addition to the first catalogue (1958), three others have been issued (1960, 1963, 1967), and currently a new edition is in preparation.

The CCEB during its existence has had an active exchange with all of the major culture collections in the world, and it is listed in their catalogues as a source of strains. Further, in the new edition of Bergey's manual (1974) specific CCEB strains are listed as reference of type cultures. With limitations of labor and space it is our intention to continue our services at an effective level for the future. When new collections of this kind arise and are initiated we are ready to share our experience and the responsibilities with them. It is obvious to everyone who has worked to maintain cultures of organisms that important strains should be maintained at different places in the world to assure that they are not lost to society.

Oleg Lysenko  
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Ceskoslovenske Akademie Ved  
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166.09 Praha 6  
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Czechoslovakia

#### PUBLICATIONS

##### A Review

Bacillus thuringiensis: Its Effects on Environmental Quality. National Research Council of Canada, Ottawa, Canada K1A 0R6. Publication no. NRCC 15385.

Dr. Forsberg's report was made in all honesty as far as collection and classification of reference material by subjects was made. Many tables have been exactly copied. Many citations were reported with precision concerning studies made by different authors, research that was either successful or not, serious or not with regards to their value. On information level only, Dr. Forsberg's report can be considered as a useful document grouping several references on B. thuringiensis.

However, the author, did not succeed in his attempt of analyzing and synthesizing all the collected reference material. First, the author was not able to evaluate, even less recommend, since he is not a specialist in the field of biological control in general and on the use of B. thuringiensis in particular. Here are a few examples illustrating this fact:

- Page 42: "Japanese workers . . ." It is possible to isolate the common B. cereus from any soil, above all in agriculture and B. anthracis from any soils where animals are grazing. Since Japanese authors are reported, it should be reminded that Japan, as a natural silk producing country, must protect, by all means, its silkworm (Bombyx mori) from the action of all insecticides including B. thuringiensis. In fact, like all lepidoptera, B. mori is highly susceptible to the action of B. thuringiensis.

- Page 43: Table 4 is not factual any more and it is impossible to use it as an entomological and a general reference, to potentially evaluate the importance of certain rare and exotic lepidopterous species. The importance of an insect as predator or parasite cannot be generalized, such as cannot be generalized the action of Nymphalus oblitalis as food for fishes. The whole table is as unrealistic as would be a request to halt the spruce budworm control because larvae can serve as food for trouts or because, although it destroys the foliage of trees, spruce budworm larvae can produce a large quantity of frass that may act as useful fertilizer for our forests! This is evidently not valid.

- Page 49: "Few studies . . ." Same comments as for the preceding paragraph (page 43).

- Page 73: "Morris et al. . . ." The legislation concerning the current use of B. thuringiensis does not permit to date its mixture with any chemical insecticides especially with non-specific ones. In such a case, it would be impossible to determine the B. thuringiensis efficiency, since the mentioned insecticide, Orthene, is an organo-phosphate with a wide spectrum.

- Page 80: "The subsequent fate . . ." The author wonders if B. thuringiensis spores can grow and reproduce in the soil (mould). I can answer to this that there is no need to be a bacteriologist to understand that the soil as well as the mould layer are not a proper nutritive medium for emergence of spores and their proliferation. The soil microfauna and fauna will never be affected whatsoever if B. thuringiensis is applied alone, i.e., with preparations free from chemical insecticides. Thus, Dr. Forsberg's remark is confusing.

- Page 81: "Other aspects . . ." Confusing reflection concerning the possible impact of B. thuringiensis on the ecosystem (energy and nutrition). In contrast to chemical insecticides, Bacillus thuringiensis has the unique and exclusive qualities of being pollution-free and perfectly safe. This has been proven by more than 20 years of practical application and we have not been able to find the least suspicion to the contrary.

Finally Dr. Forsberg is attempting to show hypothetical possibilities of spontaneous transformation of B. thuringiensis into B. anthracis, a dangerous microorganism for both man and animals. I remember that this question has been studied by Burdon and Wende (1960) and by Lausanne and Jones (1961); these references have not been quoted by Dr. Forsberg. Why? These authors have confirmed that the present knowledge does not permit to believe in these possibilities of transformation. However, let us suppose that such transformation is possible; we should then be doubtful about the food industry which currently uses different microorganisms for production of bread, yogurt, wine and ale.

This does not mean we should reject all adequate continuous controls and studies in every field, since there exist no dogma and above all no undisputed scientific authority.

In general, each doubt is a springboard to reach a more perfect knowledge. However, before expressing any doubt, at least, it is necessary to know the doubted subject and establish a solid basic general knowledge of it, especially when assuming the responsibility of interpreting and recommending.

W. A. Smirnoff

\*\*Note from Newsletter Editor: This is an unsolicited review expressing the views of Dr. W. A. Smirnoff.\*\*

## Book Review

Comparative Pathology Volume 1, Biology of the Microsporidia, Bulla, L. A. Jr., and Cheng, T. C., Editors. (Vavra, J. and Sprague, V. Contributing Editors) Plenum Press, New York, 371 pp. (\$37.50)

This volume is the first in a series called "Comparative Pathology" which is edited by Bulla and Cheng. However, it is also the first of two volumes on microsporidia which are actually edited by Vavra and Sprague, two noted microsporidologists. These two volumes will constitute the first comprehensive work on all the microsporidia infecting any animal group since Kudo's 1924 monograph.

This first volume is divided into 12 sections. The first nine deal with the biology of microsporidia. Topics such as the structure, development, and physiology of microsporidia, their extra-corporeal ecology and the many phases of host-parasite relationships in invertebrate and vertebrate hosts and microbial control are covered. Each section is authored by an expert in the area: Vavra authored the sections on Structure and Development, these two sections comprising the first third of the book and including approximately 80 illustrations. The text and illustrations, although covering only the more common types of microsporidia, provide a single source of illustrated material on "what a microsporidium is and looks like" that has not been available to the general public before except in monographs on specific groups of hosts. Some sections point out the deficiencies of information in the area by their brevity, eg. Microsporidian Physiology by E. Weidner, while a few sections could have provided more information in the chapter.

This volume covers the major microsporidian genera, and it is a primary information resource that has been needed for a long time. Anyone interested in learning about these organisms can now do so with one piece of literature as a starting point. This is especially true because of the last three chapters of the book.

This volume contains a bonus, a section on Methods by Vavra and J. Maddox, a section on the Type Slide Collection by B. Erickson, and a Glossary of Terms for the microsporidia by Vavra and Sprague.

Three problems exist for the reviewer. First, there are a significant number of errors that should have been caught with four editors to do the checking. Second, the opinions expressed in this text should not be construed as gospel. This fact is not brought out in the text but it obviously reflects the leanings of the researchers who authored it and not necessarily the entire microsporidian community. Third, is the high cost of the book, \$37.50, which is characteristic of many specialized works. The book is something everyone interested in learning about microsporidia, or interested in the areas of pathology, parasitic protozoa, or biocontrol should buy but the price may prohibit wide spread distribution.

Ann Cali  
Department of Zoology & Physiology  
Rutgers University  
Newark, New Jersey 07104

#### New Books

An Atlas of Insect Diseases (Second revised edition), by Jaroslav Weiser. 1977. 84 pp. (text part), and 240 pp., illustrations (400 photographs). Cloth. Dutch Guilders 7500. Approximately \$30.20 U.S. ISBN 90 6193 549 0. Co-edition with Academia, Praha, C.S.S.R. (Available from: Dr. W. Junk B.V. - Publishers, P.O. Box 3713, The Hague, The Netherlands.)

Beltsville Symposia in Agricultural Research Vol. 1. Virology in Agriculture. Proceedings of the first annual symposium in agricultural research, May 1976, sponsored by the Beltsville Agricultural Research Center, ARS, USDA. Cloth. LC 76-42139 SBN 805-1, 320 pp. 1977. (Available from: Allanheld, Osmun & Co. Publishers, Inc., 19 Brunswick Rd., Montclair, New Jersey 07042, \$23.50.)

#### Proposed New Book

Microbial Control of Insects, Mites and Plant Diseases Volume 2.

Since the book "Microbial Control of Insects and Mites" was written, there have been considerable advances in our subject that require assessment. Dr. H. D. Burges is editing a sequel, entitled as above, that will assess the new information, review progress and discuss the requirements of future research. None of the data in the original book will be repeated. The approach will be critical, constructive and progressive. It will be of most use to research workers, those interested in developing pathogens for insect control and university lecturers. A major objective of the book is to enhance interest in the subject and to further its development. The author invites the interest of S.I.P. members to submit suggestions and comments at this stage from anyone. Contributors will be invited to undertake chapters in time for writing to be completed during the winter and spring of 1977-78. Contributions and suggestions should be sent to:

H. D. Burges  
Insect Pathology Group  
Glasshouse Crops Research Institute  
Littlehampton,  
West Sussex, England BN16 3PU

#### NOTE

The library of the Glasshouse Crops Research Institute wishes to purchase Volumes 5-12 inclusive of the Journal of Invertebrate Pathology. Would anyone who has these numbers for sale please contact:

H. D. Burges  
Insect Pathology Group  
Glasshouse Crops Research Institute  
Littlehampton  
West Sussex, England BN16 3PU

#### CHANGE OF ADDRESSES

W. A. Ramoska  
Assistant Professor  
Department of Entomology  
West Waters Hall  
Kansas State University  
Manhattan, Kansas 66506

Dr. Chris Payne has recently joined the Entomology Department at the Glasshouse Crops Research Institute, Littlehampton, England, replacing Dr. Anker David (who has now retired) as head of the Insect Virus section. Dr. Payne hopes to make use of the experience gained in his previous position at the Unit of Invertebrate Virology, Oxford, to carry out research on the virus diseases of invertebrate pests of agricultural and horticultural crops in the United Kingdom.

#### ERRATA

A slight error. Dr. Babajide Matanmi has been a member of our society since 1973 and is not a new member as stated in the April issue Newsletter.

SIP Newsletter Editor  
A. J. Domnas  
c/o Department of Botany  
University of North Carolina  
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Chapel Hill, North Carolina 27514  
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PROGRAM  
Xth ANNUAL MEETING  
SOCIETY FOR INVERTEBRATE PATHOLOGY

SUNDAY MORNING, AUGUST 21

10:00 COUNCIL MEETING. KELLOGG CENTER, ROOM 107.

SUNDAY AFTERNOON, AUGUST 21

12:30 COUNCIL LUNCHEON. KELLOGG CENTER, GALAXY ROOM.

1:30 COUNCIL MEETING (continued). KELLOGG CENTER, ROOM 107.

MONDAY MORNING, AUGUST 22

- SESSION 1. Symposium: Pathogenesis and Mode of Action of Microbial Pathogens: Bacteria and Fungi. Organized and convened by ELIZABETH W. DAVIDSON, Division of Agriculture, Arizona State University, Tempe, AZ 85281. KELLOGG CENTER, LINCOLN ROOM B.
- 8:30 President's Welcome and Opening Remarks. THOMAS A. ANGUS, Insect Pathology Research Institute, Sault Ste. Marie, ON.
- 8:45 Introduction. ELIZABETH W. DAVIDSON, Arizona State University, Tempe.
- 9:00 J1. DOMNAS, ARISTOTLE J. University of North Carolina, Chapel Hill. Biochemical aspects of infections of mosquitoes by *Lagenidium giganteum*.
- 9:20 J2. ZACHARUK, R. Y. University of Regina, Regina, SK. Cytology and biochemistry of insect cuticle penetration by *Metarrhizium anisopliae*.
- 9:40 Discussion.
- 10:10 RECESS.
- 10:30 J3. SPLITTSTOESSER, CLARA. Cornell University, Geneva, NY. Pathogenesis and mode of action of *Bacillus popilliae* infections in the European chafer.
- 10:50 J4. DAVIDSON, ELIZABETH W. Arizona State University, Tempe. Pathogenesis and mode of action of *Bacillus sphaericus* in mosquito larvae.
- 11:10 J5. FAST, PAUL. Insect Pathology Research Institute, Sault Ste. Marie, ON. Molecular and cytological mode of action of *Bacillus thuringiensis* delta-endotoxin.

*Society for Invertebrate Pathology*

MONDAY MORNING, AUGUST 22

- 11:30 Respondent. ROBERT FAUST, USDA-ARS, Beltsville, MD.  
11:50 General Discussion.

MONDAY NOON, AUGUST 22

- 12:00 LUNCHEON MEETING. Editorial Board, *Journal of Invertebrate Pathology*. KELLOGG CENTER, ROOM 112.

MONDAY AFTERNOON, AUGUST 22

- SESSION 2. Contributed Papers. Fungi, Bacteria, Protozoa and Nematodes. Presiding: G. MALLORY BOUSH, Department of Entomology, College of Agriculture, University of Wisconsin, Madison, WI 53706. KELLOGG CENTER, LINCOLN ROOM B.
- 1:30 J6. DOMNAS, ARISTOTLE J., and B. F. HICKS. University of North Carolina, Chapel Hill. Properties of mosquito infection with *Lagenidium giganteum*.
- 1:45 J7. FEDERICI, BRIAN A. University of California, Riverside. The life cycle and biosystematics of *Coelomomyces dodgei*.
- 2:00 J8. SODERHALL, KENNETH, and TORGNY UNESTAM. University of Uppsala, Uppsala, Sweden. Fungal glucans elicit a defense reaction in crayfish.
- 2:15 J9. SAYRE, R. M., and T. B. CLARK. Plant Protection Institute, USDA-ARS, Beltsville, MD. *Helicosporidium* sp. (Protozoa: Helicosporida) found parasitizing *Daphnia magna* (Cladocera: Chydoroidea).
- 2:30 J10. JARONSKI, STEPHEN T. Cornell University, Ithaca, NY. Cations, pH, and spores filament extrusion in *Nosema algenae*.
- 2:45 J11. STREET, D. A. Ohio State University, Columbus. Microsporidian infection in the blackfly *Simulium vittatum*.
- 3:00 RECESS.
- 3:15 J12. RICHARDS, CHARLES S. Laboratory of Parasitic Diseases, NIH, Bethesda, MD. Amebocytes of *Biomphalaria glabrata* and resistance to *Schistosoma mansoni*.
- 3:30 J13. BAYNE, CHRISTOPHER J., and HANS G. BOMAN. University of Stockholm, Stockholm, Sweden. Isolation of a gram negative rod pathogenic for *Helix pomatia*.



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MONDAY AFTERNOON, AUGUST 22

- 3:45 J14. ST. JULIAM, GRANT, and ROBERT W. DETROY. Northern Regional Research Center, ARS-USDA, Peoria, IL. Longevity of *Bacillus popilliae* spores and their infectivity against *Popillia japonica*.
- 4:00 J15. TRAVERS, R. S., R. M. FAUST and C. F. REICHELDERFER. USDA-ARS, Beltsville, MD. Catabolic efficiency of *Bacillus popilliae* under aerobic and anaerobic conditions.
- 4:15 J16. SAYRE, R. M. Plant Protection Institute, USDA-ARS, Beltsville, MD. *Pasteuria ramosa*, found parasitizing *Monia rectirostris* (Cladocera: Chydoroidea).
- 4:30 J17. GAUGLER, R. R., and G. MALLORY BOUSH. University of Wisconsin, Madison. The effect of ultraviolet radiation on the entomogenous nematode, *Neoalectana carpocapsae*.

MONDAY EVENING, AUGUST 22

- 5:30 PUBLICATION BOARD MEETING. KELLOGG CENTER, HERITAGE ROOM.
- 7:00 MEETING OF THE WORKING GROUP ON SAFETY OF MICROBIAL CONTROL AGENTS. KELLOGG CENTER, LINCOLN ROOM B.

TUESDAY MORNING, AUGUST 23

- SESSION 3. Symposium: Economics and Efficacy of Microbial Agents in Biological Control. Organized and convened by RETO ENGLER, Registration Division (WH-567), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460 (Tel. 202/426-2680). KELLOGG CENTER, LINCOLN ROOM B.
- 8:30 Introduction. RETO ENGLER, U.S. Environmental Protection Agency, Washington, DC.
- 8:40 J18. RIDGWAY, ROBERT L. USDA-ARS, Beltsville, MD. Role of the Agricultural Research Service in the development of microbial agents.
- 9:00 J19. YENDOL, WILLIAM G. The Pennsylvania State University, University Park. Development of efficacy guidelines for microbial agents.
- 9:20 J20. ALLEN, GEORGE E. University of Florida, Gainesville. Collaborative efforts in the development of efficacy data on microbial agents.

*Society for Invertebrate Pathology*

**TUESDAY MORNING, AUGUST 23**

- 9:40 J21. CUNNINGHAM, J. C., and W. J. KAUPP. Insect Pathology Research Institute, Sault Ste. Marie, ON. The status of viruses for forest insect control in Canada.
- 10:00 RECESS.
- 10:20 J22. LEWIS, FRANKLIN B. U.S. Forest Service, Hamden, CT. U.S. Forest Service: Problems and successes in registering viral pesticides.
- 10:40 J23. SCHULZE, ERNST-FRIEDRICH. Hoechst A.G., Frankfurt, Germany. Insect virus research in the Federal Republic of Germany: Efforts and strategies.
- 11:00 J24. BOYD, V. FRANK. Sandoz, Inc., Homestead, FL. An industrial management view of biological agents for pest control.
- 11:20 J25. CIBULSKY, ROBERT J. Abbott Laboratories, North Chicago, IL. Economic factors affecting commercialization of microbial control agents.

**TUESDAY AFTERNOON, AUGUST 23**

- 1:30 SIP BUSINESS MEETING. KELLOGG CENTER, LINCOLN ROOM B.

SESSION 4. Symposium: Invertebrate Symbiosis (Mutualism-Commensalism). Organized and convened by JOHN A. BREZNAK, Department of Microbiology and Public Health, Michigan State University, East Lansing, MI 48824 (Tel. 517/355-6536). KELLOGG CENTER, LINCOLN ROOM B.

- 3:00 J26. BROOKS, MARION A. University of Minnesota, St. Paul. The little world inside.
- 3:30 J27. MARKOVETZ, ALLEN J. University of Iowa, Iowa City. Intestinal microbial flora of the cockroaches, *Eulaberus posticus* and *Periplaneta americana*.
- 4:00 J28. KLUG, MICHAEL J. W. K. Kellogg Biological Station, Michigan State University, Hickory Corners. Microbiota associated with the alimentary tracts of aquatic insect larvae.
- 4:30 J29. BREZNAK, JOHN A. Michigan State University, East Lansing. Biochemical aspects of symbiosis between xylophagous termites and their gut microbiota.







