

NEWSLETTER

society for invertebrate pathology

VOLUME 28, NUMBER 1 January 1996



The Roman Bridge and the Mezquita, Cordoba

29TH ANNUAL MEETING OF THE SOCIETY FOR INVERTEBRATE PATHOLOGY AND IIIRD INTERNATIONAL COLLOQUIUM ON BACILLUS THURINGIENSIS

SEPTEMBER 1 - 7, 1996. CÓRDOBA, SPAIN

The 1996 Annual Meeting of the Society jointly with the 3rd International Colloquium on *Bacillus thuringiensis* will be held in Córdoba, Spain. The meeting will be organized by Cátedra de Entomología Agrícola y Forestal E.T.S.I.A.M. Universidad de Córdoba where, since 1977, Prof. Santiago-Alvarez developed the first Spanish Research Group on Insect Pathology and Microbial Control. It is the first time in the history of the SIP that the Annual Meeting will be held in Spain. The meeting will be held on the campus of the Universidad de Córdoba. Although this

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Deadline for the next Newsletter is May 15, 1996.	

January 1996

University is only 20 years old, many meetings are held here annually.

Don't Forget to Pay Your Dues for 1996

Dues notices for 1996 were mailed out by FASEB last year. To ensure that your membership remains current and that you continue receiving the Newsletter, please don't forget to return your notice with payment immediately. The next issue of the Newsletter will be sent only to paid up members. Lapsed memberships require further action which only ends up costing the Society needlessly. If you haven't yet received your 1996 notice or have misplaced it, please contact FASEB as soon as possible.

SCIENTIFIC PROGRAM

The program will follow the usual SIP format. The meeting will begin with a mixer on Sunday evening, September 1, and conclude at noon on Friday, September 6. Scientific plenary and concurrent sessions will begin on Monday. Divisional workshops are planned for either Monday or Tuesday evening. The Society's annual Business Meeting will be held on Thursday morning.

Plenary non-concurrent morning sessions: Three plenary sessions are being organized on the following topics: Molecular genetics of entomopathogens; Ecology and diversity of entomopathogens; Strategies for the utilization of entomopathogens in the future.

Symposia: are being organized around the following topics: (The titles of some Symposia are still provisional)

- Microbial Control Division sponsored symposium: Bioassay and standardization of *Bacillus* thuringiensis
- Microsporidia Division sponsored symposium: Applied ecology of Microsporidia
- Viruses Division sponsored symposium: Recent advances in entomopathogenic viruses as control agents.
- Metabolites in insect fungal pathogenesis.

SIP NEWSLETTER

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Submissions to the following sections are solicited:

Forum: More substantial articles on current issues of concern, limited to approximately five pages.

Letters to the Editor: Issues of concern can be brought to light here.

Microbial Control News: Information on new discoveries, "News Releases", formation of companies etc. pertaining to microbial control.

We also depend on our members to supply us with information for the following sections: Obituaries, Member News (Retirements, Awards, Promotions), Members on the Move (New addresses), Positions Available/Wanted, Meeting and Workshop Announcements, and other News Items.

Send all submissions directly to the Editor in France. Submissions via EMail or on computer disk (WP, MSWORD or ASCII) make our lives much easier and save on costs. Please include a hard copy of any text sent via computer disk.

Deadline for next Newsletter is May 15, 1996.

Disclaimer: The information contained herein, including any expression of opinion and any projection or forecast, has been obtained from or is based upon sources believed by us to be reliable but is not guaranteed as to accuracy or completness. The information is supplied without obligation and on the understanding that any person who acts upon it or otherwise changes his/her position in reliance thereon does so entirely at his/her risk. Vol. 28, No. 1

- Marine invertebrate pathology and human public health
- Four Symposia on Bacillus thuringiensis
 - + Regulation and expression of toxin genes
 - + Mode of action and resistance management
 - + New toxins and strain improvement
 - + Application of B.t. and risk assessment
- How to build a better nematode?
- Population dynamics and ecology of nematodes
- Entomopathogens and sustainable agriculture
- Microbial control around the Mediterranean: Israel, Egypt, Greece, Italy, Spain, France...
- Defense mechanisms
- Microbial control of soil dwelling pests
- Microbials and the soil system
- Modeling the population dynamics of insect pathogens

Workshops: The Microsporidia Division will hold an evening workshop entitled "Describing new Species of Microsporidia: Consideration of Life cycle, Molecular, and Ultrastructural Information" while the Microbial Control Division will hold an evening workshop entitled "Recent activities in registration of products for microbial control". Another evening workshop will be on "Engineered virus".

Contributed Papers and Posters: In addition to invited papers of the plenary and symposia sessions, **papers for the Contributed Paper Sessions and Poster Sessions are being solicited.** Poster sessions will be held on both Tuesday and Thursday. There will be student paper and poster competitions; please refer to Supplements 2 & 3 for instrutions.

DEADLINE FOR ABSTRACT SUBMISSION: APRIL 1, 1996

April 1 will be the deadline for receipt of abstracts for individual symposia, submitted papers, and poster presentations. Abstracts received after the deadline will be not printed. Instructions for preparation and submission guidelines can be found in Supplements 1 & 2 of this newsletter. Those who intend to present papers are urged to prepare their presentations so that they do not exceed the 15 minutes allotted per paper, including the discussion.

SOCIAL PROGRAM

A welcome get-together buffet will be held on Sunday, September 1 at the Colegios Mayores Universitarios "Nuestra Señora de la Asunción". On Monday evening, a guitar concert at the Alcazar of the Reves Cristianos will be sponsored by the Mayor of Córdoba. On Wednesday there will be an optional excursion to the Taurine Gardens El Pilar, located 25 km from Córdoba where among other things, the 14th Annual S.I.P. 5K Race will take place. The day will end with a private party at a disco, before we return to Córdoba. A closing dinner will take place on Thursday evening in typical Córdoba restaurant, with folk music a (Flamenco) entertainment. The optional excursion to the Taurine Gardens must be reserved in advance (see registration form in Supplement 3).

ACCOMMODATION

Registrants who wish to make a reservation can choose between two options: University Housing (Colegios Mayores Universitarios "Nuestra Señora de la Asunción"), site of the meeting or in downtown hotels. The Organization has booked rooms at special low rates in a number of Hotels which can be booked at the time of registration (see Supplements 2 & 3).

REGISTRATION

The registration fee includes the Sunday welcome gettogether buffet, coffee-breaks, audiovisual equipment, insurance, the Monday Mayor reception and the Thursday closing dinner. The companion fee includes the Sunday welcome get-together buffet, the Monday Mayor reception and the Thursday closing dinner. Please return your registration forms (Supplement 3) as soon as possible. There will be a late fee of 7.000 Ptas. for registration forms received after April 1, 1996. Only payments in Spanish currency (pesetas) will be accepted. Please make money orders payable to **SIP 29th ANNUAL MEETING**. Please note that payments can be also made by Visa or MasterCard.

Program Committee Chair:

Dr. Cándido Santiago-Álvarez Cátedra de Entomología Agrícola y Forestal E.T.S.I.A.M. Universidad de Córdoba Apartado 3048 14080 Córdoba (SPAIN)

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FROM THE PRESIDENT

The SIP nominating committee, consisting of Tony Sweeney (Chair), Chris Payne, Max Bergoin, Ann Hajek, and Barbara Knowles, announced the slate of candidates for SIP office in the October newsletter. The committee is to be congratulated for presenting a list of highly qualified individuals who will be be elected to office in 1996. In this Newsletter issue you will see the biographies of these candidates, and I am especially pleased to see the international breadth that these individuals represent. I encourage the membership to become familiar with these candidates and to vote; your participation will help to provide the strong leadership that our Society needs.

In early November I spent several days in Japan as the guest of Professors Tsuguo Matsumoto and Yoshi Hashimoto, of the Kyoto Institute of Technology. During this stay I had the opportunity to visit several insect pathology/insect science laboratories and experiment stations. I was also invited to be the keynote speaker at the annual meeting of the Japanese Society for Insect Pathology held in Tokyo on Nov. 2. This was my first opportunity to visit with this group of

insect pathologists. I was gratified to see that this Society is flourishing; it is a very dynamic organization with almost 175 members. Many of the members of the Japanese Society are also members in the SIP. The current President of the Japanese Society is Professor Tosihiko Hukuhara from Tokyo University of Agriculture and Technology, and they have been an active scientific organization for about 20 years. Dr. Hukuhara mentioned that I was the first overseas speaker to be an invited speaker at their annual meeting, and that in the future they will consider inviting more speakers from abroad. I talked to a number of my Japanese colleagues and expressed an interest in seeking some possible affiliation between the Japanese Society and the SIP. I will continue to explore this possibility.

During this same visit to Japan I visited Professors Toshi IIzuka and Hisanori Bando in Sapporo, the site of the 1998 SIP Annual Meeting and Colloquium. Toshi and the organizing committee recently met in Sapporo to discuss ICIP 98 and they report that the planning is progressing on schedule.

In the last Newsletter our Meeting Board Chairman, Just Vlak, indicated that his committee is soliciting sites for the years 1999 (USA), 2000, 2001(USA), and 2001(ICIP meeting). In recent years the concept of alternating sites between North America and other parts of the world has been well accepted and supported by the membership. The committee needs a North American site for the 1999 annual meeting and I encourage the membership from this region of the world to give serious consideration to hosting this SIP event. As you probably are well aware, hosting an annual meeting with attendance now reaching in excess of 300 registrants is no easy task. However, having been involved in two such meetings in Ithaca, I can say that it is a very rewarding and gratifying experience. With a strong team effort and services from a local conference center an annual meeting can be organized in a time efficient manner.

I am in the process of finalizing the composition of several SIP committees. The Endowment Committee has been reorganized and consists of Tad Poprawski (Chair), Stephen Wraight and Nguya Maniania. The Founders Lecture Committee is now composed of Jim Harper, (Chair), Richard Daoust, Tony Sweeney, and David Ellar.

Best wishes for a prosperous and scientifically exciting New Year!

Bob Granados President



Bob Granados and Prof. T. Hukuhara



Prof. T. Matsumoto, Bob Granados and Prof. I. Kawarabata



Prof. H. Watanabe, Bob Granados and J. Mitsuhoski

GUEST EDITORIAL

It's a Great Time to Start an Ag Biotech Company

Reengineering, downsizing, consolidation, partnership, those are words that we hear describe the activities of large companies. But they also describe the present state of the agricultural biotech and microbial pesticide industry. Some very notable events have occurred in the last year. EcoScience has shrunk considerably and is auctioning off its Massachusetts facility. Crop Genetics and AgriDyne have folded into Biosys. Just as Novo Nordisk and Entotech were launching some exciting new technology, Novo needed to "go back to its core" of enzymes and diabetes care and sold its biopesticide business to Abbott. Monsanto breathed new life into Ecogen with a \$25 million investment for its Bt genes for use in transgenic plants. With a multimillion dollar investment by Pioneer, Mycogen's primary focus has shifted to transgenic plants.

After funding millions for biopesticide and transgenic plant startups in the eighties, the availability of US venture capital has been reduced to nearly zero. Ag biotech is not considered a "hot" industry right now. Ecogen's stock barely moved in response to the Monsanto deal. Calgene's stock is at an all time low despite a deal with Monsanto valued at more than \$200 million. Investors complain that they don't see any ag versions of Amgen or Genetech. No blockbuster biopesticides, either. Meanwhile Netscape is trading at 160^{3/4}.

But it really is a good time to be in this business. Why? Because without much investor notice, a grass roots interest in biological pesticides is steadily Pest control advisors, distributors and growing. retailers -- those who are closest to the growers, and the growers themselves, are all actively beating the bushes for new biological products that can be used in locally developed pest management systems. And not just in the US. Also, the US regulatory approval system for microbials is the best it has ever been. The new EPA division, dedicated exclusively to microbials and biochemicals. has streamlined regulatory approval. CAL-EPA and EPA have harmonized approvals. While US investor interest is at an all time

low, the Canadians are filling the void. The recent issue of BIO/TECHNOLOGY presents some impressive numbers in new Canadian funds being dedicated to ag biotech. And the interest is stirring in Europe and Japan, too.

Personally, for me, it is the best time to start a microbial pesticide company. With the experiences from the past decade to learn from, a continuing need for new products, a more favorable regulatory system, and continued consumer pressure on synthetic chemicals, I am optimistic. If investor money is spent wisely and efficiently on developing products that deliver value on the bottom line to the customer (with less hype and less overhead), then finally the capital markets will appreciate and recognize the true value of our industry.

Pam Marrone, AgraQuest, Inc, Davis, CA

EDITORIAL

New European Community Regulations for Microbials: A Unique Opportunity to Learn from Past Experience and Mistakes.

We've now had 3 to 4 decades of experience in the development, registration and safe, effective use of an ever increasing number of microbial control agents. We are coming to grips with IPM and are beginning to demonstrate again and again how natural enemies come into play as soon as chemicals are replaced with more host specific microbials. We are slowly but surely coming to realize that if microbials are used merely as replacements to chemical pesticides, they will suffer the same fate (i.e. development of host resistance). We have also witnessed the difficulties that a stringent, non pliable checklist approach to regulations has had. Early "pre-regulation" registered microbials, as well as those developed in countries with no regulatory oversight, continue to be used effectively and safely. As stated in Pam Marrone's Guest Editorial above, it is a good time to enter the business. However, much depends on regulatory oversight. As microbials are becoming more and more commonplace, many countries are presently scrambling to put regulations

into place. Are there any past experiences and mistakes we can learn from? There certainly are.

The U.S was the first to embark on the regulatory treadmill. At first the same principles and regulations developed for registration of chemical pesticides were used for microbials. This resulted in turmoil and much confusion in the industry. Pretty well the only organisms registered during this era were Bt's. Why? Because they are fast-acting, very host specific, innocuous organisms that faced few regulatory hurdles. No-one dreamed of registering anything as complex as an entomopathogenic fungus; the regulations were just too stringent.

But even as the U.S began to realize that the regulations needed changing as they were too restrictive, hampered development, and were unworkable, Canada jumped onto the bandwagon with its own set of regulations. Unfortunately, to the Canadian regulators, more meant better, and Canada soon found itself with even stricter registration requirements. This of course resulted in products, already registered in the U.S., not being registered and available in Canada, much to the detriment of the Canadian environment. After much pressure from the public and industry, Canada too started to simplify and streamline its regulations for microbials; we are presently awaiting the third version of streamlined guidelines.

In addition, the United States adopted policies to facilitate the development and use of biologicals, including microbials. The new Canadian Pest Management Regulatory Agency has an "Alternatives Office," EPA has a new Biopesticides and Pollution Prevention Division, and APHIS adopted a very probiological control "mission statement." This of course has had a profound effect on regulations and regulator attitudes in North America; regulators now find themselves supporting the "good guys', i.e., new, safe methods of pest control, rather than merely defenders of the environment and human health from the "bad guys.". Microbials are now seen as preferable (lower risk) alaternatives to most conventional chemical pesticides. And there's still much more room for improvement! Unfortunately, microbials are still seen soley as a commodity developed for profit and to be

used inundatively as a replacement to a chemical. But things are moving in the right direction.

One would think that the above experiences would help to "guide" the way for the development and integration of new regulations as the European Community is presently attempting under the EC Registration Directive 91/414/EEC. Here is an opportunity to take advantage of past experiences and mistakes and to take the lead. A fast, streamlined and efficient regulatory system with a minimum of hurdles and requirements, with a maximum allowance for waivers, and harmonized with those of North America, would do much to stimulate industry involvement in the development and use of microbials in Europe.

Unfortunately, after attending a recent symposium in Italy entitled "Microbial Control Agents in Sustainable Agriculture: Field Experience, Industrial Production and Registration", (Saint Vincent, October 18 & 19, 1995; see the "Publications" section for information on obtaining the Proceedings), I came away with the feeling that very little was learnt from the regulatory history of North America; far too stringent regulations are being formulated for registration of microbials which are to be used inundatively as a replacement of chemicals; a checklist approach seems to be promoted with little possibility of waivers; there appears to be very little effort at reducing registration hurdles based on the years of experience with organisms such as Bt's; there seems to be little effort to harmonize regulations with those of North America. Furthermore, the belief that regulators must "protect" the public (i.e., farmer) from dangerous or nonefficaceous products still prevails. But IPM is almost an art, developed after careful and judicial use of many methods; how is a regulator to determine whether a product that offers only a 5% reduction of a pest population is not worthy of being included in an IPM program? We will never have IPM until products are made available to IPM managers and researchers!

The European Community should immediately adopt a pro-active approach for the promotion of alternatives, including microbials, for pest management. The regulatory system must be an integral part of this process. In addition, funds should be made available to regulatory agencies for conducting or contracting

research targeted at answering regulatory problems and concerns. Only when the regulatory bureaucracy becomes integrally involved in the development and promotion of microbials will a reasonable regulatory oversight be developed that treats most microbials as beneficial, with a tiered testing scheme (to streamline the requirements and ensure that the few "bad guys" don't slip through. It is possible to have reasonable regulatory oversight without unduly risking the integrity of the European environment and the safety of its people and that at the same time does not unduely the development, registration hamper and implementation of sustainable pest control programs. But the present regulatory climate and attitude must first change. Much can be learnt from the North American experience.

Letters to the Editor are welcomed.

Mark S. Goettel Newsletter Editor



1995 FOUNDER'S LECTURE

David Ellar and Mrs Eileen Dulmage

In 1982 the Society initiated an annual recognition of individuals, who, in the opinion of the Society, have contributed to the genesis and development of scientific

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efforts and accomplishments identified as invertebrate pathology. In celebration of the recognition of an Honoree, the Society sponsors a Founder's Lecture. As a highlight of last year's meeting in Ithaca, Howard Dulmage and David Ellar were recognized as Honoree and Lecturer, respectively, for 1995. The selection was made by the Founder's Lecture Committee with considerable input from members of the Society.

Founders' Lecture Honoree for 1995 - Dr. Howard T. Dulmage

The Society took great pleasure in honoring Dr. Howard T. Dulmage at its annual meeting in Ithaca on July 17, 1995 as the 1995 Founder's Lecture Honoree. Dr. Dulmage served the Society faithfully and effectively over his long career as a microbiologist with interests in the bacterial pathogens associated with insects. His biography, which was published in the October 1993 volume of the Newsletter gives us an excellent summary of these many contributions (Vol. 25, no. 3 pp.32-33). The following is reprinted in part from that obituary. The reader is encouraged to review that issue for more details on the specifics of Dr. Dulmage's many contributions to science and to invertebrate pathology.

Dr. Howard T. Dulmage received the PhD degree from Rutgers University under the Nobel Prize winner, Selman Waksman. He was author of 69 scientific papers and several textbooks. He was retired from the United States Department of Agriculture, but remained active as a consultant until near his death. Dr. Dulmage was nominated for the position of Honorary Member of the Society for Invertebrate Pathology, and his name would have appeared on the next SIP ballot for approval of this honor. The following detailed description of his contributions to the field of invertebrate pathology is derived from the materials provided for his nomination.

Dr. Dulmage's scientific career spanned over 40 years, the last 30 years of which were spent in invertebrate pathology. Dr. Dulmage was employed from 1950-1962 by Abbott Laboratories, North Chicago, Illinois, where he obtained a thorough understanding of fermentation technology used in development of new antibiotics, although Abbott had not yet begun producing *Bacillus thuringiensis* products. introduction to *B. thuringiensis* came when he jo Nutrilite Products, Lakeview, California, and involved in development of semi-solid fermenta which led to the product "Biotrol BTB-183", one of earliest commercial *B. thuringiensis* produ Although of low toxicity compared to today's produ it represented the first introduction of many farmers the possibilities of microbial control.

In 1967 Dr. Dulmage joined the USDA laboratory Brownsville, Texas, where he spent the remainder his career. His research has had a major impact on t development of *B. thuringiensis*-based insecticide Under his leadership, the Brownsville laboratory we responsible for transfer of a high level of technology industrial and research laboratories around the work

Dr. Dulmage has been recognised by the Distinguisher Service Medal of the USDA, elected as Fellow of the Royal Society of Entomologists (UK), Fellow of the American Institute of Chemists, and received certificates from the University of Nuevo Leon in Mexico where he taught and was advisor for several years. The Industrial Microbiology Research Laboratory at the University of Nuevo Leon was named the "Howard T. Dulmage Industrial Microbiology Laboratory" in his honor in 1988.

Founder's Lecturer for 1995 - Dr. David J. Ellar

A fascination with sporulating bacilli developed while an undergraduate at Leeds University propelled Dr. David Ellar to the USA in 1963 to embark on a Ph.D. at Syracuse University with Professor Donald Lundgren devoted to an investigation of spore morphogenesis. Part of this work focused on the structure of the polymer of β -OH-butyrate produced by bacilli which has subsequently become important industrially as a biodegradable plastic. From Syracuse Dr. Ellar transferred to the Department of Microbiology at New York University School of Medicine for post-doctoral work with Professor Milton Salton investigating the biochemistry and biosynthesis of bacterial membranes.

Following his appointment to the Biochemistry Department at Cambridge in 1968, Dr. Ellar spent the

next ten years investigating the biochemistry of microbial membranes and the molecular basis of the transition from vegetative bacillus to the dormant spore. Among the successes of this programme were the development of protocols for isolating mesosomes and for separating developing spores from the mother cell. Using these protocols Dr. Ellar and colleagues were able to carry out the first comparison of the biochemistry and bioenergetics of dormant and germinating spore membranes and accumulate a large body of evidence in support of the proposal that the spore germination trigger is a biophysical event triggering lysis of the spore cortex. Together with Dr. Scott, Dr. Ellar showed that the biochemical basis for the exceptional longevity of bacterial spores was the complete absence of metabolism in the dormant state. During this period the research was notable for pioneering the use of non-invasive biophysical techniques (NMR, X-ray micorprobe analysis) to probe the biochemical basis of spore dormancy.

In 1980 Dr. Ellar began to investigate the group of proteins (δ -endotoxins) synthesised as micro crystals in the cytoplasm of spore-forming bacteria (*Bacillus thuringiensis*) and known to possess insecticidal activity. At the outset of the work, little was known of the chemistry of these toxins and their mode of action. In the dramatic improvement in this picture that has marked the succeeding fifteen years, Dr. Ellar's laboratory has played a major part and is now recognised as a leading international academic centre for research on the biochemistry and genetics of these microbial toxins.

Dr. Ellar's conviction that an *in vitro* insect cell culture system would prove invaluable in the study of the insecticidal mechanism of these toxins led him to employ such a system to study both dipteran and lepidopteran *Bacillus thuringiensis* toxins. The potential of this *in vitro* system was demonstrated in 1983 when he and a colleague (Dr. Thomas) used it to discover the cytolytic mechanism of one of the *Bacillus thuringiensis* mosquitocidal toxins. The system was successfully used again in 1984 by Dr. Knowles and Dr. Ellar to identify the first lepidopteran toxin receptor as a transmembrane glycoprotein., The partial purification and chemical characterisation of this latter receptor from insect cell lines has been followed recently by the purification and cloning by Dr. Knight in Dr. Ellar's laboratory of the analogous receptor from *Manduca sexta* epithelium.

Faced with a battery of theories to explain the cytolytic mechanism of these toxins, Dr. Ellar and colleagues, notably Dr. Knowles, successfully exploited the *in vitro* cell culture system again to build a strong experimental case that all these toxins kill cells by colloid osmotic lysis; a two-step process in which toxin binding to a receptor on the external membrane surface is followed by penetration of the toxin into the membrane to form a leakage pore.

For many years a major obstacle to molecular genetic analysis and manipulation of the structure and synthesis of the δ -endotoxins was the lack of any efficient genetic transformation system for the producer organism *Bacillus thuringiensis*. This obstacle was overcome in 1988 when Dr. Ellar and Dr. Bone reported an efficient genetic transformation system utilising the technique of electroporation. This technique is now in use around the world and has opened up an extremely productive field for the creation of novel toxin combinations and for the analysis of transcriptional control of toxin synthesis.

In 1986, Dr. Ellar and Dr. Haider provided a biochemical explanation for the fact that certain of these toxins could kill insects from two orders, by showing that differential proteolysis by larval gut enzymes yielded two toxins from a single polypeptide. Having established that toxins with different insect specificity shared a common lytic mechanism, Dr. Ellar proposed that this would be reflected in common structural features. Analysis of the sequences of twelve toxin genes revealed that they all shared a hydrophobic N-terminal region of approximately 250 residues containing 6 predicted amphipathic α -helical segments with membrane insertion potential, followed by a region of predicted β -structure which by segment swapping, appeared to contain the receptor recognition domains.

Dr. Ellar and Dr. Carroll initiated a collaboration in 1987 with Dr. Li of the MRC Laboratories in Cambridge to solve the X-ray crystal structure of one of these toxins. This goal was realised with the solution of the three-dimensional structure of the CryIIIA beetle-specific toxin to 2.5 Å resolution. The importance of this achievement to the field is very great indeed, especially since the structure reveals that the five sequence segments that are highly conserved among the entire δ -endotoxin Cry family make up the structural core of the molecule. This implies that toxins of widely differing insect specificity will fold similarly and thus the beetle toxin structure should be a key for all the other Cry toxins.

One of the most exciting aspects of the structure is that from the nature of the three distinct domains found in the toxin it is immediately apparent which domain recognises the receptor and which makes holes in the membrane. In recent years Dr. Ellar and colleagues have been carrying out an extensive analysis of several Bacillus thuringiensis toxins using site directed mutagenesis which has pin-pointed the three solvent exposed loops in Domain II of the Cry toxin structure as a site for specificity determinants. Very recently the collaboration with Dr. Li has yielded the first X-ray crystal structure of a member of the second family of Bacillus thuringiensis entomocidal toxins known as the cyt toxins. Armed with this structural database the prospects for improving these biopesticides by rational genetic manipulation are considerably enhanced and the industrial future of these microbial products looks very promising. In 1988 Dr. Chilcott and Dr. Ellar showed that the potency of the Bacillus thuringiensis israelensis subspecies for dipteran larvae was due in part to part to synergism between the different toxins which make up the δ -endotoxin crystal.

An extra applied dimension to the work with the *Bacillus thuringiensis* proteins comes with the possibility of using protein engineering to couple their membrane pore-forming domain to cell specific targeting domains and thereby construct toxins active against a variety of non-insect cells. In 1990 work began in Dr. Ellar's laboratory to link human tumour specific antibodies and human cell specific ligands to the lytic 'warhead' of these *Bacillus* toxins and the first successful retargeting of a *Bacillus thuringiensis* toxin has recently been obtained by Dr. Al-Yahyeee and Dr. Ellar.

Dr. Ellar is currently University Reader in Microbial Biochemistry at Cambridge University, A Fellow of Gonville and Caius College, Cambridge and a Fellow of the Royal Entomological Society.

The Founder's Lecture Committee James D. Harper, Chair R. Daoust A.W. Sweeney D. Ellar

HONORARY MEMBERS, PART 2

In a past issue of the Newsletter (Vol.27, No. 2, pp. 8-13) we introduced you to five of our 15 Honorary Members. We continue with the stories of several more Honorary Members, to familiarize you with the professional contributions of these persons and to remind us of their impact on our Society and our profession.

PHYLLIS T. JOHNSON



Phyllis T. Johnson

Dr. Phyllis Johnson received the Bachelor's degree from Mills College at the University of California, Berkeley, and the PhD from Berkeley in 1954. During her graduate career she was employed at the Walter Reed Army Medical Center studying the transmission and pathology of scrub typhus and other rickettsial diseases and the systematics of fleas and lice. She continued the systematics studies at the USDA, US National Museum from 1955- 1959, and from 1959-1963 was employed at the Gorgas Memorial

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Laboratory in Panama, working on the epidemiology and transmission of leishmaniasis.

Dr. Johnson began the work on marine invertebrates for which she is most well-known when she joined the University of California, Irvine, Center for Pathobiology (founded by E.A. Steinhaus). There she undertook studies of defense mechanisms and pathobiology of echinoderms, which she continued for one year at the California Institute of Technology. When she joined the National Marine Fisheries Service laboratory at Oxford, Maryland in 1972, she began her major work on pathobiology of crustaceans, especially decapods, which occupied her interest until retirement in 1987.

Dr. Johnson recognises three professional highlights in her career as a marine pathobiologist. The first was completion of "An Annotated Bibliography of Pathology in Invertebrates Other Than Insects" in 1967. This volume was the first to bring together most of the literature in the field in a single volume, permitting comparison of pathologies among species and higher groups of invertebrates other than insects. Just as with Steinhaus' "Insect Microbiology" and "Principles of Insect Pathology", this seminal book had a real impact on the early stages of a field.

Dr. Johnson was the first to recognise a virus disease of the blue crab, and later found and studied several more viruses in this crab. These studies led to the realization of how many viruses can infect a single crustacean species. Her studies of this animal led to writing *"Histology of the Blue Crab"*, which has been helpful to many others concerned with the general subject of normal and pathological crustacean physiology.

SIP has benefitted greatly from Dr. Johnson's efforts, including organization of several symposia and paper sessions, service on the Glossary Committee, Journal Advisory Committee, Founders Lectureship Committee, and Membership Retention Committee. She has served as Vice President and President of the Society. She was elected to Honorary Membership in 1992.



H.D. Burges and Phyllis T. Johnson, 1982

Dr. Johnson recalls that she was active in the field during the formation of the Society. Because so few persons were studying the diseases of invertebrates other than insects, she had no meetings to attend, and was not encouraged to present papers at entomological meetings. She shares with us her excitement and pleasure to have the great honor of presenting the *first* paper at the *first* meeting of SIP, in Columbus, Ohio in 1968.

Dr. Johnson is now retired at Friday Harbor, Washington, close to the sea, where she enjoys natural history watching, walking and enjoying a life of leisure and freedom.

MAURO E. MARTIGNONI



Mauro E. Martignoni

January 1996

Dr. Mauro Martignoni was born in Lugano, Switzerland in 1926. He received both undergraduate and PhD degrees from the Swiss Federal Institute of Technology (ETH), Zurich, with further graduate studies at the University of California, Berkeley. Dr. Martignoni was engaged in research and teaching at Berkeley from 1956 to 1965. He then joined the U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station in Corvallis, Oregon, where he was Principal Microbiologist and Chief Microbiologist, and simultaneously held the post of Professor at Oregon State University. Dr. Martignoni was the first GS-16 Scientist at the Corvallis laboratory. He also spent a year as Visiting Scientist at the Glasshouse Crops Research Institute in Littlehampton, England. He retired in 1985, and moved to Albuquerque, New Mexico with his wife, Marie Louise.

Dr. Martignoni was very active in the development of insect viruses as microbial insecticides, beginning with his dissertation research in Switzerland, which received the Silver Medal and Kern Award for distinguished research. At Corvallis, Dr. Martignoni was responsible for planning and executing a program of basic and applied research on viruses and cell culture aimed at large-scale production of insect viruses. This research culminated in the the viral insecticide, TM Biocontrol-1, based on a nuclear polyhedrosis virus of the Douglas fir tussock moth which he isolated. His team was awarded a Superior Service Group Honor Award from the USDA for these efforts.

Dr. Martignoni is the author of over 100 publications, and was a member of the editorial boards of the Journal of Invertebrate Pathology and Current Topics in Comparative Pathobiology, a member of the Subcommittee on Nomenclature of Invertebrate Viruses of the International Commitee on Nomenclature of Viruses, and served on numerous national and international advisory panels. He was the author, with Ed Steinhaus, of *Abridged Glossary of Terms Used in Invertebrate Pathology* (1962, 1967 and 1970), of *A Catalog of Viral Diseases of Insects, Mites and Ticks* (1975, 1977, 1981 and 1986), and of a computer-based *Bibliography of Viral Diseases of Insects and Other Arthropods* (1985). Dr. Martignoni has served SIP in many capacities, but perhaps his greatest contribution was principal authorship of the Constitution and Bylaws under which the Society operates. He also drafted the revised Constitution and By-Laws which were adopted in 1982, as well as the Divisional By-laws, all of which are currently in use. He was a member of the Organizing Committee which met in Seattle on May 9, 1967, to establish the Society. He served two terms as Trustee, as well as chair of several committees and sessions. He was elected to Honorary Membership in 1994.



Mauro Martignoni and Mike Mix circa 1974

Dr. Martignoni retains his interest in insect pathology, happily utilizing the library at the University of New Mexico, and occasionally doing professional writing and consulting. The Martignoni's also pursue archaeology, Lu's field, including some expeditions and lectures. They enjoy the theater scene in New Mexico, as well as tennis and skiing. The Martignoni's have two sons, Enrico and Matteo. Mauro retains his interest in the history of science, particularly insect pathology, and has been very generous in providing material for this series of articles.

E.W. Davidson Assistant Newsletter Editor

CANDIDATES FOR SIP OFFICES

PRESIDENT



Brian A. Federici

Education: B.S. 1966, Rutgers University; M.S. 1967, University of Florida, Gainesville; Ph.D. 1970, University of Florida, Gainesville.

Experience: Postdoctoral Fellow, Boyce Thompson Institute for Plant Research, Yonkers, NY, 1972-74. Assistant Professor of Entomology, University of California, Riverside, 1974-78; Associate Professor of Entomology, University of California, Riverside, 1978-1983; Professor of Entomology, University of California, Riverside, 1983-96; Acting Director, Interdepartmental Graduate Program in Genetics, University of California, Riverside, 1992-93; Member, Society for Invertebrate Pathology, 1970-1996; Trustee, Society for Invertebrate Pathology, 1984-1988; Chair, Meetings Board, Society for Invertebrate Pathology, 1988-1995; Member, Divisions of Microbial Control and Microsporidia, Society for 1984-96; Invertebrate Pathology, Member, Entomological Society of America, 1968-1996; Chair, Subsection Ce, Insect Pathology and Microbial Control, Entomological Society of America, 1987: Member, American Association for the Advancement of Science, 1968-1996; Member, American Society for Microbiology, 1974-1996; Member, American Mosquito Control Association, 1970-1988; Member, Society for Vector Ecology, 1988-1996; Member, World Health Organization, Steering Committee on the Biological Control of Vectors, 1981-1986; Member, World Health Organization, Expert Committee on Vector Biology and Control, 1982-1995; Member, World Health Organization, Scientific Working Group on the Biological Control of Vectors, 1981-1993; Member, Scientific Advisory Board, Safer, Inc., 1986-1990; Member, Scientific Advisory Board, Entotech-Novo Nordisk, Inc., 1992; USDA Competitive Grants Review Panel, Biological Stress on Plants, 1989; NIH Ad hoc Study Section, Tropical Medicine and Parasitology, 1990; Editorial Board, Journal of Invertebrate Pathology, 1982-1988; Associate Editor, Journal of Invertebrate Pathology, 1993; Member, University of California Systemwide Biotechnology Research and Education Committee, 1988-1996; Chair, University of California, Riverside, Academic Senate Committee on Educational Policy, 1986-88; Chair, University of California Universitywide Committee on Educational Policy, 1989-1990; Member, University of California Universitywide Academic Council, 1989-1990.

Interests:General insect pathology; basic and applied biology of insect-pathogenic bacteria, viruses, and fungi. Recent research has focused on the basic biology of *Bacillus thuringiensis* and baculoviruses, and the development of these pathogens as microbial insecticides for control of insect pests and disease vectors.

VICE PRESIDENT



Juerg Huber

Education: M.S. (Biology)1967, Swiss Federal Institute of Technology, Zurich (ETHZ); PhD. (Insect Pathology) 1973, Department of Entomology, ETHZ

Experience: Research Scientist, Federal Biological Research Centre for Agriculture and Forestry, Institute of Biological Control, Darmstadt, F.R. Germany, 1973-1991; Director of Institute of Biological Control, Darmstadt, F.R. Germany, 1991- present.

Membership: Society for Invertebrate Pathology (Chair, Local Organizing Committee, 25th Annual Meeting, Heidleberg, 1992); Swiss Entomological Society; German Society for Phytomedicine; International Organization for Biological Control (Treasurer, West Palaearctic Regional Section (IOBC/WPRS), 19889 - present; Convener, IOBC/WPRS Working Group on Insect Pathogens and Insect Parasitic Nematodes, 1989-1991).

Interests: Practical use of viruses for control of insect pests in agriculture and forestry; production, registration and commercialization of microbial and viral pesticides.



Dudley Pinnock

Education: H.E.C. Microbiology - Brunel University, U.K. B.Sc. (Special Hons) Entomology - Imperial College University of London, U.K. A.R.C.S. Entomology and Applied Zoology - Royal College of Science London UK Ph.D. Insect Pathology -University of London, U.K. D.I.C. Insect Pathology -Imperial College, University of London, U.K.

Membership:Charter Member of the SIP. Chairman of the Organizing and Scientific Program Committees of the Vth International Colloquium on Invertebrate Pathology and Microbial Control, Adelaide, 1990. Former Chairman of the SIP Nominating Committee and Member of the SIP Executive Committee and SIP Trustee. Member of the SIP Divisions of Biological Founder of the Control and Microsporidia. Australasian Invertebrate Pathology Working Group. Member of the Australian Entomological Society and Foreign Member of the Entomological Society of America. Founding Member, State of South Australia Biotechnology Promotion Committee Former Member, Commonwealth of Australia Department of Health Bee Ouarantine Committee.

Experience: 1968-1975: Assistant Professor and Assistant Insect Pathologist in the Agricultural Experiment Station, Department of Entomological Sciences, University of California, Berkeley, California, USA 1975-1978: Associate Professor and Associate Insect Pathologist in the Agricultural Experiment Station, Department of Entomological Sciences, University of California, Berkeley, California, USA 1978-1985: Reader in Insect Pathology, Department of Entomology, The University of Adelaide, Waite Agricultural Research Institute South Australia 1985-1990: Waite Professor of Entomology, and Chairman, Department of Entomology, The University of Adelaide, Waite Agricultural Research South Australia. 1991-present: Waite Professor of Entomology, Department of Crop Protection, The University of Adelaide, South Australia.

Interests: Research and teaching in insect pathology and microbial control, molecular biology and biochemistry of *Bacillus* entomotoxins; production, formulation safety and registration of microbial control agents; mathematical modelling of microbial control systems.

SECRETARY

research has focused on life cycle studies and taxonomy of Microsporidia.



James J. Becnel

Education: B.S. (Biology) 1976, Tulane University; M.S. (Zoology) McNeese State University; Ph.D. (Entomology) 1989, University of Florida.

Experience: Research Biologist, USDA, ARS, Gulf Coast Mosquito Research Laboratory, Lake Charles, LA and Medical and Veterinary Entomology Research Laboratory, Gainesville, FL 1980-91; Research Entomologist, USDA, ARS Medical and Veterinary Entomology Research Laboratory, Gainesville, FL, 1991-present. Courtesy Assistant Professor, University of Florida, 1992-present.

Society for Invertebrate Pathology: Member since 1981; Chair, Division on Microsporidia, 1988-90 and Member at large since 1981; Chair, Membership Committee, 1994-present, Member at Large since 1992; Microbial Control Division member, 1992-present; Member, Nominating Committee, 1991.

Membership in other professional societies: Society of Protozoology, 1981-present; Entomological Society of America, 1987 to present; American Mosquito Control Association, 1981-present; Member, Scientific and Regulatory Committee, 1991-present; Florida Mosquito Control Association; Member, Biological Control Committee, 1991-present.

Interests: Microbial pathogens of invertebrates, particularly microsporidian and viral pathogens as biological control agents of mosquitoes. Recent



Sue MacIntosh

Sue MacIntosh received her undergraduate degree in Zoology from the University of Iowa in 1975. While working in the Pathology Department at Iowa, she continued with a few graduate courses in biochemistry. Sue's career launched her into the biocontrol field in 1987, after spending more than 10 years as a protein chemist in the health care area, working specifically on blood coagulation (at the University of Iowa and Sigma Chemical Co.). Since 1987, she has worked at three different companies, Monsanto, Novo Nordisk Entotech and most recently Plant Genetic Systems (America), riding the wave of biotechnology in the virtual sense. Sue also lived one year in Copenhagen, Denmark (1994) to establish a new research group at Entotech's parent company, focused on high throughput video imaging. Sue's latest career shift allowed her to accept the new Regulatory Affairs Manager position for PGS America, a company which opened earlier this year in Des Moines, Iowa. Sue hopes to end the 'surfing' now that she has relocated back home to Iowa!

Over these last 9 years, her research focused on the study of *Bacillus thuringiensis* insect control proteins; structure/function, toxicity, synergists, mode-of-action, mechanism of insect resistance, and insect resistance strategies with over a dozen publications and several patents. The studies encompassed native Bt strains and Bt expressed both in microbes and plants. For the last

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3 years, Sue has served as chairperson of the Bt Management Working Group, a consortium of 13 companies that promote the sound use of Bt-based products within IPM systems. Sue is a member of The Protein Society, American Chemical Society, Entomological Society of America and of course, the Society of Invertebrate Pathology.

TREASURER



Theodore G. Andreadis

Education: B.S. (1972) and M.S. (1975), University of Massachusetts, Amherst; Ph.D. (1978), University of Florida, Gainesville.

Experience: Assistant Entomologist (1978-1982); Associate Entomologist (1982-1986); Entomologist (1986-1992); Chief Entomologist and Department Head (1992-present), The Connecticut Agricultural Experiment Station, New Haven; Lecturer in Epidemiology, Department of Epidemiology and Public Health, Yale University School of Medicine, (1987-present).

Memberships and Professional Activities: Member, Society for Invertebrate Pathology (1978-present); Vice-chairman (1984-1986) and Chairman (1986-1988) Division of Microsporidia; Judge, Student Poster Competition (1994, 1995). Member Entomological Society of America (1978-present); Chairman, Subsection Ce, Insect Pathology and Microbial Control (1991); Judge, Student Paper Competition (1990); Member, American Mosquito Control Association

(1978-present). Member, Society of Protozoologists (1991-present). Member Sigma Xi (1978-present); Vice President, Quinnipiac College Chapter, Sigma Xi (1981-2, 1995-1996). Member, Regional Research Project S-135 (1979-1990), Chairman, Protozoa Subcommittee (1984-1990); Member Regional Research Project S-240 (1990-1995); Chairman, (1991-1993); Protozoa Subcommittee Member-at-Large (1994-1995). Member-at Large, Regional Research Project S-265 (1995-present). Member, Connecticut State Mosquito Control Advisory Board (1986-1993). Editorial Board, Journal of Invertebrate Pathology (1986-1989). Board of Reviewers, Journal of Eukaryotic Microbiology (1991-present).

Interests: General insect pathology, microbial control of insects of medical and veterinary importance, biology of microsporidia, epizootiology of insect diseases, electron microscopy. Current research has focused on the life cycles and epizootiology of microsporidian pathogens of mosquitoes.



Raymond I.Carruthers

Raymond I. Carruthers is the National Program Leader for Biological Control with the Agricultural Research Service (ARS) of the United States Department of Agriculture (USDA) in Beltsville, MD. He has specialized his research in the areas of, using parasites, pathogens and predators to control insect pests, in developing and implementing integrated pest management programs, and in the application of computer technology to solve pest control problems in agricultural, forestry and rangeland situations. His

work has focused on the development and application of biological control agents, particularly fungal pathogens, for vegetable, field crop and rangeland pests, including grasshoppers, leafhoppers, whiteflies, and several lepidopteran larvae. Ray received a BS in Biological Sciences from California Polytechnic State University at San Luis Obispo in 1975 and both a MS and PhD in entomology from Michigan State University in 1978 and 1981, respectively. Following graduation, he accepted a position as an Assistant Professor in the Department of Entomology at Cornell University. At Cornell he developed management strategies for control of agriculturally important insect pests of field and vegetable crops. In 1985 he transferring to the USDA Plant Protection Research Unit, in the Federal Plant, Soil and Nutrition Laboratory at Cornell University where his research focused on the epizootiology of insect pathogens. Ray served ARS as Lead Scientist for the Integrated Pest Control Unit at Cornell University for several years and then moved to southern Texas where he was appointed as the Research Leader of the Biological Control of Pests Research Unit, in Weslaco, TX. While in Weslaco, Ray coordinated and conducted research and implementation activities that helped lead to microbial control technologies for whiteflies infesting vegetable and field crops. Currently, he serves USDA in ARS headquarters as a coordinator of biological control research programs. This responsibility involves working with both domestic and international USDA laboratories and with cooperators from many different agencies. Although Ray is not an insect pathologist by training, he has been involved with SIP for approximately 15 years and has studied insect pathogens for nearly 20 years. He is also an active member of the Entomological Society of America and the International Organization for Biological Control. In support of these organizations, particularly ESA, he has been involved in many service capacities.

TRUSTEES



Juan Ferré Manzanero (please note that in Spain we hold two family names)

Education: B.Sc. (1978) in Chemistry/Biochemistry by the University of Valencia, Spain; Ph.D. (1984) in Chemistry by the University of Valencia.

Experience: Associate Professor of Genetics, Fac. of Biological Sciences, University of Valencia (1981-1986); Professor (with tenure) of Genetics, Department of Genetics, University of Valencia (1986-present); Ph.D. fellow, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. (1982-83); Postdoctoral Research Fellow, Department of Reproductive Genetics, Magee Womens Hospital, Pittsburgh, Pennsylvania, U.S.A. (1985-86); Consultant Professor, Department of Medical Genetics, West Penn Hospital, Pittsburgh (3 months in 1987 and 2 months in 1988), Visiting Professor, Plant Genetic Systems, Gent, Belgium (3 months in 1989-90); Visiting Professor, Department of Entomology, University of Hawaii at Manoa, U.S.A. (1 month in 1993).

Membership: Member of Spanish Society of Biochemistry (1985-present), Spanish Society of Genetics (1985-present), International Society of Pteridinology (1988-present), Spanish Society of Biotechnology (1989-present), International Society for Invertebrate Pathology (1992-present); President of the Commission of Campus Research Facilities for the Faculty of Biological Sciences, Univ. Valencia

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(1987-1990); Editorial Board Member, Pteridines (since 1993).

Interests: Molecular and genetic basis of insect resistance to *Bacillus thuringiensis*. Mode of action of B.t. toxins. Research and development of B.t. insecticides to control agricultural pests.

Key contributions to the field of invertebrate pathology: *Bacillus thuringiensis* resistance management by the understanding of the biochemical and genetic basis of resistance, receptor specificity to B.t. toxins, and response to selection for resistance. Guangzhou, 1992-present; Director of State Key Laboratory for Biological Control, Zhongshan University, 1994-present.

Memberships: Society for Invertebrate Pathology (since 1992); Entomological Society of China (since 1971).

Interests: Basic and applied biology of insect microbial pathogens; general insect pathology and microbial pest control. Recent research has focused on the basic biology and genetic engineering of baculoviruses and *Bacillus thuringiensis*, and the development of these pathogens as bioinsecticides.



Yi Pang

Education: B.S. (Entomology) 1970, Zhongshan University, Guangzhou; M.Sc. Insect Pathology) 1984, Zhongshan University, Guangzhou; Ph.D. (Insect Pathology) 1988, Zhongshan University, Guangzhou, China.

Experience: Technician of insecticidal microbe production, Biochemistry factory, Guangzhou, 1970-1972; Teaching Assistant of Entomology, Zhongshan University, Guangzhou, 1973-1979; Lecturer of Entomology, Zhongshan University, Guangzhou, 1981-1988; Visiting Scholar, Kadoorie Agricultural Research Center, University of Hong Kong, 1987; Postdoctoral fellow, Department of Entomology, University of California, Riverside, 1988-1991; Professor of Entomology, and member of Graduate Program in Genetic Engineering, Zhongshan University,



Jenny Cory

Jenny is an entomologist who graduated from the University of Oxford with a Ph.D. on carabid beetles and their role as pest control agents. Jenny moved into invertebrate pathology when she joined the natural environment research council's institute of virology in Oxford in 1984. Her initial work was with Philip Entwistle on the control of forest pests using baculoviruses, but since she took over the ecology and biocontrol group at IVEM she has expanded these interests into baculovirus ecology and the development and risk assessment of genetically modified baculovirus insecticides. The group carried out the first release of a genetically improved baculovirus in 1993. The risk assessment work has taken up a lot of her time over the past few years but the ecological aspects are now being developed more as the underpinning research for expanding the use of naturally occurring and

genetically modified baculoviruses into agriculture and forestry.

Jorge E. Ibarra

Jorge Ibarra is a Professor of the Center for Research and Advanced Studies (CINVESTAV) in Irapuato, Mexico, since 1986, and heads the Laboratory of Bioinsecticides. Jorge is a graduate from the Universidad de Nuevo León (Mexico) (B.S. in Biology, 1976), Colegio Superior de Agricultura Tropical (Mexico) (M.Sc. in Entomology, 1978), and University of California, Riverside (USA) (Ph.D. in Entomology, 1986). His major contributions in Insect Pathology are some of the early studies of mosquitocidal Cry proteins of several Bacillus thuringiensis strains; the most recent studies on the isolation, selection and characterization of Mexican B. thuringiensis, B. sphaericus and baculovirus strains; and lately the Molecular Biology and genetic manipulation of B. thuringiensis and baculovirus. He has held posts in two Mexican and one American entomological societies. He joined the SIP eleven years ago and currently he is a member of the SIP Membership Committee.

CANDIDATE FOR HONORARY MEMBER

Dr. Thomas A. Angus is a renowned insect pathologist whose association with the SIP goes back to its very beginnings. He is a founding member of the Society and served on its Council for six years, culminating in a term as president from 1976 - 1978. He was associate editor of the Journal of Invertebrate Pathology for six years. Tom's preeminence in the



Thomas A. Angus

scientific community and his involvement in the activities of the Society were recognized in the invitation to him to give the Founder's Lecture honouring G.H. Bergold (18th Annual Meeting, Sault Ste. Marie, Ontario, 1985) and in the singular invitation to give the special Jubilee Speech at the 25th Annual Meeting of the SIP (Heidelberg, Germany, 1992).

Dr. Angus has had a distinguished career as a research scientist. He is the author and coauthor of over 60 scientific publications and technical reports on bacterial pathogens of insects, including one that appeared in the very first issue of the Journal of Insect Pathology (forerunner to the Journal of Invertebrate Pathology) in 1959. Many of these papers are today considered milestone advances in the field of insect pathology. His pioneering research on Bacillus thuringiensis has had a direct impact on our understanding of its mode of action and on its development and application as an alternative to conventional insecticides for the control of forest insect pests, particularly the spruce budworm. Dr. Angus was the first to demonstrate the role of the parasporal crystal in the pathogenesis of Bt and to describe a procedure for extracting bioactive toxin from it. In a series of groundbreaking papers, Tom and coauthors A.M. Heimpel and P.G. Fast were the first to show unequivocally that the insect midgut was the primary target of the crystal toxin and to link the

paralysis that occurs in many susceptible insects to alkalization of the haemolymph.

Dr. Angus' expertise and influence have also been felt outside the sphere of the SIP. He is a charter member of the Canadian Society of Microbiology. He was a director of the Entomological Society of Ontario, a member of the International Organization for Biological Control, a consultant to WHO and a member of the governing council of the American Institute of Biological Scientists. In 1978 he was named Fellow of the Entomological Society of Canada, and in 1992 he was awarded an honorary doctorate by Laurentian University, Sudbury, Canada.

In view of his contributions toward the establishment and success of the SIP, his outstanding accomplishments as a research scientist, and the esteem in which he is held by the scientific community, we support the nomination of Thomas A. Angus, Ph.D., D.Sc. (Hon), F.E.S.C., for honorary membership in the Society.

L. Gringorten and K. Aizawa, R. Anderson, J.D. Briggs, D. Burges, J. Cunningham, E. Davidson, N. DuBois, D. Ellar, B. Federici, W. Gelernter, M. Goettel, R. Granados, T. Iizuka, I. Thiery, K. van Frankenhuyzen, M. Wolfersberger, T. Yamamoto, H. Kaya, P. Luthy, C. Payne and D. Roberts.

NEWS ITEMS

Student Award Winners -- Erratum -- 28th Annual Meeting, Ithaca, New York

We inadvertently left one winner off the list published in the last newsletter. In addition to the poster winners listed, please include:

Honorable Mention: R. R. de Moraes, Gainesville, Florida, USA

Again, our sincere congratulations to all winners and our apologies for this error.

John Vandenberg Program Chair, SIP '95.

SIP By-Laws Revision

Our By-Laws are long overdue for revision and overhaul. President Granados will be convening a committee to oversee this process. Any members with a strong interest in serving on the committee should contact President Granados. Any members with comments on current by-laws or suggested revisions should pass these along to one of the By-Laws Committee co-chairs: John Vandenberg (e-mail jdv3@cornell.edu or phone 1-607-255-2456) or Don Roberts (e-mail: dwr2@cornell.edu or phone 1-607-254-1352).

SIP has Home Page on the WWW

One of the initiatives of the new initiatives and membership committees is the development of a home page for our Society on the World Wide Web. Margaret Johnson (AKA Peg) has done the ground work in putting together the prototype for our home page. It's beautiful! Our node resides at the University of Florida in Gainesville. In addition to providing information regarding our Society, the page is intended to promote new membership and inform those who cruise (surf, browse) the web (internet) about invertebrate pathology. Information regarding the table of contents of the latest newsletter, schedule of meetings and an eye catching feature article will be regularly updated. The page is still being developed and we could use your input. So the next time your are getting your cybernetic exercise on the information highway, take a break on the SIP home page. Our address is: http://nervm.nerdc.ufl.edu/~majohn

Please send comments to me by e-mail at: LLACEY@CIRAD.FR

Since the last Newsletter the new initiatives committee has grown and now includes: Bonifascio Magalhaes (Brasilia, Brazil); Isabelle Thiery (Paris, France); Peg Johnson and Jimmy Becnel (Gainesville, FL, USA); and Tracy Johnson (Raleigh, NC, USA).

Lerry Lacey, Chair New Initiatives Committee

End of an Era at Littlehampton

The research institute at Littlehampton which began life as Glasshouse Crops Research Institute and more recently became part of Horticulture Research International closed its doors for the last time in late 1995. For the past 25 years it has had a large and active insect pathology group and it was suggested that I wrote a short article on some of the highlights of those years and the changes that have been taking place.

Glasshouse Crops Research Institute, better known to many simply as GCRI, was opened in 1955 at Littlehampton in an area where there was a large concentration of commercial glasshouses because of the longer hours of winter sunshine enjoyed by that part of the south coast. In the 1960's, the Entomology Department, under the leadership of Joe Hussey, gained a reputation for work on the use of predators and parasites to control major glasshouse pests, particularly the whitefly and red spider mite. Commercial development of the natural enemies followed and a large proportion of the glasshouse industry adopted these control measures. This success led to an expansion of the biological control programme at Littlehampton to include pathogens as well as parasites and predators. Ironically, in view of subsequent government science policy, Margaret Thatcher opened new laboratories at Littlehampton in 1970, to house an expanded Entomology Department. W.A.L. (Anker) David moved from the ARC unit at Cambridge and Denis Burges moved from MAFF laboratories at Slough and soon recruited Paul Jarrett. There had been a small plant nematology section at GCRI previously but this was expanded to include work on entomopathogenic nematodes with the appointment of Paul Richardson in 1971. Entomopathogenic fungi were also taken care of with the appointment of Richard Hall in 1971.

A very significant by-product of this new grouping was the publication in 1971 of "Biological Control of Pests and Diseases" edited by Burges and Hussey. This was so successful that a completely new edition updating the first book was published 10 years later. Anker David retired after six years and a new insect virus group was established under Chris Payne, who moved from the then Unit of Insect Virology at Oxford in 1977. Norman Crook and Mark Tatchell joined the group, the latter only for a couple of years before moving on to Rothamsted but many years later in 1994 he returned to HRI as Head of Entomology.

A large number of students, short term postdoctoral staff and visiting workers have passed through the section in the last 15-20 years making for a lively and stimulating atmosphere. There has, on the other hand, been a relatively low turnover of permanent staff - a good indication that people have been happy working at Littlehampton. Chris Payne became head of department in 1983 and after several other upward moves is now Chief Executive of HRI though as past President of SIP, he still maintains a close interest in invertebrate pathology. Richard Hall moved into industry in 1985 and was replaced by Adrian Gillespie who also moved in the same direction a few years later. Denis Burges officially retired in 1988, but has continued to maintain a close interest in the Bt work and is still a regular participant at SIP meetings. Doreen Winstanley arrived in 1987 to add a cell biologist to the section.

Over the years, there have been many notable achievements, particularly in the number of novel products developed at Littlehampton which reached the market place. Vertalec[™] and Mycotal[™] were based on strains of Verticillium lecanii which gave good control against aphids and whitefly on glasshouse crops. Agree[™] and Design[™] which have recently taken a significant share of the Bt market are based on a transconjugant strain of Bt produced at Littlehampton. Other new Bt strains resulting from a major strain search programme are now at a late stage of commercial development. Two products based on nematodes, Nemasys- H^{TM} and Nemasys- M^{M} have been very successful against vine weevil and other soil and carrot pests and led to the Queen's Award for Environmental Achievement in 1994. At a more fundamental level, the first genetically engineered granulosis viruses were produced at Littlehampton and will hopefully lead to new commercial strains in the future.

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Society for Invertebrate Pathology

One of the highlights of the years at Littlehampton was hosting the International Colloquium on Invertebrate Pathology at the University of Sussex, near Brighton in 1982. It was my first SIP meeting, and getting to know so many people who previously had been only names in the literature was very exciting.

Government policy over the past 10 years on government-funded scientific research has had far reaching repercussions for both research institutes and universities. The number of institutes within the Agricultural and Food Research Council was reduced from almost thirty down to eight. In 1987, GCRI together with the National Vegetable Research Station at Wellesbourne in Warwickshire and East Malling Research Station working on fruit research in Kent, became the Institute for Horticultural Research. Further reorganization followed and an even larger grouping which included three Experimental Horticulture Stations became Horticulture Research International (HRI). It became inevitable that HRI could not sustain three large sites plus several smaller ones and the decision was made to close Littlehampton and move the science programmes to Wellesbourne. Wellesbourne has become the headquarters for HRI and is where most of the basic and strategic science work is now done. A major rebuilding programme has provided extensive new laboratories together with a new library and lecture theatre and other specialised facilities. Most of the existing laboratories together with the insect rearing unit have been refurbished.

Although many people regretted the closing of GCRI. HRI Wellesbourne now offers excellent facilities for all aspects of work from molecular and cell biology to large scale field trials. All the main aspects of insect pathology will continue to be studied by Paul Jarrett, Paul Richardson, Doreen Winstanley, Norman Crook and David Chandler (who has already been at Wellesbourne a few years working on entomopathogenic fungi). I am sure they all join me in inviting anyone who is visiting the UK to visit us in our new home at Wellesbourne - book the theatre too, Stratford-on-Avon is only four miles away.

Norman Crook

The State Key Laboratory for Biological Control (SKLBC) in China

The State Key Laboratory for Biological Control (SKLBC) in China has been established from the original Institute of Entomology at Zhongshan University located in Guangzhou city. SKLBC is a first-class base for biological control research and for student training in China.

The laboratory consists of 3 divisions: insect pathology and bioengineering, natural enemy insect research, and crop-pest-enemy system research, plus an administration office, an electronic microscope lab, and an insectary.

An authoritative academic committee has been established to direct the research orientation and to examine and approve the opening projects. The members of the committee are nominated from wellknown scientists in the related fields in China. The present chairman of the committee is Dr. Deming Su (Fudan University, Shanghai). The director of SKLBC is Dr. Yi Pang (Zhangshan University, Guangzhou).

The research focuses primarily on biological control of agriculture, forest, and medically important pest insects in tropical and subtropical regions. Current research at SKLBC is as follows:

1. Screen and characterization of insect pathogens and their development as biological control agents.

 Bioengineering of microbial insect pathogens and development of genetically engineered bio-insecticides.
 Development, implementation and improvement of integrated pest management strategies with the enhancement of natural enemy's efficiency as the main means.

4. Establishment of computer models for forecasting peak emergence.

5. Development of technologies for beneficial insect cultivation and for their field release.

The 1700 sq. m. lab received an 800 thousand US dollar loan from the World Bank and with that the laboratory purchased 67 sets of new advanced instruments including a DNA synthesizer, gamma counting system, liquid scintillation analyser, protein purification system, computer, refrigerated super speed

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centrifuge, table-top refrigerated centrifuge, DNA thermal cycler. DNA system for measuring, separating, blotting, and hybridization, DNA/RNA sequencing and analysing system, electroporation system, microplate reader, Ultra-low temperature CO2 incubator. freezer dryer, refrigerator, chromatography refrigerator, pure water system, SDS PAGE electrophoresis system, sterilisable-in-place fermenter, and plant growth chamber. The instruments are suitable for investigations in insect pathology, ecology, microbiology, tissue culture, molecular biology, and genetic engineering.

The laboratory is interested in cooperating with the relevant scientific institutions at home and abroad. Scientists, in particular the young, are welcome to work at the laboratory. The laboratory provides facilities and funds for basic research and the fundamentals of applied research in the field of biological control.

Dr. Yi Pang, Director State Key Laboratory for Biological Control Zhongshan University Guangzhou, Guagndong 510275 P. R. China Tel: (20) 418-6300 Ext. 3860 Fax: (20) 418-9173 E-mail: Ls12 @ZSUlink. zsu.edu. cn

MICROBIAL CONTROL NEWS

Organic Coding Moth Control Approved

The only thing worse than biting into an apple and finding a worm is finding half a worm, or so the old joke goes. Now growers have another weapon to keep worms out of their apples. After 14 years of testing, entomologist Louis A. Falcon, UC Berkeley Professor Emeritus, has received federal registration of codling moth granulosis virus for use on apple, pear, walnut an plum trees. It has conditional registration in California and full registration will be sought.

Field tests have shown that with proper application, the baculovirus could control the worms as effectively as chemical pesticides, including the commonly used pesticide azinphosmethyl. And because the baculovirus attacks only a narrow range of species, leaving other insects and spiders alone, applications did not encourage the proliferation of secondary pests such as mites, scale insects and aphids.

Falcon doesn't claim the baculovirus will supplant chemical pesticides, since it is more labor intensive to apply and monitor and more expensive. Rather, he hopes the baculovirus will help cut use of chemical pesticides. Falcon says integrating use of the baculovirus with judicious application of chemical pesticides could keep the moth at very low levels in the orchard.

Currently it is unclear who will produce the baculovirus, which is registered to the University of California and an organic grower group, Association for Sensible Pest Control, Inc. For more information, contact Howard Kaplan at (510) 672-8843 or farmvest@aol.com.

Reprinted from: California Agriculture, Volume 49, Number 5.

Monsanto Receives Final Regulatory Approval for Commercialization of Insect-Protected Cotton

St. Louis, October 31, 1995 Monsanto learned today that its Bollgard[™] gene, which provides cotton plants with season-long, in-plant protection from such major lepidopteran insect pests as the cotton bollworm, tobacco budworm and pink bollworm, has successfully completed the federal regulatory review process necessary for full commercialization.

The notification marks Monsanto's fourth regulatory approval allowing full commercialization of a genetically engineered crop in the past six months."This most recent approval, made by the U.S. Environmental Protection Agency (EPA), allows America's cotton farmers to become the latest extensive plant beneficiaries of Monsanto's biotechnology research programs," said James Tobin, Monsanto Cotton Business Director. "The focus of the company's efforts in cotton has been to provide effective, economical, environmentally-sensitive insect control through the use of naturally-occurring proteins,

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while significantly reducing the need for traditional chemical insecticides."

EPA's registration of the Bollgard gene, the first insect-protection gene to be approved for cotton and only the third for any crop, follows the successful completion earlier this year of regulatory reviews by the Food and Drug Administration (FDA) and U.S. Department of Agriculture (USDA). "The Bollgard gene will be widely available to America's cotton farmers for the 1996 planting season," Tobin said. "The gene has already been incorporated into a number of popular cotton varieties. The technology will be commercially introduced by Delta and Pine Land Company, the leading U.S. cotton seed company. Additional programs to commercialize Bollgard cotton are underway at the Jacob Hartz Seed Company and Stoneville Pedigreed Seed Company, Inc."

Field tests of cotton varieties containing the Bollgard gene have been conducted by Monsanto and its seed company partners throughout the Cotton Belt since 1990. In March 1995, the EPA granted permission to Monsanto to make large-scale plantings of cotton varieties containing the Bollgard gene to produce seed for 1996 commercial sales.

The insect control protein introduced into cotton plants by the Bollgard gene was originally isolated from a specific strain of a natural soil bacterium, *Bacillus thuringiensis* (B.t.). Monsanto has a strong proprietary position in the development of B.t. crops. The genetically-engineered seeds containing the Bollgard gene are covered by Monsanto patents, some of which have been issued, while others are pending.

According to Robert Fraley, president of Ceregen, Monsanto's new plant products business unit, "The application of this technology will help farmers increase productivity, control costs and improve quality, while protecting the environment and contributing to sustainable agriculture."

Other products of Monsanto's plant biotechnology development efforts include the NewLeat[™] potato plant, which does not require chemical insecticides for protection against the Colorado potato beetle. The NewLeaf potato successfully completed the federal regulatory review process in May 1995. That same month, the EPA also approved a label allowing Roundup herbicide to be sprayed over Roundup Ready[™] soybeans during the growing season. These products will also be available in 1996. In addition, Monsanto also received final regulatory approval earlier in October for the use of new gene technology to delay the ripening process in tomatoes.

Additional biotechnology products under development at Monsanto include: cotton, canola and corn tolerant to Roundup herbicide; corn protected against insects; potatoes protected against disease; and high-solids potatoes. Monsanto's agricultural biotechnology provides improvements in quality and yield of crops and benefits the environment where crops are grown. The company has demonstrated a strong record of advancement in biotechnology, extending from fundamental research through product development.

Monsanto Company, based in St. Louis, is a global leader in agricultural biotechnology and in the development and marketing of value-added food and fiber crops.

Gary F. Barton (314) 694-7233

U.S. Regulatory Reform: A Review

In the post-election rush to fulfill a commitment made in the Republican "Contract with America", intended to reduce the intrusion of the federal government into the lives of Americans, the House of Representatives in February passed a measure that would dramatically limit the ability of federal agencies to produce regulations of all types, including the regulation of biotechnology products. The stated purpose of the "Risk Assessment and Cost Benefit Analysis Act" was to provide regulatory reform to focus national economic resources on the greatest risks to human health and safety and the environment, through scientifically objective and unbiased risk assessments and through consideration of the costs and benefits of major rules. The proposed bill would compel federal agencies to conduct elaborate scientific and economic

analyses on any new regulation that would impose a cost upon the U.S. economy of more than \$25 million.

To forestall federal agencies from rushing new regulations into force before a reform bill could become law, the House also passed a short-term moratorium on new regulation. The moratorium has a deadline of the end of 1995 or passage of regulatory reform legislation by both houses of Congress. The House bills were then referred to the Senate where a similar regulatory reform effort was underway. Senate Majority Leader Robert Dole had introduced a bill which closely mirrored the House version except that the cost to the economy trigger for application to all new regulations was set at \$50 million rather than \$25 million. A rival and less stringent bill was introduced by Republicans imposing a cost of \$100 million would be subject to review by Congress and could be rejected.

Currently, the effort by the new Republican-controlled Congress to roll back and control federal regulations through omnibus legislation has stalled in a Senate which cannot yet reach agreement on a legislative package to reconcile with the House bill.

The fact that the direct legislative route has been difficult to use in reforming the federal regulatory structure has not dimmed the enthusiasm or creativity of the zealots of regulatory reform. They have simply changed their tactics and are using spending bills for individual agencies as vehicles for introducing regulatory roll-back measures. For example, 17 deregulation riders have been attached to the Environmental Protection Agency (EPA) spending authorization. President Clinton has threatened to veto the EPA bill if the riders are not withdrawn. However, similar types of anti-regulation riders are hidden throughout the spending bills and many will get through the appropriations process to become law.

While Vice President Gore has accused the Republican controlled congress of launching a "jihad - holy war" on U.S. environmental programs, the Administration has also helped to slow the regulatory reform train by instituting reform measures of its own. On October 23, the public comment period ended on the Department of Agriculture's proposed expansion of its notification procedures covering the introduction of genetically modified plants into the environment, and a simplification of procedures for determining for genetically modified non-regulated status organisms. Measures for implementing the new regulations are being drawn up. These new regulations will save money and time for companies producing transgenic agricultural products without sacrificing the quality of oversight.

The EPA has also moved quickly to grant premarket and market registrations for genetically engineered crop plants. In August, EPA approved full commercial use of insect resistant corn produced by Mycogen and Ciba Seeds. The salient fact is that this transgenic product passed through the approval process at USDA and EPA in less than one year.

For the current session of Congress, it is virtually certain that the push to roll back federal regulation through omnibus legislation is over. However, the business and corporate interests that have provided the muscle for regulatory reform will undoubtedly revisit the issue with the new congress in 1996.

Jay Blowers NBIAP News Report

APHIS Gearing Up to Evaluate Transgenic Insect Releases

Now that the first application to field test a genetically engineered insect has been submitted to USDA/APHIS, a Transgenic Arthropod Team has been formed in the Biotechnology Permits Unit of Biotechnology, Biologics, and Environmental Protection (BBEP), the agency that oversees introductions of transgenic organisms and products for USDA. The Team will be responsible for the development of guidance for the release of genetically modified arthropods into the environment, and the preparation of environmental associated with those releases. documents APHIS/BBEP already provides this sort of guidance to prospective applicants seeking to field test genetically engineered plants and microorganisms under permit or notification. The agency distributes USDA-APHIS Technical Bulletin 1783, "User's Guide for Introducing

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Genetically Engineered Plants and Microorganisms" to help investigators identify potential risks to the environment, and advises applicants concerning the data that must be available for agency review.

With more insect release proposals expected, the Transgenic Arthropod Team is compiling a Bibliography Associated With the Introduction of Transgenic Arthropods, which is publicly available in database format. It currently contains 32 general citations and reviews, 32 references on field evaluations, and 58 titles on laboratory methods. The Team will continue adding relevant publications and expand the database, and encourages others to suggest additional publications that should be included. In addition to the bibliography, the following information on how proposed releases will be reviewed is available on the BBEP homepage:

(http://www.aphis.usda.gov/bbep/bp).

The evaluation process first considers what the risks would be if the introduced organism was not transgenic. The analysis at this point would be the same as for the introduction of a classical biological control organism and would require such information as: (1) phylogenetic position of the organism and characteristics of near relatives, (2) geographic origin and range, to include temperature and relative humidity tolerances and diapause attributes, (3) host and habitat preferences, (4) dispersal characteristics, (5) life table attributes, (6) interactions with other species, and (7) the relationship between the organism and currently employed pest management strategies.

The evaluation process would next consider whether the genetic alterations have altered the risks associated with the unmodified organism. The fundamental risk assessment issue to be addressed is: Will the genetic alteration modify ecologically or environmentally relevant properties of the organism? To properly address this issue, APHIS would need to consider such information as: (1) how the recipient organism was transformed through recombinant DNA technology, to include characteristics of the donor, vector, and recipient organisms and a description of the methods employed, (2) the characteristics of the modified organism, to include the stability of the new genotype and the probability of gene transfer to other organisms, (3) potential impact of the transgenic arthropod on native populations, communities, and ecosystems, and
(4) methods for evaluation of the safety of the transgenic organism in field trials before unrestricted release.

In summary, the APHIS evaluation process would basically consider the attributes of the unmodified organism, the attributes of the genetic alteration, the phenotype of the modified organism compared to the unmodified organism, and the attributes of the accessible environment. Only after sufficient information is provided in these four areas of concern will APHIS be able to determine the appropriateness of a release into the environment.

APHIS welcomes comments at any time concerning the present and future regulation of transgenic arthropods. These comments can be directed to: Dr. Orrey P. Young at oyoung@aphis.usda.gov or at (301) 734-8565 (voice) or (301) 734-5992 (fax).

From NBIAP News Report

Ecogen Renegotiates European Research Contracts and Streamlines its Research & Development Efforts

Langhome, PA, October 30, 1995 Ecogen Inc. today announced it has finalized an agreement to terminate its European research and development agreements with 3A S.r.l., an Italian corporation with whom the company operated an R & D joint venture company. Under the terms of the agreement, Ecogen will no longer be obligated to conduct and fund certain research jointly with 3A in Europe while retaining rights to the technology developed.

"Divesting our research and development arrangements in Europe is another step in our strategic plan to improve and streamline operations as we progress in our transition from a research and development company to a market-driven business," said Jim Reilly, Ecogen's President and Chief Executive Officer. "Although we are exiting our research facilities in Europe, we will retain the rights to continue development of the technologies and to market our current and future product line throughout Europe, except for certain nematode technology which has been licensed to 3A on an exclusive basis in their territory."

Ecogen and 3A had formed Ecogen Europe S.r.l. in 1992 to conduct research and development activities in a facility owned by 3A in the Umbria region in Italy. The Company has chosen to exit its research facilities in Europe because progress to date has not justified additional investment. Under the terms of the agreement, 3A becomes the sole owner of Ecogen Europe, which has been renamed. As part of the transaction, Ecogen received reimbursement of amounts it had invested in Ecogen Europe. Ecogen expects to record a gain on the transaction. Further, Ecogen no longer has a \$5.6 million commitment to fund research in Europe. Ecogen also closed its other European research laboratory located in Germany.

"Reducing our research and development expenditures in Europe will allow us to focus our resources in North America, our primary market area," said Mary Paetzold, Vice President and Chief Financial Officer of Ecogen. "Eliminating these two laboratory facilities will help us toward our goal of a lower research cost structure that can be funded by product t sales without adversely impacting the prospects for success of the continuing development of our core technologies."

Restructuring the research group will have other advantages, according to Dr. Leigh English, Ecogen's Vice President of Research. "Ecogen has consolidated its research group into two locations, Langhorne for bioinsecticides including Bt, pheromone and nematode research, and Israel for disease control. With the restructuring of the 3A agreement and an additional laboratory closing in Germany, we are streamlining our research operations to two labs from five, and hope to achieve greater synergies among the groups. Further, housing research in the same facility as process development and formulations should help us to continue to develop improvements to the cost of manufacturing our products."

Ecogen is developing and marketing several proprietary biopesticides, including: Aspire[™] for postharvest rot, AQ-10[™] biofungicide for control of powdery mildew on grapes; Cutlas[®] bioinsecticide for

vegetables, and tree, nut and vine crops; Condor[®] bioinsecticide for row crops; Condor G for European corn borer; nematode-based Cruiser[®] bioinsecticide; Raven[®] bioinsecticide for control of Colorado potato beetle on potatoes, and pheromone-based Bee-Scent[®] and No-Mate[®] products. Additional biopesticides under development include: products for corn, other vegetables and fruit crops, home and garden and ornamental uses.

To access Ecogen's news releases by fax, 24 hours a day, call toll-free 1-800-758-5804 ext.104610.

Ecogen Signs \$25 Million Deal With Monsanto -Two Firms to Collaborate in Development of Bt Technology-

Langhorne, PA, November 3, 1995. Ecogen Inc. today announced that it has signed a letter of intent with Monsanto Company for a major strategic alliance to develop Ecogen's proprietary *Bacillus thuringiensis* (Bt) technology for in-plant applications. This deal, worth \$25 million, is subject to completion of definitive agreements and necessary corporate approvals, and is expected to close in early 1996.

"We believe that aligning with Monsanto, one of the leaders in transgenic plant technology, along with Ecogen's proven Bt research is a positive synergy for ag biotechnology," said Jim Reilly, Ecogen's President and CEO. "Our collaboration with Monsanto enables Ecogen to focus on Bt bio-insecticides while Monsanto obtains rights to our Bt technology for in-plant applications. This agreement capitalizes on our ongoing research and allows Ecogen to exploit its Bt gene library in an area that we are not presently pursuing."

Monsanto acquires rights to Ecogen's Bt gene library of more than 10,000 strains, which is one of the world's largest, and will have exclusive worldwide rights to develop the Bt genes for in-plant technology. Ecogen will retain its exclusive rights for Bt development in all other areas and will have unrestricted rights to the technology that is developed under the Monsanto agreement for use other than in plants. Under the agreement, Monsanto will provide

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\$25 million to Ecogen - \$5 million will be received in upfront payments to acquire rights to Ecogen's technology associated with its Bt library; \$10 million for the purchase of equity securities at a price the greater of \$2.12 per share of 85 percent of the 60-day average closing price of Ecogen's common stock prior to closing; and \$10 million in a four-year research contract. Further, the Company has the potential for profit participation in seeds developed and commercialized with Ecogen's technology.

"The relationship with Ecogen provides us access to one of the largest and most diverse Bt gene libraries in the world", said Robert Fraley, President of Monsanto's Ceregen unit, responsible for the development of new agricultural products. "Even more exciting is the extraordinary progress Ecogen has made in understanding how Bt genes work to control insect pests. They have developed proprietary approaches for enhancing Bt gene activity through sophisticated molecular techniques."

"From a financial perspective, the alliance with Monsanto is very positive for Ecogen, and will greatly strengthen our balance sheet," said Mary Paetzold, Vice President and Chief Financial Officer of Ecogen. "The terms of the letter of intent provide for Ecogen to receive \$18 million over the next three months, giving Ecogen the financial strength to continue to develop and introduce its biopesticide product lines.

"Because of the scientific synergies between Monsanto and Ecogen across two different disciplines, we will now see full implementation of Ecogen's Bt technology in both biopesticides and plant transformation," said Dr. Leigh English, Ecogen's Vice President of Research. "Bt technology, which is Ecogen's foundation, is important to the agricultural biotechnology industry, and this alliance will allow new applications to be developed using our most advanced science".

Monsanto, based in St. Louis, MO, is an \$8 billion global corporation dedicated to developing ideas, technologies and products that improve the quality of life. Its diverse portfolio includes agricultural products, performance chemicals, pharmaceuticals and food ingredients. Ecogen is developing and marketing several proprietary biopesticides, including: Aspire[™] for postharvest rot, AQ10[™] biofungicide for control of powdery mildew on grapes; Cutlass[®] bioinsecticide for vegetables, and tree, nut and vine crops; Condor[®] bioinsecticide for row crops; Condor[®] G for European corn borer; nematode-based Cruiser[®] bioinsecticide; Raven[®] bioinsecticide for control of Colorado potato beetles on potatoes, and pheromone-based BeeScent[®] and No-Mate[®] products. Additional biopesticides under development include: products for corn, other vegetables and fruit crops, home and garden and ornamental uses.

Michele Helm Noonan/Russo Communications, Inc. (212) 696-4455 ext. 225

To access Ecogen's news releases by fax, 24 hours a day, call toll-free 1-800-758-5804 ext. 104610.

EPA and USDA Join With Others To Promote Safer Pesticide Technologies Here and Abroad To Control Colorado Potato Beetle

October 27, 1995 EPA and the U.S. Department of Agriculture (USDA) have entered into a partnership with a number of private businesses, the National Potato Council and the New Jersey Department of Agriculture, and government and private institutions in Poland and the Czech Republic to introduce and demonstrate here and abroad the effectiveness of the latest biocontrol technologies available in integrated pest management programs for controlling the Colorado Potato Beetle, a significant insect pest on potatoes. The project is part of the Administration's Environmental Technology Initiative to promote the use of safer innovative environmental technologies here and abroad. As part of the project, field demonstration plots will be set up in 1996 in Poland, the Czech Republic and in the United States (USDA Beltsville, Md. research laboratory) to encourage growers, producers. cooperatives, small farmers and government agencies in the use of safer alternative pest control strategies to control the potato beetle. Funding for the project includes \$215,000 from EPA and

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Other members of the \$70,000 from USDA. partnership include: BIOSYS, INC., Palo Alto, Calif; Entotech, INC., Davis Calif., Mycotech Corp., Butte, Mont.; Beneficial Insectary, Oak Run, Calif.; Bio Base Technologies, Inc., Landesbury, Pa.; Potato Research Institute, Bonin, Poland; Plant Protection Institute, Poznan, Poland; and Potato Research Institute, Havlickuv Brod, Czech Republic. The Colorado Potato Beetle is the most important insect pest on potatoes in Central and Eastern Europe, causing significant crop loss and reduced production each year. Resistance of the beetle to traditional chemical pesticides is increasing. The region has an urgent need to find alternative methods for controlling this pest. The United States will benefit both from the development and sharing of information on safer, effective methods of pest control, and from the transfer of United States technology to Central and Eastern Europe. The project was chosen for the Environmental Technology Initiative through a competitive, peer reviewed process.

Al Heier United States Environmental Protection Agency Communications, Education, and Public Affairs (202) 260-4374

EPA Enters into Agreement with National Foundation for IPM Education to Further Development of Biological Pesticides

EPA has awarded \$50,000 to the National Foundation for IPM Education to stimulate the research, development, availability and commercialization of biological pesticides which pose less risk to public health and the environment. Biological pesticides include microbials and biochemicals that have nontoxic modes of action and consequently pose little or no risk to human health or the environment. The project was selected for funding under EPA's Environmental Technology Initiative through a competitive, peer reviewed process. Biological pesticide producers may be reluctant to engage in new product development because of regulatory requirements and uncertainty governing the testing and registration of biological pesticides. Under terms of this new project, the National Foundation for IPM Education of Austin, Texas, will assist EPA in addressing the concerns of the pesticide producers as well as users by working with them to help define produce development needs and streamlining the registration process for new, safer pesticides.

Al Heier United States Environmental Protection Agency Communications, Education, and Public Affairs (202) 260-4374

Mycotech Expands Production Capability

Mycotech Corporation, Butte, Montana recently achieved another milestone in commercially developing fungal bioinsecticides. In October, the company broke ground on a \$3.6 million plant to produce Mycotrol[®] *Beauveria bassiana*-based products. In March this year, Mycotech was awarded US EPA registration of *B. bassiana*-based formulations for controlling homoptera and for controlling grasshopper and locust. During the summer and fall, Mycotech working with USDA ARS (Weslaco, TX) and USDA APHIS (Phoenix, AZ), successfully completed an initial series of commercial field trials.

Mycotech uses proprietary solid culture technology to produce stable, high concentration conidia preparations of Deutromycete entomopathogens such as *Beauveria*, *Metarhizium* and *Paecilomyces*. The company currently operates a pilot scale *B. bassiana* production plant with an annual capacity to treat about 8,000 hectare at an application rate of 2.5×10^{13} conidia per ha (20,000 acres at 1×10^{13} conidia per acre). When completed in mid-1996, the new commercial plant will have an annual capacity of 200,000 treatment hectares. The plant design allows for future additions of culture capacity to bring the total up to 600,000 treatment ha per year at the Butte site.

During the spring of 1996, Mycotech will work with USDA and private cooperators in the US and Mexico to conduct a series of commercial demonstrations of whitefly control in vegetables and melons. Mycotech will also conduct limited trials against other target

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insects in other crop systems. The company plants to continue grasshopper control programs with USDA as well as locust programs with US AID, Agriculture and Agri-Food Canada, Montana State University and the governments of Madagascar and Eritrea.

With completion of the new production plant in mid-1996, larger quantities of Mycotrol will be available for whitefly control of fall vegetable and melon crops.

Cliff Bradley Director of Research Mycotech Corporation, Butte, Montana Fax: 406 723 8007

MEMBERS ON THE MOVE

Richard A. Daoust has recently relocated back to Ecogen Inc's. corporate headquarters in Langhorne, Pennsylvania as one of Ecogen's four new Business Directors. Richard will be responsible for the turf, ornamental, greenhouse and homeowner markets in North America and for all markets for Ecogen's products in Europe and the Middle East.

Over the last two years, Richard served as General Manager at Ecogen Europe, an R & D joint venture company between Ecogen Inc. and the Italian corporation 3A S.r.l. located in the Umbria region of Italy. Ecogen has recently finalized an agreement to terminate its agreement with 3A S.r.l. and exit its research facilities in Italy. Under the terms of the agreement, Ecogen will no longer conduct and fund certain research jointly with 3A but will retain rights to the technology developed through the joint venture over the last several years. Richard will also be responsible for Ecogen's entomopathogenic nematode business worldwide. Richard's new address is:

Ecogen Inc. P.O. Box 3023 2005 Cabot Blvd. West Langhorne, PA 19047-3023 Ph: (215) 757-1590 Fax: (215) 757-2956

Dr. Jane Drummond returned this year from a sailing voyage across the Pacific ocean, Panama to New Zealand. On each of the many islands visited en route she conducted a foray in search of entomopathogenic fungi. Just as Harry Evans recommended - 'try the Scelesia forest on the Galapagos' ... and yes indeed a fungal epizootic (unid.sp - brown floccose filamentous, attacking a leaf feeding hemipteran host). Many of the South Pacific Islands have an ideal climate and (unfortunately) increasing host range for entomogenous fungi. Most promising were the Polynesian islands: On Bora Bora, Aschersonia was conspicuous on whitefly scales and inland Tahiti a white filamentous fungus (Verticillium?) attacking adult bugs. On Tonga, Cordycepshad been observed by research staff at Vaini Research Station but not on this occasion; many thanks for the assistance of CSIRO entomologist Wilco Liebregts. The high rainfall year-round in the southern part of the Fijian island Viti Levu is ideal for the use of fungi for insect control in this agricultural region. Again, no epizootics were observed on this occasion but entomologist Sada Lal (Koronivia Research Station, Nausori) was optimistic about the use of Metarizium anisopliae for the control of rhinoceros beetle. Detailed information on the use of entomopathogenic fungi (in addition to other microbial pathogens) for the control of insect pests of the Pacific region is available in "Biological Control - Pacific Prospects" by D.F. Waterhouse & K.R. Norris (Inkata Press, Melbourne).

Jane, now back on terra firma in Australia has taken up a new position in the Cooperative Research Centre for Food Industry Innovation where she is working on process design and development of microbial fractionation products. Jane's new address is:

Department of Biotechnology The Univeristy of New South Wales, Sydney 2052 Australia EMAIL: J.Drummond@UNSW.edu.au Fax: 61-2-385 1015 Ph: 61-2-385 1014

Sue MacIntosh has joined Plant Genetic Systems (America) Inc. (Des Moines, IA) as their Regulatory Affairs Manager. PGS America was recently

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established as a wholly owned subsidiary of Plant Genetic Systems International N.V., an agricultural biotechnology company. The primary focus of PGS is the application of crop hybridization technologies (pollination control) and insect control products for the European, North American and Asian markets. Sue was previously with Novo Nordisk Entotech (Davis, CA), which was recently purchased by Abbott Laboratories (Chicago, IL). She serves as chairperson of the Bt Management Working Group, an international corporate group created to promote the use of Bt -based products within integrated pest management systems. Sue's new address is:

Plant Genetic Systems (America) Inc. 7200 Hickman Road Suite 202 Des Moines, Iowa 50322 Ph: (515) 276-6642 Fax: (515) 278-8054 Email: suemac94@aol.com

With the closing of the Glasshouse Crops Research Institute, Horticulture Research International (HRI) at Littlehampton, Paul Jarrett, Paul Richardson, Doreen Winstanley and Norman Crook recently joined their colleague David Chandler (who has already been at Wellesbourne a few years working on entomophathogenic fungi) at Wellesbourne, which has become the headquarters for HRI (see related article on page 21).

Their new address is:

Horticulture Research International Wellesbourne Warwick, CV35 9EF, U.K. Tel: (44) 1789 470382 Fax: (44) 1789 470552 E-mail: Norman.Crook@BBSRC.AC.UK

Ray(mond) Carruthers has moved again!!! Although he is still working for the US Department of Agriculture (USDA), Agricultural Research Service (ARS), he has moved from Weslaco, Texas to Beltsville, Maryland. Prior to moving to Texas in

1991, Ray lived in Ithaca, NY for 10 years where he worked both for USDA-ARS (1985-1991) and Cornell University (1981-1985). After spending four + years in southern Texas, Ray accepted a position at ARS headquarters to become the National Program Staff Leader for Biological Control. Although this position is not new in ARS, it has not been filled for several years. With increasing interest in biological control at the national level, USDA decided that it needed to increase activity and focus in this area and thus have asked Ray to help provide this coordination. Ray will be working both with ARS Scientists and non-ARS cooperators on enhancing biological control research and implementation programs. In addition, Ray now serves on several national committees that work to coordinate not only biological control activities but also IPM programs for federal, state and local groups.

Ray's new address is:

USDA/ARS/NPS Bldg. 005 Rm.220 BARC West Beltsville, MD 20705 USA Tel: (301) 504-5467 Fax: (301) 504-5930

On 1 May, 1995, John C. Harshbarger moved along with the Registry of Tumors in Lower Animals from the National Museum of Natural History, Smithsonian Institution, to Ross Hall at the George Washington University Medical Center. Ross Hall is easily accessible and is located adjacent to the "Foggy Bottom" Metrorail Station and is diagonally across 23rd Street, N.W. from the George Washington University Hospital.

John's new address:

Registry of Tumors in Lower Animals Department of Pathology, Ross 520 George Washington University Medical Center 2300 I Street, N.W. Washington, DC 20037 USA Tel: (202) 994-1056 Fax: (202) 994-2618 January 1996

PUBLICATIONS

Bacillus sphaericus Mechanism and Application as a Mosquito-Larvicide

In the last Newsletter, we reported on this book edited by Yongmei Zhang. An SIP Member has brought to our attention that we should mention that this book is written in Chinese.

Managing Pest Resistance to *Bacillus thuringiensis*: NBIAP News Report Special Issue on Bt

The December issue of the NBIAP News Report is devoted to the subject of managing pest resistance to *Bacillus thuringiensis*, an effective and safe biological pesticide commonly referred to as Bt. Crops genetically engineered with Bt toxin genes for protection against insect pests have the potential to reduce chemical pesticide use, thereby lowering the environmental and human health costs engendered by toxic compounds, and to lower production costs. At issue is whether widespread planting of these crops will hasten the development of insect populations that are resistant to Bt, resulting in the loss of this valuable and environmentally benign pesticide.

People in academia, industry, government, and farming were asked to comment on the issue of pest resistance to Bt and how best to preserve the utility of Bt as a biological pesticide. Collectively, their articles describe current thinking with respect to the potential risk, the various approaches to risk management, and what constitutes appropriate regulatory oversight.

The News Report begins with three articles that provide background information and define the issue: - Bt insecticidal proteins and how they work

- The basis for Bt resistance and overview of management strategies

- The role of EPA in pesticide resistance management

The next four articles offer industry views and resistance management plans for three Bt products, and describe an industry-wide consortium formed to promote responsible use of Bt products.

- NewLeaf potatoes from Monsanto Co.
- Maximizer corn from Ciba Seeds
- Raven microbial strain from Ecogen, Inc.

- Bt Management Working Group

The last four articles look at the future of Bt products from different perspectives - financial, ecological, and technological points of view are presented.

- Business report and market analysis
- Organic farmers' perspective
- Gene pyramiding strategy
- The next generation of insect resistant crops

Pat Traynor Information Systems for Biotechnology Tel: 540-231-2620 Email: traynor@nbiap.biochem.vt.edu

The NBIAP News Report is compiled by NBIAP's Information Systems for Biotechnology, a joint project of USDA/CSREES and the Virginia Polytechnic Institute and State University.

Information Systems for Biotechnology, 120 Engel Hall, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0308, Tel: (540) 231-3747, Fax: (540) 231-9070, E-mail: nbiap@vt.edu

For Internet access to the News Report, textfiles, and databases use one of the following procedures:

- 1. Through WWW: http://www.nbiap.vt.edu/
- 2. Use telnet or gopher to connect to ft.nbiap.vt.edu

3. Use ftp to connect to ftp.nbiap.vt.edu. Use "anonymous" as your user-id, your E-mail address as your password, Type "cd pub/nbiap".

To have the News Report automatically E-mailed, send an E-mail message to news@nbiap.biochem.vt.edu and type SUBSCRIBE NEWSREPORT in the message section.

"Microbial Control Agents in Sustainable Agriculture, Field Experience, Industrial Production and Registration"

The Proceedings of this meeting held 18 & 19 October, 1995 in Saint Vincent, Italy, (222 pp.) are available for distribution at the price of 80.000 Lira. Please make cheques payable to M.A.F. servizi S.r.l. Send order to:

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M.A.F. servizi s.r.l. Via Vico, 7 10128 - Torino Italy Fax: 39.11.50.59.76.

HALF PRICE SALE! MONTPELLIER ABSTRACTS

Abstracts and Proceedings from the VIth International Colloquium on Invertebrate Pathology and the IInd International Conference on *Bacillus thuringiensis* are available by sending a cheque or money order made out to the "Society for Invertebrate Pathology" in US currency to SIP, FASEB, C/O Delores Frances, 960 Rockville Pike, Bethesda, Maryland, 20814 USA.

Handling, processing and mailing fee is \$U.S. 9.00 for mailing in North America and \$U.S. 13.00 for mailing overseas. Upon payment of the above fee, the costs are as follows:

Abstracts free for members in good	od standing in
1994.	
Abstracts for non-members in 1994.	\$12
Proceedings	\$12

If both Proceedings and Abstracts are ordered at the same time, the handling fee remains the same.

POSITIONS AVAILABLE

Assistant Professor: Forest Entomology; Dept. of Entomology, Univ.of Kentucky; Ph.D.; Prefer postdoc. experience and evidence of success in grant support. Position is full-time, 12 month, tenure track appointment; 20% teaching, 80% research, salary commensurate with experience. Develop/maintain a nationally recognized research and teaching program. Research expertise involving biology and management of economically important forest insect pests preferred. Establish vigorous research program, compete for extramural funding, train M.S. and Ph.D. students, teach Forest Entomology and develop a graduate level course. Send letter of application, CV, transcripts, statement of research and teaching interest and philosophy, reprints, and request that 4 letters of reference be sent by Feb. 15, 1996, to:

B.C. Pass Dept. of Entomology Univ.of Kentucky, Lexington, Ky 40546-0091 USA

The University of Kentucky is an equal opportunity/affirmative action employer.

Post-Doc, Formulation: Available immediately. One year appointment through Bradley University to conduct research on formulation of biological and chemical pest control agents utilizing polymeric encapsulation technology. Multidisciplinary approach including laboratory, greenhouse, and field evaluation of candidate novel formulations. Screening of applicants will begin February 15 and continue until a suitable applicant is identified. Submit applications including CV, list of publications, and names of at least three references to:

M. R. McGuire USDA/ARS 1815 N. University Peoria, IL 61604 Tel:(309) 681-6595, Fax: (309) 681-6693 E-mail: mcguirmr@ncaurl.ncaur.gov.

Bradley University is committed to cultural diversity and is striving to maintain and enrich its cultural, racial, and ethnic communities. It is expected that the successful candidate shares in this commitment. AA/EOE

FUTURE MEETING AND WORKSHOP ANNOUNCEMENTS

1996 Summer Workshop in Microbial Physiology (SWMP '96), The University of Georgia, Athens, Georgia, August 7-30, 1996

This intensive 4-week laboratory course will provide practical hands-on experience in the basic techniques for: 1) study of microbial metabolic processes; 2) genetic manipulation of prokaryotes; and 3) product recovery from large scale cultures of miccroorganisms. A case method approach will be used and two diverse microorganisms will serve as model systems. All with both model will work participants microorganisms, and visiting experts will present both didactic lectures and state-of-the-art research seminars on the target microorganisms and their relatives. The goal of the workshop is to provide participants with information and skills which they can generalize to the study of other microbes of specific interest to them in their own work.

Course leaders include Drs. Anne O. Summers, Michael J. Adang, and Lawrence J. Shimkets.

LABORATORY WORK

Model System: Myxococcus xanthus

Isolation of myxobacteria from soil samples, extraction and assay of myxobacterial antibiotics, isolation of M. *xanthus* mutants, cloning and mapping of mutant alleles, time lapse video microscopy, enzyme assays.

Model System: Bacillus thuringiensis

Cultivation of Bt, identification of crystal protein genes by polymerase chain reaction, cloning and expression of crystal protein genes, purification and analysis of crystal proteins, bioassays for toxicity of crystal proteins.

The workshop is sponsored by the NSF Research Training Group in Prokaryotic Diversity, UGA, Athens, Georgia.

Fees: \$400 for academic and government participants and \$1000 for participants from industry which covers lodging, meals, and all social functions. Application deadline: March 15, 1996. For applications contact:

Robin Krause University of Georgia Dept. of Microbiology 527 Biological Sciences Bldg. Athens, GA 30602-2605 Phone (706) 542-2045, FAX (706) 542-2674 Email: mibrtg@uga.cc.uga.edu

V SICONBIOL, Iguazu Falls, Brazil, 9 - 14 June, 1996

The 5th Symposium of Biological Control (V SICONBIOL) will be held at the Rafain Palace Hotel in Foz do Iguacu (Iguazu Falls). Approximatey 700 participants are expected. Presentations at the conference and several symposia are by invitation only and will cover several topics in biological control (parasitoids, predators, entomopathogens against insects, diseases, weeds and vectors of veterinary and medical importance). Contributed papers are welcome, and will be presented as posters. Deadline for submitting abstracts is March 31. For more information, please contact:

Dr. Flavio Moscardi EMBRAPA - CNPSO CP. 231 Londrina 86001-970 Parana Brazil Tel: (43) 320 4166 Fax: (43) 320 4186 Email: moscardi@cnpso1.embrapa.anpr.br

Technology Transfer in Biological Control: From Research to Practice, Montpellier, France, September 9-11, 1996

(Note: This conference takes place the week following the SIP meetings in Cordoba)

The Council of the global IOBC is organizing an International Conference devoted to the various aspects of the biological control of pest organisms. The Conference will emphasize technology transfer. This will be addressed within the general framework of integrated pest management (IPM) to include all animals, plants and microorganisms considered as noxious in terms of agriculture, horticulture, forestry, nature and water reserves, human and animal health.

The objectives of the Conference will be (a) to demonstrate the effectiveness of biological control using an array of reliable examples; (b) to document the importance of biological control in developing IPM programs and sustainable land use: and (c) to identify major problems in implementing biological control.

The problems of technology transfer in biological control (from research to practice) will be considered under five main themes, i.e. production, delivery, extension, evaluation, and public policy. Leading research scientists have accepted to deliver keynote addresses on each of the main Conference themes.

Based on the responses received to the first announcement, the following symposia are being organized:

- * Production of biopesticides
- * Public and private sector cooperation in mass-rearing
- * Post-harvest fruit diseases
- * Biological control of Bemisia tabaci

*Commercialisation of insect viruses and expression systems

* Novel delivery systems for application/introduction of weed and insect pathogens

* Biological control of soil-borne nematodes and diseases

* Evaluation of efficacy of biological control

* Locust and grasshopper control

*Production of biological control agents in resourcepoor regions

* Use of pheromones in biological control

* Biological control of plant diseases : strategies and implementation

* Problems of production, sale, and distribution of biological control agents

- * Influencing public policy on use of biopesticides
- * Genetic resources in biological control

* Regulatory aspects

A special volume of Abstracts will be produced for the Conference. For each category of contribution, a one page abstract should be submitted before April 30, 1996.

For further information contact: J.P. Aeschlimann / M. Puygrenier CSIRO Biological Control Unit, Campus de Baillarguet 34980 Montferrier-sur-Lez, France Fax: (33) 67 59 90 40 E-mail: aeschlim @ cypres . montpellier . inra . fr

20th International Congress of Entomology, Florence, Italy, August 25-31, 1996

(Note: This conference takes place the week prior to the SIP meeting in Cordoba)

Contact: Organizing Secretariat, O.I.C., Viz A. La Marmora, 24, 50121 Florence, Italy. Tel: ++ 39 55 5000631 Fax: ++39 55 5001912

PAST MEETINGS AND WORKSHOPS

Second International Symposium on Entomopathogenic Nematodes and Their Symbiotic Bacteria

This meeting was held at The East-West Center, University of Hawaii, Honolulu between October 15 and 17, 1995. Scientists from 5 continents representing 15 countries participated in the symposium. Internationally recognized scientists spoke on controversial and critical issues in the discipline of Entomopathogenic Nematology. Speakers and their topics were Raymond Akhurst, Australia on the progress in entomopathogenic nematology since the First International Symposium held in 1989; Thomas Powers, USA on nematode taxonomy; Noel Boemare, France on bacterial symbionts; Peter Smits, The Netherlands on nematode biology; Itamar Glazer, Israel on genetics; Edward Lewis, USA on behavior; Christine Griffin, Ireland on ecology; Parwinder Grewal, USA on quality; Donald Strong, USA on host specificity; David Shetlar, USA on implementation, and Robin Bedding, Australia on future directions. Each speaker also served as the moderator for the ensuing discussion that followed each presentation. A number of controversial and critical issues were covered and summarized. Individuals wishing a copy of the abstracts of the speakers and the summary of the issues can request them from Randy Gaugler, Department of Entomology, Rutgers University, New Brunswick, NJ 08903, USA.

January 1996

The organizers thank the generous support from the National Institute of Biological Control and the following commercial companies and/or research organizations: biosys, Ciba-Geigy, Ecogen, Kubota Corporation, Microbio, Ocean Spray, Sandoz, Scotts, SDS Biotech, and Zeneca. Special thanks are extended to Lynn LeBeck who served as Local Arrangement Chair and did an excellent job in arranging all aspects of the meeting.

The Third International Symposium on this subject will be held in the year 2000 at a site to be selected.

Randy Gaugler, Rutgers University Harry K. Kaya, University of California at Davis. Co-organizers



Figure 1. Left to right: Randy Gaugler, Lynn LeBeck and Eizo Kondo.



Figure 2. Left to right: Front Row: Dawn Gouge, and Mary Barbercheck. Back Row: Peter Gothro and Albrecht Koppenhöfer

MEMBER NEWS

Lawrence A. Lacey of the USDA's European Biological Control Laboratory, Montpellier, France was recently elected as the Entomological Society of America's Secretary-Elect, Section-C (this section includes microbial control). Also, in February 1996, Lerry will receive the Alumni Public Service Award from the University of California, Riverside in recognition for his contributions to medical entomology.

Michael R. McGuire has recently been named as Research Leader of the newly formed Bioactive Agents Research Unit located at the USDA-ARS National Center for Agricultural Utilization Research Center. In addition to his previous research project on formulation of microbial pesticides, the new unit will conduct research on mycotoxins produced by *Fusarium* spp., chemical ecology of Nitidulid beetles, and discovery and identification of novel plant derived chemicals with pesticidal or other biologically active attributes. Dr. McGuire can be reached at:

1815 North University St. Peoria, IL 61820 Tel: 309-681-6595 Fax: (309) 681-6693 E-mail: mcguirmr@ncaur1.ncaur.gov

Mir S. Mulla, Professor of Entomology at the University of California, Riverside, was honored as a Fellow of the Entomological Society of America at their recent meeting in Las Vegas, Nevada. Dr. Mulla was cited for his distinguished research record focused on the biology, ecology and control of arthropods of medical and public health importance. His research has resulted in the publication of 460 peer reviewed and technical papers, one book, and three invited chapters. His research has been instrumental in the development of practical control strategies for a number of noxious insects and disease vectors.

President **Robert R. Granados** is the 1995 recipient of the Entomological Society of America Recognition Award in Entomology. A leader in invertebrate cell culture and baculovirus biotechnology, Granados has pioneered technologies which will significantly impact

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the greater use of baculovirus insecticides for pest management. Bob has identified a novel family of baculovirus-encoded gene products, "enhancins", which can synergise the activity of other insect-pathogenic microorganisms. His research in insect cell culture also has far-reaching implications for use in agriculture, entomological sciences, and human health. He has developed novel insect cell lines which are superior producers of virus biopesticides and recombinant proteins. Over nine patents have been issued or are pending on these technologies, and several licensing agreements have been brokered for their commercial use.

EDITOR'S NOTES

Newsletter Mailing. In an effort to improve our delivery of the Newsletter in a timely, yet most economical manner, this issue of the Newsletter is being sent to U.S. members under a bulk rate mailing. U.S. residents, please inform me if you receive this Newsletter later than mid-February. Once again this issue is being selectively air mailed to other areas. Please send me a short Email or postcard if it arrives after February 28, 1996.

Acknowledgements. Many thanks to all of you who submitted material in a timely manner. This issue took an extra effort as the French postal service went on strike for 3 weeks in December. Thank you for the special effort it took many to get things to me by courier or through travelling colleagues.

Deadline for next issue. Please submit all material by May 15, 1996 for publication in the June, 1996 issue.

SIP LOGO CONTEST

DEADLINE EXTENDED

\$US 250 prize for winning entry!

At the Ithaca meeting, Council decided that its time SIP adopted a new logo. Here is your chance to design it and make money too! The logo can be in color but should also be easily reproduced in black and white and should be appropriate for use in letterhead etc. Send your submissions by **15 May**, **1996** to Dr. James Becnel, MVERL, P. O. Box 14565, USDA/ARS, Gainesville, FL 32604. Phone: 904-374-5961 Fax. 904-374-5922. EMail: JBECNEL@nervm.nerdc.ufl.edu.

Good Luck

SIP reserves the right not to accept any of the submissions.



 Bryan Severyn; 2) Nguya Maniania; 3) Ray St Leger; 4) Bill Moar; 5) Ann Hajek;
 6) Dawn Gouge; 7) Judy Pell; 8) Min-Ju Chang MORE PHOTOS FROM ITHACA



9) Ray Carruthers and Matt Thomas (" Don't worry Mark, we'll get that manuscript done for you!"); 10) Wayne Brooks and Ann Cali; 11) Mike Bidochka; 12) Aris Domnas ("Give me a Maine lobster and I'm in heaven!");
13) Marty Erlandson and Suzanne Bjornson; 14) Sergio Alves; 15) Ke Luo, LiYoung Wang, Mrs. and Mr. Xinpei Huang; 16) Brian Federici and Jim Harper

MORE PHOTOS FROM ITHACA



17) Straight ahead but don't forget to stop; 18) Now take a left; 19) Another left, but watch the pot hole!; 20) Straight ahead but watch the horses!; 21) Now take a right; 22) Time for a water break; 23 Who's lost? Don Roberts!!

ITHACA 5-K FUN WALK

INSECT PATHOLOGY, INSECT MICROBIOLOGY,

AND MICROBIAL CONTROL

Books published since 1981

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Second Edition

1996

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INSECT PATHOLOGY, INSECT MICROBIOLOGY, AND MICROBIAL CONTROL

BOOKS PUBLISHED SINCE 1981

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- Webster, Robert G.; Granoff, Allan, editors. 1994. Encyclopedia of virology. 1622 pp., 3 Vols. Academic Press, Inc., San Diego. ISBN 0-12-226960-8 (set). \$475.00.
- Weiser, Jaroslav. 1991. Biological control of vectors. 189 pp. John Wiley & Sons, Somerset. \$69.95.
- Wilding, N.; Collins, M.; Hammond, P. M. 1989. Insectfungus interactions. 288 pp. Academic Press, Inc., London and New York. ISBN 0-12-751800-2. \$62.00.

Page 4

LIST OF AUTHORS

Adams, J. R. (see Bedding) Akhurst, R. Alves, S. B. Bailey, L. (see Entwistle) Bailey, M. J. (see Bailey) Ball, B. Beckage, N. E. Bedding, R. (see Couch) Bland, C. E. (see Adams) Bonami, J. R. Brehlin, M. (see Hull) Brown, F. Burges, H. D. (see Warr) Cohen, N. (see Wilding) Collins, M. (see Entwistle) Cory, J. S. Couch, J. N. Davidson, E. W. Davidson, E. W. (see Laird) Deacon, J. W. de Hernandez, M. (see Kuno) Deseö-Kovács, K. V. Dubitskii, A. M. (see Mackauer) Ehler, L. E. Entwistle, P. F. Evans, H. C. (see Samson) Faust, R. M. (see Davidson) (see Beckage) Federici, B. A. Federici, B. A. (see Granados) (see Hickle) Fitch, W. L. Franz, J. M. (see Krieg) Franz, J. M. Fuxa, J. R. Garner, W. Y. (see Schwemmler) Gassner, G. Gaugler, R. (see Jackson) Glare, T. R. Granados, R. R. Granados, R. R. (see Shuler) Granoff, A. (see Webster) Gupta, A. P. (see Shuler) Hammer, D. A. Hammond, P. M. (see Wilding) (see Garner) Harvey, J., Jr. (see Hoy) Herzog, D. C. Hickle, L. A. (see Entwistle) Higgs, S. Hoy, M. A. Hull, R. Ignoffo, C. Jackson, T. A. (see Bedding) Kaya, H. K. (see Gaugler) Kaya, H. K. (see Tanada) Kaya, H. K. Kim, L. King, L. A.

Krieg, A. (see Martignoni) Krieg, A. Kuno, G. Kuroda, Y. Kurstak, E. (see Kuroda) Kurstak, E. (see Laird) Lacey, L. L. Laird, M. (see Samson) Latge, J.-P. Lomer, C. Luckow, V. A. (see O'Reilly) Lumsden, R. D. Mackauer, M. Maramorosch, K. (see Kuroda) Maramorosch, K. (see Davidson) Margalit, J. Martignoni, M. E. (see Maramorosch) McIntosh, A. H. (see Laird) Miles, J. W. (see O'Reilly) Miller, L. K. Mitsuhashi, J. Mitsuhashi, J. (see Maramorosch) Morse, R. A. Mulett, J. (see Kuno) Nickle, W. E. Nowogrodzki, R. (see Morse) O'Reilly, D. R. Pathak, J. P. N. (see Hull) Payne, C. Pimentel, D. Poinar, G. O., Jr. Possee, R. D. (see King) (see Robertson) Preisler, H. K. (see Prior) Prior, C. Richardson, C. D. Robertson, J. L. (see Mackauer) Roland, J. (see Martignoni) Rossmoore, H. W. (see Deseö-Kovács) Rovesti, L. Samson, R. A. Schwemmler, W. (see Maramorosch) Sherman, K. E. Shuler, M. L. Stirling, G. R. (see Davidson) Tahori, A. S. Tanada, Y. (see Fuxa) Tanada, Y. Tchukhrii, M. G. (see Poinar) Thomas, G. M. (see Beckage) Thompson, S. N. (see Martignoni) Vago, C. (see Lumsden) Vaughn, J. L. Warr, G. W. Webster, R. G. Weiser, J. Wilding, N. Wood, H. A.

(see Shuler)

Page 6

CHRONOLOGICAL LIST

1981

Burges, H. D., editor Laird, M., editor (1) Laird, M., editor (2)

1982

Kuno, G.; Mulett, J.; de Hernandez, M. Kurstak, E., editor Maramorosch, K.; Mitsuhashi, J., editors

1983

Deacon, J. W. Dubitskii, A. M., editor

1984

Garner, W. Y.; Harvey, J., Jr., editors Martignoni, M. E.; Krieg, A.; Rossmoore, H. W.; Vago, C. Nickle, W. E., editor Poinar, G. O., Jr.; Thomas, G. M.

1985

Couch, J. N.; Bland, C. E., editors Hoy, M. A.; Herzog, D. C., editors Laird, M.; Miles, J. W., editors Maramorosch, K.; Sherman, K. E., editors

1986

Alves, S. B. Brehlin, M. Franz, J. M., editor Granados, R. R.; Federici, B. A., editors

1987 Euro I

Fuxa, J. R.; Tanada, Y., editors Maramorosch, K., editor

1988

Ignoffo, C., editor Kuroda, Y.; Kurstak, E.; Maramorosch, K., editors Samson, R. A.; Evans, H. C.; Latge, J.-P., editors Tchukhrii, M. G.

1989

Hull, R.; Brown, F.; Payne, C. Krieg, A.; Franz, J. M. Mitsuhashi, J., editor Schwemmler, W.; Gassner, G. Wilding, N.; Collins, M.; Hammond, P. M.

1990

Gaugler, R.; Kaya, H. K., editors Hickle, L. A.; Fitch, W. L. Laird, M.; Lacey, L. L.; Davidson, E. W., editors Mackauer, M.; Ehler, L. E.; Roland, J., editors Morse, R. A.; Nowogrodzki, R., editors Warr, G. W.; Cohen, N.

1991

Adams, J. R.; Bonami, J. R., editors
Bailey, L.; Ball, B.
Davidson, E. W.; Faust, R. M.; Margalit, J.; Tahori, A. S., editors
Gupta, A. P., editor
Kurstak, E., editor
Maramorosch, K., editor
Pimentel, D., editor
Stirling, G. R.
Weiser, J.

1992

Deseö-Kovács, K. V.; Rovesti, L. Jackson, T. A.; Glare, T. R., editors King, L. A.; Possee, R. D. Lomer, C., ; Prior, C., editors Robertson, J. L.; Preisler, H. K.

1993

Beckage, N. E.; Thompson, S. N.; Federici, B. A.
Bedding, R.; Akhurst, R.; Kaya, H., editors
Entwistle, P. F.,; Cory, J. S.; Bailey, M. J.; Higgs, S., editors
Kim, L., editor
Lumsden, R. D.; Vaughn, J. L., editors
Pathak, J. P. N., editor
Tanada, Y.; Kaya, H. K.

1994

Maramorosch, K.; McIntosh, A. H., editors (1) Maramorosch, K.; McIntosh, A. H., editors (2) O'Reilly, D. R.; Miller, L. K.; Luckow, V. A. Webster, R. G.; Granoff, A., editors

1995

Richardson, C. D., editor Shuler, M. L.; Wood, H. A.; Granados, R. R.; Hammer, D. A., editors

IN LANGUAGES OTHER THAN ENGLISH

FRENCH

Lomer, C.J.; Prior C. 1992. Lutte biologique contre les acridiens.

GERMAN

Krieg, A.; Franz, J. M. 1989. Lehrbuch der biologischen Schädlingsbekämpfung.

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SPANISH

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NOTES

This second edition of *Books published since 1981* was completed October 10, 1995. The first edition was published as *Supplement 1* in the February 1994 issue of *SIP Newsletter*. Book prices are those listed in publishers' bulletins through September 1995. For up-to-date prices please inquire at your bookstore. Some of the books listed are no longer in print.

Correspondence: Mauro E. Martignoni, P.O. Box 14892, Albuquerque, New Mexico 87191, USA

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SOCIETY FOR INVERTEBRATE PATHOLOGY APPLICATION FOR 1996 MEMBERSHIP

В	ACKGROUND INF	ORMATION			
NAME					
first	middle initial	last			
ORGANIZATION	A	DDRESS			
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Membership (founding, charter and regula	r member)			\$30.00	
Student membership				\$15.00	
Division of Microsporidia				\$2.00	
Division of Microbial Control				\$2.00	
Journal of Invertebrate Pathology (special	member price, plus	\$3 handling)		\$179.00)
(Canadian subscribers add GST nun	nber + 7%)			\$	
Credit card fee (applicable when paying by	VISA or MasterCa	rd)		\$2.00	
Society contribution				\$	
Endowment contribution				\$	
TOTAL				\$	

•	PAYMENT INSTRUCTIONS Enclose this form with check, credit card or money order payment and return to: SOCIETY FOR INVERTEBRATE PATHOLOGY 9650 ROCKVILLE PIKE BETHESDA, MARYLAND 20814 USA 301-530-7026 (phone) 301-530-7001 (FAX)
•	Make check or credit card payment payable to SOCIETY FOR INVERTEBRATE PATHOLOGY in U.S. dollars. PLEASE DO NOT SEND CASH.
•	Paying by credit card: fill out the information below: Charge to (check one): ☐ MasterCard/EuroCard ☐ VISA Total (fill in TOTAL from DUES section): [U.S. dollars) Card number: Card number: [U.S. dollars) Card holder name (please print): Card holder signature:

Vol. 28, No. 1

29TH ANNUAL MEETING OF THE SOCIETY FOR INVERTEBRATE PATHOLOGY AND IIIRD INTERNATIONAL COLLOQUIUM ON BACILLUS THURINGIENSIS

SEPTEMBER 1 - 7, 1996. CÓRDOBA (SPAIN)

GENERAL INFORMATION

The 29th Annual Meeting of S.I.P. and the IIIrd International Colloquium on *Bacillus thuringiensis* will be held between September 1 and 7, 1996 on the Universidad de Córdoba Campus at the facilities of the Colegios Mayores Universitarios "Nuestra Señora de la Asunción" (Avda. Menéndez Pidal, s/n, 14004-Córdoba-SPAIN).

THE CITY

Córdoba is a historic and dynamic town of 350,000 inhabitants situated in the center of Andalucía, the southern region of Spain, about 130 Km east of Sevilla. It has a great artistic and cultural tradition and is famous for its monuments: The Mosque, representation par excellence of caliph's art; Medina-Azahara, caliph palace of Abderramán III...

WEATHER

The weather in Córdoba in September is generally dry and hot, with daytime temperatures of 30-35° C. Evenings may be cooler (about 15-20° C). Meeting facilities will be air-conditioned.

SOCIAL ACTIVITIES FOR ALL DELEGATES

Welcome get-together buffet: Sunday, September 1st, 21'00 h. at the Colegios Mayores Universitarios "Nuestra Señora de la Asunción". Included in registration fee.

Mayor's reception at the Alcazar of the Reyes Cristianos: Monday, 2nd, 21'00 h. A guitar concert at the Alcazar of the Reyes Cristianos will be sponsored by the Mayor of Córdoba. Included in registration fee.

Full day excursion and race (optional): Wednesday, 4th, 11'00 h departure from Colegios Mayores. We will celebrate with an excursion to the Taurine Gardens El Pilar, located 25 km from Córdoba. The 14th Annual S.I.P. 5K Race will take place here. The Taurine Gardens El Pilar offers us the opportunity to admire its thoroughbred horses or experience the excitement of tackling young bulls. This excursion will offer meeting attendees the chance to relax informally with colleagues and taste typical food and wines from Córdoba: The Perol Cordobés is a way of cooking rice in the country. And for ending the day, a private party will take place at a disco where the 5-k race prizes will be presented. We will return to Córdoba at 19'00 h. Not included in registration fee.

Closing dinner: Thursday, 5th. 21'00 h. The closing dinner will take place in a typical Córdoba restaurant, with folk music (Flamenco) entertainment. Included in registration fee.

ACCOMMODATION

Registrants who wish to make a reservation can choose between two options: University Housing (Colegios Mayores Universitarios "Nuestra Señora de la Asunción"), site of the meeting or in downtown Hotels. The Organization has booked rooms at special low rates in the following Hotels:

Hotel "NH Amistad Córdoba" (4-stars), Hotel "Meliá Córdoba" (4-stars), Hotel "Selu" (3-stars), Hotel "Sol Los Gallos" (3-stars).

The Local Organizing Committee recommends accommodation in the University Housing, site of the meeting. Rooms at the Colegios Mayores Universitarios "Nuestra Señora de la Asunción" have a private bathroom, and air conditioning. Swimming pool and sporting facilities are also available. The number of rooms at the Colegios Mayores Universitarios is limited. Registrants may book accommodation in advance by completing the lodging reservation in Supplement 3 and returning it, accompanied by a deposit of 10.000 ptas. (to be paid together with registration fee) before April 1st, 1996. Accommodation cannot be guaranteed if the deposit has not been paid before July 31, 1996.

REGISTRATION

The registration fee includes the Sunday welcome get-together buffet, coffee-breaks, audiovisual equipment, insurance, the Monday Mayor reception and the Thursday closing dinner. The companion fee includes the Sunday welcome get-together buffet, the Monday Mayor reception and the Thursday closing dinner. **Please return your registration forms as soon as possible.** There will be a late fee of 7.000 Ptas. for registration forms received after April 1, 1996. Only payments in Spanish currency (pesetas) will be accepted. Please make money orders payable to **SIP 29th ANNUAL MEETING**. Please note that payments can be also made by Visa or MasterCard. For your information, the U.N. exchange rate as of December, 1995 was 120 pesetas for \$US1.00.

REFUND POLICY

Refunds of Registration Fees will be made by SIP 29th ANNUAL MEETING ORGANIZING COMMITTEE after the meeting: registrations cancelled before July 1st, 1996 will be fully refunded (less bank/exchange charges); before July 31th, a 50% refund will be made. No refunds will be made after these dates. Cancellations must be confirmed in writing.

TRAVEL INFORMATION / HOW TO REACH THE MEETING SITE

By car: Córdoba can be easily reached by motorway Madrid-Sevilla (N-IV/E5). Exit "Poligono Guadalquivir" is about 4 km from the meeting site (Colegios Mayores Universitarios "Nuestra Señora de la Asunción").

Distances to Córdoba:	- From Madrid:	400 km.
	- From Sevilla:	135 km.

By train: Córdoba can best be reached by train. There are numerous (hourly) high-speed trains (AVE o TALGO) from Madrid (1 hour and 45 minutes travel time) and Sevilla (45 minute travel time). Reservation in advance is strongly recommended.

By plane: For those traveling by plane, the Organizing Committee highly recommends the following travel plans:

Travel through Madrid:

- Plane to Madrid-Barajas International Airport.

- Take a taxi from Madrid-Barajas International Airport to Madrid-Puerta de Atocha Railway Station. Another possibility is to take a bus from the Airport to downtown Madrid (Plaza de Colón) and then take a taxi to the Railway Station.

- Train from Madrid-Puerta de Atocha Railway Station to Córdoba Railway Station by AVE or TALGO trains; there are connections every hour. Reservation in advance is strongly recommended.

Travel through Sevilla:

- Plane to Sevilla International Airport. The Sevilla International Airport is the closest one to Córdoba.
- Take a taxi (there is no bus service) to Sevilla-Santa Justa Railway Station.
- Train from Sevilla-Santa Justa Railway Station to Córdoba Railway Station by AVE or TALGO trains; there are connections every hour. Reservation in advance is strongly recommended.

KEY DATES TO REMEMBER

Deadline for Submission of Abstracts: April 1, 1996.

Deadline for early Registration: April 1, 1996.

Deadline for Accommodation Reservation: July 31, 1996.

Deadline for Registration and Accommodation Cancellations:

- Full refund: July 1, 1996

- 50% refund: July 31, 1996

Society for Invertebrate Pathology Newsletter Supplement No. 2

January, 1996

CONTACT PEOPLE

Program Committee Chair:

Dr. Cándido Santiago-Álvarez Cátedra de Entomología Agrícola y Forestal E.T.S.I.A.M. Universidad de Córdoba, Apartado 3048 14080 Córdoba (SPAIN) Telephone number: +34 57 21 84 75 Fax number: +34 57 21 84 76 E-Mail: sipcor96@uco.es

Local Arrangements Committee Chair:

Dr. Enrique Vargas Osuna Cátedra de Entomología Agrícola y Forestal E.T.S.I.A.M. Universidad de Córdoba, Apartado 3048 14080 Córdoba (SPAIN) Telephone number: +34 57 21 84 75 Fax number: +34 57 29 83 43 E-Mail: cr1saalc@lucano.uco.es For matters concerning Registration, Accommodation, Social Program and Travel:

P.I.C. Proyectos, Incentivos y Congresos S.L. C/. José Zorrilla, nº 5; Esc.A; 3º 3. 14008-Córdoba (SPAIN) Phone numbers: + 34 57 48 58 48/43 Fax number: + 34 57 48 58 49 E-Mail: pic@cod.servicom.es

29TH ANNUAL MEETING OF THE SOCIETY FOR INVERTEBRATE PATHOLOGY AND IIIrd INTERNATIONAL COLLOQUIUM ON BACILLUS THURINGIENSIS

SEPTEMBER 1 - 7, 1996

CORDOBA, SPAIN

REGISTRATION FORMS

AND

ABSTRACT SUBMISSION GUIDELINES

ABSTRACT SUBMISSION GUIDELINES Absolute Deadline for Receipt of Abstracts: April 1, 1996

PLEASE NOTE: Because the master copy of the abstract book will be sent May 15th, 1996, to Boyce Thompson Institute for final editing and mailing to FASEB for printing, the firm deadline for receipt of abstracts is April 1st, 1996. Please help us by submitting your abstract as early as possible before April 1st, 1996. Abstracts received after April 1st, 1996, will NOT be printed.

Since abstracts will be prepared electronically, there is no fixed form to follow.

Instead, please adhere to the following guidelines:

Each line m The number	ust not exceed a total of 80 characters and spaces. r of lines for each section is limited as follows:
Title:	* No more than 2 lines
	* Capitalize ONLY those words that must be capitalized.
Authors:	* No more than 2 lines
	* Put the last (family) name of the presenting author all in CAPITAL LETTERS.
	* All other names should appear in upper and lower case letters.
Affiliations:	* No more than 4 lines
Abstract:	* No more than 40 lines

ABSTRACT SUBMISSION FORM

I am submitting _____ (how many?) abstract(s) for presentation/publication in the program. The abstract(s) is for presentation as:

Plenary session		Symposium paper	
Contributed Paper		Student paper	·
Poster	<u> </u>	Student poster	
		•	

I have sent the abstract(s) by electronic mail:	YES _	NO (Not available)
I have sent the abstract(s) on diskette:	YES	NO (Not possible)
I also enclose two printed copies of my abstract.	·····	

Submit electronic and printed copies of your abstract, together with your name, address, phone, FAX number and e-mail address, to:

Cándido SANTIAGO-ÁLVAREZ Cátedra de Entomología Agrícola y Forestal E.T.S.I.A.M. Universidad de Córdoba Apartado 3048 14080 CORDOBA (Spain) Phone: + 34 57 218475 Fax: + 34 57 218476 E-Mail: sipcor96@uco.es

Vol. 1	28. N	No.	1
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REGISTRATION FORM

(Please type or print legibly in capital letters)

PERSONAL DATA

Name:		· · · · · · · · · · · · · · · · · · ·	
(Family Name)		(First Name)	(Title)
Name desired on Registration	Badge:	······································	
Affiliation:			
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Member of S.I.P.	Yes No)	
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REGISTRATION			
S.I.P. Member* Student Member* Non-Member* Accompanying Person** (please give name):	29.000 Ptas. 14.500 Ptas. 40.600 Ptas. 14.500 Ptas.	x x x x	= Ptas. = Ptas. = Ptas. = Ptas.
Excursion 5-K Runner (with T-Shirt) Extra T-Shirt Late Fee (After April 1 st)	11.000 Ptas. 1.800 Ptas. 1.200 Ptas. 7.000 Ptas.	X X X X	= Ptas. = Ptas. = Ptas. = Ptas.
Lunch Tickets (please circle) 1 st 2 nd 3 rd 4 th 5 th 6 th 7 th 8 th Dinner Tickets (please circle)	1.200 Ptas.	x	= Ptas.
1 st 2 nd 3 rd 4 th 5 th 6 th 7 th 8 th	1.200 Ptas. SUBTOTAI	x _ (1)	= Ptas. = Ptas.

Deadline for early Registration: <u>APRIL</u>, 1st, 1996. Registrations cancelled before July 1st, 1996 will be fully refunded (less bank/exchange charges); before July 31th, a 50% refund will be made. No refunds will be made after these dates. Cancellations must be confirmed in writing. All refunds will be processed after the Meeting.

^{*} Registration Fee includes: Admission to all Scientific Sessions, Registration Package, coffee and refreshments during the breaks, Welcome Party and Banquet.

^{**} Registration Fee for Accompanying Persons includes: coffee and refreshments during the breaks, Welcome Party and Banquet.

LODGING RESERVATION Accommodation is available from August 31 th to Septer and taxes. I would like lodging in: University Housing Date of arrival:/ / Date of departure: Number of room(s): I wish to share a double room with:	ingle Room 5.750 Ptas 4	Prices includes breakfas Double Room 5.600 Ptas f nights: ce?	it
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Hotel "Meliá Córdoba" (4-stars)	.630 Ptas.	12.840 Ptas.	
Hotel "Selu" (3-stars)	.890 Ptas.	11.740 Ptas	
Hotel "Sol Los Gallos" (3-stars)	190 Ptas	8 876 Ptas	
PAYMENT			
Total amount due: SUBTOTAL (1) + SUBT	OTAL (2)	= Ptas.	
All payments should be made in advance and in Spanish borne by the remitter:	Pesetas (Ptas.).	Bank charges are to be	;
 by Bank Transfer in favour of SIP 29th ANNU (Bank: 0049; Branch: 1874). Account no. 2910 (Please make sure that your name is on the tra with this registration form.) 	AL MEETING. I 073045. 1sfer document a	Banco Central Hispano nd enclose a copy of it	
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REGISTRATION FORMS RECEIVED WITHOUT P A VALID REGISTRATION OR RESERVATION.	AYMENT WILL	. NOT CONSTITUTE	
Date:	Signature:		
Please return to: PROYECTOS, INCENTIVOS José Zorrilla, 5 Esc. A 3º 3 14008 Córdoba (SPAIN)	CONGRESOS,	, S.L.	
Telephone numbers: + 34 57 48 Fax number: + 34 57 48 58 49	58 48/43		

14th ANNUAL SIP 5K RACE 12 p.m. Wednesday, September 4th, 1996 To be held on "Jardines Taurinos de El Pilar"

YES!! Sign me up!!:	NAME	 	
	ADDRESS	 	

I wish to compete in the following category (honesty about your own age and sex is assumed!):

Category	Male	Female
runner, under 35		
runner, 35 & over	<u></u>	
walker		

PLEASE NOTE: Prizes will be awarded to fastest finishers in these categories, and, in the spirit of maximizing participation and fostering a friendly, non-competitive atmosphere, prizes will also be awarded to a few randomly-selected finishers! **Proper attire, including shirts, is required**.

CERTIFICATION: I intend to participate in the SIP 5-k race on September 4th, 1996. I affirm that I am in proper physical condition to participate in this race and in consideration of the acceptance of this entry, I hereby release sponsors, race officials, organizers, and organizations affiliated with this race from all claims of injury or damage to person or property, including death, resulting from my participation in this event.

Signature _____

FEES:1.800 Ptas. for the race and a souvenir T-shirt1.200 Ptas. for the T-shirt only

T-shirt size: L XL

Please enter the appropriate fee on the Meeting Registration Form.

KEY DATES TO REMEMBER

Deadline for Submission of Abstracts: April 1, 1996.

Deadline for early Registration: April 1, 1996.

Deadline for Accommodation Reservation: July 31, 1996.

Deadline for Registration and Accommodation Cancellations:

- Full refund: July 1, 1996

- 50% refund: July 3

SOCIETY FOR INVERTEBRATE PATHOLOGY APPLICATION FOR 1996 MEMBERSHIP

BAC	KGROUND INF	ORMATION			
NAME					
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ORGANIZATION	A[DRESS			
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Student membership	lember)			\$15.00	
Division of Microsporidia				\$2.00	
Division of Microbial Control				\$2.00	
Journal of Invertebrate Pathology (special mo	ember price, plus	s \$3 handling)		\$179.00)
(Canadian subscribers add GST numb	er + 7%)			\$	
Credit card fee (applicable when paying by V	ISA or MasterCa	urd)		\$2.00	
Society contribution				\$	
Endowment contribution				\$	
TOTAL				\$	

	PAYMENT INSTRUCTIONS
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