



EDWARD A. STEINHAUS  
1914-1969

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A thunderstorm darkened the sky, and the late afternoon rumbled on the campus of his alma mater. A damp young man searched the vacated passages of one building, delivering a message from California.

As lightning, he had struck us, alerting our minds and spirits: to do; leading us with a thunderous: doing! And the elements spent their energy this October twentieth in Columbus, Ohio, as we read of the death of Edward A. Steinhaus.

Professor Steinhaus championed the individual -- student, colleague, friend -- in his dedication to "our mission in science, and our service to mankind." Witness as the fruition of his labors and inspiring idealism, the major ecumenical activity and movements in biology today.

As a graduate student in Microbiology at The Ohio State University, he inquired as to the significance of the microbiota characterizing arthropods, particularly insects. To be sure, specific relationships had been observed and recorded for centuries, and functional relationships between invertebrates and microorganisms were evident in the epidemiology of vertebrate diseases. Was there

not another side of the coin? There is! The cross-fertilization of Microbiology and Entomology as disciplines resulted in a new discipline: Insect Pathology. The impact was international in scope; the response in private and public research organizations, industry, and education is legend. The new knowledge which developed with the impetus of Edward Steinhaus through his roles as researcher, mentor, administrator, and catalyst has provided the insight and tools to intelligently manage diseases affecting invertebrates.

In 1940 insect pathology at The Ohio State University existed only in the mind of Edward Steinhaus. But, as the result of his activities as a teacher in California, an invertebrate pathology group now exists at The Ohio State University, and in other institutions throughout the world, yielding second- and third-generation pathologists.

The challenge to develop a School of Biological Sciences at the Irvine Campus of the University of California promised additional eras of ecumenism for Professor Steinhaus.

The academic and research structure in the biological sciences at the Irvine Campus flourish and show his vision and the work of his fine hand. He was keenly aware of the ferment in the

biological sciences, and accordingly, took the initiative, as revealed in a quote from his Presidential Address to the Entomological Society of America: "Old compartmentalizations will have to go, without destroying the vital essence of the classical. Room must be made for new concepts, for new insights into teaching and research, and for new alignments with developments in the physical and biological sciences."

Undaunted by the details besetting the office of a new Dean on a campus under construction, he once remarked that the most pressing "biological" problem on that particular day was to decide upon the location of a sanitary sewer line for the biological sciences building!

Serving the University at Irvine from 1963, where he was Dean of Biological Sciences until 1968, the crescendo of need for new avenues of understanding in pathology called for the expression of pathobiology as a new thrust in biology and the establishment of Centers of Pathobiology. He urged all those concerned to consider the subject of pathology, the study of disease "in all its aspects." Professor Steinhaus visualized the three principal areas in pathology as forming the angles of a triangle with the apical position of vertebrate pathology drawing upon plant and invertebrate pathology, and providing for comparative pathology in the true sense. Furthermore, to facilitate the necessary communication, stimulate research, and serve as educational foci for a new breed of comparative pathologists, specifically, pathobiologists, the establishment of Centers of Pathology was proposed. In the School of Biological Sciences at Irvine, the first Center was established, for which Professor Steinhaus served as Director. Confirmed by the University of California as a new development in biology, the Center will grow as a memorial to Edward A. Steinhaus.

In sequence, from his postdoctoral years: a microbiologist in the U.S. Public Health Service at Hamilton, Montana; immunologist, insect pathologist, and invertebrate pathologist at the University of California at Berkeley; then at Irvine as Dean of Biological Sciences, Professor of Pathobiology, and finally, Director of the Center for Pathobiology.

A stimulating and prolific writer, he authored approximately 200 professional publications including three books and edited the two-volume Insect Pathology -- An Advanced Treatise. Scholarship and service were the hallmarks of his initiative. He was the founder and prime mover for both the Annual Review of Entomology and the Journal of Invertebrate Pathology (originally known as the Journal of Insect Pathology). Dr. Steinhaus served as Editor of the Annual Review from 1955 to 1962, and Editor-in-Chief of the Journal until his death.

Who was this man? Born and educated in the public schools on the North American frontier at Max, North Dakota, Edward Steinhaus received his baccalaureate at North Dakota State University and his doctorate at The Ohio State University. The pinnacle of academic recognition came to Dr. Steinhaus in 1962 when the honorary degree of Doctor of Science was conferred upon him by the North Dakota State University. He was a nominee for an honorary degree to be awarded by The Ohio State University during the Centennial year of the University in 1970. In addition, recognition as a scientist and professional biologist came as awards, honors, and election to society offices. He was a Muellhaupt Scholar, a Guggenheim Fellow, Memorial Lecturer for the Entomological Society of America, a Griswold Lecturer at Cornell University, a Starin Lecturer at The Ohio State University, President of the Entomological Society of America, Founding President of the Society for Invertebrate Pathology, and a member of the National Academy of Sciences. Other professional activities included editorial board membership for the Journal of Economic Entomology, University of California Publications in Entomology, Life Sciences, Virology, and Bergey's Manual of Determinative Bacteriology and Section Editor for Biological Abstracts. He also served as a consultant to the U.S. Surgeon General, the World Health Organization, the Office of Science and Technology, and the National Research Council.

Professor Steinhaus's wisdom and perspective were sought as a member of international and national commissions and boards, reflecting his great competency. These activities included membership on U.S. Department of Agriculture Committee on Agriculture Science, National Academy of Science--National Research Council Subcommittee on Comparative Pathology, and the International Committee on Comparative Pathology.

Membership in professional societies included the American Association for the Advancement of Science, the American Society for Microbiology, the American Society of Parasitologists, the Society for the Study of Evolution, the California Academy of Sciences, the American Microscopical Society, the American Institute of Biological Sciences, the American Society for Experimental Pathology, and the Council of Biological Editors. Professor Steinhaus counselled students to actively support at least two professional societies in their careers: a broadly based scientific society, and an organization serving their specific professional objectives.

Ed Steinhaus was sensitive to the personal needs of others; unambiguously a husband and father. He is survived by Mabry, his wife and companion, and his children, Peggy, Timothy, and Cynthia. Ed can be described as a religious individual who testified by example. A man for all with whom he associated; virile, progressive, and strong, with a political adeptness that was known best to an adversary, yet curiously unappreciated by many who benefited.

Professor Steinhaus was forever the mentor. Upon the receipt of a manuscript from a former student, he replied in a bold hand: "Your spelling is atrocious! To the postscript of your next letter please add the word, 'phenomenon' 25 times....With all best wishes, Sincerely, Ed Steinhaus."

In his Presidential Address to the Society for Invertebrate Pathology, entitled "Be Favorable to Bold Beginnings ...," Professor Steinhaus stated that he was not attempting to "tassel his remarks with pedantic erudition" by quoting from Vergil's Georgics for his title, rather he found the quotation to be "admonishing advice, particularly appropriate for this First Annual Meeting," to set the tone for the Society. "To be bold" was not his intent to encourage audaciousness or impertinence, rather to be bold in thought, in preparation, in expression, and bold in putting the thought into action--in time! This was his style in life where he believed "that invertebrate pathology and invertebrate pathologists, as do other sciences and scientists, have a responsibility and role to fill in the general betterment of society and man's lot on earth...."

With delightful style, a smile, a young man in a hurry, Ed Steinhaus spoke eloquently for himself in 29 years of professional life. His Presidential Address to the Entomological Society of America provides a revealing and poignant epithet for his prevailing spirit: "And so, I have decided to set aside my prepared and previously announced address..." and he did.

John D. Briggs

(Written for the November 1969 issue of the Journal of Invertebrate Pathology and printed here with permission of Academic Press.)

#### MEMORIALS TO DR. STEINHAUS

Since Dr. Steinhaus was a giant in so many ways, there have been numerous suggestions as to how the Society can best commemorate his memory. A decision will be announced by the Executive Council in the very near future.

The Steinhaus family has established a memorial fund at the Irvine campus of the University of California known as the "Edward A. Steinhaus Annual Award for Teaching Excellence in the School of Biological Sciences for Graduate Assistants."

This is a most appropriate commemoration. One of his intense concerns was that the students at Irvine have good instruction. Therefore, he selected a relatively young faculty competent in both teaching and research. His door was always open to students as well as others with whom he unselfishly shared his ideas and knowledge. This attitude contributed greatly to the firm establishment of invertebrate pathology.

Individuals wishing to contribute privately to this fund should make their check payable to the Regents of the University of California and mail it to Mr. John Spear, Office of Public Affairs, University of California, Irvine, California, 92664, USA.

ANNOUNCEMENT AND CALL FOR PAPERS  
Third Annual Meeting of the  
Society for Invertebrate Pathology  
Adult Education Building, University of Maryland  
College Park, Maryland, USA  
August 25-28, 1970

Dear Colleagues:

The third annual meetings of the Society for Invertebrate Pathology will be held in August, 1970, in conjunction with the International Colloquium on Insect Pathology on the campus of the University of Maryland. Dr. J. L. Vaughn has been designated as the Program Chairman for the Insect Pathology Colloquium while I am completing my second and final year as the Program Chairman for our Society at the request of President A. K. Sparks. The following information is provided as a guide to all persons intending to participate in the forthcoming meetings.

Insect Pathologists: Arrangements have been made with Dr. Vaughn to include all contributed papers dealing with insects in the program of the International Colloquium on Insect Pathology. Individuals planning to contribute papers in this area should send their abstracts to Dr. J. L. Vaughn, Colloquium on Insect Pathology, Center of Adult Education, University of Maryland, College Park, Maryland, 20742, USA. Instructions for the submission of abstracts to the Colloquium have been mailed to the membership in a brochure issued by the Organizing Committee. Those desiring additional copies should contact Dr. Vaughn.

Noninsect Invertebrate Pathologists: Several sessions are planned for contributed papers dealing with the pathobiology of noninsect invertebrates. Individuals planning to contribute in this area should complete the enclosed form and submit it to me no later than April 1, 1970. Notice of acceptance will be mailed no later than June 1, 1970.

Publication of Abstracts: All abstracts, both those included in the insect and noninsect sections, will be published in the Colloquium Proceedings although a later number of the Society's NEWSLETTER will include the program for the noninsect sections.

Registration: Details relative to registration, housing, meals, etc. are given in the brochure issued by the Colloquium. In brief, a registration fee of \$25.00 (U.S.) will cover the cost of all expenses except meals and lodging. The application form provided by the Colloquium should be used for pre-registration.

Housing will be provided by the University Housing Service or at nearby motels. Forms for the reservation of housing and meals were provided earlier by the Colloquium and should be sent directly to Dr. A. M. Heimpel, Insect Pathology Laboratory, Building, A, A.R.C., U.S. Department of Agriculture, Beltsville, Maryland, 20705, USA.

Plans are already underway for several comparative pathobiological symposia of interest to all invertebrate pathologists. For noninsect pathologists, the strength of our program will depend on you -- so make plans not only to attend but also to contribute one or more papers.

Thomas C. Cheng  
Program Chairman  
Society for Invertebrate Pathology  
Department of Biology  
Lehigh University  
Bethlehem, Pennsylvania 18015, USA

Summarizing the above information:

- I. Insect Pathology Papers are for the Colloquium and abstracts should be sent to J. L. Vaughn by April 1, 1970;

- II. Non-insect Pathology Papers (includes all other invertebrates) are for the Society's program and abstracts should be sent to T. C. Cheng by April 1, 1970. Use enclosed form;
- III. Registration and housing reservations should be directed to A. M. Heimpel as soon as possible; and
- IV. General information and forms for housing, registration, and Colloquium abstracts were sent out earlier and additional copies are available from J. L. Vaughn.

#### NEW EDITOR OF THE JOURNAL OF INVERTEBRATE PATHOLOGY

Dr. Thomas Cheng has accepted an offer from the owners of the Journal of Invertebrate Pathology, the officers of Academic Press, to succeed Dr. Steinhaus as Editor-in-Chief of the Journal.

Although published under the auspices of the Society for Invertebrate Pathology, the Journal of Invertebrate Pathology is an autonomous publication owned and governed by Academic Press. Dr. Cheng's becoming Editor-in-Chief, however, does give the Society a closer tie with the Journal since he was appointed Chairman of the Publications Committee of the Society at the last annual meeting. Thus in his dual capacity the Journal will reflect, within reason, the directives of the Society's Publications Committee.

Dr. Cheng plans few changes in the Journal and Dr. Steinhaus's policy relative to the Editorial Board will be maintained. In order to perpetuate his memory, starting with the January 1970 issue, the Journal will carry Dr. Steinhaus's name as Founding Editor.

Manuscripts should be sent to Dr. Thomas C. Cheng, Department of Biology, Williams Hall, Lehigh University, Bethlehem, Pennsylvania, 18015, USA.

#### EUROPEAN CORRESPONDENTS

The Executive Council recommended, at its last meeting, that there be regional correspondents for the NEWSLETTER to insure better coverage of pertinent information. Subsequently, Dr. P. A. van der Laan agreed to be Coordinator for correspondents representing European countries. The names and addresses of persons cooperating with Dr. van der Laan in this effort are listed below, followed by several items they have contributed to this number.

Dr. P. A. van der Laan, Coordinator  
Laboratorium voor Toegepaste Entomologie  
Universiteit van Amsterdam  
Linnaeusstraat 2 B  
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Dr. H. D. Burges  
Pest Infestation Laboratory  
65 Albert Street  
Slough, Bucks-England

Dr. F. P. G. Heitor  
Estacao Agronomica Nacional  
Oeiras-Portugal

Professor G. A. Benz  
Department of Entomology  
Swiss Federal Institute of Technology  
Universitätsstrasse 2  
Zürich, Switzerland

Dr. J. J. Lipa  
Laboratory of Biological Control  
Institute of Plant Protection  
Grunwaldzka 189  
Poznan-Poland

Dr. T. K. G. Unestam  
Institute of Physiological Botany  
University of Uppsala  
Uppsala, Sweden

Dr. L. Szalay-Marzso  
T. T. Herman Otto ut 15  
Research Institute for Plant Protection  
Budapest, Hungary

Professor C. Vago  
Faculté des Sciences  
34-Montpellier, France

Dr. V. P. Pristavko  
Institute for Plant Protection  
Vasil Kovskiaia  
Kiev 127, USSR

#### INTERNATIONAL STANDARD OF PURE B. T. EXOTOXIN, BY H. D. BURGES

Dr. R. P. M. Bond of Shell Research Ltd., Milstead Laboratory of Chemical Enzymology, Broad Oak Road, Sittingbourne, Kent, England has produced a quantity of pure Bacillus thuringiensis exotoxin, which he will hold as in International Standard in an attempt to infuse comparability into research results. He is willing to send 1 mg quantities of this standard to research workers on request. An opportunity for discussing the standard should arise at the forthcoming Colloquium in the USA.

#### NEW BOOK ANNOUNCEMENT, BY H. D. BURGES

Most of the chapters for the new book, "Microbial Control of Insects and Mites," edited by H. D. Burges and N. H. Hussey have been sent to the printer, and it should be ready for the August 1970 meeting of the Society. Information on the B. t. standard mentioned above will be included.

#### COLLOQUE SUR LES MANIFESTATIONS INFLAMMATOIRES ET TUMORALES CHEZ LES INVERTEBRES

(Organisé par C. Vago et O. Flandre. Publié en supplément aux Annales de Zoologie-Ecologie Animale, 136 p., 1969. Prix est 40,00 F. Bon de command à adresser à: Service des Publications, Institut National de la Recherche Agronomique, Route de Saint-Cyr, 78 Versailles, France.)

Le développement particulièrement rapide de la pathologie des invertébrés au cours de ces dernières années, a déjà permis d'aborder l'étude de plusieurs problèmes de pathologie de l'homme et des animaux à la base de la pathologie comparée, en utilisant les avantages qu'offrent les divers invertébrés sur le plan expérimental.

Par contre, ce n'est que depuis très peu de temps que le problème des tumeurs et des réactions inflammatoires a été envisagé selon les principes de la pathologie comparée, avec inclusion du secteur des invertébrés.

L'intérêt d'une telle extension s'étant révélé considérable, une confrontation des éléments acquis et des possibilités d'études comparées, a eu lieu au cours d'un premier colloque. Les communications et les discussions ont été orientées, d'une part vers l'étude des réactions inflammatoires, d'autre part vers la formation et la structure des tumeurs et enfin vers les relations entre ces deux phénomènes pathologiques qui sont souvent étroitement liés chez les invertébrés.

Les travaux de ce Colloque pourraient constituer le point de départ de recherches organisées d'une façon de plus en plus précise dans le domaine de l'oncologie comparée.

#### IUBS CONFERENCE ON BIOLOGICAL CONTROL, BY J. M. FRANZ

The International Union of Biological Sciences (IUBS) invited 34 experts from all parts of the world to attend a meeting on November 17-19, 1969 in Amsterdam, The Netherlands. The purpose was to set up an International Organization for Biological Control of Noxious Animals and

Plants (IOBC), evolved from the "Organisation Internationale de Lutte Biologique" (OILB). The OILB, representing Western European and Mediterranean countries, has been affiliated with IUBS since 1955. Representatives of other countries actively engaged in biocontrol work, had provisionally assembled in the International Advisory Committee for Biological Control (IACBC) and had endeavoured, since 1964, to find an appropriate way of global cooperation corresponding to the needs of this branch of pest control and acceptable to IUBS. After several preliminary meetings and owing to the active assistance given by the Secretary General of IUBS, Professor Stafleu, statutes had been drafted for a single world-wide organization. These drafts were discussed at the Amsterdam conference, adapted to suggestions made by the participants, and adopted almost unanimously.

The essential features of the new global organization which is going to remain the only representative of biocontrol affiliated to IUBS, are as follows: Regional Sections allow the cooperation of members within manageable areas. The former OILB shall become the Western Palaearctic Section. Membership in the organization shall be open to all interested individuals, to institutions engaged in biological control, and to supporting members. Postal ballot assures a world-wide and equal participation of all members in general decisions to be taken. The Council includes, in addition to the Executive Committee of five persons, one representative of each Region. As first president, P. DeBach (Riverside) was proposed, as vice-presidents E. Biliotti (Versailles, president of OILB) and F. Wilson (Sunninghill, England, chairman of IACBS). "Entomophaga" will remain the journal of the organization.

The new statutes of IOBC have yet to be approved by the General Assemblies of IUBS and OILB. Immediately afterwards, probably in March 1971, new Regional Sections are expected to appear, for instance North America, the Pacific Area, East Asia, and Eastern Palaearctic.

The meeting in Amsterdam was very important for the further development of biological control, including microbial control, because this field is based, more than most other pest control methods, on international cooperation. The exchange of natural enemies of pests and weeds now requires such a high degree of sophisticated coordination that it can no longer be guaranteed solely by chance-conditioned, personal contacts of experts. Several disadvantages of conventional pest control such as environmental pollution and the appearance of insects resistant to insecticides, urge us to put more effort into the development of biological control methods. A world organization should greatly help in preparing and executing larger projects, in establishing contacts and in disseminating information. It can also give a unified voice for all types of biocontrol efforts which, in the concert of different methods in pest control, need to be heard widely for the benefit of all.

#### POSITIONS DESIRED IN INVERTEBRATE PATHOLOGY

Name: Dr. Richard J. Milner, Department of Agricultural Zoology, School of Agriculture, The University, New Castle upon Tyne I, England

Specialty: Insect Protozoology -- interested in applied aspects. Willing to work with other organisms.

Type of Position and Place: Postdoctoral (up to 2 years) anywhere in North America.

Name: Dr. Clinton Y. Kawanishi, Department of Entomology, Purdue University, Lafayette, Indiana, 47907, USA

Specialty: Insect virology -- basic research in virology.

Type of Position and Place: Research and/or teaching in invertebrate pathology or virology anywhere in the USA.

Name: Dr. C. B. Jagannatha Rao, Asia Bunka Kaikan, 12-13 Honkomagome 2 chome, Bunkyo-Ku, Tokyo, 113, Japan

Specialty: Insect virology, developmental enzymology (silkworm). Specialization in silkworm breeding. Speaks excellent English and Japanese.

Type of Position and Place: Postdoctoral (minimum one year) requires experience on mass production of insect pathogens; biological control of insect pests. Anywhere in the USA.

Name: Dr. Richard Lewis Ziprin, Department of Bacteriology, Iowa State University, Ames, Iowa, 50010, USA

Specialty: Microbiology with training in Entomology. Immune systems in insects.

Type of Position and Place: Full employment on Invertebrate microbiology -- microbial physiology, cell culture. Anywhere in the USA.

Name: Dr. Samuel Singer, 7105 Peppermill Lane, Louisville, Kentucky, 40228, USA

Specialty: Microbiology, research and development, fermentation, bacterial culture.

Type of Position and Place: Basic research in microbiology, bacterial pathogens, Government position in USA preferred.

Name: Goro Kuno, Department of Zoology and Entomology, Ohio State University, 1735 Neil Avenue, Columbus, Ohio, 43210, USA

Specialty: Biochemistry of insect pathogens. Microbiology and tissue culture.

Type of Position and Place: Teaching and/or research in Invertebrate Pathology with emphasis on pathogen host relationships. Anywhere in the USA.

Name: Dr. P. S. Lalitha Kumari, 3.4.869/1, Barkatpura, Hyderabad, 27 (A.P.), India

Specialty: Protozoology -- particularly Mynosporidia.

Type of Position and Place: Research, North America.

#### EXCHANGE OF REPRINTS

Most literature is easily obtainable from a library as a reproduction of the original article. However, sometimes it is important to have the original article such as when:



(1) the photographs cannot be adequately reproduced; (2) the article is quite long and would be expensive to reproduce; or (3) the article is a classic and it would be desirable to have the original. Since nearly everyone has reprints he no longer needs, the NEWSLETTER could help facilitate an exchange. Dr. Victor Sprague, Chesapeake Biological Laboratory, Natural Resources Institute, University of Maryland, Box 38, Solomons, Maryland, 20688, USA, for example, has several reprints of each of the following articles and they are available on request.

Kudo and Hetherington. 1922. Notes on a microsporidian parasite of a trematode. J. Parasitol. 8, 129-132.

Kudo. 1925. Studies on Microsporidia parasitic in mosquitoes. V. Further observations upon Stempellia (Thelohania) magna Kudo, parasitic in Culex pipiens and C. territans. Biol. Bull. 48, 112-127.

Kudo. 1925. Microsporidia. Science 41, 1579.

Kudo. 1962. Microsporidia in Southern Illinois Mosquitoes. J. Insect Pathol. 4, 353-356.

#### INFORMATION FOR THE NEWSLETTER

Please send news items directly to the Editor, Dr. John C. Harshbarger, Director, Registry of Tumors in Lower Animals, Smithsonian Institution, Museum of Natural History, Room W216-A, Washington, D.C., 20560, USA. Europeans may send news items to Dr. van der Laan or their regional correspondent mentioned earlier.

#### A REPORT OF DR. GEORGE POINAR'S TRIP TO THE SOVIET UNION TO VISIT AND COLLABORATE WITH SCIENTISTS STUDYING ENTOMOGENOUS NEMATODES

The purpose of my trip was to visit scientists currently engaged in research on the taxonomy, bionomics and parasitic relationships of entomogenous nematodes and to collaborate in joint research projects. It was sponsored by the National Academy of Sciences.

I spent from April to June 1969 in the USSR and visited scientists in Moscow, Kiev, Tbilisi and Leningrad. Most of my time was spent in the latter city where I first spent several days examining prepared slides of mermithids and tetradonematides with Dr. Rubstov of the Zoological Institute. Then, Dr. Kiryanova, Mr. Zahidov and I collaborated on a description of a new genus of mermithids.

At the All Union Institute for Plant Protection, I collaborated with Dr. Veremtschuk on a study comparing the Soviet and American strains of Neoaplectana carpocapsae. The Soviet strain was brought back to California for further testing.

There is much enthusiasm in the Soviet Union for the use of entomogenous nematodes against pest insects and field trials have begun with mermithids and neoaplectanids.

I was received everywhere with the utmost courtesy and good will and there is certainly great interest in all aspects of insect pathology in the United States. I was told that DDT is banned in the Soviet Union and their government has given permission for the widespread use of insect viruses.

For those wishing to make a similar trip, I would strongly recommend studying Russian for at least 6 months before leaving. Although all of the scientists I met could read English, only a few were willing to speak it.

Once there, do not miss the cultural activities, such as the Bolshoi Theater and many other fine ballet groups. Of course, there are also the symphony, opera, dance and theater groups that should be sampled as well. If you go in May, try to get a pass to view the May Day celebration. It is an unforgettable experience.

A Partial Summary of the Current Biological Control Programs in the USSR  
(emphasizing microbial control)

<u>Common name of insect pest</u>	<u>Scientific name</u>	<u>Method of control</u>	<u>Crop</u>
Alfalfa looper	<u>Autographa</u> sp.	Nuclear polyhedrosis (1) <u>Bacillus</u>	Cabbage
Cabbage looper	<u>Trichoplusia</u> sp.	Granulosis (1) <u>Bacillus</u>	Cabbage
Cabbageworm	<u>Pieris</u> sp.	Granulosis (1) <u>Bacillus</u> <u>Nosema</u>	Cabbage
Wheatbug	Hemipteran (?)	<u>Beauveria</u> (1)	Wheat
Leaf weevil	<u>Sitona</u> sp.	<u>Beauveria</u> (1)	Alfalfa
Bean beetle	<u>Epilachna</u> sp.	<u>Beauveria</u>	Beans
Potato beetle	<u>Leptinotarsa decemlineata</u>	<u>Beauveria</u> , <u>Neoaplectana</u>	Potatoes
Corn earworm	<u>Heliothis zea</u>	Nuclear polyhedrosis (1)	Corn, cotton
Cereal noctuid	<u>Hadena sordida</u>	Granulosis (1)	Wheat, etc.
Cotton cutworm	<u>Agrotis segetum</u>	Granulosis (1)	Cotton
Gypsy moth	<u>Porthetria dispar</u>	Nuclear polyhedrosis	Forest trees
Codling moth	<u>Carpocapsa pomonella</u>	Granulosis (2)	Apple
Ermine apple moth	<u>Yponomeuta padella</u>	Nuclear polyhedrosis (1)	Apple
Wireworm	<u>Agriotes lineatus</u> and others	<u>Neoaplectana</u> (1)	Wheat, pasture
Cutworm larvae	Various noctuids	<u>Neoaplectana</u> (2)	Grain
Knapweed	<u>Centaurea repens</u>	<u>Paranguina</u> (1) (nematode)	--
Ragweed	Ambrosia (3 species)	<u>Tarachidia candefacta</u> (2) (noctuid)	--

(1) Satisfactory control has been achieved.

(2) This is the first year of application and the results are not evaluated.

PLACEMENT SERVICE

To announce job openings or availability of employment contact Dr. A. M. Heimpel, Head, Insect Pathology Laboratory, Entomology Building A, Agriculture Research Center, U.S. Department of Agriculture, Beltsville, Maryland, 20705, USA.

PAPER SUBMITTED FOR PRESENTATION AT THE 1970  
MEETINGS OF THE SOCIETY FOR INVERTEBRATE PATHOLOGY  
(Noninsect Invertebrate Pathology Papers Only)

If you wish to present more than one paper, please submit the same information on an additional sheet of paper.

Name(s) of author(s) \_\_\_\_\_

Professional address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Title of paper \_\_\_\_\_

\_\_\_\_\_

Time required for presentation: 15 minutes ( ), 20 minutes ( ).

Projection equipment required: 2x2 slide projector ( ), 3 1/4x4 lantern slide projector ( ), 16 mm movie projector ( ).

\_\_\_\_\_

ABSTRACT (Please submit an abstract of 250 words or less which will be published in the Colloquium Proceedings. It will also be used by your Program Chairman in assigning your contribution to a specific section).