出國報告（出國類別：其他）

第 40 屆無脊椎病理學會年會暨第一屆昆蟲病原線蟲與共生菌國際論壇

服務機關：農業藥物毒物試驗所

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派赴國家：加拿大魁北克

出國期間：96 年 8 月 10 日至 96 年 8 月 18 日

報告日期：96 年 09 月 19 日

摘要

無脊椎病理學會爲國際性之學會，每年召開 1 次，本(40)屆無脊椎病理學會年會於加拿大魁北克省舉辦，期間從 8 月 12 日至 8 月 16 日，共 4 日。口頭報告論文共有 225 篇，壁報論文共 149 篇。參與會議者約 300 名。所謂「無脊椎病理學」，就是在探究無脊椎動物疾病的問題，無脊椎動物如同別的動物，疾病大多是微生物感染所致。這些微生物有的是細菌，有的是真菌(黴菌)，有一些是病毒，還有一些是原生動物。因此大會分爲細菌(Bacteria)、病毒(Virus)、真菌(Fungi)、孢子蟲(Microspordia)、及昆蟲病原線蟲(Nematodes)和共生菌等六大主題，大會除安排口頭及壁報發表論文的方式外，同時亦安排了“Methods of field inoculation with microspordia”；“Nematode phylogeny and systematics”；“Polydravirus phylogeny and Taxonomy”；“Joint workshop organized by microbal control and bacterial divisions”；“Virus Division satellite workshop:The biology of polydnaviruses:some unresolved issues”等五場實驗操作研習(workshop)，供與會者實地學習該相關實驗技巧。整個大會過程來自各國之學者均針對無脊椎動物因微生物感染所致的病理現象及致病分子機制做了許多創新及詳盡的研究，例如感染決定因子的研究及感染機制和交互感染與宿主親緣性分析。

目次

目的

本行程目的爲參加第 40 屆無脊椎病理學會年會暨第一屆昆蟲病原線蟲與共生菌國際論壇並以壁報分式發表論文。由於目前實驗的主題是進行桿狀病毒之相關研究，因此整個與會過程主要目的還是參與桿狀病毒相關之議程。加強本身於桿狀病毒之細胞分子生物學與致病機轉及植物保護上的應用與商品化等方面的訓練與見聞。桿狀病毒(baculovirus)是目前有機農業上極具潛力的生物農藥，也是當今醫學及工業上生產外源蛋白的載體系統。因此，桿狀病毒的研究發展在未來的生物技術及農業科技化將扮演著十分重要的角色。並藉由此會議瞭解其他國家目前在該領域上的研究進展與結果，藉由經驗與技術上的交流，擴展對該桿狀病毒的研究前景。

過程

第 40 屆無脊椎病理學會年會暨第一屆昆蟲病原線蟲與共生菌國際論壇是由 Jean-Louis Schwartz 擔任該大會主席，並於加拿大魁北克省的 Laval 大學舉辦。期間從 8 月 12 日至 8 月 16 日，共 4 日。

Laval 大學於市區的校區

8 月 13 日開幕式首先是由 Elizabeth W. Davidson 作一簡介「無脊椎病理學會 40 年之回顧」（Looking back : 40 years of SIP）；接著由 Jeremy N. McNeil 無脊椎病理學者進行一大會專題演講：Chemical ecology and invertebrate pathology: Do sub-lethal pathogenic infections affect chemically mediated behaviors? 結束後即進行分組的專題報告，如前述共分爲細菌(Bacteria)、病毒(Virus)、真菌(Fungi)、孢子蟲(Microspordia)、及昆蟲病原線蟲(Nematodes)和共生菌等六大組別，其中口頭報告論文共有 225 篇，壁報論文共 149 篇。於第一場病毒類的專題報告前，大會表揚已退休之學者 Bob Granados，由於他在桿狀病毒的研究上有諸多重大及對未來深具意義的研究發現，因此無脊椎病理學會發給獎狀表揚他在桿狀病毒學術與研究上的貢獻。第一場病毒類的專題報告 Virus Division Symposium I 主題爲：Insect cells and baculoviruses”Pas de Deux”-A symposium in honor of Bob Granados。其內容包含了 Developments and significance in insect cell culture、The peritrophic membrane and the role

of enhancins、viral entry in insect cell systems、及 Contributions to virology by Robert R. Granados: reflections by a colleague and friend。

8 月 14 日 AM 參與 Virus Division SymposiumII：
Baculovirus Bounty: A Symposium to Honor Loy Volkman
Convener: Linda A. Guarino
內容如下：1. Viruses Insex and the SIP、2.Functional analysis of the interaction between BmNPV ORF8 and its host factor、3. Expanding baculovirus bounty through glycoengineering、4. Baculovirus replication sites: role of cellular and viral genes。在此會場表揚已退休之學者 Loy Volkman（如下照片）。

8 月 14 日 PM 參與 Viruses 1. Viral Ecology and Biocontrol：
內容包括：1.Variation in the prey-processing behavior of insectivorous bird affects NPV transmission in the gypsy moth, Lymantria dispar.、2. Host plant-mediated changes to the peritrophic matrix influence baculoviral pathogensis、3. Impact of host plants on the peritrophic matrix as a barrier to baculovirus、4. Effects of developmental resistance on LdMNPV pathogenesis in gypsy moth、5. Inheritance of field resistance of codling moth against Cydia pomonella granulovirus (CpGV)、6. On the validity

of the independent action hypothesis model for the nucleopolyhedroviruses : can infection with a single virion lead to host mortality ? 7. Is there evidence for selection for resistance to viral disease in cyclic populations of tent caterpillars ? 8. The use of Baculovirus to control fall armyworm, Spodoptera frugiperda, in Brazil.

8 月 15 日 AM 參與 Viruses 2 Gene and Genones，其內容如下： 1. Ha44 is an essential gene for HearNPV infection and Arg25 is critical for HA44 nuclear localization 、2. The role of ME53 in baculovirus infection、3. Characterization of six new Mamestra configurata pertrophic matrix proteins and interaction of MacoNPV enhancin with insect intestinal mucins、4. Sequence analysis of a new isolate of Cydia pomonella granulovirus (I12) that breaks CpGV resistance in codling moth、5. ORF390 of white spot syndrome virus genome is identified as a novel anti-apoptosis gene、6. Gene Organization and content of the Western tent caterpillar, Malacosoma californicum pluviale nucleo polyhedrovirus、7. Genotypic and phenotypic variation of South African isolates of Helicoverpa armigera single nucleocapsid nucleopolyhedrovirus 、8. Strctural and ultrastructural alterations of Malpighian tubules of Anticarsia gemmatalis larvae infected with different Anticarsia gemmatalis multiple nucleopolyhedrovirus (AgMNPV) recombinant viruses。此部份主要是討論桿狀病毒基因的選殖與功能鑑定，並証明某些選殖出的基因與病毒的感染性有關。

8 月 15 日 PM 參與 Viruses 3: Molecular aspects of virus-host Interaction 其內容如下：1.Transcriptomics of the baculovirus Choristoneura fumiferanamulticapsid nucleopolyhedrovirus (CfMNPV)、2. Reprogramming the Autographa californica multiple nucleopolyhedrovirus chitinase expression profile、3. Escape mutants of Autographa californica multiple nucleopolyhedrovirus (AcMNPV) resistant to nucleoside analogues、4. Functional analysis of a putative inhibitor of apoptosis (IAP) encoded by Chilo iridescent virus、5. Deletion within the AcMNPV IE0 Mterminus 54 amino acid reduces its ability to support viral DNA replication 、6. The baculovirus occlusion-derived virus envelope protein P74 requires site-specific cleavage by insect midgut trypsins for function in per os infection. 7. Functional analysis of HrarNPV putative anti-apoptotic gene、8. Baculovirua infection of an insect host immuno suppressed with cys-motif and vankyrin polydnavirus genes。

8月15日 PM參與Virus 4, Virus Production, Infection and Biotechnology 其內容如下：

1.Translation of complex baculovirus mRNAs: an unanswered question? 2.Identification of retroviruses sequence in insect cells used for baculovirus expression 、3.Establishing aTissue Culture System for the Mosquito Iridescent Virus (RMIV) from Ochlerotatus taeniorhynchus、4.Production of LdNPV in the Wave® cell culture bioreactor: Comparison to production in stirred tank bioreactor、5.Insecticidal activity of the baculovirus expressed, basement membrance-degrading protease, ScathL、6.Impact of basement membrance-degrading protease on dissemination and secondary infection of Autographa californica multiple nucleopolyhedrovirus in Heliothis virescnes (Fabricus)、7.Infection of twolepidopteran cell lines with Amsacta moorei entomopoxvirus and induction of apoptosis 、8.Isolation and characterization of the Serratia entomophila anti-feeding prophage-a unique toxin delivery system?

8月16日 AM參與Microbial Control 3

其內容如下： 1.Use and formulation of Baculovirus insecticides in Australian broadacre crops. 2.Suppressing plum curculio (Coleoptera: Curculionidae) with biopesticides、3.Identification of the midgut receptor for Cry4Ba toxin in Anopheles albimanus larvae. 4.Bioactivities of photorhabdus luminescens subsp. akhurstii, a symbiont of entomopathogenic nematode, Heterorhabditis brevicaudis 、5.Novel Controlled-Delivery Formulation Technology: Mosquito Biolarvicide Applications、6.Quantifying the serine protease enzymes of neat gut juice from C. fumiferana (spruce budworm). 7.Bioassay of a highly purified vip 3a toxin against forest pest Lepidoptera 、8.Authorisation and commercialization of microbial biopesticides: regulatory innovation and the regulatory state。

8月16日 PM參與Viruses 5: Insect Virus Diversity and Evolution

其內容如下： 1.The genes driving baculovirus genome evolution、2.Trichoplusia ni and Chrysodexis chalcites single nucleopolyhedrovirus: Genomic and biological comparison. 3.Towards the complete genome sequence of the baculovirus-related nonoccluded Oryctes rhinoceros nudivirus of beetles、4.Origin of Ichnoviruses: is there consistent molecular support to the Brain Federicis endosymbiogenic theory? 5.Genome analysis of salivary gland hupertrophy virus (SGHV) reveals a novel large double-stranded circular DNA virus from Glossina pallidipes 、

6.Characterization of the Musca domestica salivary glandhyperplasia virus (MdSGHV)、7.A caspase-like gene from Heliothis virescens ascovirus (HvAV-3e) is not involved in apoptosis but is essential for virus replication、8.Two Microplitis demolitor Braconirus virulence factors, PTP-H2 and Glc1.8, induce apoptosis in insect hemocytes。

於 8 月 13 日 PM4:30-6:30 和 8 月 15 日 PM4:00-6:30 進行壁報論文展示與討論，其內容包括：1.細菌類(Bacteria)37 篇

2.微生物控制(Microbial control) 13 篇

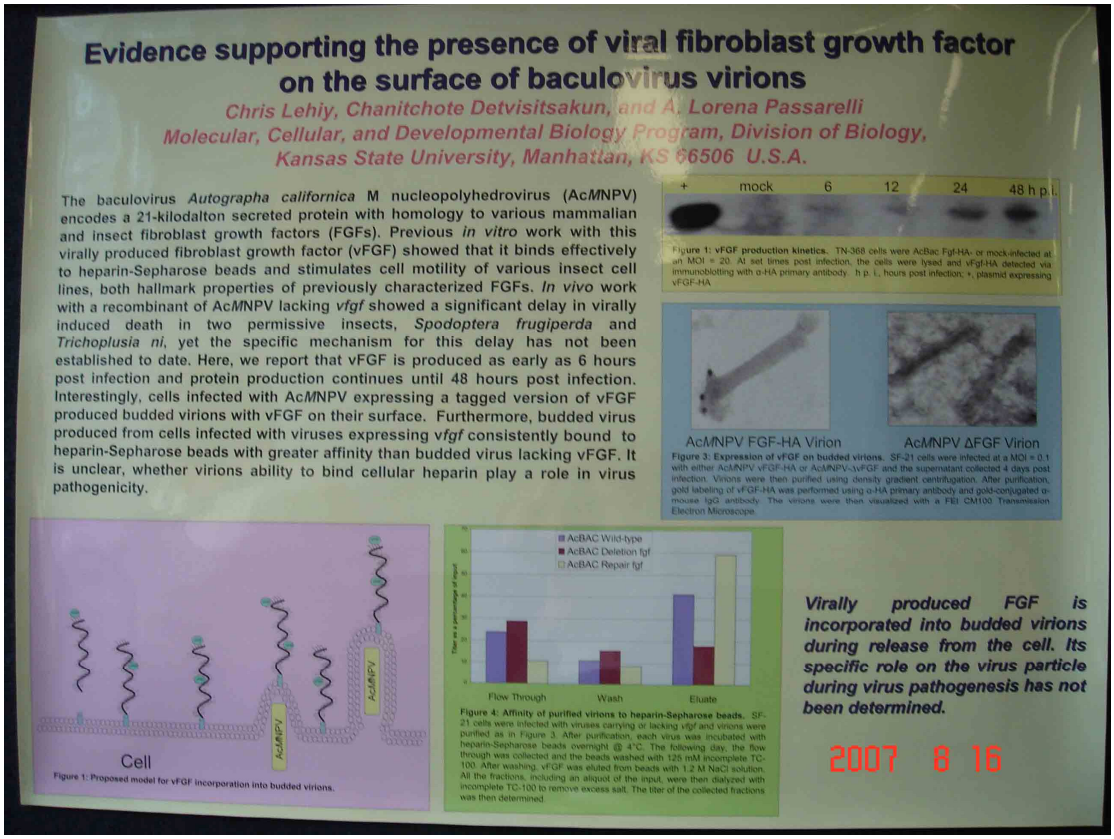
3.病毒類(Virus) 50 篇

4.真菌類(Fungi) 30 篇

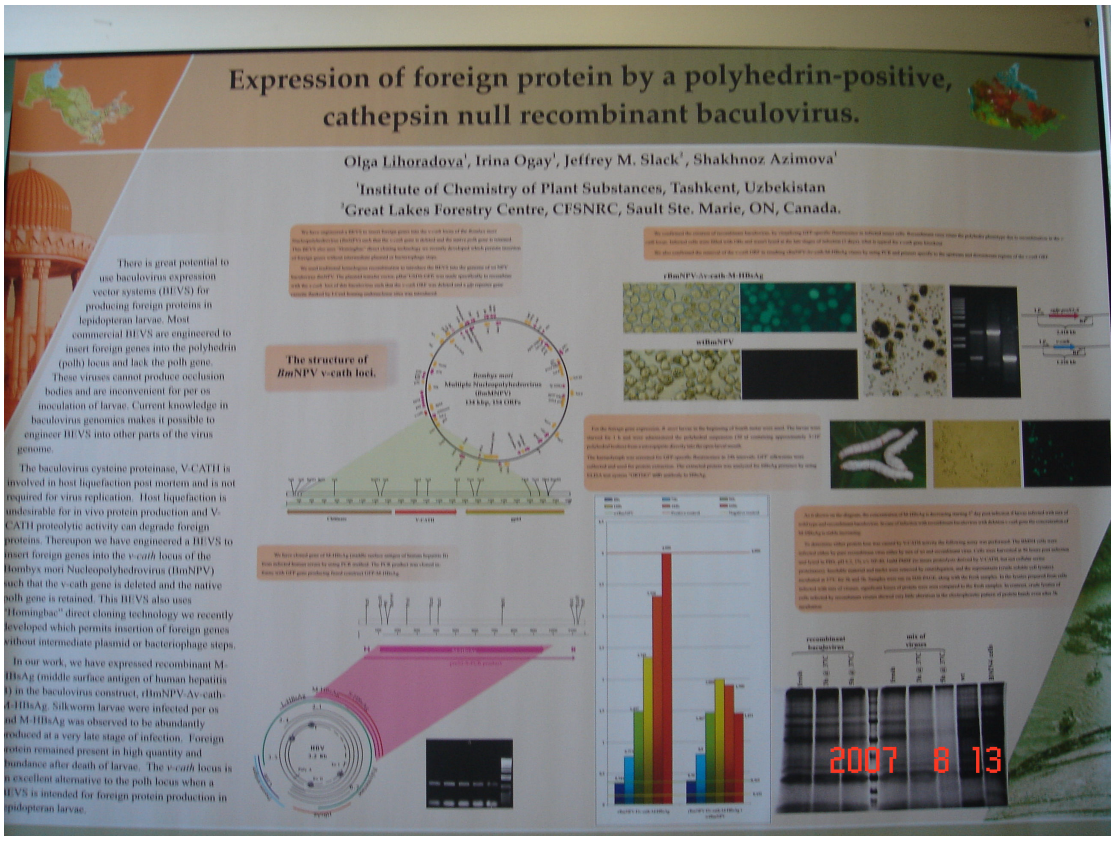
5.線蟲類(Nematodes) 13 篇

6.爲孢子蟲(Microsporidia) 6 篇

桿狀病毒致病機轉探討之壁報論文：



利用桿狀病毒生產蛋白之壁報論文：



參與本次無脊椎病理學會年會之壁報論文：

Effects of wheat germ agglutinin and concanavalin A lectin on the insecticidal efficacy of *Spodoptera exigua* multiple nucleopolyhedrovirus

Tzyy-Rong Jinn*, Chi-Ming Wu , Suey-Sheng Kao and Tzong-Yuan Wu

Biopesticides Division, Taiwan Agricultural Chemicals and Toxic Substances Research Institute, Taichung 413, Taiwan

Abstract

The insecticidal activity of *Spodoptera exigua* multiple nucleopolyhedrovirus (SeMNPV) in combination with wheat germ agglutinin (WGA) and concanavalin A (Con A) was investigated on *S. exigua*. Results showed that the combination of SeMNPV with 0.2, 0.5 and 1% WGA increased the mortality of 2nd instar *S. exigua*, 42, 47 and 57%, respectively, 4 days after inoculation. The combination of SeMNPV with 0.2, 0.5 and 1% Con A also increased mortality of 2nd instar *S. exigua* 30, 35 and 57%, respectively, 3 days after inoculation. Furthermore, the combination of SeMNPV with 0.5, 1% WGA or 0.2, 0.5, 1% Con A also caused a 20% increase in mortality of 3rd instar *S. exigua* 6 days after inoculation.. The combination of SeMNPV with 1% WGA or Con A also significantly increased the insecticidal potency on 2nd instar *S. exigua*. The LT50 value was reduced from 4.05 days to 3.13 and 2.34 days, respectively, and the LD50 value was also reduced from 1.46 x10^5 PIBs/ml to 6.35 x10^4 and 2.11 x10^4 PIBs/ml, respectively. Similar results were also observed on 3rd instar *S.exigua*. Our results have demonstrated the feasibilit of using WGA and Con A in insect control with SeMNPV in the future.

Results

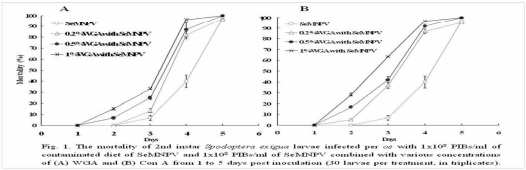


Fig. 1. The mortality of 2nd instar *Spodoptera exigua* larvae infected per *os* with 1x10^6 PIBs/ml of contaminated diet of SeMNPV and 1x10^6 PIBs/ml of SeMNPV combined with various concentrations of (A) WGA and (B) Con A from 1 to 5 days post inoculation (30 larvae per treatment, in triplicates).

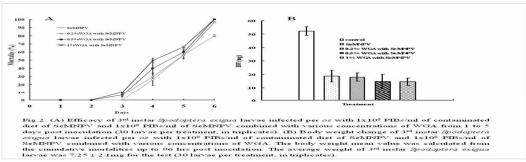


Fig. 2. (A) Efficacy of 3rd instar *Spodoptera exigua* larvae infected per *os* with 1x10^6 PIBs/ml of contaminated diet of SeMNPV and 1x10^6 PIBs/ml of SeMNPV combined with various concentrations of WGA from 1 to 5 days post inoculation (30 larvae per treatment, in triplicates). (B) Body weight change of 3rd instar *Spodoptera exigua* larvae infected per *os* with 1x10^6 PIBs/ml of contaminated diet of SeMNPV and 1x10^6 PIBs/ml of SeMNPV combined with various concentrations of WGA. The body weight mean value was calculated from the cumulative mortalities up to 96 hrs post inoculation. The average weight of 3rd instar *Spodoptera exigua* larvae was 7.25 ± 2.1mg for the test (30 larvae per treatment, in triplicates).

Table 1. Dose efficacy response of 2nd and 3rd instar *Spodoptera exigua* larvae infected by SeMNPV and SeMNPV combined with various concentrations of WGA and Con A (30 larvae per treatment, in triplicates)

Treatment	Mean LT_{50}[1] (days) ± SD	
	2nd instar	3rd instar
SeMNPV [2]	1.46±0.63 × 10^5 a [3]	5.48±1.66 × 10^5 a
SeMNPV with 1% WGA	6.35±0.68 × 10^4 b	2.35±0.55 × 10^5 b
SeMNPV with 1% Con A	2.11±0.21 × 10^4 b	2.23±1.38 × 10^4 b

[1] The LD_{50} values were calculated from the cumulative mortalities up to 5 days post inoculation.
[2] Second and third instars *Spodoptera exigua* larvae infected through per *os* with 1x10^6 PIBs/ml of SeMNPV of each treatment.
[3] Means within the same column without same superscript are significantly different (Alpha = 0.05).

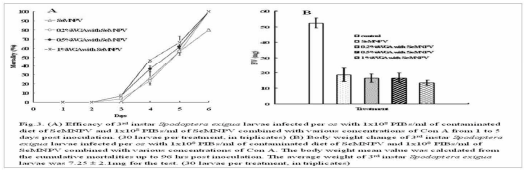


Fig. 3. (A) Efficacy of 3rd instar *Spodoptera exigua* larvae infected per *os* with 1x10^6 PIBs/ml of contaminated diet of SeMNPV and 1x10^6 PIBs/ml of SeMNPV combined with various concentrations of Con A from 1 to 5 days post inoculation (30 larvae per treatment, in triplicates) (B) Body weight change of 3rd instar *Spodoptera exigua* larvae infected per *os* with 1x10^6 PIBs/ml of contaminated diet of SeMNPV and 1x10^6 PIBs/ml of SeMNPV combined with various concentrations of Con A. The body weight mean value was calculated from the cumulative mortalities up to 96 hrs post inoculation. The average weight of 3rd instar *Spodoptera exigua* larvae was 7.25 ± 2.1mg for the test. (30 larvae per treatment, in triplicates)

Table 2. Time-efficacy response of 2nd and 3rd instar *Spodoptera exigua* larvae infected by SeMNPV and SeMNPV combined with various concentrations of WGA and Con A (30 larvae per treatment, in triplicates)

Treatment	Mean LT_{50}[1] (days) ± SD	
	2nd instar	3rd instar
SeMNPV [2]	4.05±0.53 a [3]	4.47±0.28 a
SeMNPV with 0.2% WGA	3.56±0.44 b	4.18±0.42 ab
SeMNPV with 0.5% WGA	3.29±0.42 b	4.20±0.08 ab
SeMNPV with 1% WGA	3.13±0.37 b	3.96±0.26 ab
SeMNPV with 0.2% Con A	3.30±0.40 ab	4.23±0.49 ab
SeMNPV with 0.5% Con A	3.10±0.30 b	4.26±0.36 ab
SeMNPV with 1% Con A	2.54±0.26 c	3.94±0.16 ab

[1] The ET_{50} values were calculated from the cumulative mortalities up to 5 days post inoculation.
[2] Second and third instars *Spodoptera exigua* larvae infected through per *os* with 1x10^6 PIBs/ml of SeMNPV of each treatment.
[3] Means within the same column without same superscript are significantly different (Alpha=0.05).

conclusion

1. The combination of SeMNPV with 1% WGA or Con A is significantly increased the insecticidal potency on second or third instar *S. exigua*.
2. The LT50 value was reduced from 4.47 days to 3.96 days by 1%WGA and to 3.94 days by 1%Con A and the LD50 value was reduced from 5.48 x10^5 PIBs/ml to 2.35 x10^5 PIBs/ml by 1%WGA and to 2.23 x10^5 PIBs/ml by 1%Con A which were observed on 3rd instar *S. exigua*.
3. Our results have demonstrated the feasibility of using WGA and Con A in insect control with SeMNPV in the future.

References

1. Etzler, M. E. 1985. Plant lectins: molecular and biological aspects. Annu. Rev. Plant Physiol. 36: 209-234.
2. Gatehouse, A. M. R., Powel, K. S., Peumans, W. J., Van Damme, E. J. M., and Gatehouse, J. A. 1995. Insecticidal properties of lectins: their potential in plant protection, pp. 35-57. *In*: A. J. Pusztai and S. Bardocz [ed.], Lectins: biomedical perspectives. Taylor and Francis., Hants, UK.
3. Roy, A., Banerjee, S., Majumder, P., and Das, S. 2002. Efficiency of mannose-binding plant lectins in controlling a homopteran insect, the red cotton bug. J. Agric. Food Chem. 50: 6775-6779.

心得

桿狀病毒(baculovirus)是目前有機農業上極具潛力的生物農藥，也是當今醫學及工業上生產重要外源蛋白的載體系統。因此，桿狀病毒的研究發展在未來的生物技術及農業科技化將扮演著十分重要的角色。桿狀病毒爲昆蟲的病原體，主要爲感染鱗翅目昆蟲。其分類上可分成 A、B、C 三群，其中核多角體病毒(*nucleopolyhedrovirus*; NPV)即爲 A 群。自 1983 年核多角體病毒被開發成真核細胞表現載體(eukaryotic expressing vector)，並成功的製造出具有生物活性的人類β-干擾素(β-interferon) (Smith *et al.*, 1983)後，即被廣泛的探討與研究。因此，在此次第 40 屆無脊椎病理學會年會暨第一屆昆蟲病原線蟲與共生菌國際論壇中，也有不少的論文是探討以桿狀病毒生產外源蛋白。另在桿狀病毒感染宿主之決定因子上亦有諸多探討，關於此方面我國研究學者則較國外學者涉獵的較少。參與此次會議讓我瞭解到其他國家目前在該領域上的研究進展與結果，並藉由經驗與技術上的交流，擴展了對該桿狀病毒的研究前景。

建議事項

1. 國外實驗室通常研究人員職缺比率比國內實驗室高出許多，建議國內需提升實驗室的研究人員人數，以提高研究效率。
2. 爲提升實驗室的研究水準，建議應多鼓勵國內學者與國內或國外實驗室合作。
3. 政府應多鼓勵研究學者參與國際會議，多與國外相關研究學者進行技術及經驗上的交流，以提升國內研究之競爭力。
4. 基礎研究是應用研究的基礎，故發展生技產業則需兩者均衡發展。
5. 桿狀病毒是一值得開發之生物農藥，目前已有野生型病毒上市，但殺蟲效果較野生型好的重組病毒，則尚未有商品化，因此相關的法案及評估實驗需待推動及進行。
6. 建議國內應主動積極爭取主辦國際會議，以讓更多的國內學者參與國際性會議，增進與國外交流的機會。

附錄

第 40 屆無脊椎病理學會年會暨第一屆昆蟲病原線蟲與共生菌國際論壇會議行程

SUNDAY, AUGUST 12TH

08:30 - 17:00 SIP Council Meeting, Room VCH-[illegible]
13:00 - 18:00 Registration
18:00 - 21:00 Mixer

MONDAY, AUGUST 13TH

7:00 - 8:30 Registration Pavillon Vachon

8:30 - 10:00 Opening Ceremony and Founders' Lecture Room PLT-1112
Jean-Louis Schwartz, Chair, Organizing Committee
Wendy Gelernter, President, SIP

Founders' Memorial Lecture: A Pioneer and Visionary in Non-Insect Invertebrate Pathology. Albert K. Sparks
Dudley Pinnock, Chair, Founders' Lecture Committee
Dr. Albert K. Sparks, Honoree
Dr. Frank Mikkola, Lecturer

10:30 - 12:30 Plenary Lectures Room PLT-1112
Historical perspective on this 40th Anniversary
Chemical ecology and invertebrate pathology

14:00 - 16:00 Bacterial Division Symposium Room VCH-2850
[illegible]

14:00 - 16:00 Virus Division Symposium I Room VCH-[illegible]
[illegible]
- A Symposium in honour of [illegible]

14:00 - 16:00 IWGNSB Room VCH-3860
Session I: Symbiosis

14:00 - 16:00 Contributed Papers Room VCH-3880
Fungi 1

16:30 – 18:00 Contributed papers Room VCH-2850
Microsporidia

16:00 - 16:30 COFFEE BREAK

16:30 - 18:30 **POSTER SESSION I** Pavillon Vachon, 2nd Floor
Bacteria, Microbial Control and Virus I

20:00 - 21:00 **Bacteria Division Business Meeting** Room VCH-2850

21:00 - 22:00 Bacteria Division Workshop Room VCH-2850
So Many Strains, so Few Products! Opportunities and Constraints to Commercial Development of New Bt Products

20:00 - 22:00 Fungal Division Business Meeting Room VCH-3870

20:00 - 22:00 Microsporidia Division Business Room VCH-2880
Meeting and Workshop. Workshop: "Methods of field [illegible]"

20:00 - 22:00 Nematode Division Business Room VCH-3860
Meeting and Workshop. Workshop: Nematode Phylogeny and Systematics

20:00 - 22:00 Virus Division Business Meeting Room VCH-3850
and Workshop. Workshop "Polydnavirus Phylogeny and Taxonomy"

TUESDAY, AUGUST 14TH

6:30 - 7:30 5K SIP Run/Walk Pavillon PEPS

8:00 - 10:00 Contributed Papers Room VCH-2850
Microbial Control I

8:00 - 10:00 Virus Division Symposium II Room VCH-2880
Baculovirus Beauty: A Symposium to honor Loy Volkman

8:00 - 10:00 IWGNSB Session II Room VCH-3860
Virulence

8:00 - 10:00 Cross-Divisional Symposium I Room VCH-3880
Current situation on the biological control of [illegible]

10:30 - 10:30 Contributed Papers Room VCH-2850
Bacteria II

10:30 - 10:30 Contributed Papers Room VCH-2880
Viruses I. Viral Ecology and Biocontrol

10:30 - 10:30 Contributed Papers Room VCH-3860
Nematodes

10:30 - 12:30 Fungi Division Symposium I Room VCH-3880
"Are entomopathogenic fungi only entomopathogens?

12:30 - 14:00 LUNCH

12:45 DEPARTURE FOR EXCURSION (tickets required)

12:30 Meet buses in front of the Pavillon Vachon (meetings building). A **LUNCH** will be provided.
14:00 - 15:30 BOAT CRUISE on the M/V Louis Jolliet
16:00 - 17:00 Montmorency WATERFALLS

16:15 Buses leave from Laval University for BBQ (Pavillon [illegible])
(For those who are not going to the Excursion)

18:00 BBQ and ENTERTAINMENT at Mont-Sainte-Anne

22:30 - 00:30 Buses back to the University and Hotels

WEDNESDAY, AUGUST 15TH

[illegible] – Contributed Papers – Room VCH-2850
Bacteria 2

[illegible] – Contributed Papers – Room VCH-[illegible]
Fungi 2

[illegible] – Contributed Papers – Room VCH-[illegible]
Viruses 2 [illegible]

[illegible]

[illegible] - 12:30 – Contributed Papers – Room VCH-[illegible]
Microbial Control 2

10:30 - 12:30 – [illegible] Session III – Room VCH-[illegible]
Infection & [illegible]

[illegible] - 12:30 – Contributed Papers – Room VCH-[illegible]
Viruses 3: [illegible] aspects of Virus-host interaction

12:00 - 14:00 – Student Committee – Room VCH-3880
Student Committee Session with Pizza Lunch

12:30 - 14:00 LUNCH

12:30 – 14:00 – **IP Editorial Board Meeting** – Room VCH-1039C

14:00 - 16:00 – Cross-Divisional Symposium – Room VCH-2850
Advances in the use of Microbial Agents for Control of Orchard Pests

[illegible] – Microsporidia Division Symposium – Room VCH-[illegible]
Microsporidia of beneficial and pest insects in [illegible] and pollination systems

[illegible] – Contributed Papers – Room VCH-[illegible]
Bacteria 3

14:00 – [illegible] – Contributed Papers – Room VCH-[illegible]
Viruses 4, Virus Production, Infection and [illegible]

[illegible]

16:30 - 18:30 – **POSTER SESSION II** – Pavillon Vachon, 2nd Floor
Fungi, Nematodes, Microsporidia and Virus II

[illegible] – Microbial Control Division Business Meeting Room VCH-[illegible]

[illegible] – Workshop – Room VCH-[illegible]
Joint Workshop Organized by Microbial Control and Bacterial Divisions

THURSDAY, AUGUST 16TH

08:00 - 10:00 – Contributed Papers – Room VCH-[illegible]
Fungi 3

[illegible] – Cross-Divisional Symposium – Room VCH-[illegible]
[illegible] Development and use of [illegible] in control invasive forest pests

[illegible] – Contributed Papers – Room VCH-[illegible]
Microbial Control 3

[illegible] – Contributed Papers – Room VCH-[illegible]
Bacteria 4

[illegible]

[illegible] – Business Meeting of SIP – Room PLT-[illegible]

12:30 - 14:00 – Student Awards Committee Luncheon Meeting Room VCH-[illegible]

12:30 - 14:00 LUNCH

14:00 - 16:00 – Fungi Division Symposium – Room VCH-2850
Fungal Secondary Metabolites: Knowns and Unknowns

14:00 - 16:00 – Contributed Papers – Room VCH-2880
Microbial Control 4

14:00 - 16:00 – Contributed Papers – Room VCH-3860
Viruses 5: Insect Virus Diversity and Evolution

16:00 - 16:30 COFFEE BREAK

16:15 - [illegible] – Workshop – [illegible] Room
Virus Division Satellite Workshop: The Biology of [illegible]
[illegible] Laurentian Forestry Centre

[illegible] – [illegible] Session IV – Room VCH-[illegible]
ECOLOGY

16:15 - [illegible] – Contributed Papers – Room VCH-[illegible]
Bacteria 5

16:15 - 19:30 – Contributed Papers – Room VCH-3880
Microbial Control 5

[illegible]

[illegible] – Buses leave from Laval University, Pavillon [illegible] ([illegible] departures [illegible])
One bus will be leaving from [illegible] Hotel at [illegible]
One bus will be leaving from [illegible] Hotel at [illegible]
One buse will be leaving from the Laurentian Forestry Centre at 19:45

19:00 - 20:00 – Cocktail Hour
20:00 – Banquet
22:30 - 02:00 – Buses back to the University and Hotels