

Book Review

Caballero P., Lopez-Ferber, M., Williams, T. (eds.). 2001. Los Baculovirus y sus Aplicaciones como Bioinsecticidas en el Control Biológico de Plagas [Baculoviruses and their Application as Bioinsecticides in Biological Control of Pests]. PHYTOMA-España, Universidad Publica de Navarra, Valencia. 2001. ISBN 84-9320256-0-5, 518 pp. Price: \$35.80

For decades baculoviruses attracted attention of economic entomologists and insect pathologists as they play significant role in natural mortality and population collapse of many important forest, orchard and field crop pests. In addition baculoviruses became an easy and powerful tool in general and medical molecular and biotechnological research due to large virion size and double-stranded, circular DNA molecules. All these features are discussed in up-to-date manner in the reviewed book.

Chap. 1 "Structure and classification of baculoviruses" (p. 15–46) by P. Caballero et al. describes structures of nucleocapsides, virions and inclusion bodies of the DNA viruses classified into family Baculoviridae. This family has two genera recognized by shape of inclusion bodies: *Nucleopolyhedrovirus* with polyagonal inclusion bodies and *Granulovirus* with granule shaped inclusion bodies. Both genera are detailed characterized on the basis of morphological, biochemical, serological, genetic and phenotypic characters. Several baculoviruses with their insect hosts are listed.

Chap. 2 "Biology and pathogenesis of baculoviruses" (p. 47–72) by A. Sciocco de Cap discusses topics of symptomatology, cytopathology and cycles of virion replications in primary and secondary infection. A concise review of pathogenesis of nuclear polyhedrosis viruses infecting Lepidoptera, Hymenoptera, Diptera, and Crustacea is given. Pathogenesis caused by granulosis viruses concerns only Lepidoptera.

Chap. 3 "Genomic organization and evolution" (p. 73–93) by T. Luque provides general characteristic of opened reading frames of baculoviruses and discusses their genome organization. Several viruses were compared as to the number of ORFs, number of genes bro, and G+C(%). Interesting remarques as to the phylogeny of baculoviruses are given.

Chap. 4 "Natural diversification of baculoviruses" (p. 95–118) by D. Muñoz and P. Caballero discusses genetic diversity observed among baculoviruses caused by deletion, transposition and recombination phenomena. Of special interest is phenotypic diversity concerning pathogenicity measured by LD₅₀ values, infection speed measured by LT₅₀- values, and insect hosts spectrum.

Chap. 5 "Molecular biology of baculoviruses – replication and regulation of gene expression" (p. 119–142) by V. Romanovski and P.D. Ghiringenelli concerns mainly various phases of viral transcription, utility of host cells machinery, DNA replication, combining virions and production of occlusion bodies. Interactions between insect hosts and viruses at cell and larval levels were discussed covering also insect host spectrum.

Chap. 6 "Ecology of baculoviruses" (p. 143–201) by S.D. Vasconulos broadly discusses general as well as specific aspects of virus epizootics in insect populations. Among factors concerning insect hosts their biology, mobility, cannibalism, and population density were discussed. Among factors concerning viruses their pathogenicity, specificity, productivity, transmission and persistence ability were discussed.

Chap. 7 "Insecticidal capacity of baculoviruses" (p. 203–224) by J.E. Ibarra and C. del Rincon Castro discusses laboratory and field methods of bioinsecticidal evaluation of baculoviruses: bioinsecticidal evaluation of baculoviruses; methods of bioassay and probit analysis; control of heterogeneity; validation of laboratory bioassays in field and greenhouse conditions; evaluation of biosecurity and virus recombinant phenomenon.

Chap. 8 "Baculovirus recombinants in integrated control" (p. 225–255) by M. Lopez-Ferber and C. del Rincon Castro discusses methods of changing insect host spectrum using as examples development of three baculoviruses: AcMNPV in *Bombyx mori*, BmNPV in cell culture sf9, and AcMNPV in *Lymantria dispar*. Methods of genetic modification by *egt* gene deletion or insertion of toxins, juvenile hormones and protein hormones are described. Risks concerning use of recombinant baculoviruses were also considered.

Chap. 9 "Mass production of baculoviruses" (p. 257–312) by J.D. Claus and A. Sciocco de Cap provides a very broad description of techniques and topics, that were arranged into the following blocks. Insect host: source, developmental stage, sex. Virus inoculum: origin, activity, dose. Environmental

factors: temperature, humidity, photoperiod, alimentation. Productivity of baculoviruses in vivo: rearing facilities. Production of baculoviruses in insect cell cultures: media, physical factors, scale of production, other factors.

Chap. 10 "Formulation and application of baculoviruses as bioinsecticides" (p. 313–372) by T. Williams and J. Cisneros discusses very broadly various aspects of formulation of viral bioinsecticides and their applications. Solid and liquid formulations of baculoviruses must contain surfactants, adherents and other adjuvants. Presence of ultraviolet protectants greatly increase efficacy of viral bioinsecticides. Of special importance is also proper size of drops during spraying.

Chap. 11 "Effect of sublethal doses" (p. 373–387) by E. Vargas Osuna discusses the effect of sublethal doses of baculoviruses in the infection process in insects. Use of sublethal doses may alter development of infected larvae as well as reproduction and longevity of adult insects without causing their death. Vertical transmission and latent infections with of baculoviruses are also discussed in this chapter as they are important factors in virus epizootics.

Chap. 12 "Control of noxious insects using baculoviruses" (p. 389–450) by A. Cherry and T. Williams provides information on biopesticide market in which virus biopesticides have share of 5–6 millions of US dollars. Strategies of virus use to control insects include: classical spraying, periodic introduction, habitat manipulation, and inundative releases. Use of viruses against following insects is described: *Anticarsia gemmatilis*, *Helicoverpa* spp., *Heliothis* spp., *Spodoptera littoralis*, *S. exigua*, *Cydia pomonella*, *Lymantria dispar*, *Orgyia pseudotsugata*, *Neodiprion sertifer*, *N. lecontei*, *Plodia interpunctella*.

Chap. 13 "Resistance of lepidopterans to nucleopolyhedroviruses: case of *Anticarsia gemmatilis* – AgMNPV" (p. 451–478) by D.R. Sosa-Gomez and F. Moscardi discusses influence of genetic and ecological factors on resistance to virus infection demonstrated by *Anticarsia gemmatilis*, *Phthorimoea operculella*, *Cydia pomonella*, *Spodoptera frugiperda* and *Pieris brassicae*.

Chap. 14 "Basic techniques for characterization of baculoviruses" (p. 479–518) by D. Muñoz et al. describes several techniques used in studies of baculoviruses. Identification techniques include: recognition of infected larvae in field, symptomatology of infection, microscopic techniques; multiplication of viruses in vitro and in vivo using artificial diet; purification of inclusion bodies, virions and DNA virus material; standardization of inclusion bodies and virions; separation and purification of virus material in vitro and in vivo; biochemical characterization of structural proteins and DNA using restriction endonucleases; biological characterization using various methods of inoculation; determination of host range and virus productivity in larvae.

Without question this book provides a voluminous amount of information very valuable to all persons interested in use of baculoviruses as tools in molecular research or in use to control insects noxious to field, horticultural and forest pests. I recommend this book to all natural sciences and agricultural libraries.

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