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Baculoviruses in Crop Protection

Hamburg, 2008-11-14

Baculoviruses in crop protection: properties

- **Suitability for agricultural pest management and integrated or biological production !**

- natural disease organisms of pest insects
- non-pathogenic to mammals
- globally distributed with variable pathogenicity to a range of species and often specialized to a few species
- degradable and exemption from residue concern
- control pest numbers spectacularly especially with high pest densities

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Examples of insect pests on several crops

Crop	Pest	Virus	Status
Cotton	old world bollworm (*Helicoverpa armigera*)	AcMNPV	FermoVirin / Ac
	cotton bollworm (*Helicoverpa zea*)	Ha(S)MNPV Hz(S)MNPV	development
	beet armyworm (*Spodoptera exigua*)	SeMNPV	
	cotton leafworm (*Spodoptera litoralis*)	SlMNPV	development
	cabbage looper (*Trichoplusia ni*)		
	gypsy moth (*Lymantria dispar*)		
Tea	*Lymantria albulunata* *Euproctis latifascia* *Cydia leucostoma* *Buzura suppressaria*	ElNPV BsNPV	projected
Forest	Oak processionary (*Thaumetopoea processionea*)	TpNPV	projected
	gypsy moth (*Lymantria dispar*)	LdMNPV	

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Insect pests in cotton

Heliotis virescens larva
(Tobacco budworm)
feeding on cotton boll

Agrotis ipsilon larva
(Black cutworm)
feeding on cotton stem

Spodoptera frugiperda
(Fall armyworm) feeding
damage on cotton boll

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Virulence of wild type - *Autographa californica* NPV LD_{50} values (OB's per mm2 diet)

Genus and species	LD50
Autographa californica	0,1
Estigmene acrea	0,1
Spodoptera exigua	0,1
Trichoplusia ni	0,1 – 0,5
Heliothis virescens	0.5
Heliocoverpa zea	3.7 - 20
Pectinophora gossypiella	1.5 - 5
Hellula phillealis	3 - 5
Plutella xylostella	3 - 5

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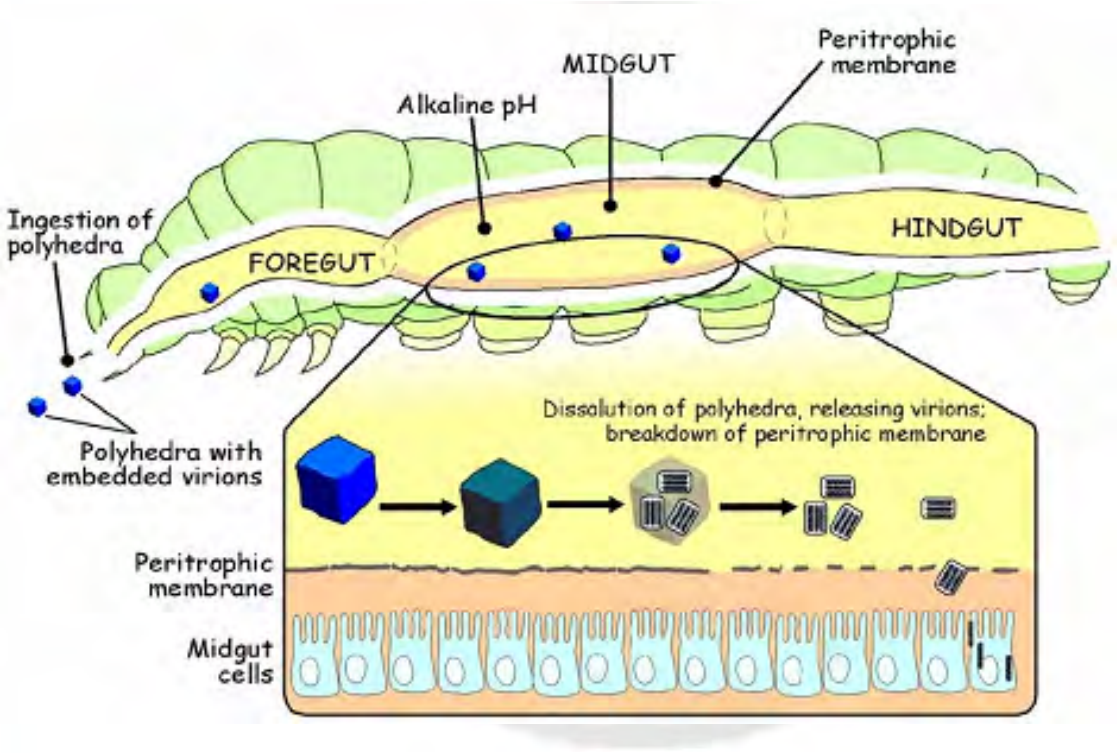
Baculovirus infection of an insect host



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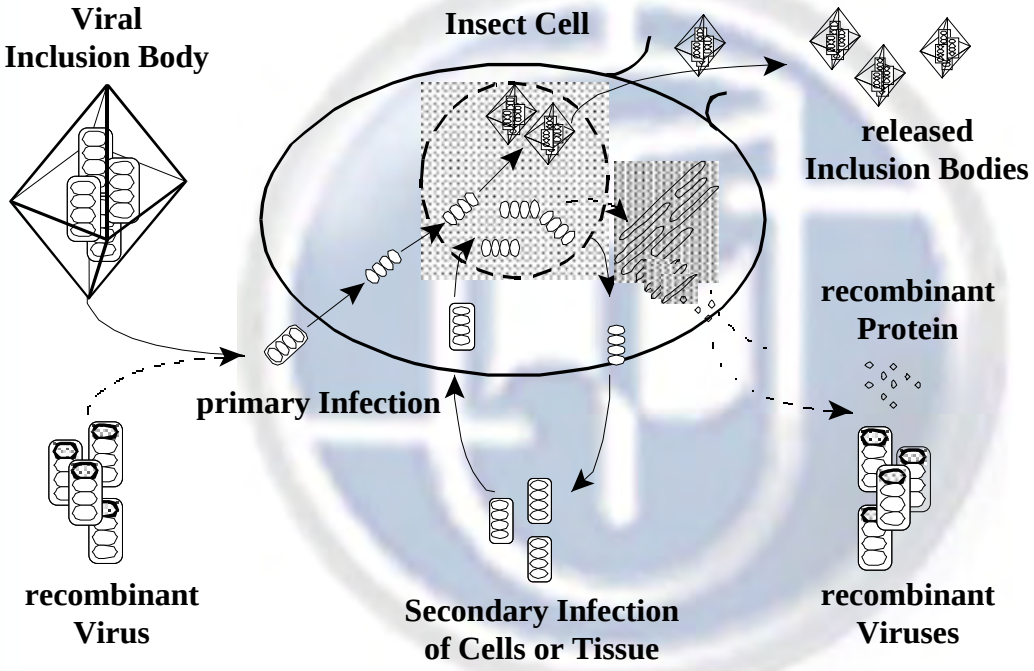
Baculovirus Life Cycle



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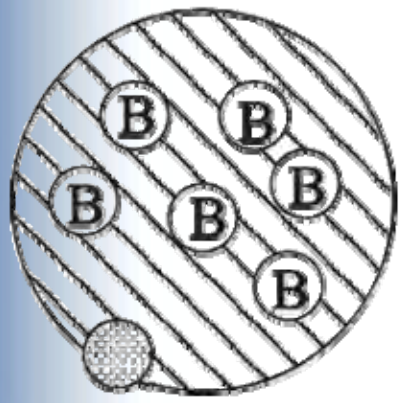
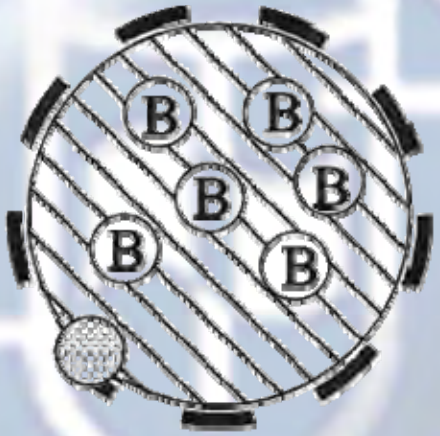
Encapsulation systems

Solid Beads



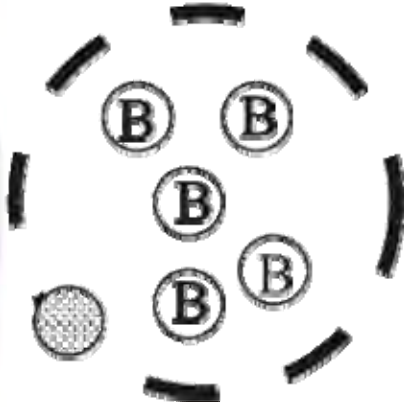
Ca-Alginate
PVA

Coated Beads



PLL / Ca-Alginate

Hollow Microspheres



Polyelectrolytes
(NaCS / PDADMAC)

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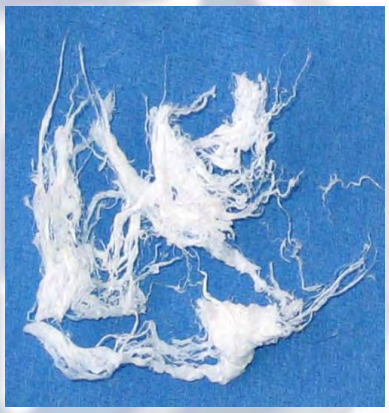
Synthesis of sodium cellulose sulphate

Derivatisation of cellulose

Linters

H_2SO_4
ROH
NaOH



NaCS-Fibres

NaCS-Foil

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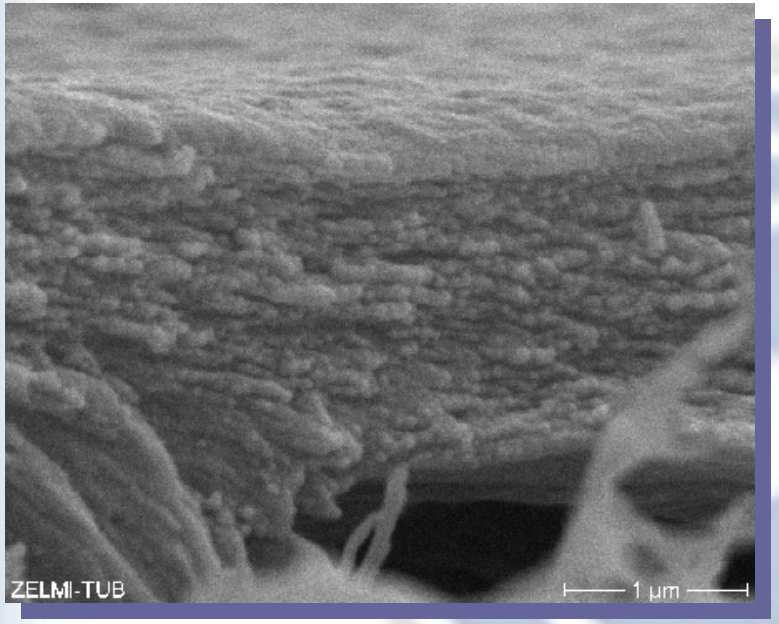
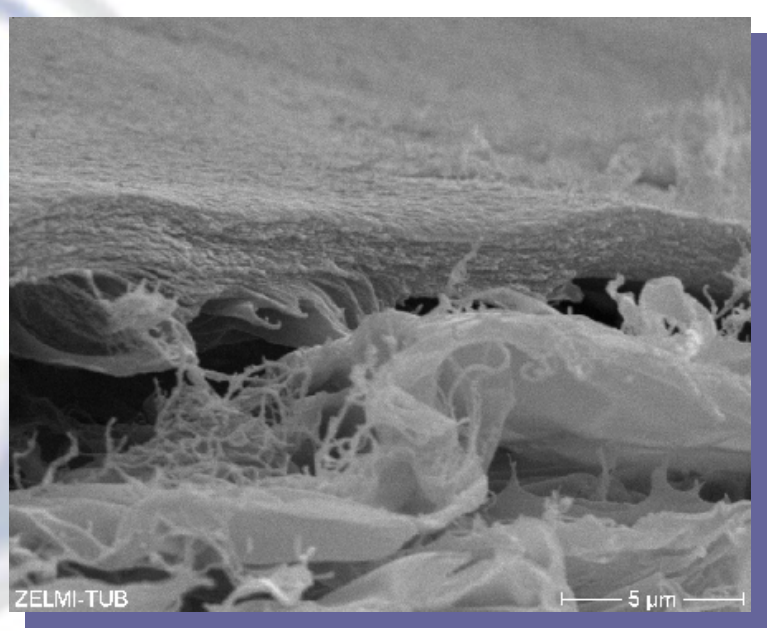
Membrane of NaCS





Micrograph of NaCS-Membrane

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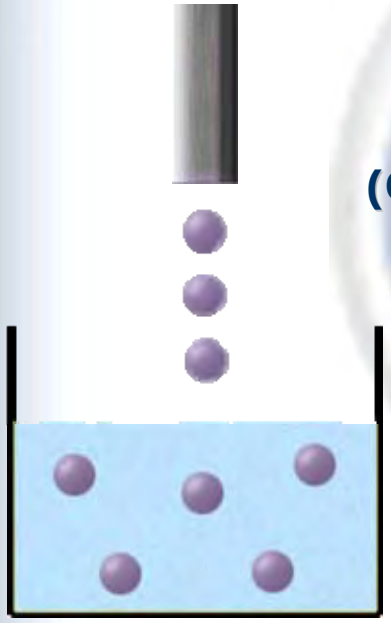
Immobilisation of insect cells

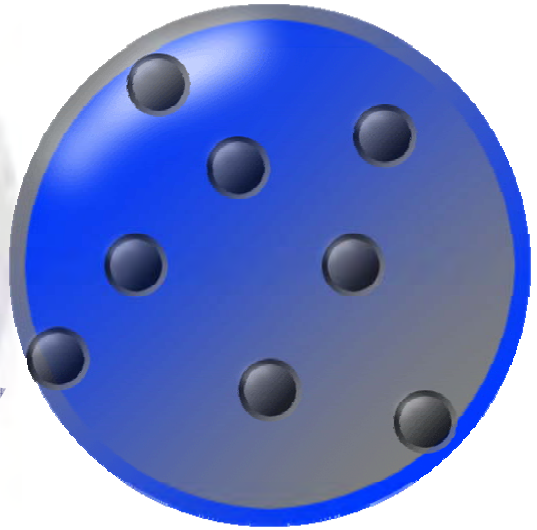
Droplet generator

Hollow spheres with cells



Droplets
(Cellulosesulfate & Cells)

Precipitation bath
(pDADMAC)



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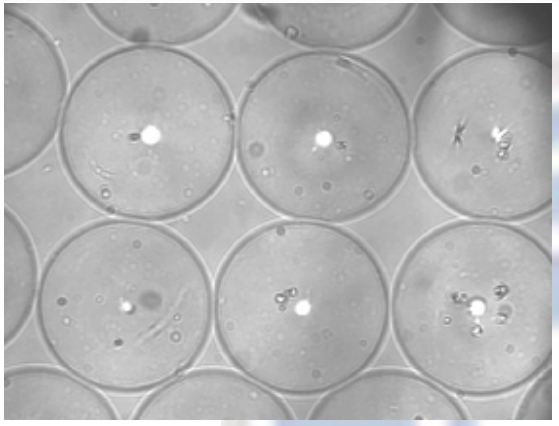
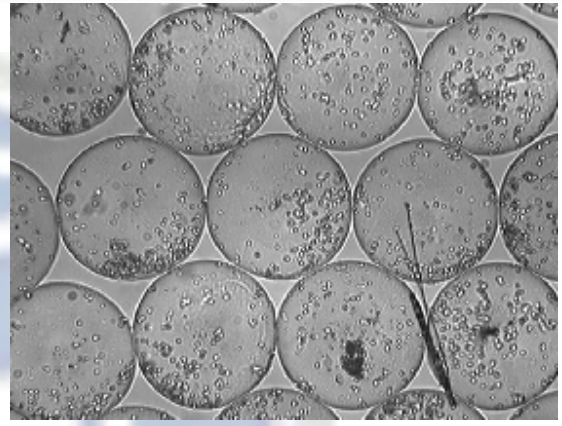
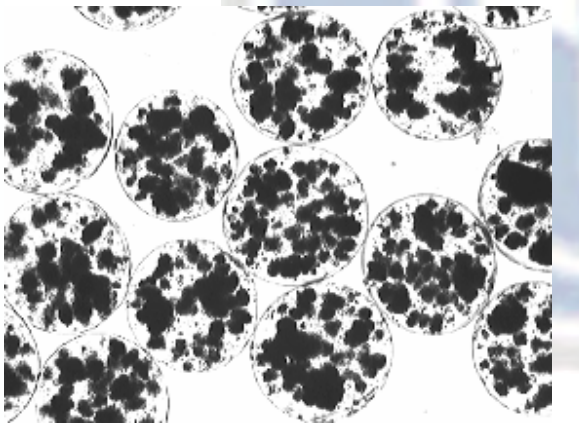
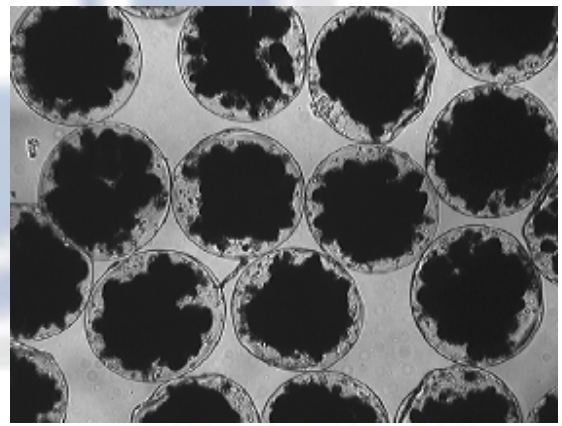
Insect cells embedded in micro-capsules









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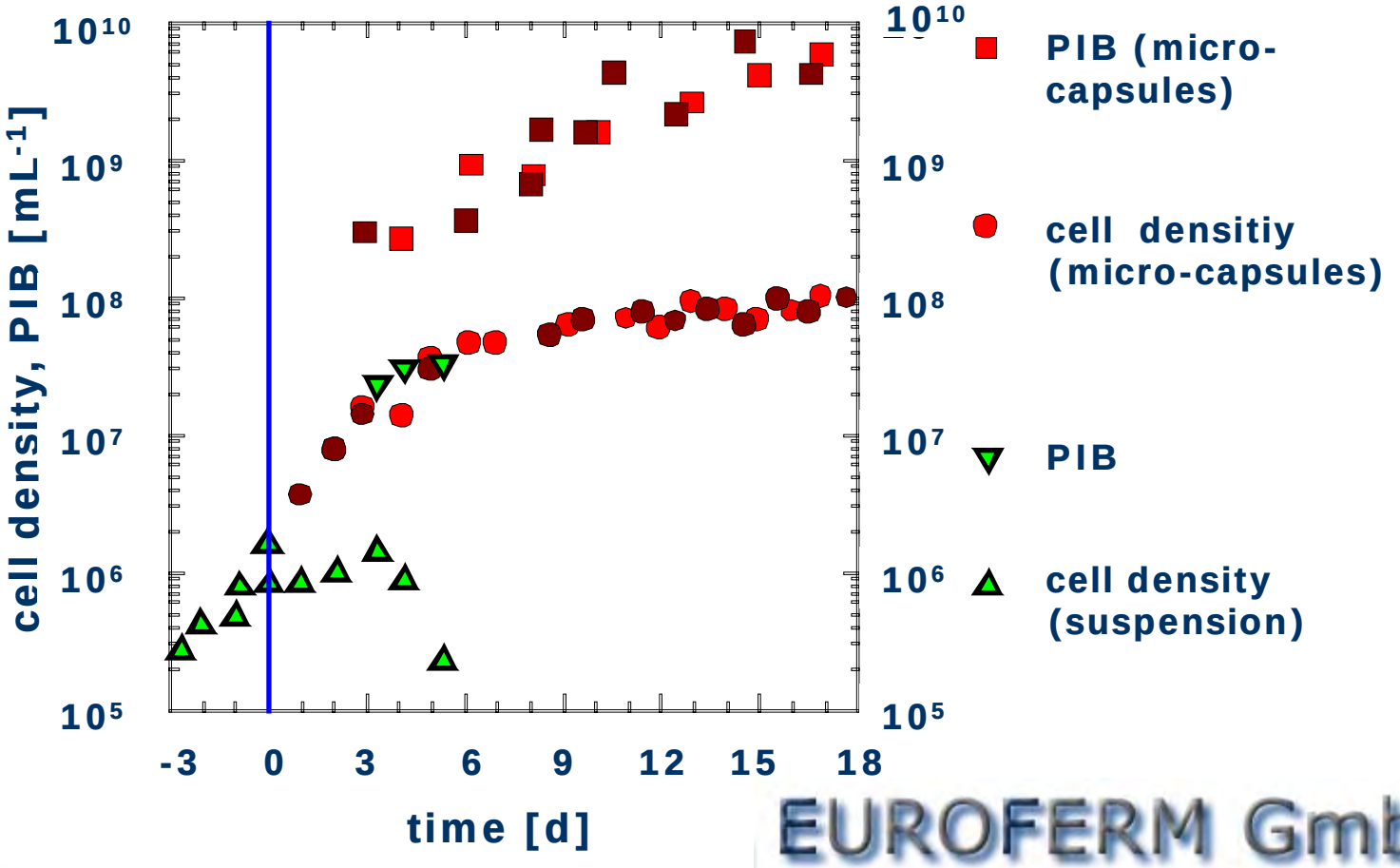
Production of AcMNPV

(in suspended and immobilised culture)



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Insect Ppsts in apple orchards

Damage on Apple

Codling Moth Larvae

Damage on Apple

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Crop protection with FermoVirin

Cydia pomonella (Codling Moth)
Pest in apple orchards

State of the art

Production of
insect pathogen viruses
in living larvae of the pest insect

Alternative solution with EuroFerm technology

In vitro production
of insect pathogen viruses
with immobilised insect cells

FermoVirin / CpGV is under registration in Russia

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Thank you for your attantion

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