

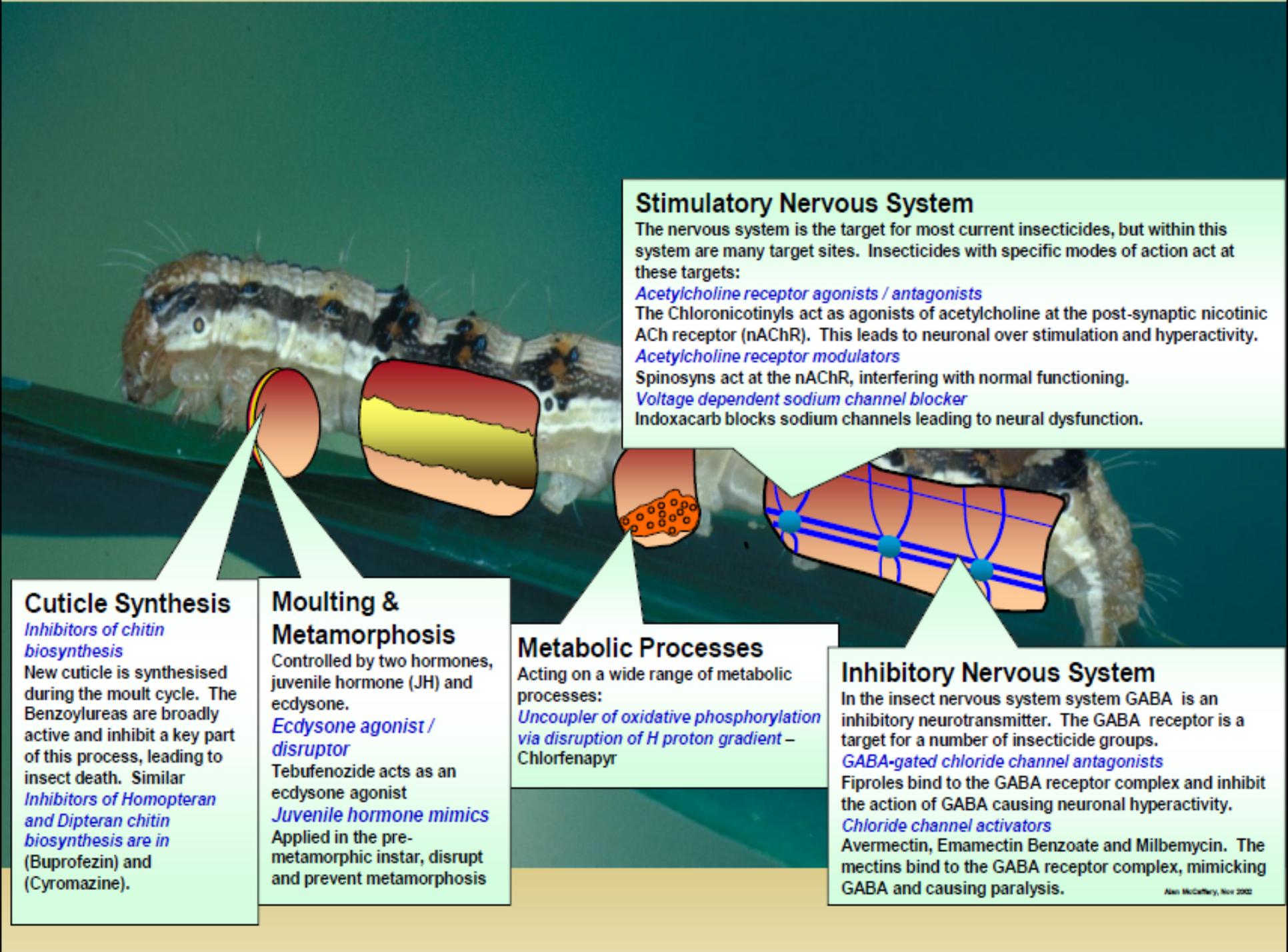


Chemical control in IPM



Mode of action of conventional insecticides

- All of the conventional insecticides are nerve poisons whose mode of action depends on binding at one of only four target sites in the insect's nervous system:
- Organochlorines - Gamma-aminobutyric acid (GABA) gated chloride channel
- Organophosphates and carbamates - acetylcholinesterase receptor
- Formamidine- octopamine receptor
- Pyrethroids- voltage gated sodium channel



Cuticle Synthesis

Inhibitors of chitin biosynthesis

New cuticle is synthesised during the moult cycle. The Benzoylureas are broadly active and inhibit a key part of this process, leading to insect death. Similar *Inhibitors of Homopteran and Dipteran chitin biosynthesis* are in (Buprofezin) and (Cyromazine).

Moulting & Metamorphosis

Controlled by two hormones, juvenile hormone (JH) and ecdysone.

Ecdysone agonist / disruptor

Tebufenozide acts as an ecdysone agonist

Juvenile hormone mimics

Applied in the pre-metamorphic instar, disrupt and prevent metamorphosis

Metabolic Processes

Acting on a wide range of metabolic processes:

Uncoupler of oxidative phosphorylation via disruption of H proton gradient – Chlorfenapyr

Stimulatory Nervous System

The nervous system is the target for most current insecticides, but within this system are many target sites. Insecticides with specific modes of action act at these targets:

Acetylcholine receptor agonists / antagonists

The Chloronicotinyls act as agonists of acetylcholine at the post-synaptic nicotinic ACh receptor (nAChR). This leads to neuronal over stimulation and hyperactivity.

Acetylcholine receptor modulators

Spinosyns act at the nAChR, interfering with normal functioning.

Voltage dependent sodium channel blocker

Indoxacarb blocks sodium channels leading to neural dysfunction.

Inhibitory Nervous System

In the insect nervous system system GABA is an inhibitory neurotransmitter. The GABA receptor is a target for a number of insecticide groups.

GABA-gated chloride channel antagonists

Fiproles bind to the GABA receptor complex and inhibit the action of GABA causing neuronal hyperactivity.

Chloride channel activators

Avermectin, Emamectin Benzoate and Milbemycin. The mectins bind to the GABA receptor complex, mimicking GABA and causing paralysis.

Advantages of Novel insecticides over conventional insecticides

- ✓ **Good bioefficacy**
- ✓ **High selectivity and less toxic to non-target organism**
- ✓ **Very low mammalian toxicities and potent act by preventing immature stages of the insects from molting in to an adult**
- ✓ **Use at very low concentrations**
- ✓ **More target specific chemicals are replacing older broad spectrum synthetic pesticides**
- ✓ **Environmentally and ecologically sound**
- ✓ **Majority are Green labelled insecticides**
- ✓ **No resistance development, because they are having different mode of action**
- ✓ **Low residue in soil**