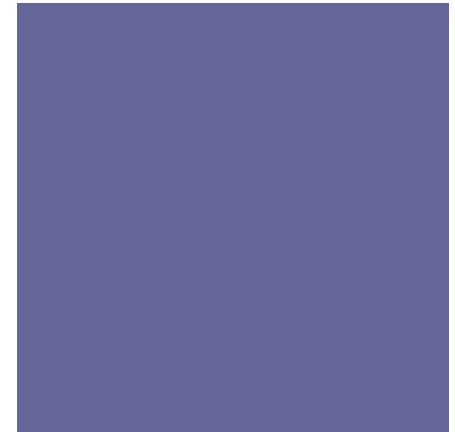


+  
Finding solutions  
to the  
shortcomings of  
the risk evaluation  
of the effects of  
pesticides on  
honeybees



Apimondia  
Buenos Aires - Argentina

Noa Simon Delso

# + Evolution - pesticide molecules



pesticides (active substance)	Commercialised product	Use	DL50 (ng/bee)	Tox/DDT
DDT	Dinocide	Insecticide	27.000,0	1
Amitraz	Apivar	Ins./Acaricide	12.000,0	2
Coumafos	Perizin	Ins./Acaricide	3.000,0	9
Tau-fluvalinate	Apistan	Ins./Acaricide	2.000,0	14
Metiocarb	Mesurool	Insecticide	230,0	117
Carbofuran	Curater	Insecticide	160,0	169
Lambda- cihalotrine	Karate	Insecticide	38,0	711
Deltametrin	Decis	Insecticide	10,0	2.700
Tiametoxam	Cruiser	Insecticide	5,0	5.400
Fipronil	Regent	Insecticide	4,2	6.429
Clotianidin	Poncho	Insecticide	4,0	6.750
Imidacloprid	Gaucho	Insecticide	3,7	7.297

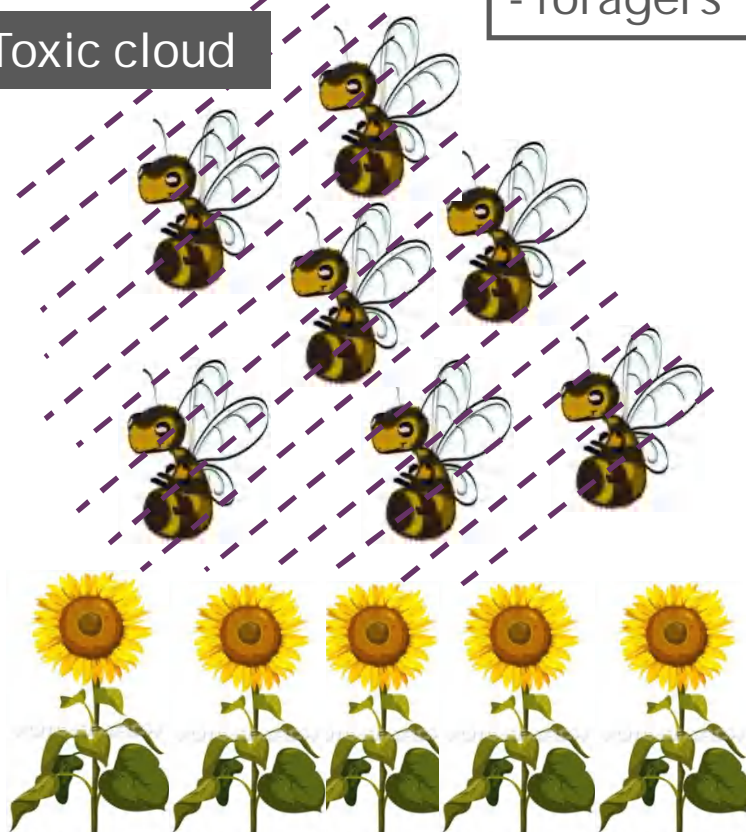
Source: Dr. J.M. Bonmatin, CNRS (France)

# + Evolution application patterns

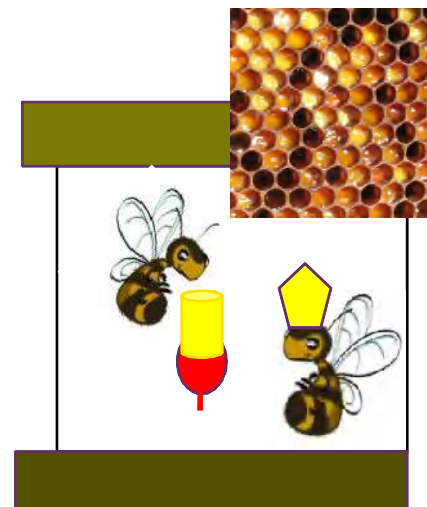
## Exposure (mainly)

- contact
- acute
- foragers

Toxic cloud

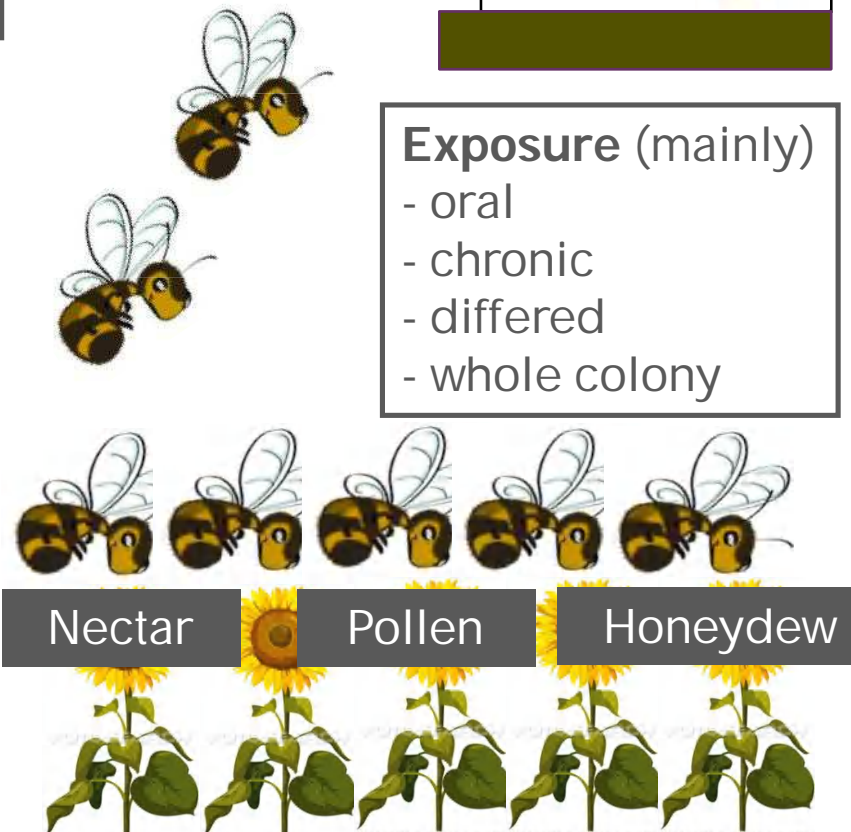


Sprayed products



## Exposure (mainly)

- oral
- chronic
- differed
- whole colony



Systemic products

# + Additional exposure pathways

## ■ During drilling seeds

**Systemic products** (seed treatments)

Dust and drift

### **Exposure** (mainly)

- contact
- acute
- foragers

## ■ Superficial water

**Systemic products + Sprayed products**

### **Exposure** (depends on doses)

- oral
- acute/chronic
- foragers/whole hive

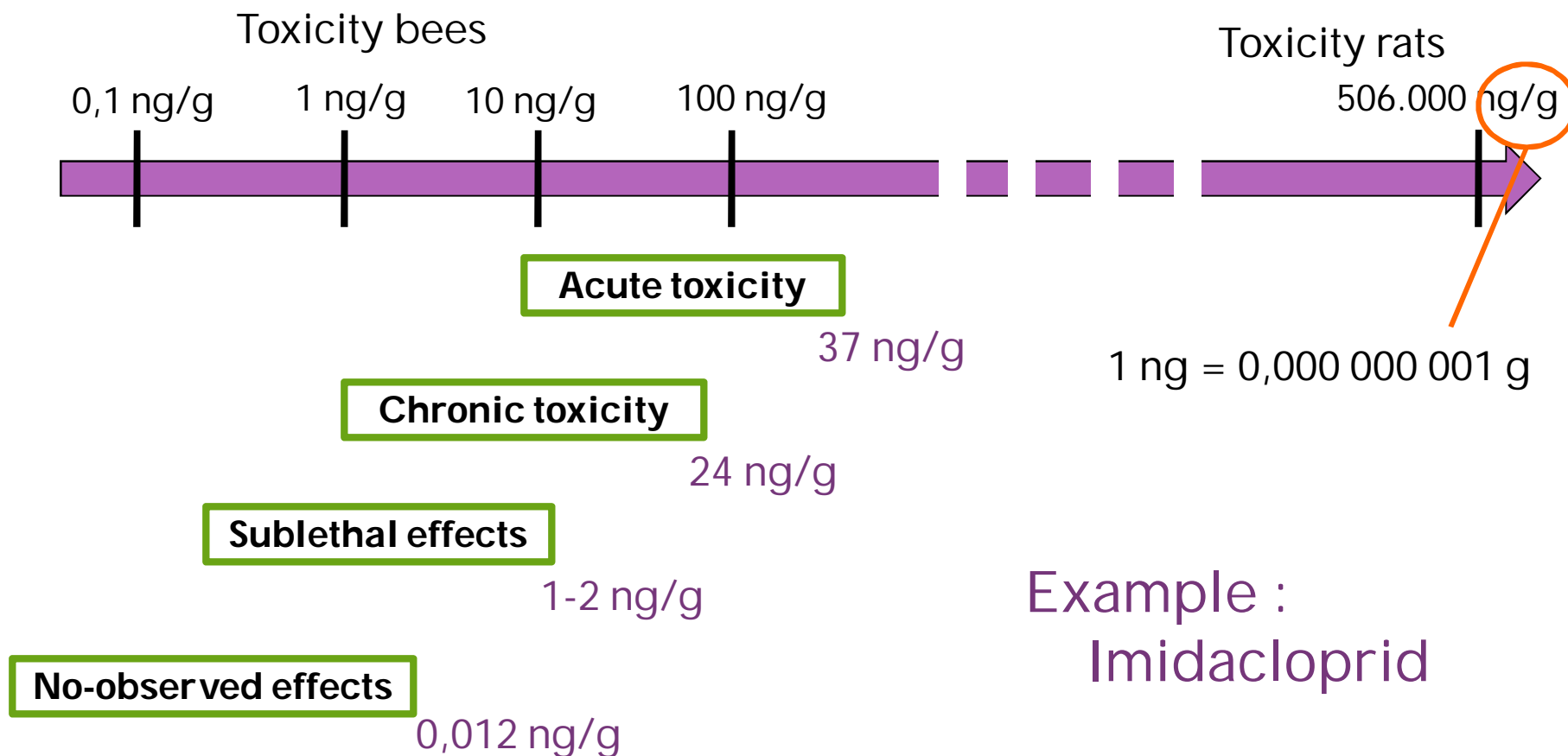
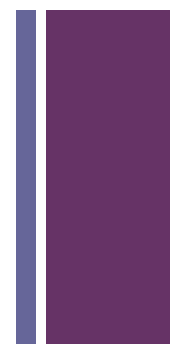
## ■ Plant exudates (guttation, extrafloral secretions, etc)

**Systemic products**

### **Exposure** (depends on doses)

- oral
- acute/chronic
- foragers/whole hive

# + Relationship effect-concentration



## + Consequence

- Products are extremely efficient (very toxic) and have toxic effects at very little doses
- Different modes of action of a.s. (active substance) – systemic properties
- New application patterns – exposure pathways not considered
- A.s. persist long time in the environment

## + Context – risk assessment of pesticides on bees



- Prior to the authorisation of pesticides, there is normally a risk assessment carried out
- Risk assessment includes many tests: residue analyses, mode of action, behaviour in the environment, impact to human health, impact to the environment...
- Tests are done on bees as representatives of non-target arthropods, representing pollinators
- Based on this assessment the risk of the a.s./product to bees is classified into low/medium/high
- Assessment is followed by risk management (consideration of risk mitigation measures)

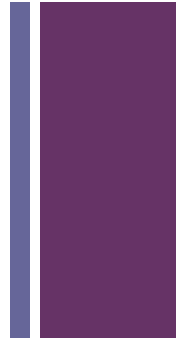
# + Existing methodologies for pesticides testing on bees in Europe

- Analyses of the methodologies proposed for the risk assessment of pesticides.
- Some shortcomings – not consideration of:
  - Chronic toxicity at first tier
  - Sublethal effects (nervous symptoms, etc)
  - Delayed effects (derived from long-term consumption of contaminated pollen and nectar)
  - Effect on brood on a regular basis if systemicity is proven
  - Synergic effects
  - Statistical settings – lack of significance and power



## + Alternative proposal

- Change in the philosophy of the assessment:
  - Colony = “animal” (survival + behaviour)
  - All sources of exposure need to be considered = also long-lasting exposure to small quantities of toxic substances
- Toxicity tests included : acute tox. + chronic tox. + larvae tox. (as first tier) + sublethal effects on bees
- Risk coefficient = exposure / No-Effect doses
- Studies about synergic effects (pesticide-pesticide and pesticide-pathology)



+ Thank you very much!!



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