

Global effects of pollutants and other risk factors on invertebrate fauna

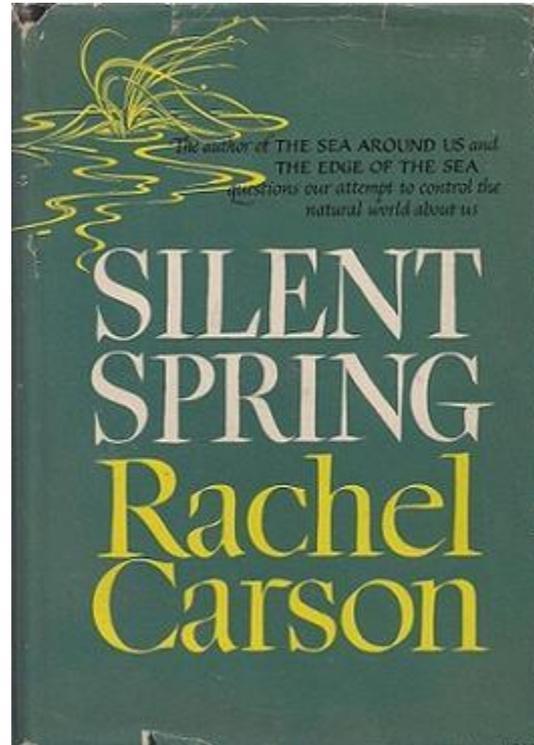
Pedro Cardoso

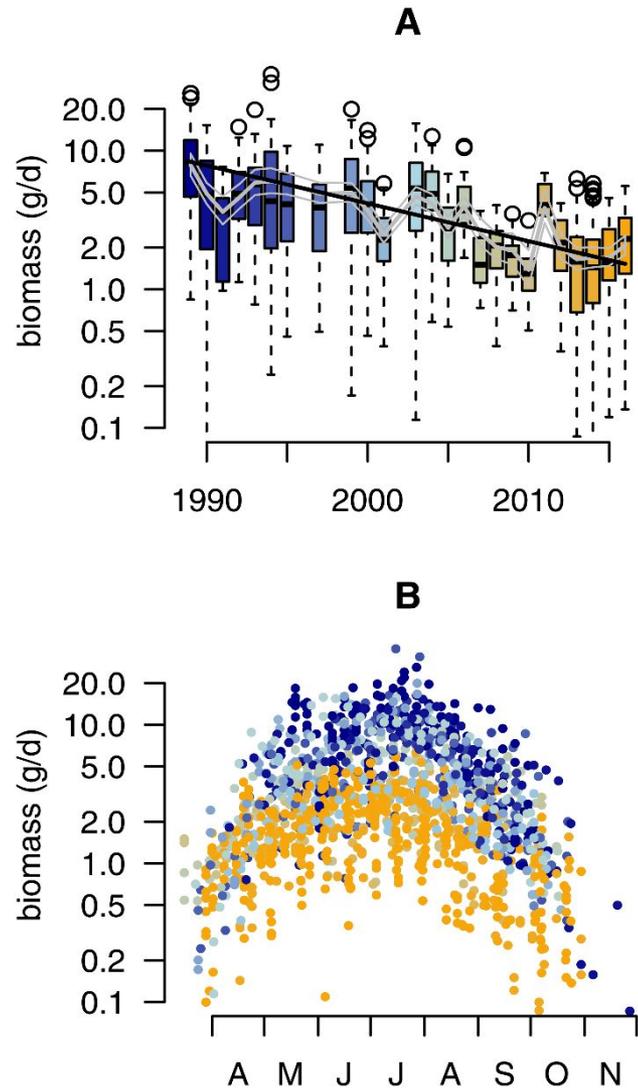
Laboratory for Integrative Biodiversity Research (LIBRe)
Finnish Museum of Natural History Luomus
University of Helsinki

@cardosopmb
pedro.cardoso@helsinki.fi



“Mal soavam ao fundo os primeiros gritos a anunciar “*Carro do fumo! Carro do fumo!*”, um bando de crianças saía à rua em êxtase, à procura de um dos maiores divertimentos nas ruas de Luanda, no rescaldo das chuvas. Ninguém perdia a alegria de correr atrás de uma carrinha de caixa aberta que aspergia uma gorda e apetitosa nuvem de DDT para matar mosquitos.”





Hallmann et al. (2017) More than 75 percent decline over 27 years in total flying insect biomass in protected areas

May to August 2020, residues of 47 pesticides in German protected areas.



Bruhl et al. (2021) Direct pesticide exposure of insects in nature conservation areas in Germany

This article is more than 3 years old

Plummeting insect numbers 'threaten collapse of nature'



The rate of insect extinction is eight times faster than that of mammals, birds and repti

Exclusive: Insects could vanish within a century at current rate of decline, says global review

- **Editor's pick: best of 2019. We're bringing back some of our favorite stories of the past year. [Support the Guardian's journalism in 2020](#)**

FORBES > INNOVATION > SCIENCE

EDITORS' PICK

Scientists Again Warn About Global Insect Decline— But Will We Act?

GrrlScientist Senior Contributor ©

Follow

EST



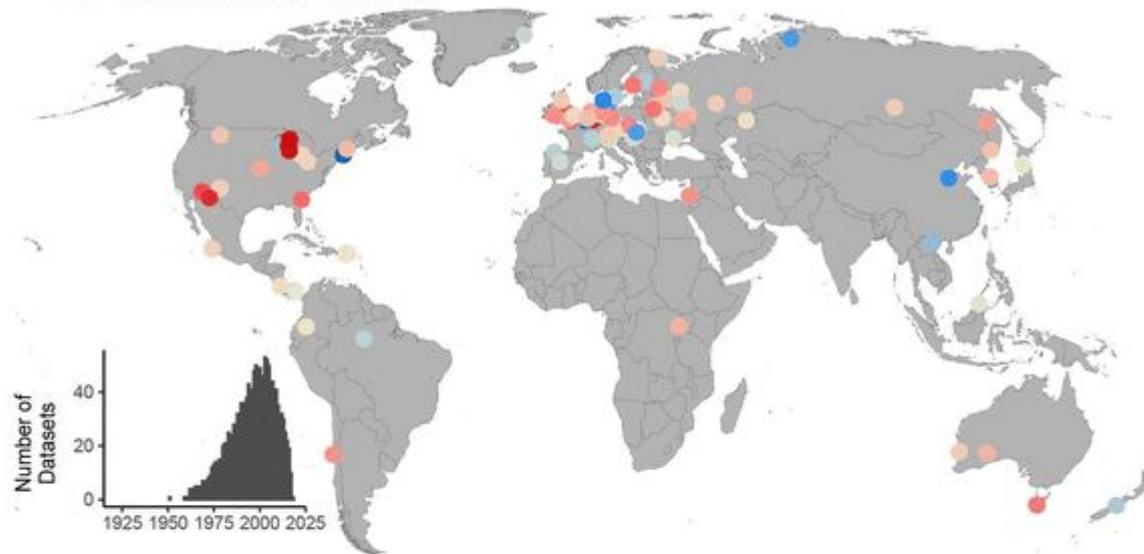
The collapse of insects

The most diverse group of organisms on the planet are in trouble, with recent research suggesting insect populations are declining at an unprecedented rate.

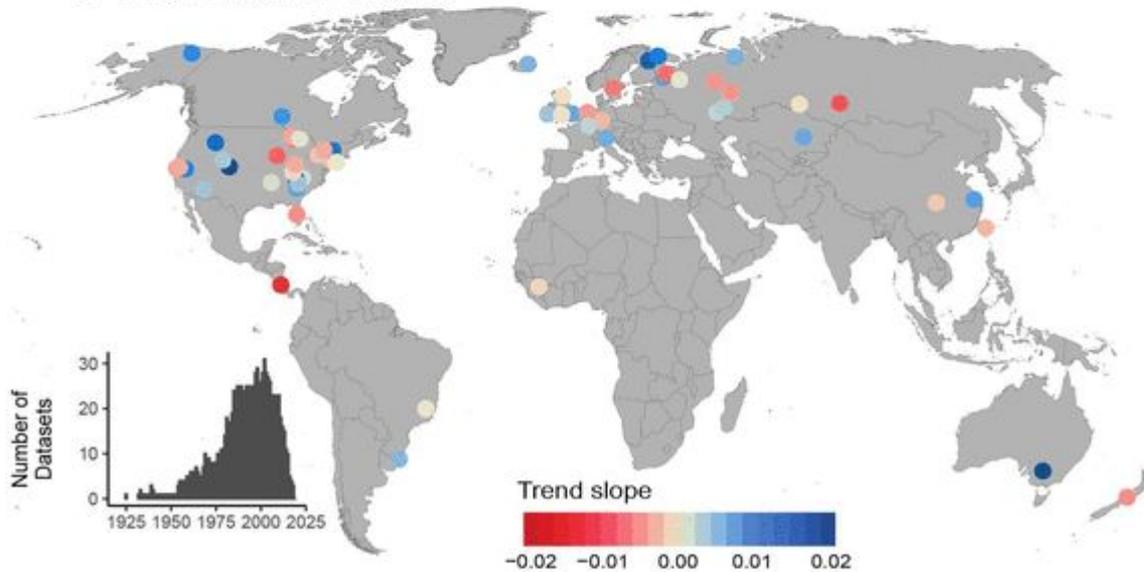
- Insects alone pollinate 75% of global crops, valued annually at €150 - €600 billion per year.
- Soil formation is dependent on multiple organisms, small to large
- Saprophagous insects contribute to nutrient recycling
- Predators and parasitoids control the outbreak of insect pests



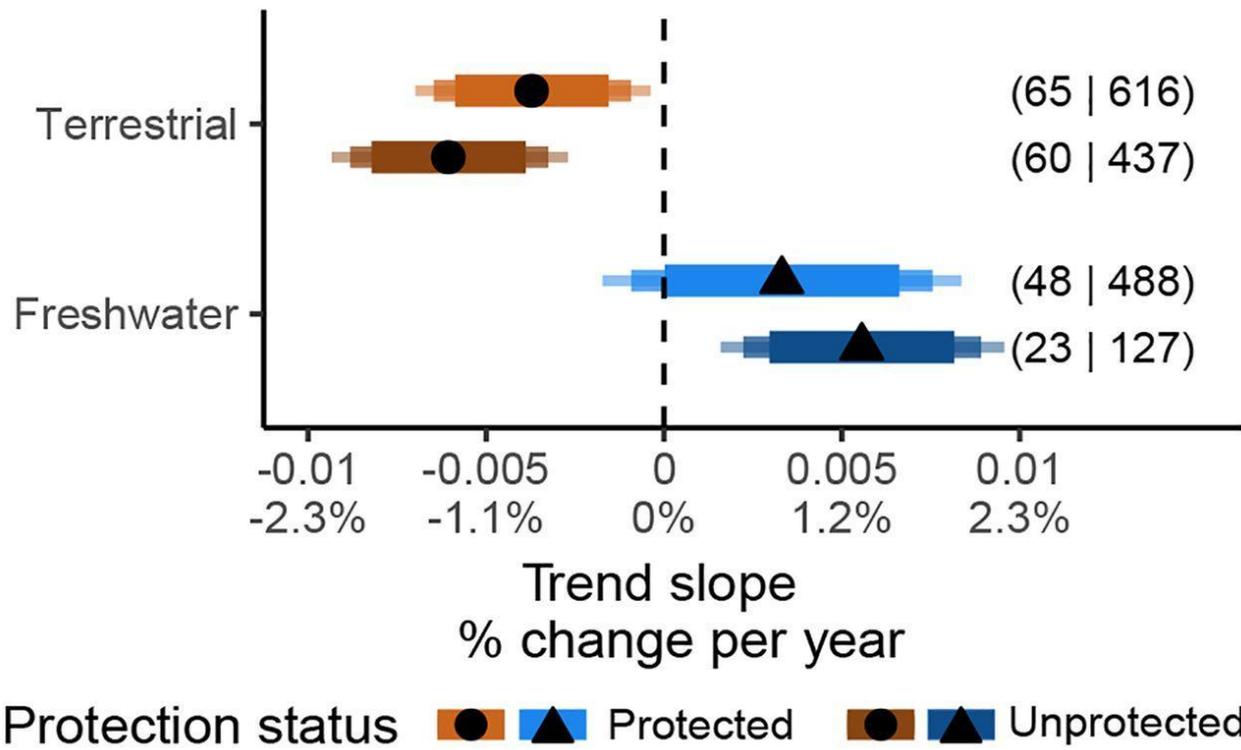
A Terrestrial fauna



B Freshwater fauna



Klink et al. (2020) Meta-analysis reveals declines in terrestrial but increases in freshwater insect abundances



Klink et al. (2020) Meta-analysis reveals declines in terrestrial but increases in freshwater insect abundances



Land-use change

- Habitat loss
- Habitat fragmentation
- Habitat degradation
- Land use intensification



Climate change

- Climate warming
- Climate variability
- Changes in precipitation patterns



Pollution

- Pesticides
- Other chemicals
- Nitrogen
- Atmospheric CO2
- Light and sound pollution



Invasive species

- Island invasives
- Pathogens
- Biocontrol agents



Overexploitation

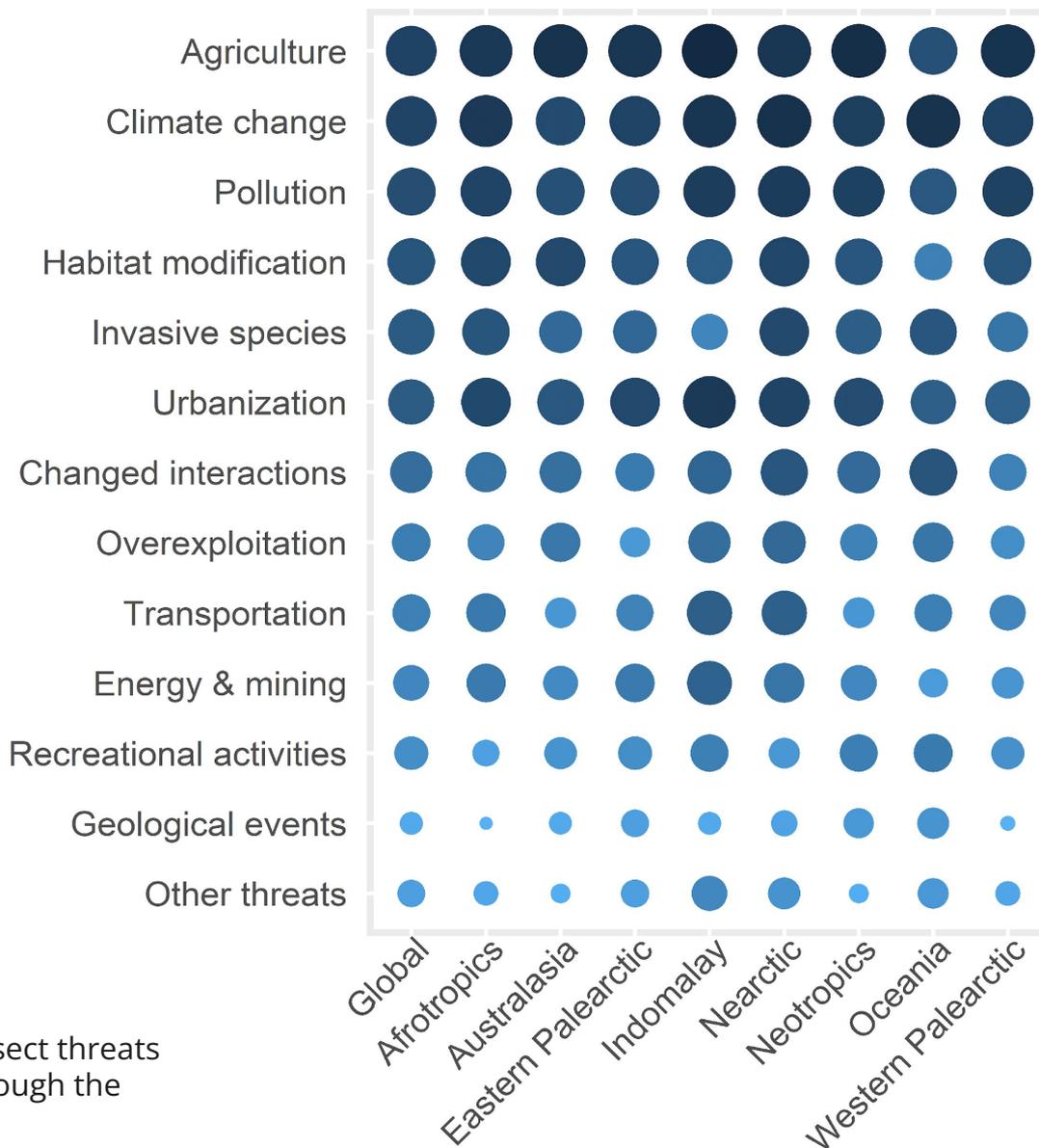
- Ornamental uses
- Entomophagy
- Traditional medicine
- Pet trade



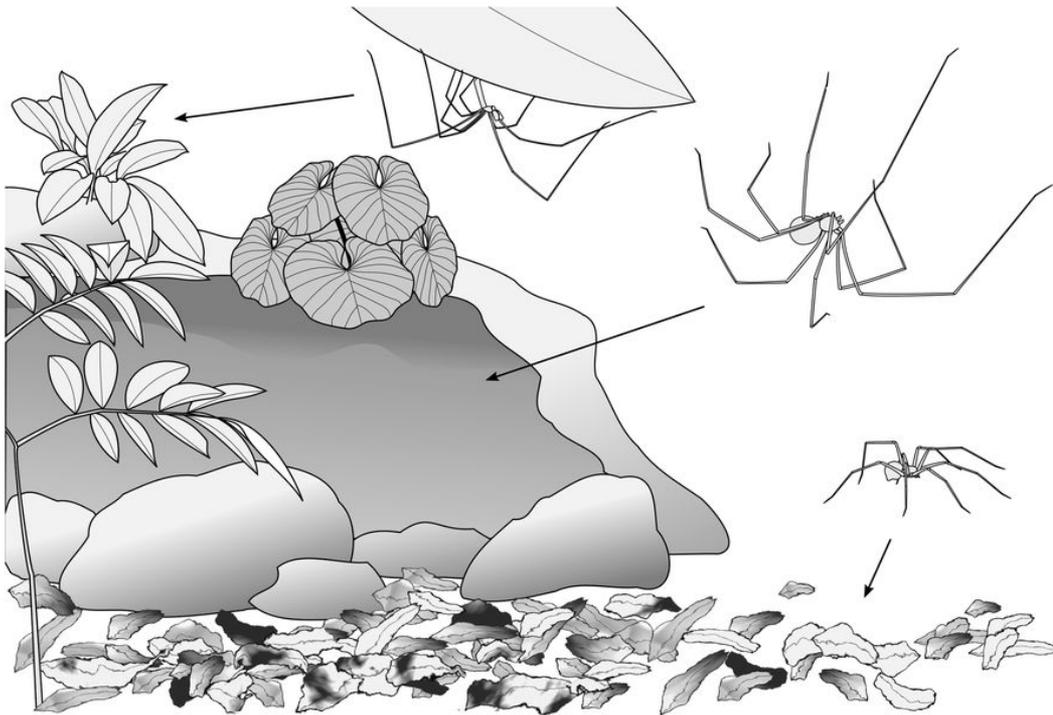
Changed biotic interactions

- Host overexploitation
- Shifting host dynamics
- Little host redundancy
- Eradication efforts

Cardoso et al. (2020) Scientists' warning to humanity on insect extinctions



Milicic et al. (2021) Insect threats and conservation through the lens of global experts



Universal predictors:

- Habitat breadth
- Speed-of-life:
 - generation length
 - Fecundity

Taxon-specific predictors:

- Body size
- Microhabitat
- Dispersal ability

Chichorro et al. (2022) Trait-based prediction of extinction risk across terrestrial taxa

Exposure to very low concentrations of Roundup Gold caused memory problems in bumblebees.



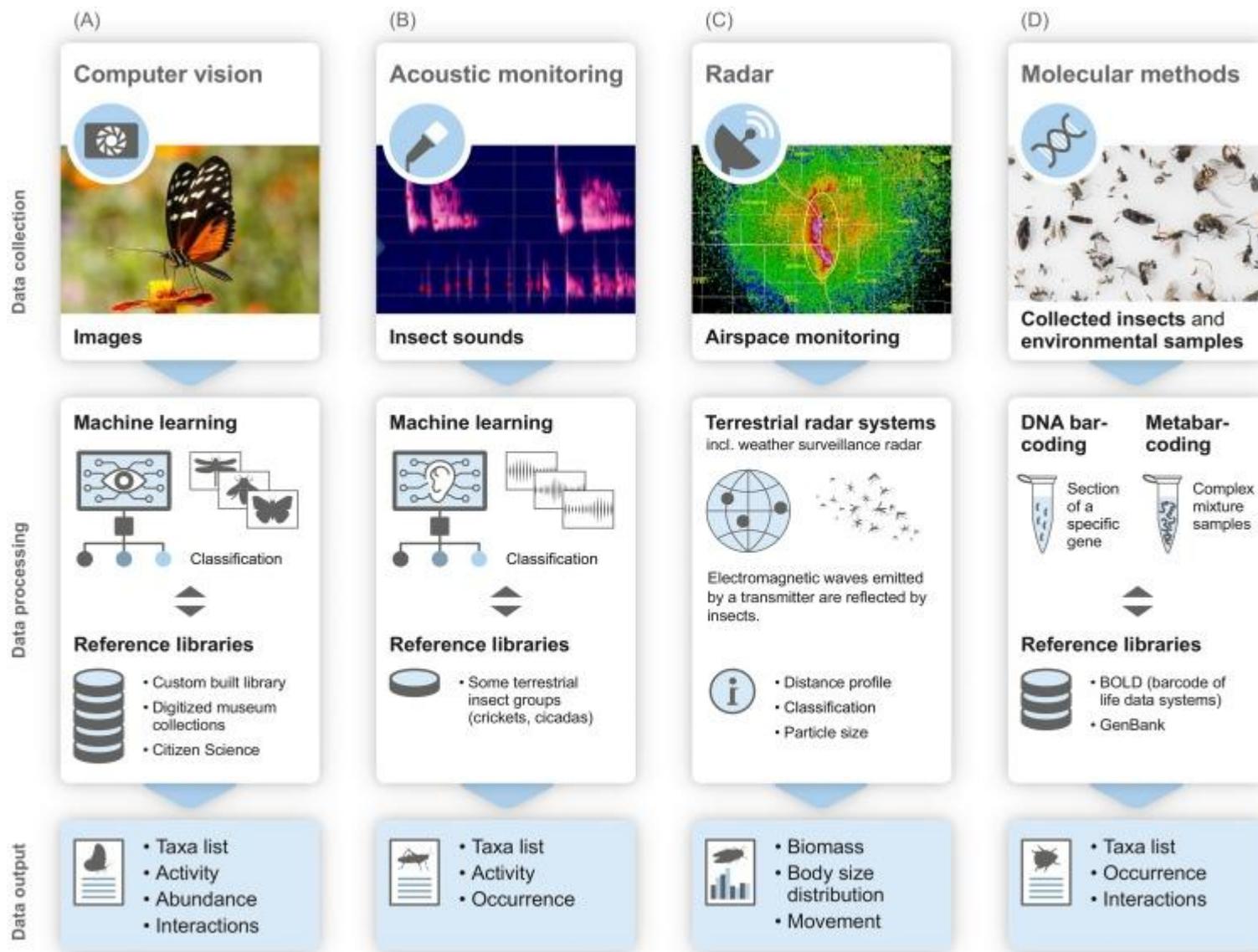
In the flight arena bees will undergo several learning trials connecting colors to rewards.

Glyphosate affects the microbiota of honeybees by reducing the abundance of beneficial bacterial species.



Flower odors are collected for biochemical analyses.

Low concentrations of herbicides in soil may alter flower odors and its attraction to flower-visiting insects.



Klink et al. (2022) Emerging technologies revolutionise insect ecology and monitoring

Trends in Ecology & Evolution



SustInAfrica

Global effects of pollutants and other risk factors on invertebrate fauna

Pedro Cardoso

Laboratory for Integrative Biodiversity Research
Finnish Museum of Natural History Luomus
University of Helsinki

@cardosopmb
pedro.cardoso@helsinki.fi