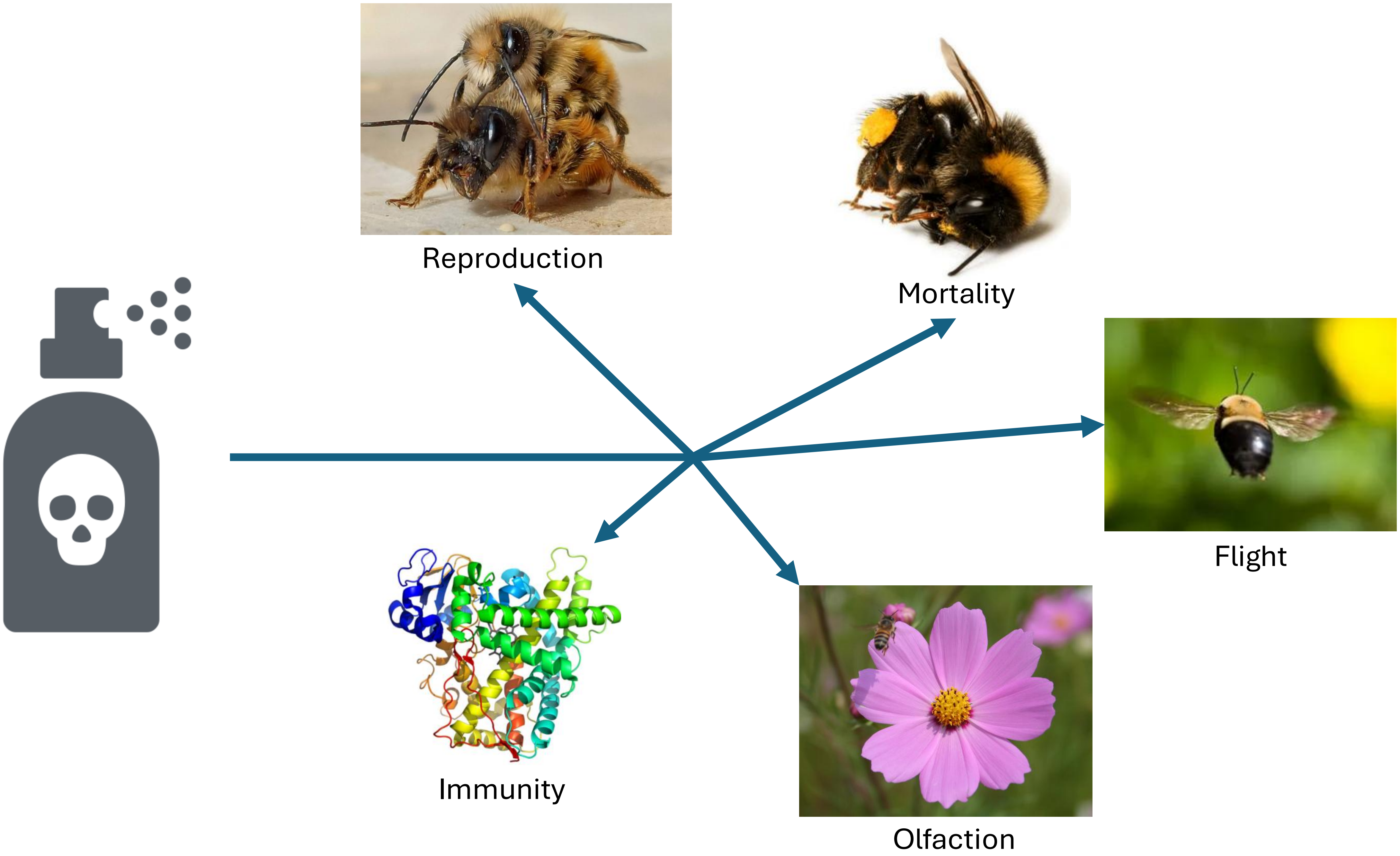
How pesticides amplify other stressors on pollinators

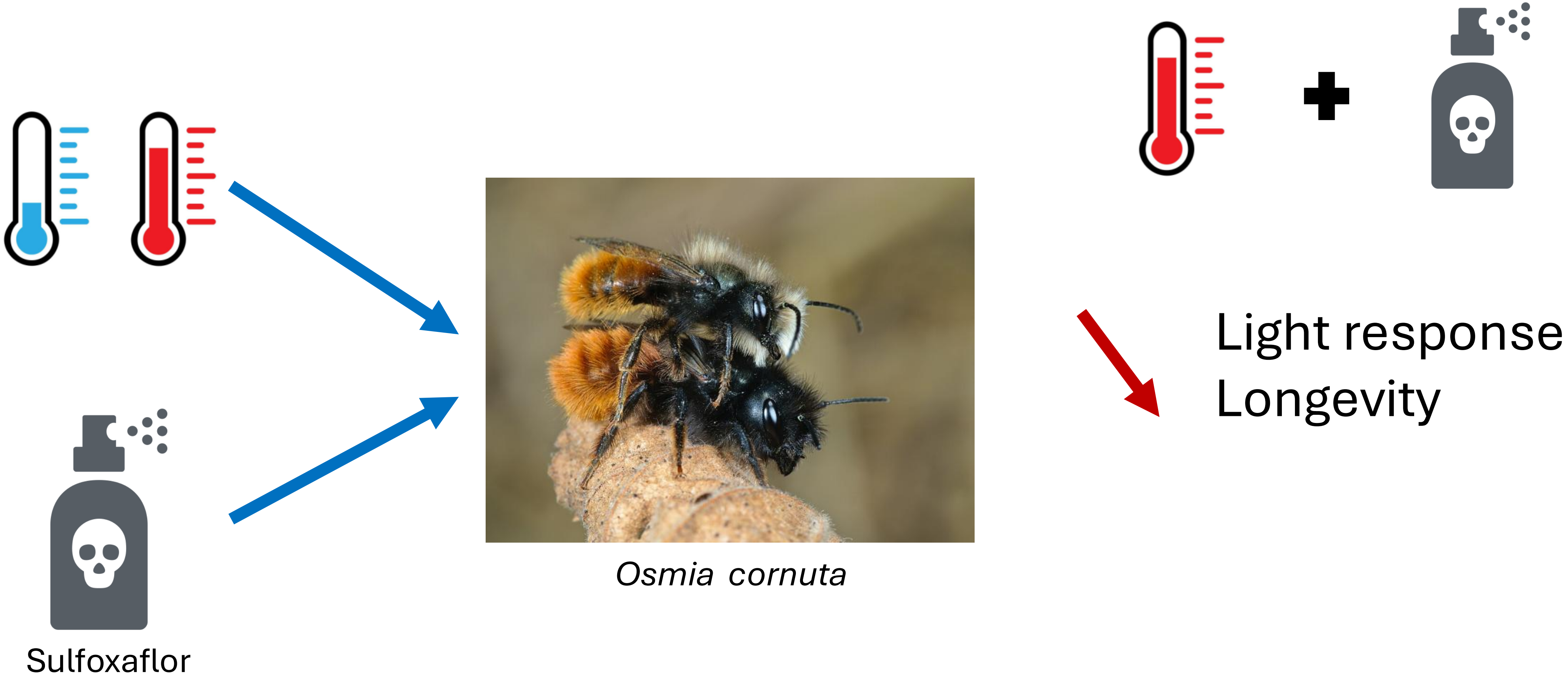
Dr. Alexandre Barraud

POLLINIS

STOPPONS L'EXTINCTION DES POLLINISATEURS

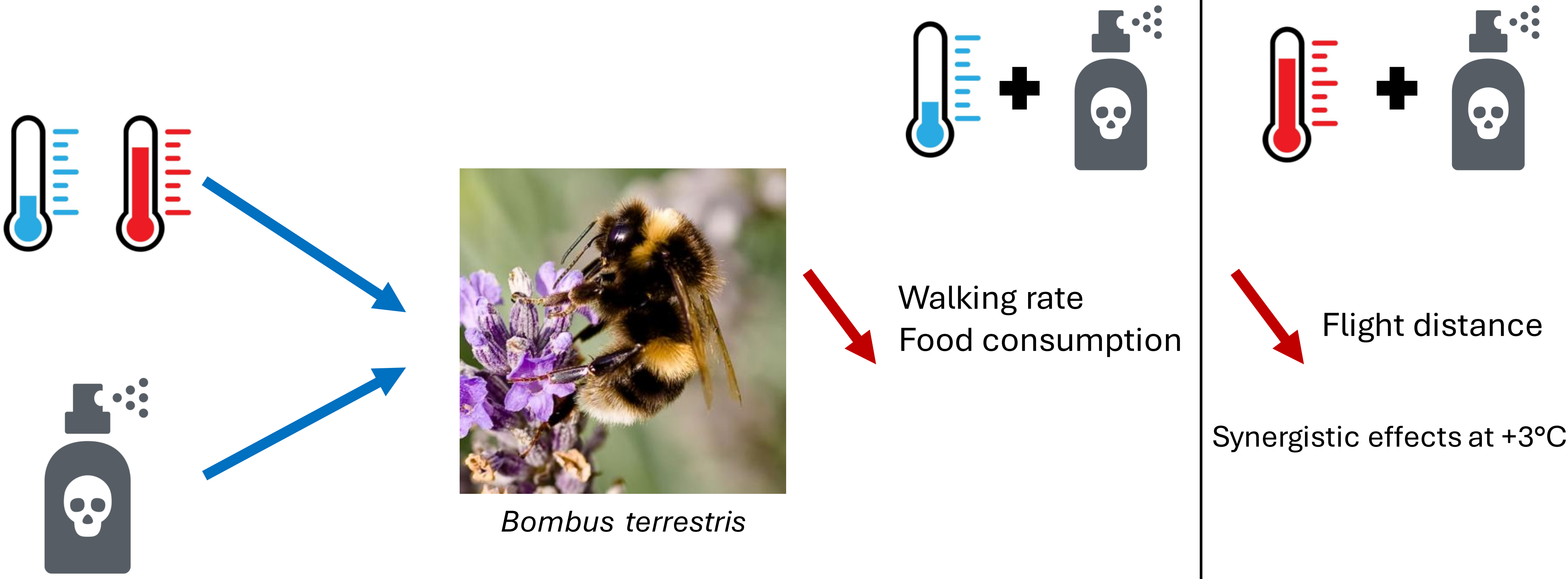

Reproduction
Mortality
Flight
Immunity
Olfaction

Pesticide-Heat interaction



Albacete, S. et al. (2023). Bees exposed to climate change are more sensitive to pesticides. *Global Change Biology*, *29*(22), 6248-6260.

Pesticide-Heat interaction



Bombus terrestris

Kenna, D., Graystock, P., & Gill, R. J. (2023). Toxic temperatures: Bee behaviours exhibit divergent pesticide toxicity relationships with warming. *Global Change Biology*, *29*(11), 2981-2998.

Pesticide-Diet interaction

Low or high flower density

Imidacloprid

Osmia lignaria

Reproduction

Pesticide only :-10%
Low density only : -26%
Combined : -42%

Additive effect

Stuligross, C., & Williams, N. M. (2020). Pesticide and resource stressors additively impair wild bee reproduction. *Proceedings of the Royal Society B*, *287*(1935), 20201390.

Pesticide-Diet interaction

Poor or limited nectar

Neonics

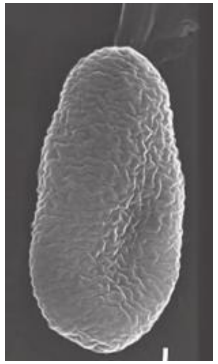
Apis mellifera

Survival -50%
Food consumption -48%
Haemolymph glucose -60%

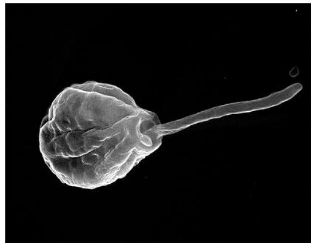
Synergistic effects

Tosi, S. et al. (2017). Neonicotinoid pesticides and nutritional stress synergistically reduce survival in honey bees. *Proceedings of the Royal Society B: Biological Sciences*, *284*(1869), 20171711.

Pesticide-Pathogen



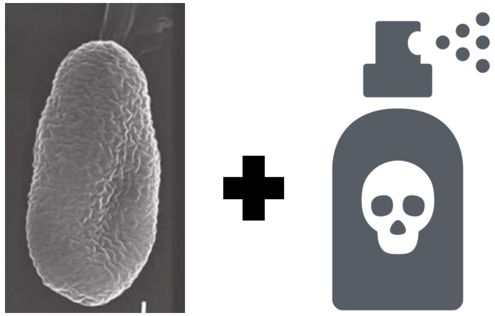
N. ceranae



C. bombi

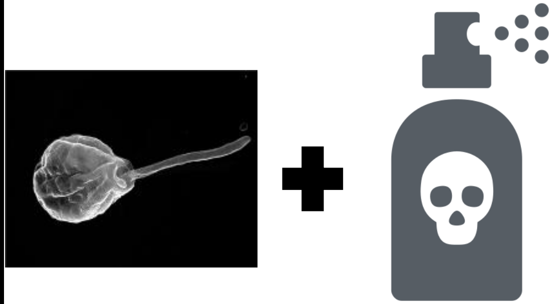
Neonics

Bombus terrestris



Colony growth

Fauser-Misslin, A., et al. (2014)



Queen survival

Botías, C., et al. (2021)

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Risk assessments underestimate threat of pesticides to wild bees

René S. Shahmohamadloo[1] | Mathilde L. Tissier[2,3] | Laura Melissa Guzman[4]

- Knowledgebase still largely populated by acute lethality data on honeybee
- Few data on interaction among stressors
- Interspecific differences
- Unexplored parameters

➡ In order to have a more realistic estimation, risk assessment must include interactions

Thanks for your attention !

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