

Environmental exposure to metallic pollution impairs honey bee brain development and cognition

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Abstract

Laboratory studies show detrimental effects of metal pollutants on invertebrate behaviour and cognition, even at low levels. Here, we report a field study of Western honey bees sampled from an historic mining site heavily contaminated with metal and metalloid pollution, particularly arsenic. We analysed more than 1,000 bees from five apiaries within 11 km of the world's largest gold mine in Southern France. Bees collected close to the mine exhibited decreased olfactory learning and memory performances and developed smaller heads. Three-dimensional scans of bee brains showed that the olfactory centres of bees sampled close to the mine were also smaller, indicating impairment of brain. Our study raises serious concerns about the health of honey bee populations in metal-polluted areas and illustrates how standard cognitive tests can be used for risk assessment.

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