Micronucleus assay, a suitable tool to evaluate genotoxicity in wild bats

BACKGROUND
Bats provide important ecosystem services, such as pollinators, seed dispersers, and pest control agents. [1] Given their ecological role as insect predators, insectivorous bats are particularly vulnerable to pesticides. [2]

Micronuclei are a good biomarker of genotoxicity. It is an easy, low-cost, and field-ready method that can be used to monitor wild animals chronically exposed to genotoxic substances. [3]

OBJECTIVE
To evaluate the suitability of the Micronucleus (MN) assay as a biomarker of genotoxicity in insectivorous bats exposed to different levels of agricultural intensity.

METHODS & DESIGN

STUDY SPECIES
- Insectivorous bat [4]
- Distribution: South America, Central America, and Caribbean coast [4]
- Roost in mines and caves [4]

Parnell’s mustached bat
Pteronotus mexicanus

STUDY SITE
-Jalisco, Colima, Mexico, showing the three cave sites where the bats were captured.

FIGURE 1. Depiction of the study site in Colima, Southern Mexico, showing the three cave sites where the bats were captured.

FIGURE 2. Pictomicrographs of the erythrocytes of P. mexicanus under a light microscope at a magnification of 1000x.

FIGURE 3. Total count of micronucleus detected in bats roosted from three different cave sites located in Colima, Southern Mexico. Z = 11.3; p=0.003

RESULTS
Bats roosting in caves surrounded by high intensive agricultural lands showed the highest number of MN.

Bats roosting in caves surrounded by low intensive agricultural lands presented relatively low MN count compared to the caves surrounded by commercial crops.

Arthropods can bioaccumulate agricultural contaminants such as pesticides. [2,5] Exposure to such genotoxic substance can induce damage to genetic material and result in micronucleus formation. [6] Hence, insectivorous bats roosting in caves and foraging in the surrounded crop lands that have intensive pesticide application contain the highest number of MN.

CONCLUSIONS
Micronucleus assay is a reliable and field-ready test for evaluating variation of genotoxic damage in wild bats.

Therefore, it can be used in analysis and monitoring of ecotoxicological sensitivity in wild populations.

References

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