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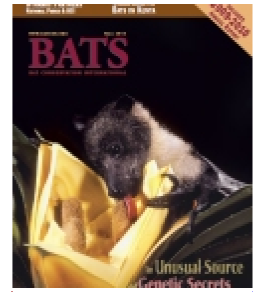

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Flying Under the Influence
Dara Orbach

Many fruit-eating bats may drink alcohol almost daily. And, just as with humans, overindulging can be hazardous to their health: inebriated bats could have a much tougher time avoiding predators. Bats get their alcohol directly from fleshy fruit, such as dates and figs, that produce ethanol as they ripen.

Research suggests that fruit-eating bats use highly developed senses of smell and taste to determine when fruits contain especially high levels of alcohol. Bats may avoid intoxication by choosing fruits with relatively low alcohol content. But when food is in short supply, they can't afford to be picky and are more likely to consume high-alcohol fruits despite the consequences.

Intoxicated bats don't have the luxury of a designated driver to get them safely home at the end of a boozy night. They can literally hang tight until they sober up, exposing themselves as easy targets for predators â€“ or they can attempt to fly home. Bats "flying under the influence" risk colliding with or impaling themselves on fences, branches, buildings, etc. Either option can be dangerous, even potentially lethal.

I went to Belize in 2009 to study how alcohol affects the flight performance and behavior of bats. I collaborated with Brock Fenton (University of Western Ontario), Nina Veselka (University of Western Ontario), Yvonne Dzal (University of Regina), Louis Lazure (University of Western Ontario) and a team of dedicated graduate and undergraduate field assistants to conduct an obstacle-avoidance experiment on wild fruit bats.

We built an obstacle course for bats â€“ three rows of plastic chains suspended from the ceiling of an outdoor flight cage, and captured bats of six species. We randomly assigned the bats to one of two groups, then fed one group plain sugar-water, and the other sugar-water spiked with 1.5% alcohol. Then we compared the performance of sober and inebriated bats as they flew through the obstacle course.

Before we released the bats in the flight cage, we first weighed them, fed them and tested their blood-alcohol concentrations. In humans, the effects of alcohol can be determined in part by body mass. Accordingly, we calculated how much alcoholic sugar-water to feed the bats based on their weights. Each bat was fed an appropriate volume to achieve a blood-alcohol concentration of 0.11 (well beyond the typical legal driving limit for humans of 0.08), or the same volume of plain sugar-water.

For the most part, our bats loved the sugar-water, even when it contained alcohol. They guzzled it as fast as we could administer it from the syringes.

We confirmed blood-alcohol levels in saliva, then freed the bats to fly individually through the obstacle course while videotaping the flights and recording their echolocation pulses with ultrasonic microphones.

These frugivorous bats of Belize seem to demonstrate a high tolerance for alcohol. Bats in

the test group did not "slur their speech" as we had expected, suggesting that alcohol consumption did not affect the bats' ability to echolocate. We were also surprised to find that consuming alcohol did not affect their maneuverability, willingness to fly or flying time through the obstacles.

Our findings contrast with those of Francisco Sanchez and colleagues, who report evidence that frugivorous bats in Israel display overt signs of intoxication.

We also observed species-specific differences in blood-alcohol concentrations. Perhaps, like people, some bats handle their liquor better than others.

In tropical regions such as Belize, where fruits ferment quickly, bats may regularly encounter alcohol while foraging and thus develop a tolerance for high concentrations of it. The ability to consume alcohol without showing signs of intoxication would confer foraging advantages. Over evolutionary time, bats with greater tolerances for alcohol-rich fruit could have access to more food than rivals that cannot "hold their drink."

DARA ORBACH recently completed her Master's degree in biology at the University of Western Ontario in London, Ontario, Canada. She gratefully acknowledges the benefits from working on this topic in the laboratories of Berry Pinshow and Carmi Korine at Ben Â-Gurion University of the Negev's Mitrani Department of Desert Ecology.

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