

## VOLUME 21, NO. 4 Winter 2003

### Churning the Food Chain

Frogs are food for bats in Central America, but they turn predator in Australia

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Sometimes you eat the bear, and sometimes the bear eats you.” That old cowboy adage acknowledges that nature can get a bit topsy-turvy: The diner and the main course occasionally switch places at the table. Such is the strange case of the predator-prey relationship between bats and tree frogs.

As a herpetologist, I was fascinated in the early 1980s by the discovery that a Central American bat (*Trachops cirrhosus*) feeds on tree frogs, and BCI Founder Merlin Tuttle’s superb action photographs of this behavior became etched in my mind.

But an ocean away, I found that prey can turn predator as I watched Australian tree frogs -literally gulp down bats.

Two years ago, I contracted to make a documentary film about Australian snakes. I was especially excited at the prospect of filming pythons nabbing bats at the mouth of Bat Cleft, a maternity cave for the little bent-wing bat (*Miniopterus australis*) in Mount Etna Caves National Park in southern Queens-land. I took my camera along in hopes of getting a few images to use in my lectures.

At the cave, at 7 p.m. sharp, the first bats begin spiraling upward, shooting out of the maw of the cleft and disappearing into the waning twilight. Ten bats shoot out. Twenty, fifty, then hundreds flutter around me, their wings touching my face and arms. Bat Cleft is so narrow that the bats must fly zigzag paths from one end of the cleft to the other to gain altitude before reaching the open sky. So many bats are trying to leave the maternity chambers 70 feet (21.3 meters) below that they interfere with each other’s flight. I hear the tiny, flicking sounds of hundreds of bat wings brushing against other bats and against the rough limestone walls. Countless bats stir a continuous wind in my face and create a low-pitched roar, like the “sound of the ocean” you hear in a conch shell.

Now come the predators. I slowly turn my head and see a small, dark-spotted python (*Liasis maculosus*), about 30 inches (76 centimeters) long, moving over the limestone boulders of the cramped side chamber where I wait. Sitting on one of the boulders that the snake passes is a big green tree frog (*Litoria cerulea*). The snake crawls in a straight line, reaches my boot, crawls right over it without hesitation, and comes to a stop on a jagged piece of limestone that’s jutting out into the cleft. It anchors itself on the rough rock, then stretches its head and half of its body out into the air of the abyss. Bats are making a sharp turn at this point, and some of them brush the limestone – and the snake. Soon the little python nabs one in the air by biting sideways when it feels a bat’s touch. It be-gins constricting the bat.

I feel a thud on my boot. The tree frog is moving forward, too. I look back and see another tree frog entering my small chamber from a crack in the limestone that leads to the outside world. Eventually, both frogs pass me and take up positions at the edge of the abyss. The first frog sits on a flat part of the spotted python’s rock, just inches from the snake.



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In the frenzy of the emergence, many bats alight briefly on the limestone walls before renewing their upward pro-gress. Some land on me and crawl across my chest. I remain frozen, trying not to interfere with their activity. There are so many bats that they can't all fly through the cleft at once. A few land on the flat rock near the tree frog, which stares at them glumly as each bat flies off.

A different kind of snake appears on the left wall of the abyss, a skinnier snake, orange-brown, and longer than the spotted python. This is a brown tree snake (*Boiga irregularis*), a native of Australia that has wrought havoc on fauna of the mid-Pacific island of Guam. It has a bulbous head and red, reflective eyes. It takes up a stance similar to that of the second python: hanging from the sloping wall and dangling out into the air to intercept a bat. Soon it has one. It seems less efficient than the little python because it tries to swallow the bat alive without constricting it. While watching this lethal little drama unfold, I glance down to see the back end of a little bent-wing bat hanging out of the mouth of a frog. I am astounded as I contemplate this predator-prey turnabout.

With some difficulty, I bend to photograph the frog, which sits facing me with the bat sticking out of its big mouth. The frog is not much bigger than the bat. About this time, one of the pythons has caught and constricted a second bat. Frog and python sit there, inches apart, eating bats. The frog makes three gulping movements and the bat disappears.

I return to the cleft two nights later. I hunker down in my cramped chamber and watch another green tree frog waiting patiently at the edge of the abyss. Spotted pythons and brown tree snakes come and go. Then, during the heaviest outpouring of bats, some of them drop onto the rock where the tree frog sits. One fallen bat struggles forward, directly toward the frog. A gaping mouth quickly opens and snaps shut, leaving the posterior of the bat protruding. The frog makes a swallowing movement and more of the bat disappears. Then the frog uses one hand to push the bat's wing forward. Two more gulps and the bat is gone. On three nights, I witnessed frogs eating bats a total of four times; snakes consumed at least 30 bats.

Exactly what led this population of tree frogs to add bats to its menu is uncertain. However, the destruction of alternative roosts worldwide is forcing more and more bats to congregate in fewer locations, making them increasingly vulnerable to predators. Several of Mount Etna's bat caves have been permanently destroyed. Thanks to the diligent efforts of local colleagues and letters from BCI and its members, several, including Bat Cleft, eventually won protection.

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All articles in this issue:

- ▶ [Counting Bats the Hard Way](#)
- ▶ [Churning the Food Chain](#)
- ▶ [Giant Bats Face a Shrinking Forest](#)
- ▶ [Bat Conservationist of the Year](#)
- ▶ [Corporate Conservationist of the Year](#)
- ▶ [A New Kind of Bat House](#)
- ▶ [Discoverer of Echolocation](#)

