



## Crabs Take Direction

Fiddler crabs respond to their poor eyesight by becoming habituated to intruders based on direction, a student has discovered in the course of an Honours project.

The crabs live on mudflats, without vegetation or even much terrain, so they substitute height for depth perception, with eyes on stalks that can see over very small obstacles. The crabs have learned to conduct sophisticated calculations to determine whether an approaching crab is in a position to steal their burrow (*AS*, March 2003, p.11).

"The crabs treat anything above the horizon of their eyes as a predator, and anything below as a mate," says Ms Chloe Raderschall, a research assistant at the Australian National University's Vision Centre.

For her undergraduate Honours project Raderschall placed black objects the size of a ping pong ball on some fishing wire and made them swoop over crabs in their natural environment.

"We did two dozen runs of a dummy approaching from direction A without attacking the crabs, and within five runs the crabs started to ignore it," Raderschall explains. "When we switched to another dummy coming from direction B, the crabs were scared witless and headed straight to their burrows." Returning to direction A saw the crabs regain their comfort.

In each case the object was placed at the same height, so the crabs were not reacting to its angle to the ground. The timing of the dummy's movement was also kept consistent so the only difference for the crab was the direction from which it came.

The finding demonstrates that crabs do not distinguish potential predators from other intruders by their shape, as



**This small ball terrifies crabs until they become used to it appearing from a particular direction.**

previously thought, but through specific habituation responses. Objects that behave in a manner similar to those that have not posed a threat in the past are ignored.

Raderschall says this is necessary because the crabs' eyesight is so poor that "apart from very simple visual cues, they don't really have other ways to detect predators, and this study provides clues as to how animals with relatively poor vision can adapt and survive over time".

The crabs maintain an exceptional awareness of the location of their burrow relative to wherever they may be, and this may be useful for them to distinguish directions of motion. Raderschall is not sure how the crabs would respond if moved to a location without a burrow.

The findings were published in the *Journal of Experimental Biology*.