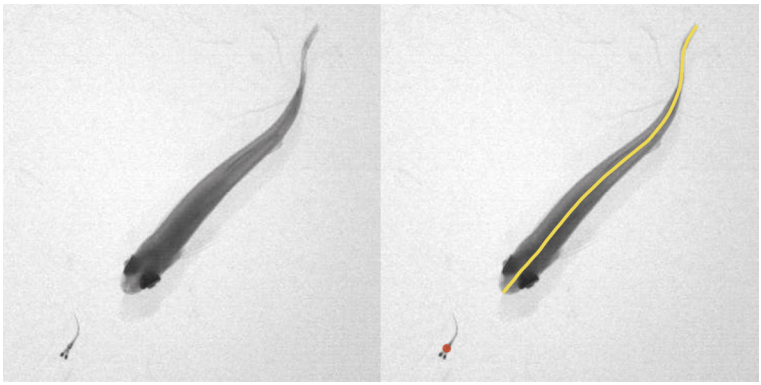
INSIDE JEB

Coasting zebrafish adjust to pursue



A zebrafish pursing a larva (left) with the midline superimposed (right). Photo credit: Alberto Soto.

If you were asked to come up with a list of top predators, which would you put first: lions, hawks, sharks, zebrafish? Despite their diminutive size, tiny zebrafish are voracious hunters, pursuing larvae of their own and other species before feasting on them mercilessly. The question was, which strategy do the ravenous mini-predators use when in hot pursuit? Alberto Soto and Matthew McHenry, from the University of California, Irvine, USA, explain that some fish simply overwhelm their prey by pursuing them at top speed in one continuous deadly swoop, while other predators predict where their victim is heading and then aim to intercept them there directly. Yet zebrafish coast between propulsive bursts from their tails when going about their routine business, which is more analogous to the sporadic advances of ants than the relentless attack of a hawk. Curious to find out how predatory zebrafish home in on fleeing larvae, Soto and McHenry pitted adult zebrafish against individual larvae, filming 31 pursuits at 500 frames s^{-1}, to discover which strategy the unlikely top predators favour.

Analysing over 150,000 movie frames, the duo monitored the backbone position of each predatory adult to track their manoeuvres as they closed in for the kill. However, instead of turning into decisive assassins approaching in a single high-speed pursuit, the fish continued their hesitant approach, coasting between each flick of the tail. Yet, when the duo plotted the fish's paths, they realised that the zebrafish were using the same strategy as species that adjust their approach during a pursuit, instead of plotting a single linear interception course. And when they compared the sweep of each tail beat against the zebrafish's change in direction, it was clear that the fish were able to fine-tune each twist and turn to match the manoeuvres of their quarry during each deadly duet.

'Pure pursuit – where a predator orients its direction of travel directly toward prey – may be the best strategy for animals that move intermittently', the duo says, explaining that the movements of escaping larvae are simply too random for their adversaries to set an accurate intercept path. And Soto and McHenry suggest that the zebrafish's sporadic strategy could buy them time to plot their next move, before propelling themselves in the correct direction with the next flick of the tail.

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Kathryn Knight
kathryn.knight@biologists.com