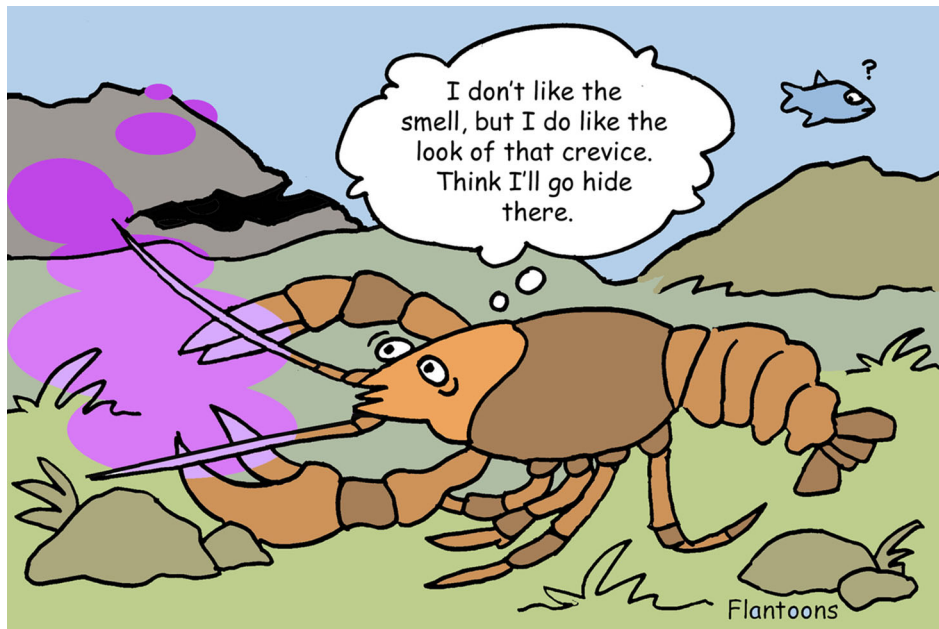


INSIDE JEB

Promise of safety can overcome crayfish fear



Even if you're covered in armour and equipped with a formidable pair of pincers, fear can play a significant role in your life. Avoiding predators and generally steering clear of trouble would seem to be the best course for a quiet life, even for rusty crayfish (*Faxonius rusticus*). But what if the urge to avoid danger is in direct conflict with something you truly desire, such as a cosy retreat? Would terror win out, forcing you to avoid a desirable residence at all costs, or might an animal be capable of overriding its fear in order to occupy an attractive dwelling? Intrigued by the internal struggle such a conflict could generate, Becky McKay, Tyler Wood and Paul Moore, all at Bowling Green State University, USA, decided to find out how rusty crayfish would react when tempted by the security of a comforting retreat while feeling the fear caused by a terrifying whiff.

Knowing that the choosy crustaceans prize burrows with a single entrance above those with multiple entrances, the team constructed an arena with 16 burrows arranged in a 4×4 design, where each burrow in the first row was the least secure with four entrances, the burrows in

the next row had three entrances, those in the next had two, and those in the final row were extremely safe, being equipped with single entrances. Next the team created two odours designed to strike fear into the hearts of the crustaceans: the scent of one of their predators, largemouth bass (*Micropterus salmoides*), and the odour produced when one of their own had sustained injury. Then, MacKay and Wood cautiously pipetted one of the odours into the each of the burrows, so that the first column of burrows – including all four burrow designs – had no odour at all, the next column had a slight scent of doom and the final column had the strongest stench of fear. Then, the team released individual crayfish into the centre of the arena and tracked their manoeuvres over the course of 15 min as the animals explored the alternatives, before repeating the entire procedure with the second odour.

Intriguingly, the crayfish almost galloped around the arena when the predatory scent of largemouth bass hung in the water, increasing their walking speed almost 68% to 2.1 cm s⁻¹. They were clearly concerned but spent as much time touring

the stinkiest burrows as the odour-free burrows; security didn't seem to bother them too much. However, when the crayfish could smell the alarming scent produced by recently injured animals – indicating that an impending threat may be lurking near – they preferred to frequent the safest burrows and ambled more slowly. The option to seek sanctuary in a safe haven was affecting how the crayfish were reacting to the risk of genuine threats.

So, crayfish react to the push and pull of fear and safety when exploring their terrain, and Moore says, 'We argue that crayfish are utilising a landscape of safety, in conjunction with a landscape of fear, when navigating their environment'.

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MacKay, B. N., Wood, T. C. and Moore, P. A. (2021). Running away or running to? Do prey make decisions solely based on the landscape of fear or do they also include stimuli from a landscape of safety? *J. Exp. Biol.* **224**, jeb242687.

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