© 2018. Published by The Company of Biologists Ltd | Journal of Experimental Biology (2018) 221, jeb188060. doi:10.1242/jeb.188060

INSIDE JEB

Garden eels capitalise on immobility to catch a snack

Garden eels in a current. Photo credit: Alexandra Khrizman.

Plankton sure is a popular dining choice amongst aquatic species. Some birds even feast on the tiniest ocean creatures as they plunge through the waves. Yet, garden eels (*Gorgasia sillneri*) seem to go against the flow. Instead of swimming freely while feasting, the supple creatures tether themselves in defensive burrows, emerging to waft like blades of seagrass in the current as they wait for plankton morsels to drift past. Amatzia Genin from The Hebrew University of Jerusalem, Israel, was puzzled by the eels' unorthodox approach. Realising that their sit-and-wait strategy had more in common with that of invertebrate corals than other plankton feeders, Genin and Master's student Alexandra Khrizman, from the same institute, descended beneath the waves to learn more about the eels' unconventional feeding tactic.

Joining the eels on the Red Sea seabed, Khrizman recalls that the animals were remarkably shy, making it difficult to film while they were feeding. 'When a large fish or a diver approaches, they rapidly retreat into their burrow', she says. After several unsuccessful attempts at filming, the team eventually settled on using GoPro cameras mounted 20 cm above the seabed to ensure that the eels felt at ease. However, the cameras' short battery life forced Khrizman and her dive buddies Dmitri Churilov and Irena Kolesnikov, from Interuniversity Institute for Marine Sciences – Eilat, to return frequently to the submerged fields of garden eel to replace the cameras when their batteries failed. 'We performed over 100 dives, amounting to hundreds of dive-hours', she recalls. And, with no control over the speed of the water flowing through the eel colony, the scientists set up flow monitors to warn when the current was fast enough in order for them to capture the eels feeding at water speeds ranging from 3–4 to 30 cm s^{-1}; 'requiring us to wait months', says Khrizman.

Back in the lab, she began analysing the eels' postures, observing that the fish allowed their bodies to drift fully extended in the most sluggish currents (<5 cm s^{-1}) with their heads weaving ~60 cm above the seabed. However, as the water speed picked up, the eels began curling and compressing their bodies into a question mark shape, extending their heads into the current, until at the highest speeds the heads of the crouched animals were craned forward barely 20 cm above the sand. Gal Ribak from Tel Aviv University, Israel, and Khrizman also calculated how hard the water tugged on the animals as the current grew stronger and were impressed to see that the eels' increasingly compressed posture substantially reduced the forces dragging on them by up to 80%.

While diving, Kolesnikov also recorded how often individual eels snapped up pieces of plankton at currents of up to 20 cm s^{-1}, and realised that as the current became swifter the eels were able to snap up more and more titbits, in contrast to free-swimming fish, which ensnare less food as the current strengthens. The clever garden eels have taken advantage of their immobility to increase their feeding rates, and Genin says, 'The modulation of the posture with the increase in current speed allows garden eels to not only reduce the hydrodynamic forces but also maintain a favourable feeding position, holding their head above the plankton-poor layer near the bottom'.

Thanks to their protective burrows and unconventional dining style, garden eels are able to take advantage of relatively barren locations that would otherwise be too exposed, and Khrizman and Genin are eager to find out how the eels interact when packed closely together in their gently swaying submerged meadows.

10.1242/jeb.188060

Khrizman, A., Ribak, G., Churilov, D., Kolesnikov, I. and Genin, A. (2018). Life in the flow: unique adaptations for feeding on drifting zooplankton in garden eels. *J. Exp. Biol.* **221**, jeb179523.

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