Inside JEB is a twice monthly feature, which highlights the key developments in the *Journal of Experimental Biology*. Written by science journalists, the short reports give the inside view of the science in JEB.

Inside JEB

TACKLING SPACE FLIGHT BONE LOSS

Picture by John De Witt

Man has always dreamed about voyaging to the stars, and with the advent of manned space flight at the end of the 20th century we are finally taking our first tentative steps in space. But it seems that our space pioneers may pay a significant physical toll for their experience of weightlessness; even short forays outside our planet's gravitational field lead to significant, albeit reversible, bone loss. In an effort to counteract this, astronauts exercise during space flight, but could they reduce bone loss still further by increasing their mass and inertia during a good microgravity work-out? John De Witt, Donald Hagan and Ronita Cromwell teamed up to see if increasing an athlete's mass during exercise, without increasing their weight, could increase the beneficial forces acting on astronauts' bodies to reduce space-flight bone loss (p. 1087).

Recruiting 10 experienced treadmill runners, De Witt set each athlete running or walking on the treadmill as he measured the ground reaction forces generated while they moved. Then he increased each athlete's mass by 10, 20, 30 or 40% while supporting the athletes with a harness so their weight remained the same as they moved. Measuring the forces as the athletes ran and walked, De Witt also recorded each individual's stride time, as well as the length of time they were in contact with the treadmill, and the forces generated as their feet hit the ground and pushed off again.

Analysing the runners' and walkers' performances, the team were surprised to find that the forces exerted by the runners didn't increase, despite their mass gain. If anything, as De Witt loaded more mass onto each runner the force was slightly reduced when their foot hit the ground. Adding mass to the runners hadn't increased the forces on their bodies that could reduce bone loss in microgravity.

However, when De Witt analysed the forces acting on the walkers as their mass increased, he found that they hit the ground faster and with more force, despite pushing off at the end of a stride with slightly less force than when walking freely. De Witt adds that although the loaded walkers experienced the most significant force increase as they gained mass, overall the forces acting on the runners were always greater, so jogging is still better to maintain astronauts' bone mass than weighted walking.

Finally, when the team analysed the loaded walkers' and runners' styles, they realised that both runners and walkers increased their stride time as they were loaded up, but only the runners spent more time in contact with the ground. De Witt admits that the team was 'surprised that the body adapts differently to increased mass between walking and running', and suspects that in the long run it may not be possible for astronauts to stave off bone loss given their busy schedules. 'Bone loss may be a necessary consequence of spaceflight' he adds.

10.1242/jeb.018127

De Witt, J. K., Hagan, R. D. and Cromwell, R. L. (2008). The effect of increasing inertia upon vertical ground reaction forces and temporal kinematics during locomotion. *J. Exp. Biol.* **211** 1087-1092.

Coming soon in JEB

Neurosensory Ecology Special Issue

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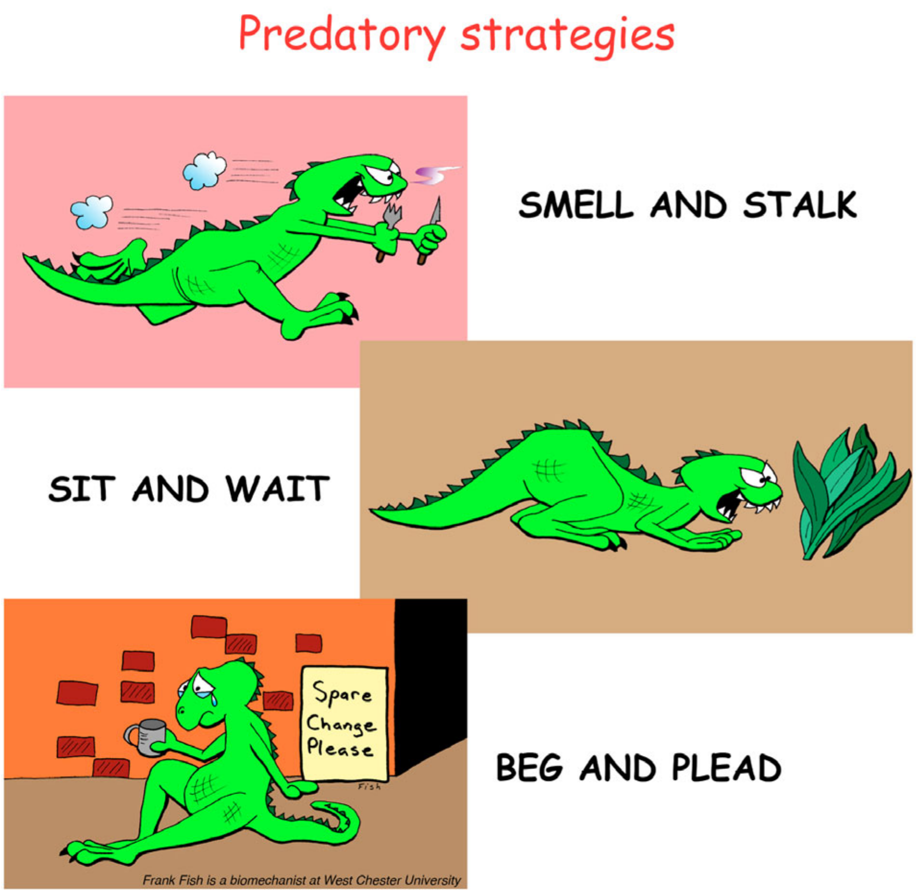
FORAGING STYLE INFLUENCED HOW LIZARDS GET ABOUT



When it comes to grabbing a snack, lizards have opted for one of two foraging styles. Some species simply sit tight until a tasty morsel wanders past, while other species carefully sniff out and stalk their prey before landing lunch. Knowing that some species are relatively sedentary, while stalkers are on the move most of the time, Eric McElroy and his colleagues from Ohio University, USA wondered whether a species' foraging style had also influenced the way they get about (p. 1029).

Collecting 18 species of lizard, the team filmed the animals as they sprinted, ran and walked along a racetrack, while recording the forces generated by the creatures. Having categorised the way each lizard moves, the team mapped their foraging styles on the family tree and found that the original lizard probably sat and waited for meals to pass their way before chasing them down with a quick dash. Moving on through evolutionary time, the team could see that foraging style had affected the way the reptiles move. Sitters have specialised in sprints and trots while stalkers evolved a new slow walk. However, when escaping predators, most stalkers could sprint, but a few evolved a peculiar slow run. Surprisingly, the team also realised that, over time, three groups of lizards that had taken up stalking had later lost the walking knack, and reverted to sitting and waiting.

10.1242/jeb.018135

McElroy, E. J., Hickey, K. L. and Reilly, S. M. (2008). The correlated evolution of biomechanics, gait and foraging mode in lizards. *J. Exp. Biol.* **211**, 1029-1040.

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