

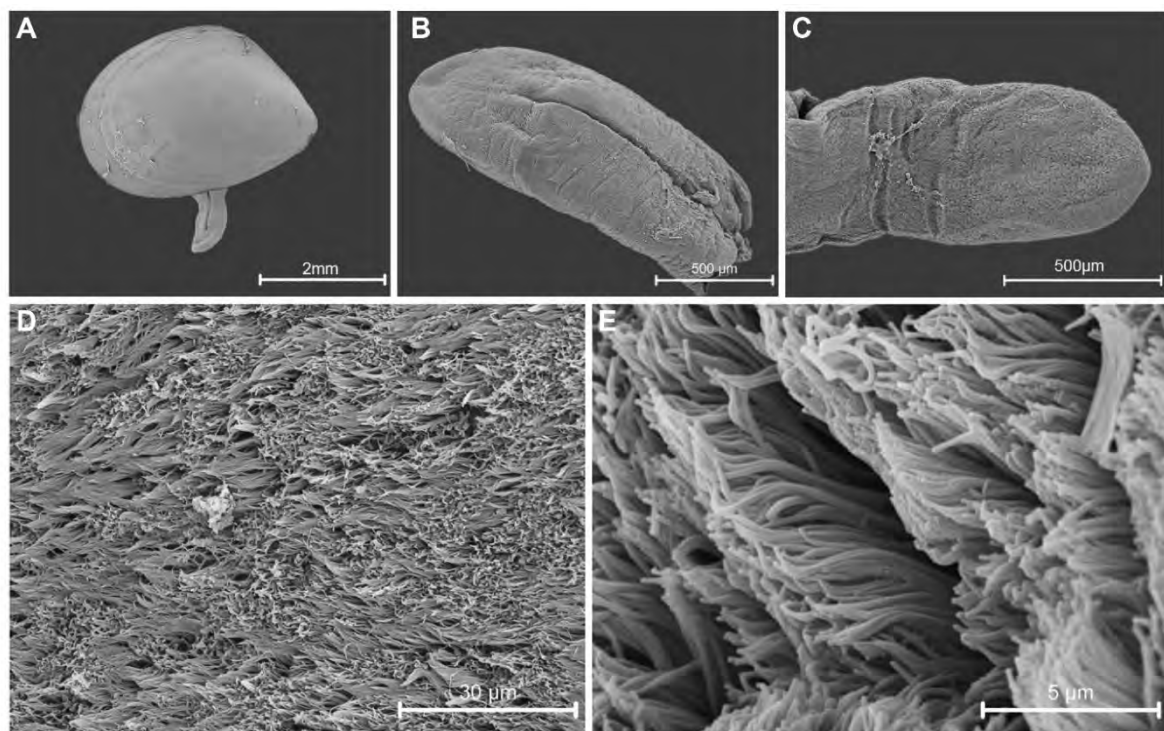
Tiny Mussels with Big Hairy Feet

If you've ever watched *The Lord of the Rings*, you'll know that hobbits are famous for one thing above all else – their big, hairy feet. It turns out that baby Greenshell™ mussels have something in common with Middle-Earth's most famous residents.

Researchers at the University of Auckland have discovered that newly settled mussel spat have surprisingly large and hairy feet, what's more spat use their hairy foot to feed themselves. Rather than relying only on filtering food particles from the water like adult mussels, these youngsters use many thousands of tiny hairs (called cilia) covering their entire foot to gather food and transport it to their mouth.

This discovery helps explain a long-standing puzzle in mussel farming. Very young spat have only poorly developed gills, making them very inefficient filter feeders. Producing enough live microalgae for them to eat is expensive and one of the major costs of nursery production.

To investigate whether the "hobbit foot" could provide another way to feed spat, researchers offered juvenile mussels flocculated (clumped) algae that settled onto the bottom of the culture tanks instead of remaining suspended in the water. The spat happily gathered and ate the settled algae using their foot, growing almost twice as fast as unfed mussels and achieving growth rates comparable to spat fed conventional suspended algae.



Pictures: Scanning electron microscope images of the foot of 2 mm Greenshell™ mussel spat. (A) Juvenile mussel with foot extended, (B) Under surface of the foot showing the central groove used for gathering food, (C) Upper surface of the foot, (D) Close up of the surface of the foot showing the thick layer of hairs used for sweeping up food particles, (E) Even closer view of fine hairs used for food sweeping that cover the entire foot of the spat.

The work suggests there may be opportunities to develop new feeds specifically designed for this early life stage. Instead of relying entirely on expensive live algae suspended in the water, future nursery systems may be able to provide specially formulated feeds that settle onto surfaces where young spat can simply "walk up to dinner".

There is still work to do before this becomes a commercial reality. The researchers found that some of the flocculated algae was rejected, so improving feed quality and particle characteristics will be an important next step.

Sometimes the biggest breakthroughs come from looking at familiar animals in a completely different way. In this case, it turns out that the secret to feeding tiny mussels may have been right under our feet all along—or, more accurately, under theirs.

- *Theresa Huang, Leslie Sampollo, Andrew Jeffs – University of Auckland*

