Science spins truth out of resilient worms

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Resilient: Marine worm Alitta virens

Worms, it appears, are good at keeping secrets.

Scientists are now confident that fossils of some soft-bodied creatures

may not be telling the truth about where they came from.

Fossils of creatures like worms are rare, because they are delicate and often decay too fast to leave a clear imprint in the sediment where they die.

The few worm fossils which have been found have given scientists what they thought was a clear glimpse into the past, about life where the fossil was formed hundreds of millions of years ago.

But that might be about to change.

Orla Bath Enright, a PhD student at the University of Portsmouth, has found the soft bodies of some dead worms are intact even after being put through the laboratory equivalent of a turbulent ride in a cement mixer.

Her research is published in *Royal Society Open Science*.

Miss Bath Enright said: "The results are exciting and really not what we expected. This will ultimately push our knowledge forward on whether some of the most rarely preserved fossils in our geological record could have been living in different environments to the ones that they are found in.

A model-based reconstruction of the Burgess Shale, in Canada, a site famous for its fossils' soft-bodied preservation, where many of the organisms' appendages and internal organs have been preserved. Credit: Public exhibit at the Carnegie Museum of Natural History in Pittsburgh, Pennsylvania. The reddish-coloured animal near the center is an Aysheaia onychophoran. The light-coloured arthropods at left are Marrella

"The remains of soft-bodied animals like worms are rarely preserved as fossils. They decay away quickly after death and it is assumed that, because they are delicate, they are likely to be broken apart by any kind of movement.

"This is what we set out to study using a flume tank, water, sand and some dead worms.

"Could the fossils found within deposits of sediment-density flows have come from shallower water marine environments or been picked up

from a number of environments along the way and all been jumbled up together?"

The researchers, from the University of Portsmouth and University of Southampton, replicated flows using an annular flume tank – a bit like a cement mixer or top-loading washing machine.

"We made the most destructive flows that we could – fast and turbulent," Miss Bath Enright said.

The researchers investigated how long the flows lasted, the amount of sediment in the flow, and how angular the sediment was – and studied the effects of all these variables on the damage caused to the dead worms.

The longest experiments were roughly equivalent to the worms' bodies doing a half-marathon (21 km) in three hours, while being flipped over, turned around, and being hit by sand.

Remarkably, some of the worms came out intact and looking not that dissimilar from when they went in. This means that some or even all the animals preserved in these types of flow deposits could in fact come from somewhere else.

More information: Palaeoecological implications of the preservation potential of soft-bodied organisms in sediment-density flows: Testing turbulent waters, *Royal Society Open Science*, rsos.royalsocietypublishing.or … /10.1098/rsos.170212

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