

Abstract Submitted
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Wiggling arthropods induce flow in granular materials¹ KAREN DANIELS, MELIA KENDALL, SHIH-YUAN CHEN, EMILY BROWN, BJORN SUMNER, MICHAEL MANN, North Carolina State University — Just as heating a viscous fluid causes its viscosity to drop, we observe that the introduction of active particles into a passive granular material can increase its flowability. This effect can be observed, for instance, in the historical practice of aging Milbenkäse cheese in mixtures of flour and mites. In our experiments, we examine this effect by introducing flour beetle larvae (*Tribolium confusum*) into agricultural grains of various sizes. We measure the timescale for bulk flow via the relaxation of a sloping pile, and the timescale for particle-scale rearrangements via diffusing wave spectroscopy. We find that the macroscopic and microscopic timescales are approximately proportional; both timescales decrease as the fraction of larvae increases, but only for samples in which the grains are smaller than the larvae. For samples in which the larvae and grains are of similar size, these two timescales decouple.

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