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Macroscopic motion of living organisms from internal microscopic stresses SHAHRZAD YAZDI, ALFREDO ALEXANDER-KATZ, Massachusetts Institute of Technology — The motion of living systems, particularly at the scale of a cell and above, depends on the collective motion of active agents constrained within a given boundary. For example, cell locomotion arises from the internal flows of filaments and active motors. However, it is not clear what the necessary conditions are to transfer microscopic stresses stemming from activity into macroscopic motion. Here, we study a system at a larger scale in which microscopic stresses are induced using ferromagnetic beads that are ingested by a model living system: the worm *C. elegans*. To explore the relationship between internal microscopic activity and macroscopic motion, we apply a rotating magnetic field to induce torques on the beads and make them spin. Under other conditions, we also explore a combination of torques and point forces. Our system shows that the interfacial chemistry of the beads and the frequency of rotation are critical for observing macroscopic motion. Our study helps to elucidate the necessary ingredients to convert microscopic motions into macroscopic displacements. Furthermore, our work also helps in understanding how to manipulate *in vivo* the activity of biological organisms, which can have important implications in cell analysis, drug discovery, and locomotion control.

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