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The role of the ventral pedal waves in the locomotion of terrestrial gastropods JANICE LAI, ROBERT D. SHEPHERD, JUAN C. DEL ALAMO[1], JAVIER RODRIGUEZ-RODRIGUEZ, JUAN C. LASHERAS, University of California San Diego — The locomotion of terrestrial gastropods exhibits unique characteristics which allow these animals to crawl on steep surfaces. Gastropods move by gliding over a ventral foot lubricated by mucus. They generate trains of pedal waves through periodic muscle contractions in the central portion of the ventral foot, producing a forward traction, while the rim of the foot adheres to the substrate and generates suction forces. We analyzed the kinematics and dynamics of locomotion by conducting two sets of experiments. In the first set, we used digital image processing to correlate the frequency and wavelength of the pedal waves to the migration velocity. In the second set, we computed the traction and adhesion forces produced by these animals from measurements of the deformation of an elastic substrate of known properties. We found that the strain energy exerted by the animal on the substrate is quasi-periodic, and explored a possible correlation between the mean speed of migration and the period of this energy fluctuation. In addition, we found that the pedal waves accelerate as they move forward along the ventral foot producing the symmetry break necessary for the generation of a net traction force.

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