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Locomotion and drag in wet and dry granular media[1] DANIEL GOLDMAN, ROBYN KUCKUK, SARAH SHARPE, Georgia Institute of Technology — Many animals move within substrates such as soil and dry sand; the resistive properties of such granular materials (GM) can depend on water content and compaction, but little is known about how such parameters affect locomotion or the relevant physics of drag and penetration. We developed a system to create homogeneous wet GM of varying moisture content and compaction in quantities sufficient to study the burial and subsurface locomotion of the Ocellated skink (*C. ocellatus*) a desert-generalist lizard. X-ray imaging revealed that in wet and dry GM the lizard slowly buried ($\approx$ 30 seconds) propagating a wave from head to tail, while moving in a start-stop motion. During forward movement, the head oscillated, and the forelimb on the convex side of the body propelled the animal. Although body kinematics (and "slip") were similar in both substrates, the burial depth was smaller in wet GM. Penetration and drag force experiments on smooth cylinders revealed that wet GM was $\approx 3\times$ more resistive than dry GM, suggesting that during burial the lizard operated near its maximum force producing capability and was thus constrained by environmental properties.

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