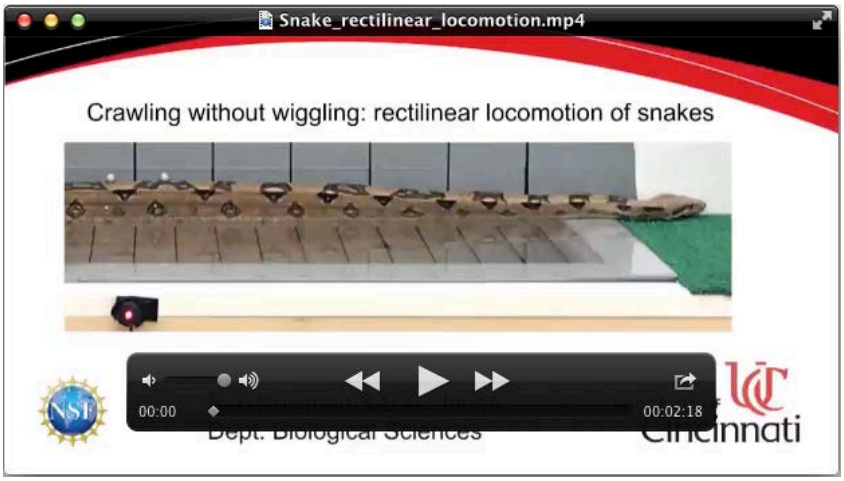

Movie 1. The kinematics and muscular mechanisms of rectilinear locomotion of boa constrictors. Note how the mid-dorsal skin, which is firmly attached to the vertebral column, moves forward with nearly a constant speed, whereas skin along the belly of the snake periodically stops. The costocutaneous inferior muscle (CCI) is a propulsive phase muscle that is active and shortens when the ventral skin has static contact with the ground as the skeleton slides forward relative to both the skin and the ground. Early activity of the interscutalis muscle (IS) shortens the ventral skin prior to static contact, and subsequent isometric activity of the IS prevents the skin from stretching when the CCI is pulling the body forward. The costocutaneous superior muscle (CCS) is a recovery phase muscle that slides the skin forward relative to both the ground and the underlying skeletal structures. A substantial difference between our findings and the hypotheses of Lissmann (1950) was the isometric activity of the IS muscle, which is consistent with transmitting but not generating propulsive force.