

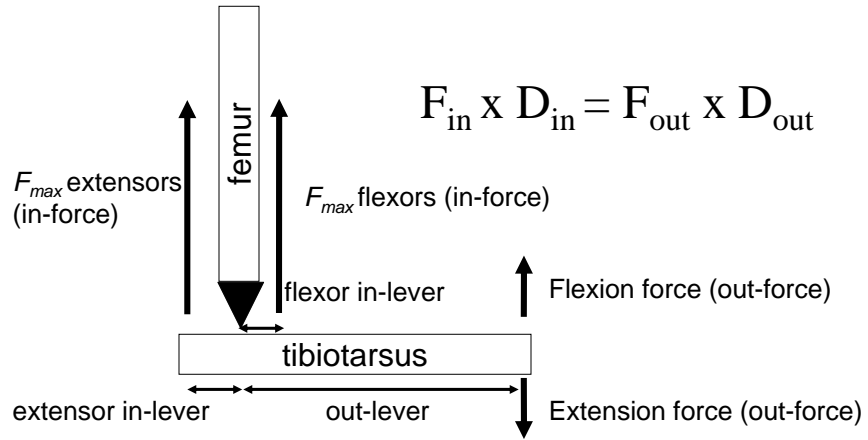


$$F_{max} = PCA \times K$$

Where F_{max} is the maximum force the muscle can generate, PCA is the physiological cross sectional area and K is a constant (assumed here to be 50 N/cm^3).

$$PCA = m / (\rho L)$$

Where m is the mass of the muscle, ρ is its density (assume 1.056 g/cm^3) and L is the length of the muscle fibers (assume $.5 \text{ cm}$).



Comparative functional anatomy & physiology

3 Taxa:

Tiger whiptail



Sceloporus spp.



Gila monster



Tiger whiptail, *Aspidoscelis tigris*



Photo © 2005 Tom Brennan

This is an alert, fast-moving, ground-dweller that actively forages during the day. It spends nearly all of its waking hours in motion foraging and moving between sun and shade for thermoregulation. This wary lizard can be difficult to capture. It is usually very conscious of its proximity to the pursuer and is careful to stay just out of reach. It actively forages by rooting around in organic matter under bushes and by digging in the soil around the bases of rocks, logs, and other surface debris. It feeds on termites, insect larvae, beetles, grasshoppers, butterflies, moths, and other insects.

***Sceloporus* spp.**



Photo © Tom Brennan

During the summer this diurnal lizard is most active mid morning and late afternoon. In spring and fall it can be active all day long. It forages on the ground but climbs onto rocks, trees, fence posts, and wood piles to bask. It hibernates during the cold months of winter and late fall. Sits and waits for prey to wander within close proximity. It feeds on a variety of insects including termites, ants, beetles, grasshoppers, flies, larvae, and wasps. It also eats a variety of spiders, snails, and small lizards. .



Found across most of western and southern Arizona. Its range extends from the far northwestern corner of the state, down through our western deserts to Yuma, and eastward across nearly all of sub-Mogollon Rim southern Arizona. The relatively slow moving and lethargic Gila Monster spends most of its time in underground burrows. The Gila Monster is a carnivore that feeds on nestling mammals, nestling birds, the eggs of birds and reptiles, lizards, and carrion. It stores fat in its tail. Four or 5 meals may be enough to sustain the lizard for an entire year.

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Make predictions for differences in the following traits:

1. F_{max}
2. In-lever distance
3. Out-lever distance

What about differences in body mass?

$$F_{max} = PCA \times K$$

Where F_{max} is the maximum force the muscle can generate, PCA is the physiological cross sectional area and K is a constant (assumed here to be 50 N/cm^2).

$$PCA = m / (\rho L)$$

Where m is the mass of the muscle, ρ is its density (assume 1.056 g/cm^3) and L is the length of the muscle fibers (assume $.5 \text{ cm}$).

