



**Figure 1.** Summary of hypothesis related to the evolution of both venom potency and venom volume



To test if venom is prey-specific we calculated the evolutionary distance between the LD<sub>50</sub> model species and the species of the diet.

For example, if LD<sub>50</sub> was tested on a mouse a diet comprising of mammals would have a distance of 0 Mya while a diet of fish would be 550 Mya (See methods). Using this metric we test the following hypothesis:

**Prey-Specific Venom:** As venom is expected to be adapted towards typical prey targets it predicts a positive relationship between LD<sub>50</sub> and the distance between LD<sub>50</sub> model and diet.

**The Overkill Hypothesis:** Under neutral selection LD<sub>50</sub> is expected to show no pattern relating to prey identity.

**Prey-Specific Immunity:** If prey immunity evolves faster than venom potency LD<sub>50</sub> would be expected to be highest on phylogenetically distance venom naive species.



The amount of venom a snake produces is likely to be determined by factors relating to body mass. These potential drivers can be tested based on predictions of the allometric scaling of venom volume with body size including;

**The Overkill Hypothesis:** Predicts no relationship.

**Predator-prey:** If venom volume follows scaling associated with predator-prey size scaling a coefficient of between 0.19 and 0.51 is predicted (equation 2).

**MTE:** If venom production scales with according to the metabolic theory of ecology (MTE) venom volume would be expected to scale according to 0.75.

**Alternative:** Scaling exponents of >1 would suggest drivers such as sexual selection or defense are important in venom evolution.