Difference in Phosphorus Levels Between African and European Honeybees

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Abstract

Recent studies indicate growth rate my be linked to phosphorus levels in insects: faster growing insects have more phosphorus than slower growing ones. Because the African honeybee develops faster than the European honeybee, we hypothesize the African honeybee (*Apis mellifera scutaletta*) will have a higher level of phosphorus in its body than the European honeybee (*Apis mellifera linguistica*). A statistically meaningful difference occurred in the phosphorus levels between the two species, showing African honeybees have higher phosphorus levels than European honeybees.

Introduction

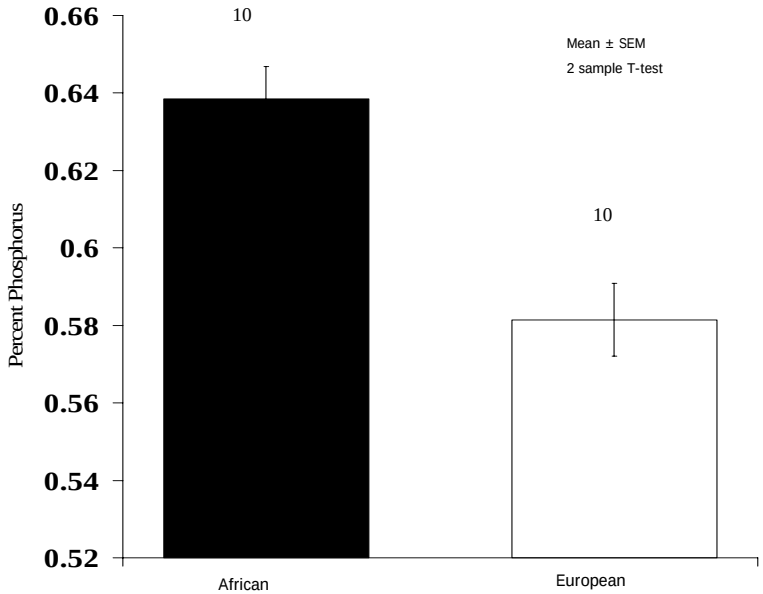
African honeybees hurt agriculture by replacing European honeybee colonies raised for agricultural purposes. African honeybees have been a problem since they were accidentally released in 1957 in southern Brazil, because they are aggressive and outcompete European honeybees. African honeybees grow faster than European honeybees, and thus African honeybees also spread faster than European honeybees, swarming more often.

Recent studies show growth is linked to phosphorus levels (Elser et al., 2000b; Elser et al., 2001; Urabe et al., 1997). This led us the hypothesize ***A. mellifera scutellata* will have higher percentage of phosphorus by biomass than *A. mellifera lingustica***. Here we examine the phosphorus levels in African and European honeybees.

Methods

- Obtained seven day old African and European larvae.
- Dried larvae at 60ºC for over two days and ground samples.
- Two homogeneous samples from each larva massed and put in separate test tubes.
- Samples digested in persulfate overnight and then autoclaved.
- Phosphorus measured using protocol from "Standard Methods for the Examination of Water and Wastewater" 20th ed.

Do Africans have higher levels of phosphorus?
Yes



Discussion

Our results indicate African honeybees have higher percentage body mass of phosphorus than European honeybees. This supports the hypothesis that growth rate is phosphorus limited.

Unfortunately this preliminary study cannot distinguish whether African honeybees are fed more phosphorus than European honeybees or African honeybees absorb phosphorus better. Recent studies suggest absorption rates of phosphorus is linked to growth in other insects, such as larval *Manduca sexta* (Elser et al., 2002). The rate of absorption of phosphorus could also be a cause for the higher percentage of phosphorus by body mass for African honeybees.

Currently we are investigating other life stages in more colonies to see if the difference in phosphorus levels between Africans and Europeans is consistent throughout a bee's life. Many more trials will be run of African and European larvae to strengthen the findings here.

References

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