INTRODUCTION

Mirror-induced behavior has been used to provide a window into animal minds, helping us better understand animal cognition and consciousness. Recent studies suggest that some animal species, especially vertebrates that possess complex cognitive abilities and social lives, are able to recognize themselves in a mirror. In these studies, behavior changes with exposure to the mirror in ways that may be indicative of self-recognition. Specifically, with repeated exposures, social behaviors decrease, and exploration of the own body begins. Such self-directed behaviors have been interpreted to mean that the animal has learned that the image in the mirror is its own self; and further, that this implies that the animal has a concept of self, that is, it is capable of understanding that it exists apart from its external environment.

METHODS

Using standard methods for mirror self-recognition (MSR) tests from animal behavior literature, we observed 34 individual wasp queen’s mirror induced behavior.  
- Wasp was placed in sectioned petri dish with mirror on one half (Figure 3) in side with no mirrors for 5 minutes to acclimate.  
- Separation was removed and wasp behavior was then observed for either 2 minutes (short test, with numerous controls) or 25 minutes (long test).  
- Behaviors of interest included: antennation, touching the mirror, and self-grooming.  
- Results were analyzed using a 2-factor ANOVA (short test) or a t-test (long test).  
- The key treatment for MSR tests is placement of a visible mark on the face; this was done using paint placed on the wasps’ clypeus (Figure 4). Several other controls were included: no mirror, clear mark, and sham mark (touched but not marked on the face) in the short test (Table 1).

LONG MIRROR TEST RESULTS

CONCLUSIONS

Short Term:  
- Wasps show interest and behavior changes in response to a mirror  
- Wasps notice the presence of a mark on their clypeus (even if it is clear, so may be related to the presence of being touched)  
- Wasps do not appear to show MSR because there was no increase in self-directed behavior

Long Term:  
- A visible mark appears to stimulate wasps to explore the mirror through antennation and touching  
- Increased antennation and touching responses to a visible mark appear over several minutes, but less time is spent doing self-directed behaviors  
- Wasps appear to be highly in tune to changes in their visual environment, but display no evidence of self-recognition

POLISTES PAPER WASPS

Polistes wasps are a primitively eusocial genus of insects known as paper wasps. They live in stable colonies of relatives, a queen and daughter workers, and have relatively small colony sizes. Individuals fight with each other over opportunities to become reproductively dominant. Recognition of nest mates is an important ability in this social system. We suspect that mirror self-recognition may be feasible in this species because individual recognition sets the stage for self-recognition.

Our research concentrates on determining whether the native North American paper wasp species Polistes metricus are capable of mirror self-recognition.