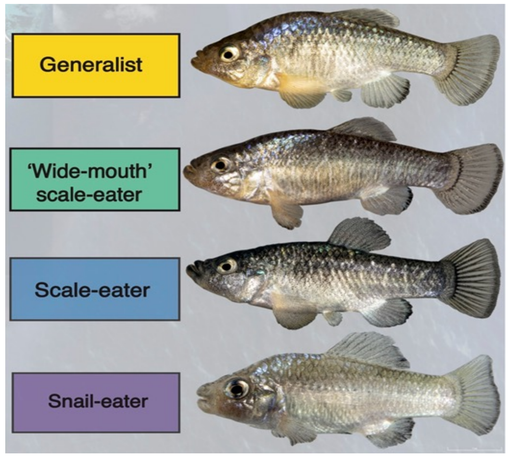
It's about to be a fish fight: the role of aggression during trophic specialization in an adaptive radiation of *Cyprinodon* pupfish

Anay Ochoa[1,2], Emilie J. Richards[2], Christopher H. Martin[2]

[1]Department of Biological Sciences, California State University San Marcos
[2]Department of Integrative Biology, University of California, Berkeley

Introduction

- New behaviors, morphologies or an interaction of the two allow organisms to occupy new ecological niches such as scale-eating
- Scale-eating is a novel feeding behavior that less than 1% of fish perform and one proposed origin is the aggression hypothesis (Sazima 1983; Peterson and Winemiller 1997)
- Here we investigate the importance of aggression in a radiation of *Cyprinodon* pupfishes that displays several ecological shifts



- If shifts in aggressive behavior were important for trophic specialization, we expect dietary specialists to be more aggressive than generalist.

Methods & Materials

- Behavioral Mirror Assays were used to measure aggression for all species within a 5-minute trial (Francis 1990)

Statistical Analyses

- 95 % confidence intervals were made using 10,000 bootstrap replicates to draw inferences in behavior across all species
- Generalized linear mixed models allowed us to determine if aggression varied by species, sex or their interaction.

Results

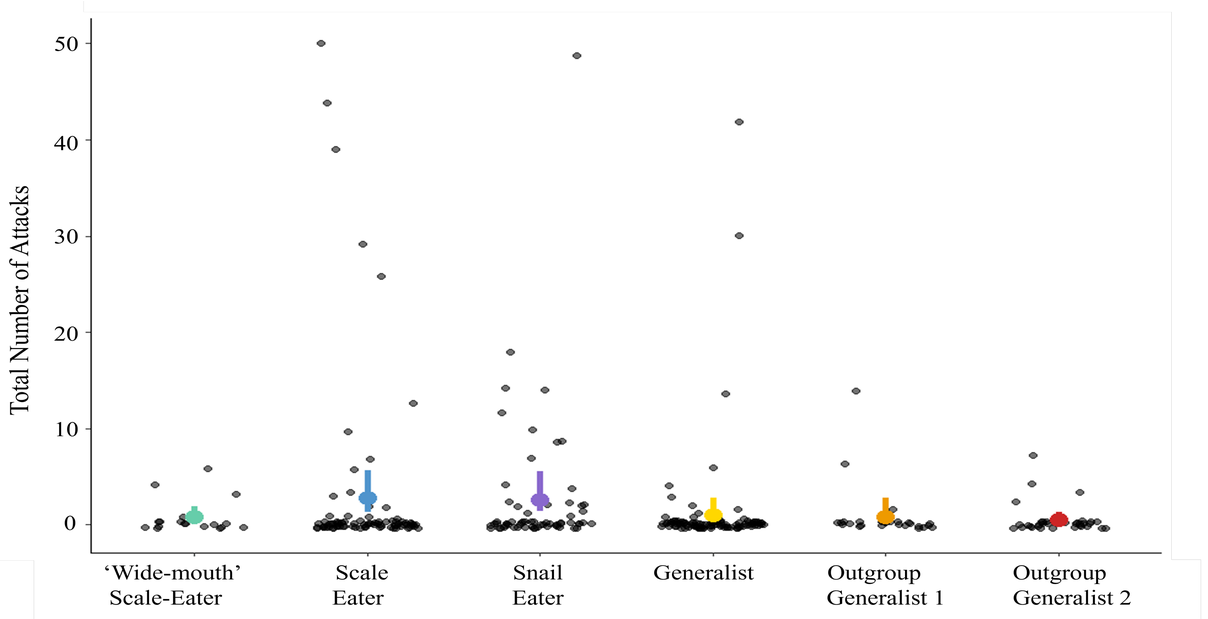


Figure 1: Mean and 95% confidence intervals for the total number of attacks by species within the adaptive radiation in San Salvador Island and two outgroup generalist species

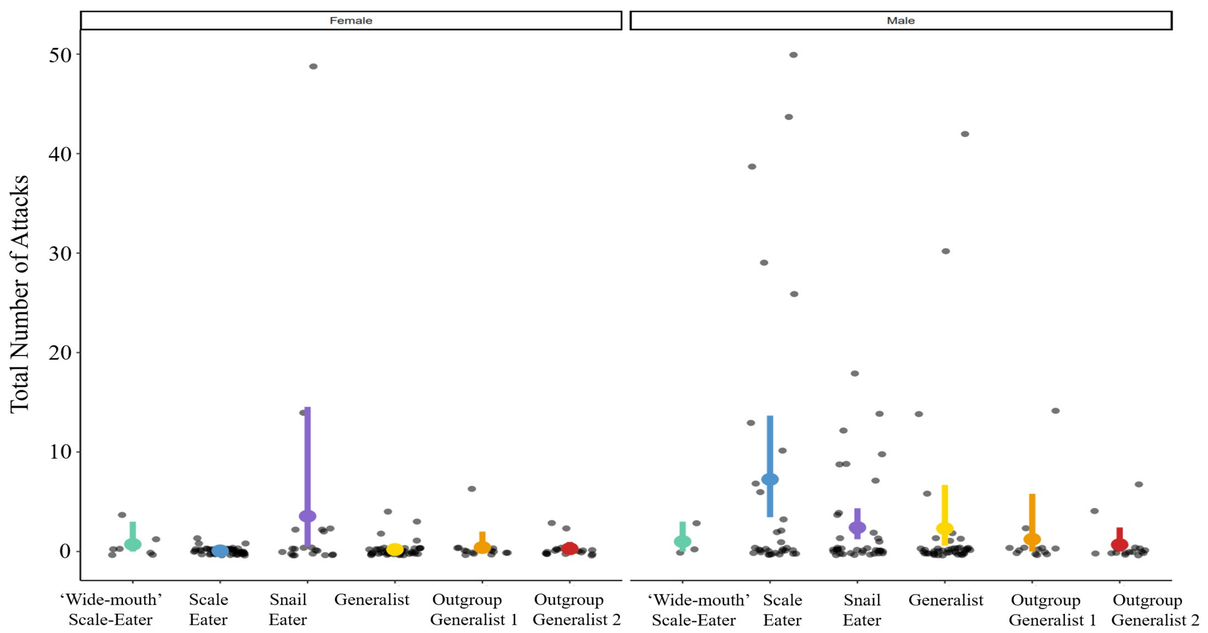


Figure 2: Mean and 95% confidence intervals for the total number of attacks by sex for all species within the adaptive radiation in San Salvador island and two outgroup generalist species

Conclusions

- Our findings show that 'wide-mouth' specialists are as aggressive as the other dietary specialists.
- However, we also discovered that generalists displayed aggressive behavior suggesting that aggression can be used in other contexts. This is consistent with the findings of St. John et al. 2019
- Future studies can investigate the variation in aggression across populations

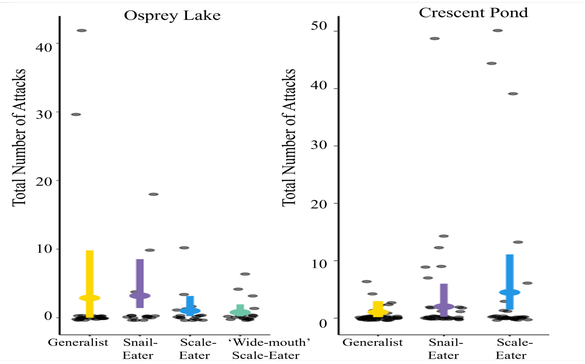


Figure 3: Mean 95% confidence intervals for the total number of attacks by populations across San Salvador Island

- If we focus on the scale-eater we can see that it displays higher levels of aggressions in sites where the 'wide-mouth' specialists is not present

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