Summary of 2022 FSCA visit

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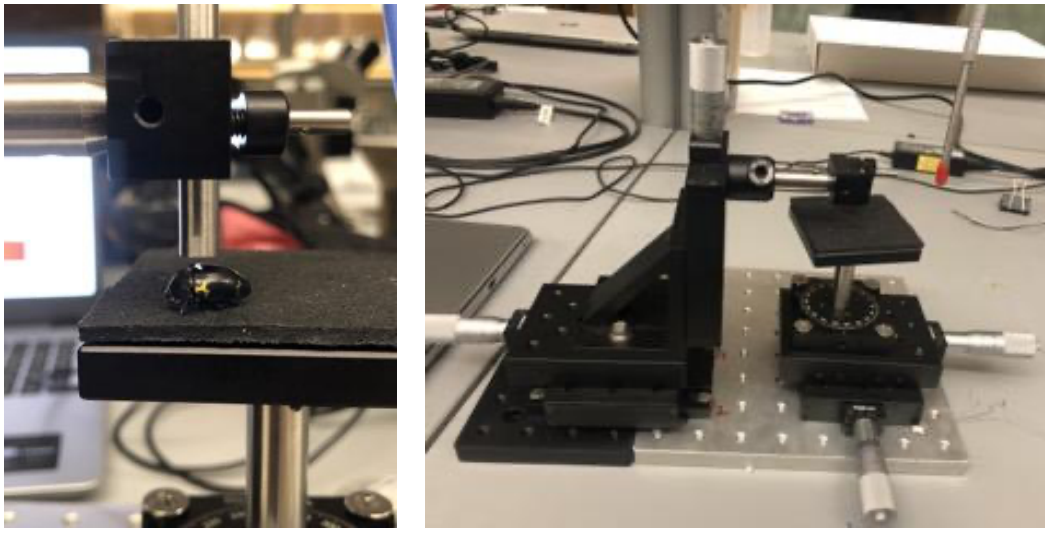
Color variation can be extreme among groups of organisms. There are examples of colorful lineages that are more familiar such as birds (Stoddard & Prum, 2011) and butterflies (Stavenga & Arikawa, 2006). Perhaps overlooked, but equally impressive are the Erotylidae, this group also contains tremendous amounts of color variation among the 4,000+ described species. We set out to formally characterize the color variation of this group using a spectrophotometer.

The high-speed spectrophotometer (*Ocean Insight*, Orlando, FL) was used to measure the colors present on the dorsal surface of each species. There are numerous research papers that also use the spectrophotometer to collect data and demonstrate the importance of it (Briscoe & Chittka, 2001; Yokoyama, 2002). These papers show that spectral data is more objective than the color the human eye can observe. The human visual system is tuned very specifically while the spectrophotometer provides the total reflectance a surface is giving off. Generally, this more complete picture of the reflectance for each beetle allows us to discuss the effect of color more broadly in the environment, as different organisms will be sensitive to different parts of the total color scheme.

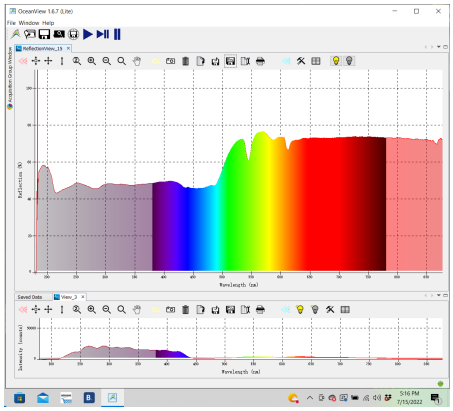


A. Images of Spectrophotometer used to collect data.

We quickly realized that our hypotheses would benefit from a more global sampling scheme and were provided this opportunity to get greater diversity and variation of the family by including museum specimens. The Florida State Collection of Arthropods has one of the most comprehensive and diverse collections of authoritatively determined Erotylidae in the world. My previous sampling included recently collected material from Peru and Vietnam for a total of 137 specimens. Before traveling to the FSCA, I had 28 genera represented and was able to add a further 62 new genera during the visit. This does not include any overlap which was occasionally

done because of limitations in the identification of the previously included taxa. During a week-long visit to the FSCA, I added 62 genera. Much of the original data was for generic-level taxa, but with the strengths of that collection, we were also gathering much more valuable data at the species level. While this proportion of genera is very strong for the New World, Australia, Southeast Asia, and Tropical Africa, more taxa could still be added from the Indian subcontinent and broader Palearctic to include the majority of generic diversity. Our current sampling does however reflect the described centers of diversity for the group and cover all higher classification levels.

Our goals with this dataset are to provide a survey of coloration for erotylids, reporting which regions of the color spectrum are more commonly exhibited by the group, and using the literature to hypothesize why those colors might be more common. We also want to use this dataset to assess whether the color diversity is more often seen in the maculation or the "background" of the beetle themselves. There could be lineages within the erotylids that exhibit different patterns, some that have evolved bright spots or stripes, others that are overall brighter or more colorful but have evolved dark spots or stripes possibly to break up the gestalt of the beetle. Ultimately, in tandem with ongoing phylogenetic efforts, we will be able to estimate the rate of color accumulation, as well as reconstruct ancestral color patterns for each lineage. Then test hypotheses relating to ecological drivers of the color diversity and patterning we observed.



B. Spectral Output of Erotylidae (Figure C)

C. *Iphiclus sedecimpunctata*

With this goal in mind, traveling to the FSCA allowed us to increase our sampling from 28 to 137 and we believe helped build a large comprehensive dataset necessary to answer our broad questions and investigate these compelling evolutionary hypotheses. We hope to see this study published within the next year and would be happy to send it to the CSE upon completion. I appreciate everything the FCSA provided to help with this research and look forward to future collaborations.

References

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