

Ultraviolet-Induced Fluorescence of Insect Eyes



When exposed to UV lights, the eyes of many different species of insects fluoresce. This is due to fluorescent materials that were tentatively identified as hydroxyindole derivatives (Kay, 1969). I chose 3 subjects where the fluorescence was clearly visible: *V. maculifrons*, *A. tuberculifera*, and *C. Eponina*.

While looking for a plant specimen to image under ultraviolet light, I decided to shine the light at my insect specimen collection. Much to my surprise at the time, all of their eyes greatly fluoresced.

The first specimens to be evaluated were the Halloween Pennant (*C. eponina*, top-right) and Black-Tipped Darner (*A. tuberculifera*, bottom-right). Due to their relatively large eyes it was easier to see fluorescence on a greater scale compared to smaller insects. Additionally, they can both be found in upstate New York.



C. eponina under normal light, 3.5x magnification



A. tuberculifera under normal light, 3.5x magnification



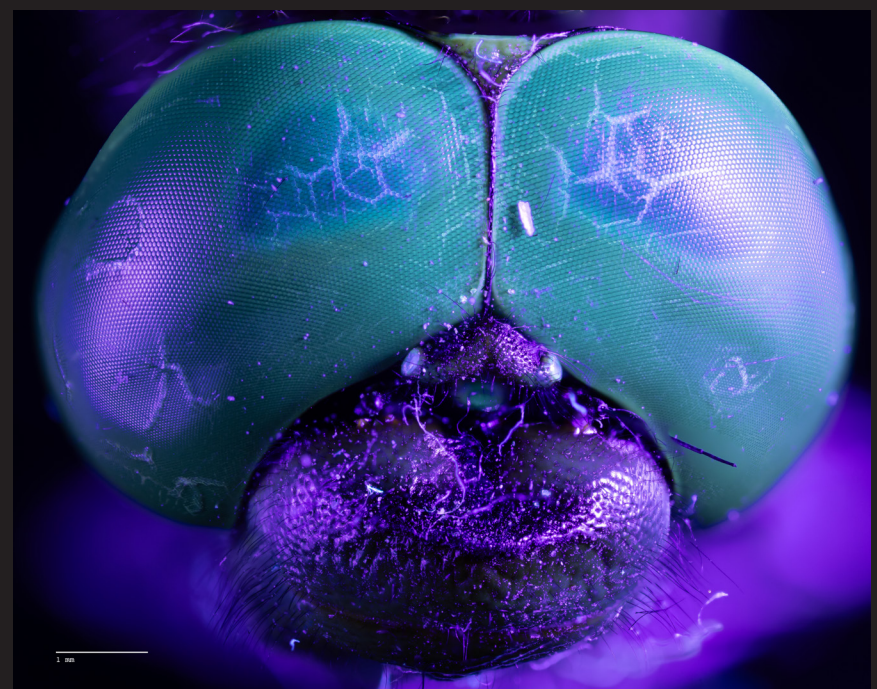
C. eponina with Barrier Filter, 3.5x magnification



C. eponina without Barrier Filter, 3.5x magnification



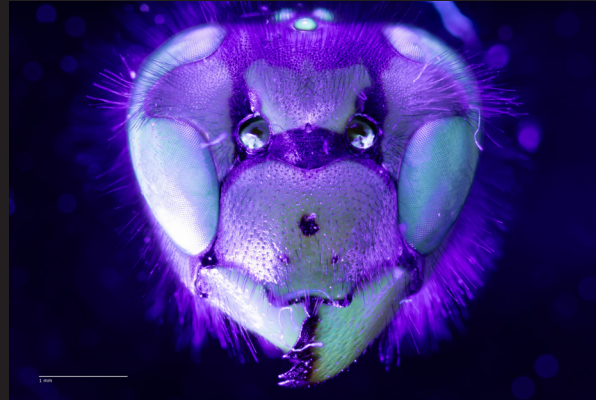
A. tuberculifera with Barrier Filter, 3.5x magnification



A. tuberculifera without Barrier Filter, 3.5x magnification



V. malicufrons under normal light
5x magnification



V. malicufrons without barrier filter
5x magnification

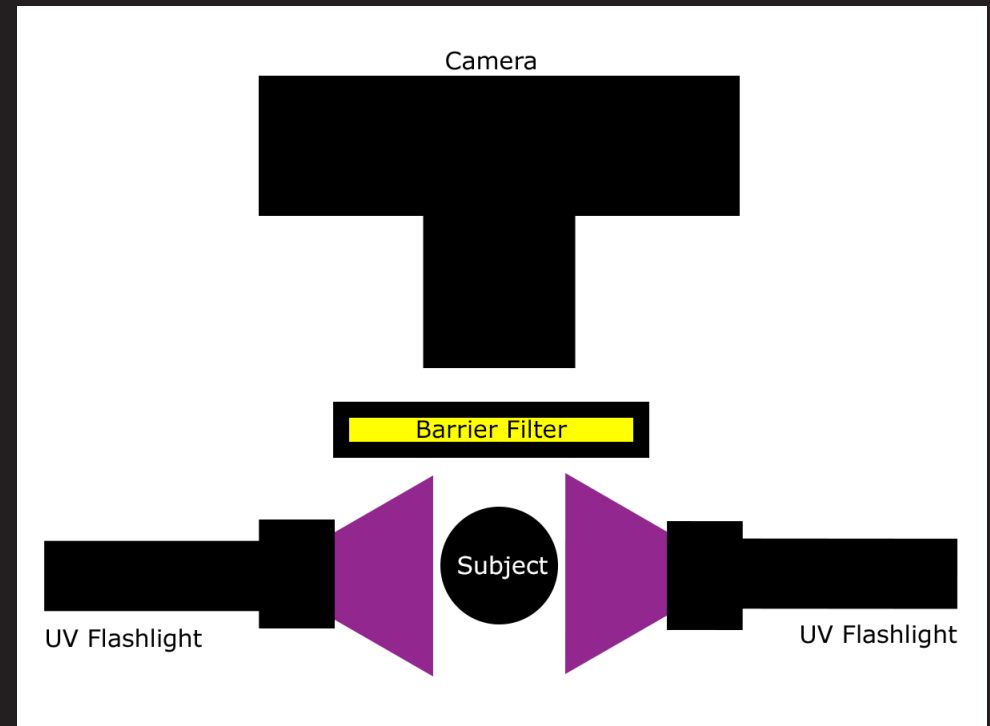


V. malicufrons with barrier filter
5x magnification

The Eastern Yellowjacket (*V. malicufrons*, above) was the most fascinating to image because of its ocelli, simple photo-receptors, on the top of its head. The ultraviolet light had the greatest notable effect bringing out the ocelli in contrast to its head. Like the dragonfly specimens, the Eastern Yellowjacket can also be found in upstate New York.

Equipment and Setup

- UV Lights
- Fiber Optic Lights
- Barrier Filter
- Sony α1
- Laowa 25mm f/2.8
2.5- 5x Ultra Macro
- Stackshot Macrorail
- Copystand



About the Author

Daniel Umansky is a Photographic Sciences student at the Rochester Institute of Technology in Rochester, New York. He hopes to pursue a career in medical or biological imaging. Some of his other interests include wildlife photography and marine biology.

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References:

Kay, R. E. (1969). Fluorescent materials in insect eyes and their possible relationship to ultra-violet sensitivity. *Journal of Insect Physiology*, 15(11), 2021–2038. [https://doi.org/10.1016/0022-1910\(69\)90070-5](https://doi.org/10.1016/0022-1910(69)90070-5)

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