



# The Photochemistry of Cholesta-5,7,9(11)-trien-3-ol in a Medium that Mimics Biological Conditions.

**Olivia Bogdanski, Sumesh B. Krishnan and Jack Saltiel**

**Florida State University Department of Chemistry and Biochemistry**

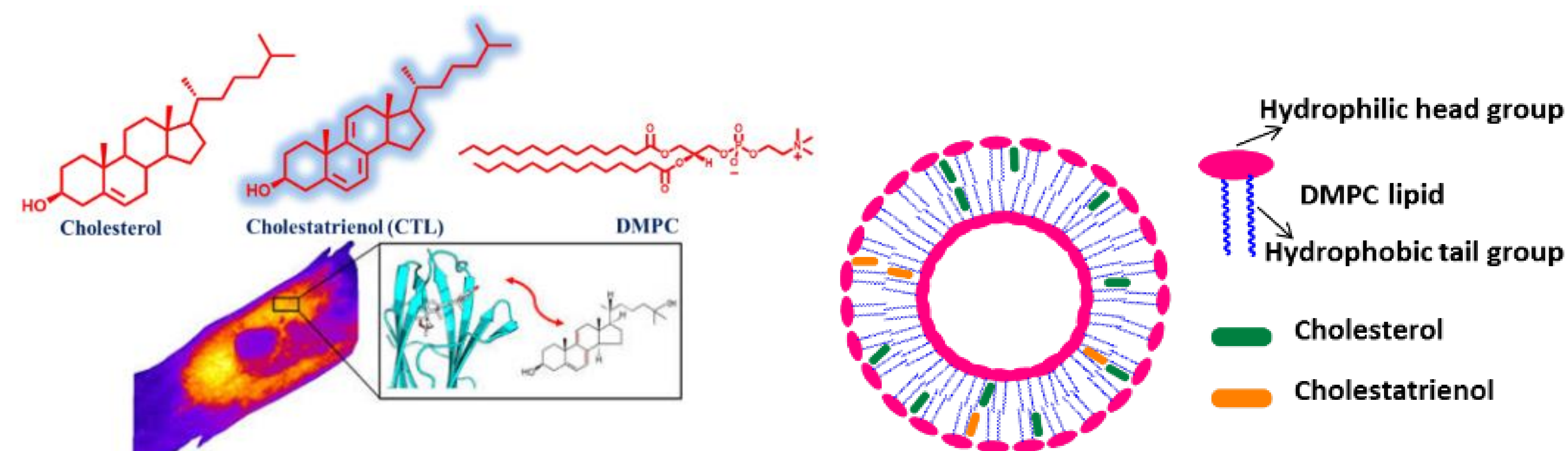


## Abstract:

Cholesterol (CHOL) is essential for membrane structure. It can determine the membrane's permeability, trafficking, and signal transduction, among other functions. It is challenging to study cholesterol directly, so most derivatives are used as probes to determine how CHOL works in the cell. This research concerns cholesta-5,7,9(11)-trien-3-ol (CTL) that differs from CHOL by only two double bonds. Although CTL has been used as a fluorescent probe to study CHOL tracking in vivo, its photochemistry in biological or biomimetic media is not known. What was established in our laboratory is that CTL gives rearrangement and addition/reduction photoproducts in aprotic and protic solvents, respectively. Whether these products form in biomimetic media is not known, nor is their possible toxicity. For initial measurements we selected multilamellar vesicles (MLVs) as the biomimetic medium with CTL and HOCTL incorporated in the membrane. Previous studies in our laboratory lead us to expect that we should be able to follow the product evolution by UV and fluorescence spectroscopies.

## Introduction:

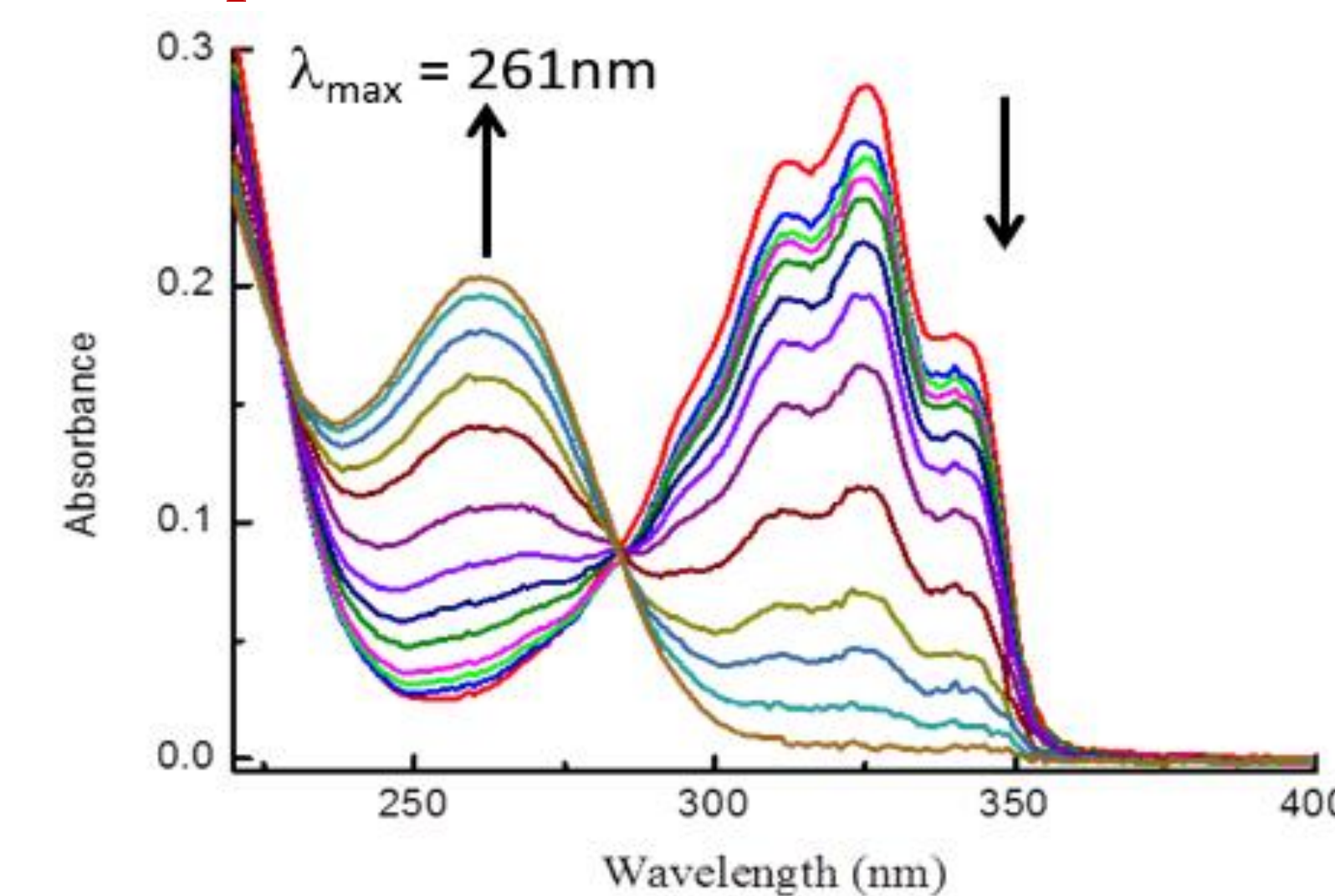
- Cholesterol is component of biological membranes and essential for cell functions.
- Precursor for the biosynthesis of steroid hormones, bile acids and vitamin D.
- Aim: To identify CTL photoproducts in biological systems and to evaluate their toxicity.



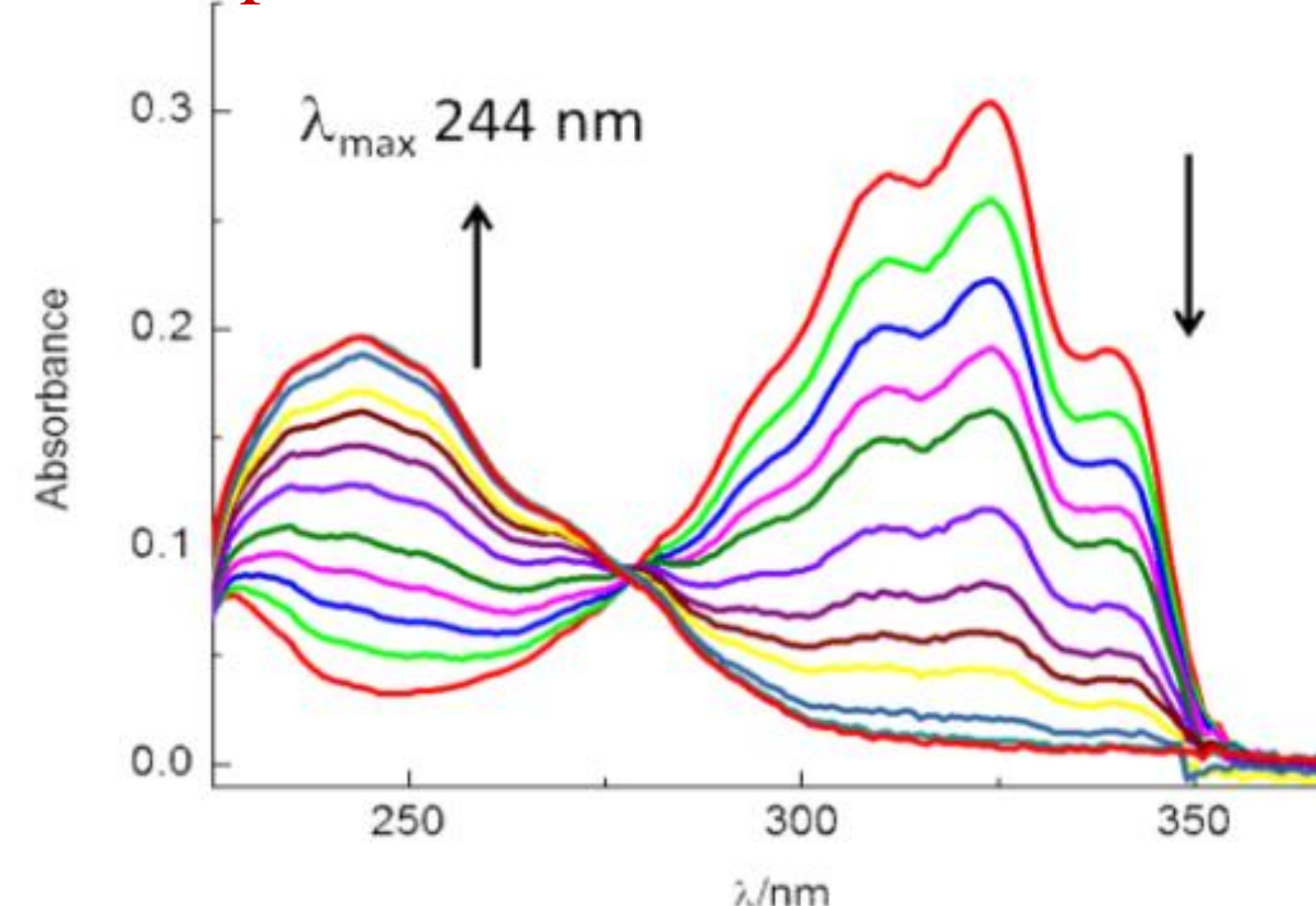
Peterson *et al.* BBA-Biomembranes, 2020, 1862, 183063

## Results:

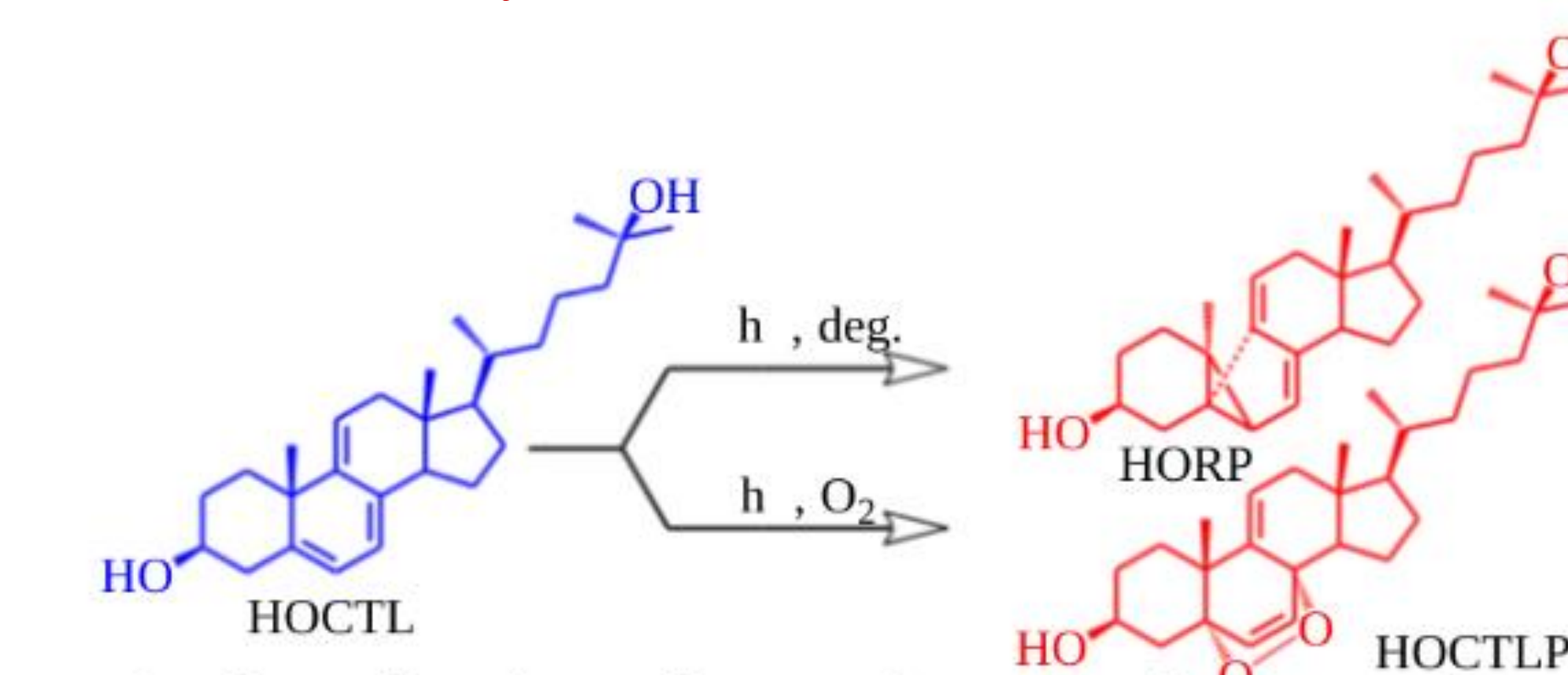
### Photoproducts in THF:



### Photoproducts in Ethanol:

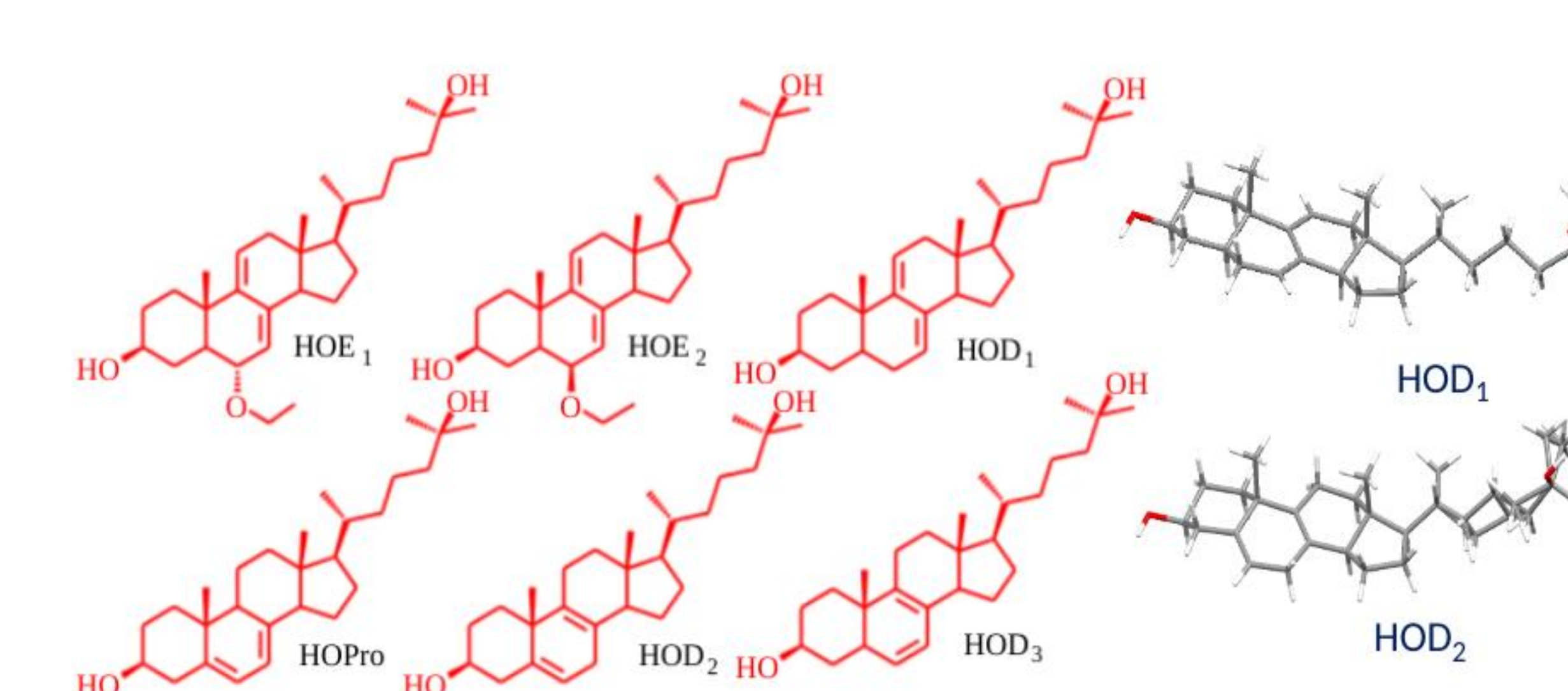


### Photochemistry of HOCTL in THF

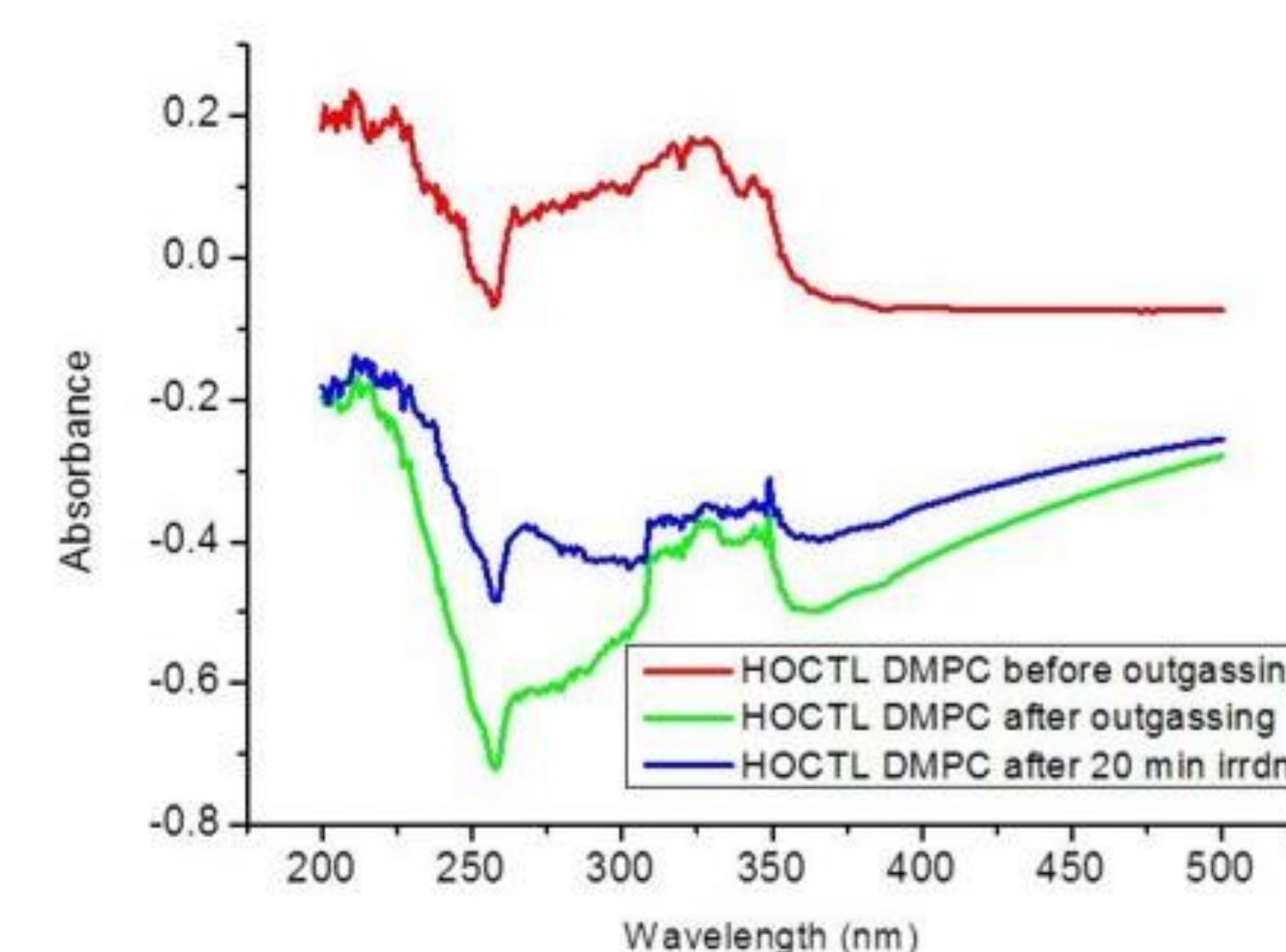


Saltiel *et al.* Photochemical & Photobiological Sciences, 2022, 21, 37-47

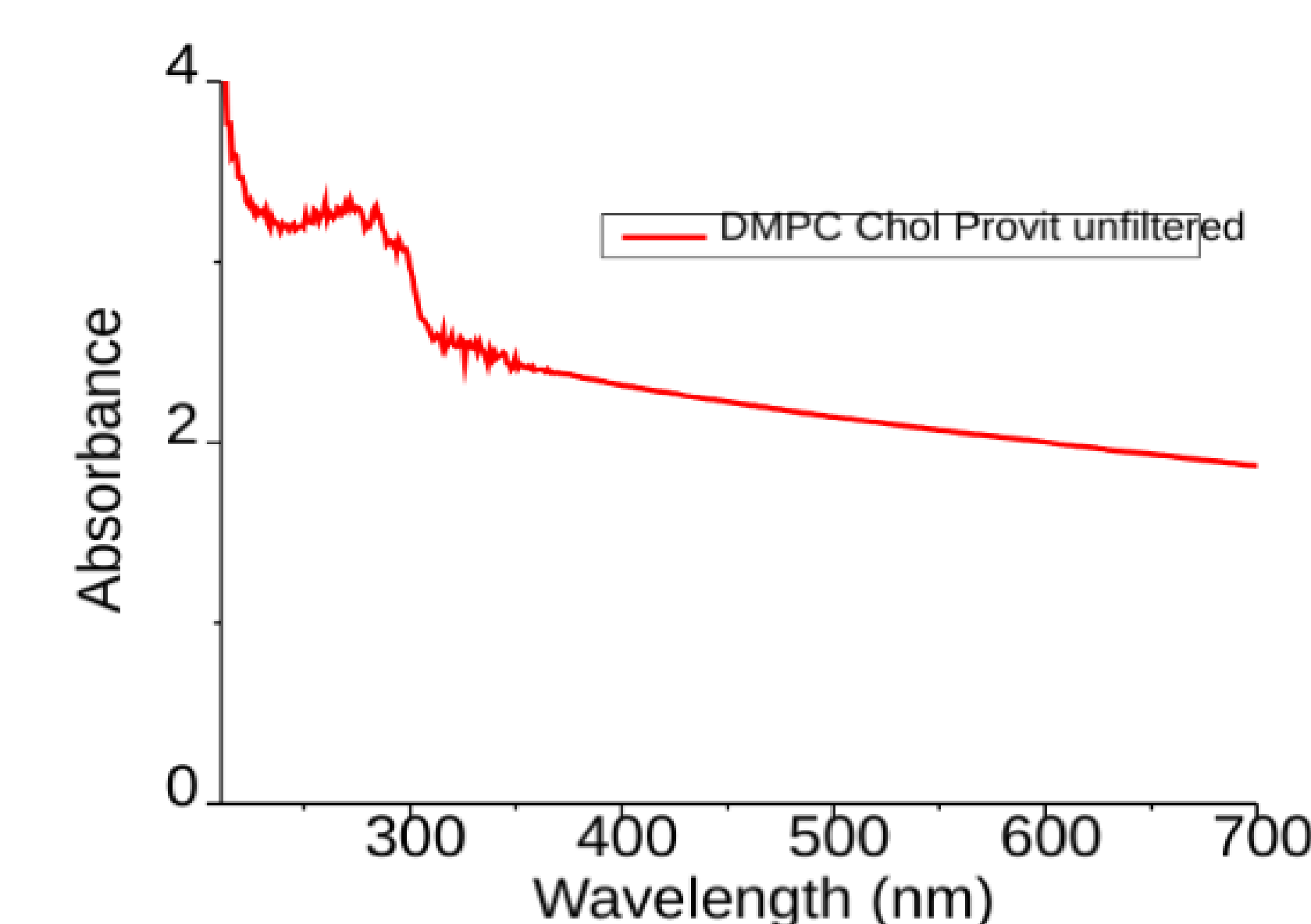
### Additional Photoproducts in Ethanol



### Spectra of HOCTL in DMPC + CTL



### Spectra of Provitamin D +CHL



## Future Work:

We will refine the procedure of preparing HOCTL/CHOL mixtures in DMPC membranes with the aim of obtaining HOCTL UV spectra that more closely resemble our THF and EtOH spectra. We will then irradiate those mixtures and monitor changes by UV for comparison with the changes observed in THF and in EtOH.

## References:

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- Smutzer, G., Crawford, B. F., & Yeagle, P. L. (1986). Physical properties of the fluorescent sterol probe dehydroergosterol. Biochimica Et Biophysica Acta (BBA) - Biomembranes, 862(2), 361–371. [https://doi.org/10.1016/0005-2736\(86\)90239-7](https://doi.org/10.1016/0005-2736(86)90239-7)

## Acknowledgments:

Special thanks to Dr. Jack Saltiel, Dr. Sumesh Krishnan, Sultha Fehroza, Mohammad Khizer, and Fernando Melo for their guidance, support, and kindness throughout working on this project. Thank you to UROP and FSU for giving me this opportunity to broaden my horizons and bettering myself in the world of science.