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UV irradiation of thymine molecules and gas chromatography – mass spectrometry

Kelsey Mauk

Concordia University - Portland

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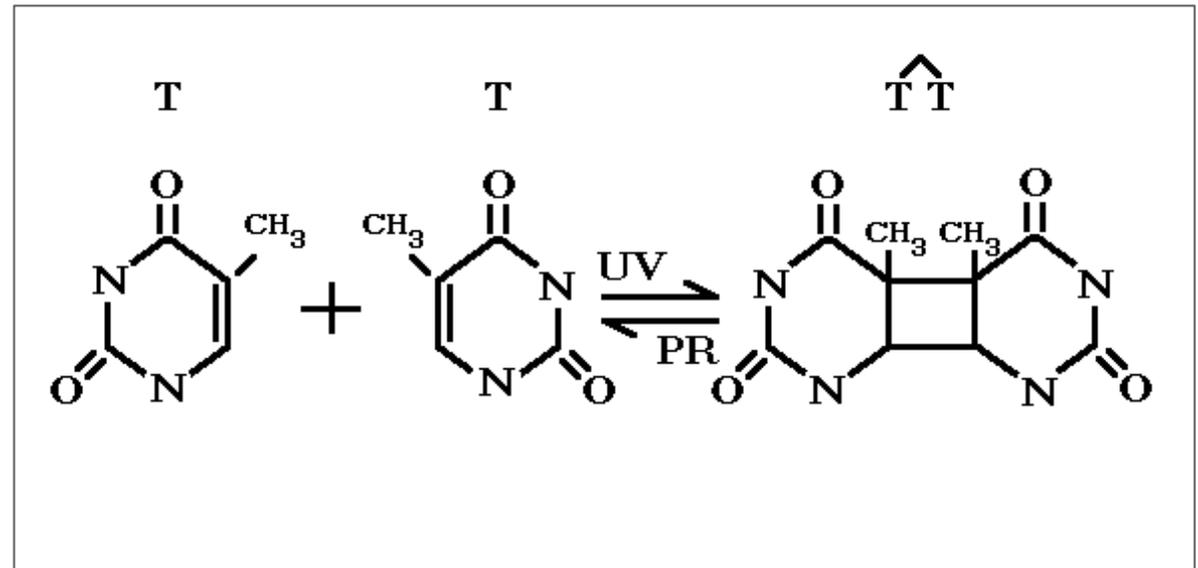
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UV irradiation of thymine molecules and gas chromatography – mass spectrometry

Kelsey Mauk – SURI 2016

Thymine Dimer Formation

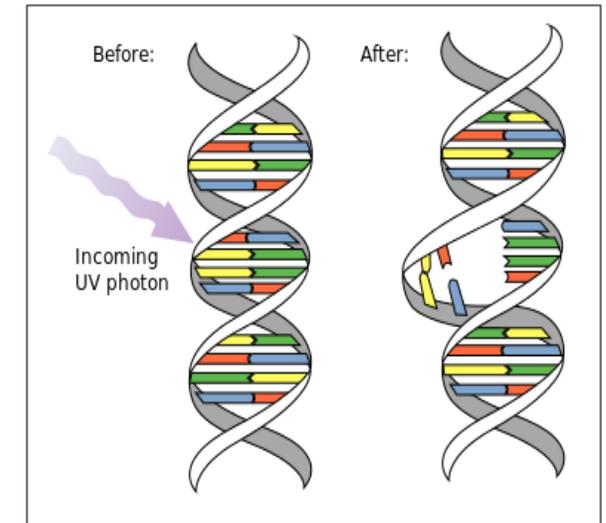
- UV light causes covalent bonding between thymine molecules
- Cannot be done thermally



<http://www-personal.ksu.edu/~bethmont/mutdes.html>

What do Thymine Dimers Do?

- Thymine dimers made within our DNA are often cut out and repaired by enzymes before they can do much damage
- Unrepaired thymine dimers can lead to DNA mutations, which can cause skin cancer



What Did I Study?

- My research revolved around trying to develop a way to replicate and analyze the thymine dimer reaction in Concordia's lab
 - Most of our organic chemistry students are studying biology
 - Many students are planning on going into the medical field
 - This lab would allow a new type of chemistry (photochemistry) to be explored in the lab
- Needed to find a way that was simple and cost-effective

General Layout of My Reaction and Analysis

1. Freeze and irradiate thymine mixture
2. Thaw and react with capping agent
3. Extract with chloroform and prepare for GCMS
4. Run sample through GCMS
5. Analyze MS results for evidence of thymine dimer

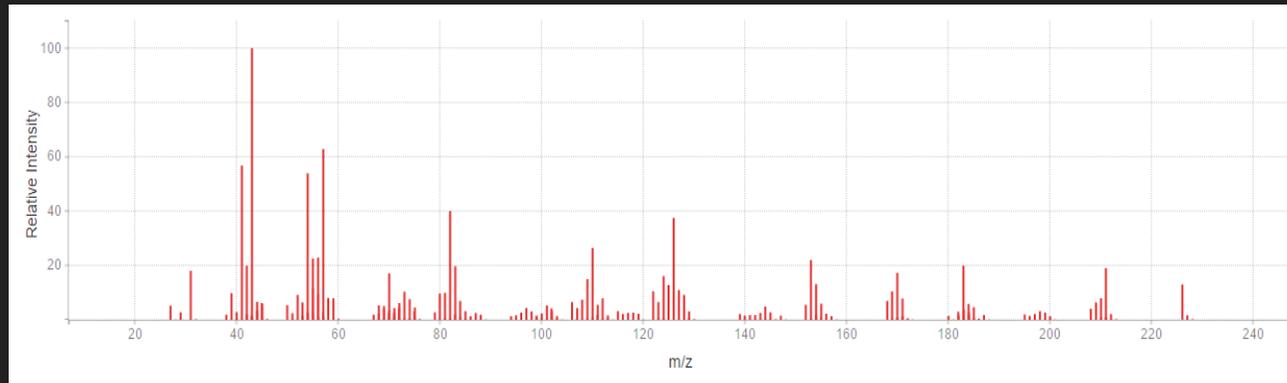
Gas Chromatography – Mass Spectrometry

- Molecules are run through a capillary tube which sorts them based on volatility and how they react with the capillary coating
- Molecules are then ionized and their mass fragmentation is recorded
- Since the dimer is twice the mass of the thymine molecule by itself, we hypothesized that we could see if the dimerization had occurred by noticing the differences in mass

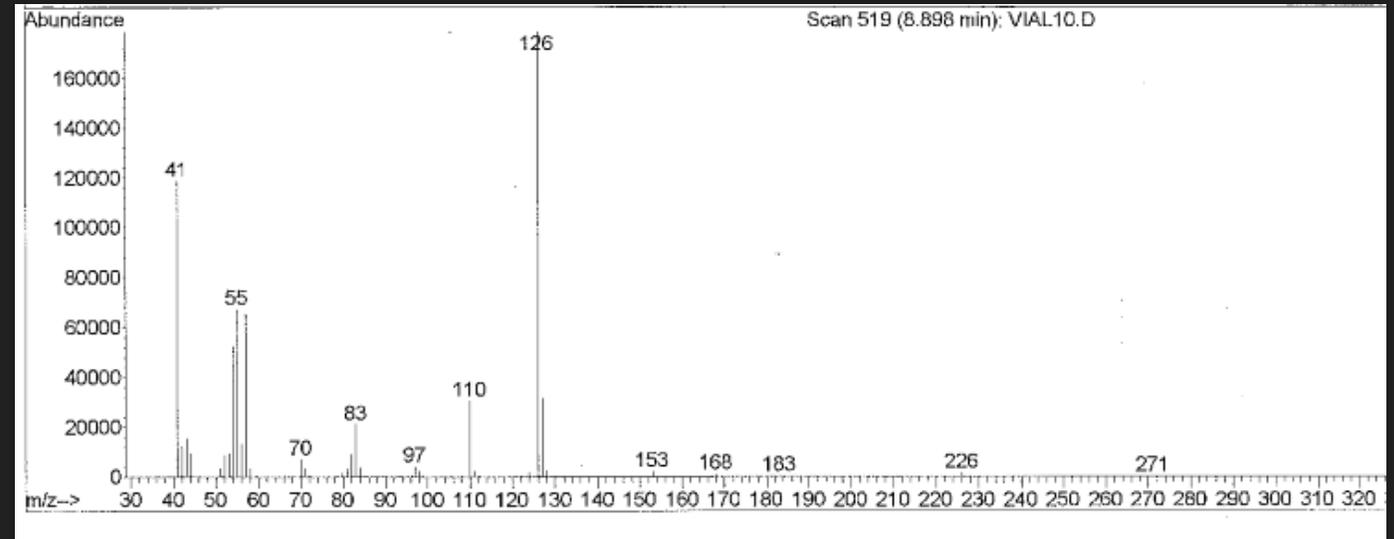


Data Analysis of Thymine in the GCMS

Hypothetical Thymine MS



Our Thymine Sample



Acknowledgments and References

Acknowledgements

- Dr. Johnson, for guidance and support throughout my research, and for support during my thesis writing
- Dr. Wise, for advice on how to improve our research methods
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- Concordia University and SURF, for the opportunity and funding to conduct research

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