: Shari U. Dunham, Ph.D., Associate Professor of Chemistry and Anastasia Thévenin, Ph.D., Assistant Professor of Biology

: Miles Lizak (post-baccalaureate student)[1]

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10 weeks

Transition metal elements (those in the short and wide center of the periodic table) are underexplored for their potential use in pharmaceuticals. Although most drugs are primarily "organic" in nature (meaning they are made up of carbon, hydrogen, oxygen, nitrogen, with perhaps the occasional sulfur, phosphorous or halide atom), one very successful cancer drug has a platinum atom at its core. This platinum-based drug, commonly known as cisplatin and referred to as the "penicillin of cancer drugs"[3], has been used in the clinic for over 35 years and for decades has inspired the search for other transition-metal based drugs.

that differ systematically in the bridging groups that surround the rhodium centers. Work to determine the DNA-binding rates of a series of these new rhodium compounds has begun in the Dunham laboratories with a SOAR summer ’17 project by Lauren Caronia, independent studies in Spring ’17 and Fall ‘17 by Ana Bustamante, and most recently with Winter term and Spring ’18 independent studies by Miles Lizak. With the recent arrival of Dr. Anastasia Thévenin in the Department of Biological Sciences, the expertise and facilities to explore the affect of these compounds on mammalian cells is now also present at Moravian College. The goals for this summer work are (1) to determine the DNA-binding rates for the remaining two rhodium complexes in this series, (2) to compare the DNA-binding rates for all of the compounds in the series, and then (3) to evaluate the extent to which these compounds are toxic to both cancerous and non-cancerous cells. Ultimately, our intent is to compare the DNA-binding rates and cytotoxicity of each rhodium compound in the series, and to use this information along with their DNA unwinding angles and their extent of DNA interstrand crosslink formation to identify the most likely potential candidates for new chemotherapy drugs.

- Anastasia Thévenin

•! Throughout the summer, Miles

He has started to see the differences between biochemistry research in the teaching laboratory (where the experimental variables are quite limited and the instructor often has a good sense of the experimental outcome) versus true biochemistry research on a novel project (where planning and problem-solving are critical and regular processes in which the instructor and the student researcher regularly take part). During winter term (Jan ’18) Miles learned the methodologies necessary to measure DNA-binding rates of rhodium compounds, kept a detailed laboratory

Miles Lizak, Biochemistry Major, expected graduation Dec 2018
Shari U. Dunham, Ph.D., Associate Professor of Chemistry and Anastasia Thévenin, Ph.D., Assistant Professor of Biology
On-campus housing is not needed

I was drawn to the study of biochemistry by an intense interest in the workings of physiology and pharmaceuticals. Once I finish my education, I hope to go on to work in a pharmaceutical research laboratory. Naturally, I was excited by Dr. Shari Dunham's research into novel dirhodium compounds which bind to DNA, since these compounds may have chemotherapeutic applications. When Dr. Dunham sat me down and explained her work to me last fall, I was hooked.

I began working in Dr. Dunham's research laboratory in January 2018. Throughout the winter term, I learned the techniques necessary for carrying out the rhodium compound/DNA reactions and analyzing the results. I have continued working with Dr. Dunham in the spring semester, moving on to analyze different reactions. I keep a carefully-compiled research notebook, which Dr. Dunham reviews on a regular basis. Thus far, the project has taught me valuable laboratory skills that I would not have learned in a classroom setting, as well as adaptability and problem-solving skills. I have the opportunity to work with advanced instruments, such as a gr