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NORTH CAROLINA SCHOOL OF SCIENCE AND MATHEMATICS



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“Every great advance in science has issued
from a new audacity of imagination”

~ Dr. John Dewey

Foreword

“Somewhere something incredible is waiting to be known” is a quote attributed to astronomer, Dr. Carl Sagan. This thought is in essence why we explore, why we seek to understand, why we research. I am proud to introduce NCSSM-Morganton’s first scientific journal, *Morganton Scientific*. *Morganton Scientific* is a showcase of some of the best scientific research being done by students on our Morganton campus.

Providing students with opportunities to apply their learning through research is not only vitally important in preparing and exciting students to pursue STEM degrees and careers after high school, but essential to encouraging innovative thinking that allows students to scientifically address major issues and problems we face in the world today and will face in the future. Opened in 1980, NCSSM was the nation’s first public residential high school where students study a specialized curriculum emphasizing science and mathematics. With the opening of our Morganton campus in the fall of 2022, we are able to provide more students with opportunities to conduct high-level research in biology, chemistry, physics, the applied sciences and math. Providing these opportunities is critical to NCSSM’s mission to educate academically talented students to become state, national and global leaders in science, technology, engineering and mathematics.

The research showcased in this publication is an example of the significant research that students conduct each year at NCSSM under the direction of the outstanding faculty at our school and in collaboration with mentors at institutions all across our state. For 39 years NCSSM has showcased student research through our annual Research Symposium each spring and at major research competitions such as the Regeneron Science Talent Search and the International Science and Engineering Fair. It is wonderful that the talented student researchers at NCSSM-Morganton are building upon and expanding this legacy. The publication of *Morganton Scientific* is a great new opportunity to present some of the outstanding research being conducted by students each year at NCSSM-Morganton.

I would like to thank all of the students and faculty involved in producing *Morganton Scientific*, particularly faculty sponsor Ms. Jennifer Williams and senior editors Bianca Chan, Lara Dincer, Rachel Joel, Tanvi Sharma, Kovida Vupputuri. Indeed, “somewhere something incredible is waiting to be known.”

Dr. Todd Roberts
Chancellor
North Carolina School of Science and Mathematics

Table of Contents

4	<i>Words from the Editors</i>
5	<i>Analyzing Carbon-13 NMR Spectra to Predict Chemical Shifts of Carbon Compounds using Machine Learning Algorithms</i> PRANAV AGRAWALA
10	<i>Age Determination of NGC 1952 and PSR B0531+21 Using Radio Observations</i> SYDNEY COVINGTON
14	<i>Using Bromelain Application to Inhibit the Spread of the Tobacco Mosaic Virus and Promote Tissue Regeneration in Red Bell Pepper Plants</i> CHISOM DURU
19	<i>A Novel Approach to Inhibit MAP2K1 Overexpression Present in Melorheostosis Utilizing Moringa oleifera Extracts</i> ASHMITH GUDUDURU
25	<i>Inhibition of TORC1 Pathway in Saccharomyces Cerevisiae to Induce Autophagy Using Graphene Oxide</i> SESHA JONNAVITHULA
30	<i>Assessing the Impact of Water, Algae, Alcohol, and Oil-Based Inks on the Biodegradability of Cellulose in Filter Paper</i> PRERANA KULLA, SOPHIA SOLOMON
35	<i>An Investigation of the Economics Behind Air Emergency Medical Services</i> NOAH LANGBO
39	<i>Predicting Network Traffic Flow with a Multi-Layer Short-Term Memory Model</i> TARAN PUVVALA
46	<i>AQINet: A multimodal deep convolutional neural network to predict Air Quality Index via satellite imagery and meteorological data</i> ZOAIB SIHORWALA
51	<i>An Analysis on Genomic Correlation for Gallstone Susceptibility</i> SANJITA SRINATH
60	<i>Effect of Sulfakinin/Cholecystokinin-type Peptide ArSK/CCK1 on Satiety and Energy Metabolism of Asterias vulgaris</i> CAROLINE ZHANG

Words from the Editors

Welcome to the *Morganton Scientific*, the first edition of the STEM research journal at the North Carolina School of Science and Mathematics in Morganton, North Carolina. This journal showcases student research spanning a variety of fields, including Biology, Chemistry, Engineering, Physics, Computer Science, Mathematics, and interdisciplinary topics.

As members of the first graduating class of NCSSM-Morganton, we filled the blank pages with new stories and milestones that have and will shape our high school career and beyond. During these two years, we've embarked on a new journey together with Mrs. Jennifer Williams, the Chair of Science and advisor of *Morganton Scientific*. Although we initially only knew of each other, through our collaborations in establishing this journal and bonding over our love for science communication, all of us have reflected upon the true meaning of being inaugural.

Fittingly, this year's theme is DNA. Just as DNA establishes the underlying code for life, we hope this journal will establish a new beginning in encouraging students to explore the sciences, at NCSSM, the greater community of North Carolina, and more. Our hope is that students from all around read this journal and are inspired to come to NCSSM and/or discover the world of research.

A novel way to showcase research, the *Morganton Scientific* is only the start of the journey. We hope that future years are able to add on to this product, and as DNA mutates and evolves, the journal will as well.

As a journal by and for emerging scientists, it was important to us that we created a medium that progressed with the scientific community. As open science is becoming further integrated into how we share our research, *Morganton Scientific* wanted to follow this example by using MyST, an open-source tool designed to make research transparent, accessible, and inclusive. MyST allows us to make our pieces machine readable, and thus more accessible to online queries. It enables us to be transparent about the research we share, as we can include the data sets or code used for each experiment, making them more easily reproducible. We would like to thank Mr. Taylor Gibson for introducing us to this amazing tool and giving us his time and expertise to help launch the online portion of this journal.

Finally, we would like to give a special thank you to Ms. Jennifer Williams, Dr. Amy Sheck, Mr. Taylor Gibson, Rowan Cockett, Dr. Jonathan Bennett, and Mr. Kevin Baxter for their continuous support in the creation of this journal.

Bianca Chan, Kovida Vupputuri, Lara Dincer, Tanvi Sharma, and Rachel Joel
Founding Editors