Budding Scientist

Who’s hands did it land in?

Who Stole It?

The Case of The Stolen Microscope

Artwork by Elaina Morgan

OTHER FEATURED ARTICLES

First Grade: “Where Did the Puddle Go?”
Second Grade: “Save the Bees!”
Fourth Grade: “Renewable Energy”
Dear Reader,

I am pleased to welcome you to the fourth edition of Budding Scientist, a research journal for grades K–4. The student work in this year’s Budding Scientist was inspired by hands-on, inquiry-based science units focused on real-world problems spanning water quality, bee colony collapse disorder and habitat loss, renewable energy, and forensic science. These problem-based learning units were the product of collaboration between Dan Mills Elementary School and the Center for Science Outreach (CSO) at Vanderbilt Peabody College. The student work in this 2017 edition was chosen to represent the creativity and individuality demonstrated by each and every scientist in grades first through fourth. As you read through the pages of this year’s edition, you will find the engagement, curiosity, and enthusiasm of the students shine through in their writing and artwork.

The student work published in this journal would not be possible without the inspiration, hard work, and encouragement of the Dan Mills teachers and faculty. I would especially like to recognize Annie Driskell, the Dan Mills literacy coach for her support in modeling and planning literacy-focused lessons anchored in scientific inquiry. In addition, I would like to recognize Dan Mills teachers Monika Johannesen, Angela Riggs, and Sophia Tsinakis for providing support in curriculum design and lesson planning. I would like to thank Dr. Jennifer Ufnar, director of the Resident Scientist Program at Vanderbilt and Dr. Virginia Shepherd, director of the CSO, for their tireless support of teachers and students in Metro Nashville Public Schools.

Finally, I am especially grateful to the Dan Mills Parent Teacher Organization who generously gifted funds to cover printing costs for this year’s edition of Budding Scientist.

I invite you to enjoy and be inspired by the ingenuity and imagination of Dan Mills’ Budding Scientists. To learn more about the journal, how to get involved, or to request additional copies, please visit our website at vanderbilt.edu/cso/bsj.

Sincerely,

Lauren M. Tetz, Ph.D.
Editor
First Grade

“Where Did the Puddle Go?”

At the beginning of the 2016–2017 school year, first grade students engaged in science inquiry, hands-on experiments, and scientific modeling to discover where puddles go when they “disappear.” Students watched a short cartoon introducing them to Dawn, a hippo who enjoys playing and splashing in puddles, but becomes confused when she finds that puddles eventually disappear when the sun comes out!* After learning of Dawn’s mystery, first grade students created a hypothesis picture showing where they thought the puddle had gone. Then, students made observations of evaporation, condensation, and precipitation to discover the process of water cycling on Earth. Students finished this part of the unit by drawing a model of the water cycle to help Dawn understand where the puddle went.

The second part of the unit was focused on water quality. The class read the book, Clean Water for Elirose, by Ariah Fine, describing the struggle of a child named Elirose in getting clean water for her and her family. Students learned that not all humans have access to clean water. In addition, students learned what makes water dirty or clean and how water filtration works to clean water. Finally, students planned and built their own water filters.

Table of Contents

Hypothesis Drawing and Water Cycle Diagrams
Aaron Espinoza Soreque
Eisley Donehey

Water Filter Design
Nataly Medina C.
Alayna Tucker

*www.youtube.com/watch?v=Mt_m59_Wgsw
Hypothesis Drawing

“Where I Think Puddles Go”
Water Cycle Model:
“Where I Know Puddles Go”

By Aaron Espinoza Soreque
First Grade
Ms. Tsinakis, Teacher
Hypothesis Drawing

“Where I Think Puddles Go”

By Eisley Donehey
First Grade
Ms. Werner, Teacher
Water Cycle Model:
“Where I Know Puddles Go”

By Eisley Donehey
First Grade
Ms. Werner, Teacher
Water Filter Design Plans

By Nataly Medina C.
First Grade
Ms. Tsinakis, Teacher
Water Filter Design Plans

By Alayna Tucker
First Grade
Mrs. Riggs, Teacher
Second grade scientists provided habitat for bees in the backyard of the school in a unit titled “Save the Bees.” Using informational text, hands-on activities, and experiments, students discovered that honeybees and native bees are disappearing across the country. They learned of possible reasons for this disappearance including habitat loss, pesticides, disease, and stress. Students designed a bee garden taking into account cost, aesthetics, space, and flowers that bees like. Myles VanCleve’s garden design was chosen to be planted in the backyard of the school.

Also included is a piece of writing by Olivia Hooper. She was inspired to research and write about a scientist she admires.

**Table of Contents**

**Bee Garden Design Plans**
- Tri’ana Walker
- Ella Grider
- Myles VanCleve

**Biography of Jane Goodall**
- Olivia Hooper
We Must Plant My Bee Garden!

First, my bee garden is colorful because it has purple, and pink and even orange, red, yellow.

Second, it is great for bees because since I have lots of flowers bees will make lots of honey and my flower will not get sprode with pestaside.

Third, if I put pestaside on the flowers maby that is pozin to bees because they will die because pestaside will keep them from getting polin. In my opinion people shold not spy pestaside on flowers that is why bees are disapiring.

By Tri'ana Walker
Second Grade
Mrs. Wiseman, Teacher
My Bee Garden Design

30-40

2 feet

2 feet

Ivy Beauty
$2.00

Cosmo Red White
$2.00

Cherry Queen
$2.00

30-40

Autumn Beauty
$2.00

Evening Sun Canary Bird
$2.00

Harlequin Lychnis
$2.00

Lychnis
$2.00

Canary Bird
$2.00

Evening Beauty
$2.00

Lychnis
$2.00

Lychnis
$2.00

Total Cost
$14.00

By Tri’ana Walker
Second Grade
Mrs. Wiseman, Teacher
We Must Plant My Bee Garden!

First, my bee garden is the best because its in heights from shortest to tallest so you can see all my flowers for example sunflowers are in the back and marigolds and zinnias are in the front.

Second, my bee garden is pretty cheap its only $9.00 total not including tax.

Last, my bee garden is very healthy for the bees it has no pesticides or sprays that can kill bees and I put flowers that bees like!

In conclusion, now you know why we should plant my idea of a bee garden!

By Ella Grider
Second Grade
Mrs. Wiseman, Teacher
By Ella Grider  
Second Grade  
Mrs. Wiseman, Teacher
We Must Plant My Bee Garden!

My bee garden is the very best because it’s cheap. It is only $10.75! Since it’s cheap that means that you’ll have more money to buy things you need.

Another reason my garden is the best is it’s very long lasting. Do you know what that means? It means that bees will get food for a long time, even through winter, when bees don’t much food.

One last reason is that it’s edible. That means not just bees will have good food! Most flowers are great in salad! I hope you chose my bee garden to make because then we can have a cheap way to help bees and us too!

By Myles VanCleve
Second Grade
Mrs. Anderson, Teacher
My Bee Garden Design

5.00
2.25
---
7.25

key

- Sunflowers
- Autumn beauty (edible)
- Arika x3
- Zinnias
- Cherry Queen
- Calendula
- Ball's Improved Orange x2

Campanulas 1.75
Bright Littles

By Myles VanCleve
Second Grade
Mrs. Anderson, Teacher
A Biography of Jane Goodall

This is a true story about Jane Goodall who is famous for studying chimpanzees in Africa. She is a primatologist. Jane is the founder of "The Jane Goodall Institute." Jane is also a United Nations Ambassador. Jane has a stuffed toy chimpanzee named Jubilee who is still on her dresser today. Jane's real name is Valerie Jane Morris-Goodall. Jane earned her PhD in ethology at Darwin College. Jane will always be remembered for her kindness. Jane is also still alive today teaching people about the world.

By Olivia Hooper
Second Grade
Mr. C'Debaca, Teacher
Third grade students took on the role of forensic scientists to solve “The Case of the Stolen Microscope.” In the science lab, students worked with the resident scientist to make observations and measurements of a crime scene and perform forensic tests on the evidence. In their homeroom class, students worked closely with their teacher and the Dan Mills literacy coach to write a crime report detailing the suspect information, crime scene evidence, forensic tests, and their hypotheses and conclusions about who committed the crime. In the next several pages, you will find parts of several students’ crime reports pieced together to make a full report, “The Case of the Stolen Microscope.”

**Table of Contents**

**Introduction**
Florence Bavas and Anna Marie Hesse  Page 19

**Evidence Left at Crime Scene**
Arella Villaescusa Flores  Page 20

**Suspects**
Elaina Morgan  Page 21

**Hypotheses**
Adam Taylor  Page 24
Sadye Belle Bush and Treionna W.  Page 25
Sloan P.  Page 26

**Pen Chromatography Test**
Sloan P.  Page 27

**Blood Typing Test**
Bella Adkinson  Page 30

**Fiber Analysis**
Rin M.  Page 33

**Fingerprint Analysis**
Riley Jamison  Page 35

**Lipstick Test**
Elaina Morgan  Page 36
Bella Adkinson  Page 37

**DNA Typing**
Camden Miles  Page 39

**Likelihood of Suspect to Commit Crime**
Florence Bavas and Anna Marie Hesse  Page 41

**Conclusions**
Garrison M.  Page 42
Maryuri Esteban Lopez  Page 43
Who's hands did it land in?

Who stole it?

The Case of the Stolen Microscope

Artwork on this page by Elaina Morgan
Third Grade
Mrs. VanCleve, Teacher
Introduction

Someone stole Dr. T's microscope!!
The suspects are the third grade teachers.
The third grade forensic scientists are on the case.
Dr. T found 6 pieces of evidence at the crime scene: a mug with lipstick and a fingerprint, a broken microscope slide with blood on it, two powders, which are baking soda and sugar, a spilled unknown powder with footprints in it, a paper towel with the words “Sorry” on it and even DNA!!!!
Now we are doing tests on evidence to find WHO STOLE THE MICROSCOPE!!!!

By Florence Bavas and Anna Marie Hesse
Third Grade
Ms. Stevens, Teacher
Evidence left at crime scene

1# boxing soda sugar

2# muddy with lipstick handprints

3# powder with footprints

4# note

5# sorry :(

By Arella Villaescusa Flores
Third Grade
Mrs. VanCleve, Teacher
Suspects

Mrs. VanCleve

Hair: Light Blonde
Motive: None
Eye Color: Green
Left at: 6:30
Height: 5'3

Suspects

Mrs. Jones

Hair: Black
Motive: Wants a microscope for class
Eye Color: Brown
Left at: 8:00
Height: 5'6

By Elaina Morgan
Third Grade
Mrs. VanCleve, Teacher
Hair: Blonde
Motive: Wants a microscope to look at insect wings
Eye Color: Brown
Left at: 4:00
Height: 5'4"
Suspects
Ms. Williams

Hair: Dark Brown
Nature: Wants to see animals in the dirt
Eye Color: Brown
Left at: 7:00
Height: 5'3

Suspects
Ms. Goude

Hair: Blonde
Nature: Wants a microscope to look at plants' cells
Eye Color: Blue
Left at: 7:00
Height: 5'2

By Elaina Morgan
Third Grade
Mrs. VanCleve, Teacher
Hypothesis

I hypothesize that Ms. Jones is what stole the microscope out of all the third grade teachers. (Mrs. VanCleve, Mrs. Williams, Mrs. Goude, Ms. Stevens, and Ms. Jones.)

I think this because there was black hairs in one of the foot prints of a crime scene.
I hypothesize Mrs. Goude stole the microscope because she wears red lipstick often, she sometimes wants her way, so she maybe would steal someone's things. She probably asked but Dr. T said no, so she took it because she wants her way, and her way only.

Picture example:

**At night...**

<table>
<thead>
<tr>
<th>![Image]</th>
</tr>
</thead>
</table>

**Next day**

<table>
<thead>
<tr>
<th>![Image]</th>
</tr>
</thead>
</table>

**Later (the same day)**

<table>
<thead>
<tr>
<th>![Image]</th>
</tr>
</thead>
</table>

**That afternoon**

<table>
<thead>
<tr>
<th>![Image]</th>
</tr>
</thead>
</table>

**2 minutes after...**

<table>
<thead>
<tr>
<th>![Image]</th>
</tr>
</thead>
</table>

By Sadye Belle Bush and Treionna W.
Third Grade
Ms. Stevens, Teacher
My hypothesis is Ms. Jones stole the microscope because: 1. Ms. Jones left at 8:00 PM, and Dr. T left at 6:00 PM, so that gave Ms. Jones two hours to steal the microscope. 2. Ms. Jones admitted that she wanted a microscope for her classroom really badly!! This is why I think Ms. Jones stole the microscope.
Pen Chromatography

You will need:
- 2 cups
- Rubbing alcohol
- 2 half cups
- 2 rubber bands
- Paper towels
- A Sharpie
- A Crayola marker

Procedures:

1. First, place the paper towel half on the cup, then secure it with the rubber band. Repeat with the other.

2. Next, take your marker, then draw a dot in the middle of the paper. Repeat with the other, but use your Sharpie.

By Sloan P.
Third Grade
Ms. Jones, Teacher
3. Then put 10 drops of rubbing alcohol on both of your dots, then watch them spread until they are done.

4. Last draw pictures of the pigments.
Results. Pen chromatography

<table>
<thead>
<tr>
<th>SUSPECT</th>
<th>MARKER</th>
</tr>
</thead>
<tbody>
<tr>
<td>crime</td>
<td>black crayola</td>
</tr>
<tr>
<td>evidence</td>
<td></td>
</tr>
<tr>
<td>Goude</td>
<td>black crayola</td>
</tr>
<tr>
<td>Jones</td>
<td>black sharpie</td>
</tr>
<tr>
<td>Vancleve</td>
<td>black crayola</td>
</tr>
<tr>
<td>Williams</td>
<td>black crayola</td>
</tr>
<tr>
<td>Stevens</td>
<td>black sharpie</td>
</tr>
</tbody>
</table>

I think the suspect used a black crayola marker to write the sorry note because the colors look alike and they dissolved into the same pattern. The suspects that matched were Mrs. Goude, Mrs. Williams, and Mrs. Vancleve.
You will need:
- 2 wells
- Anti-serums
- Bottle of Blood*
- Tooth Pick

Procedures: Well A

1. First take the suspect blood and put 2 drops in Well A.

2. Next grab the anti-A serum and put 2 drops of it in Well A.

3. Now take your tooth pick and stir for 15 seconds

*synthetic blood used

By Bella Adkinson, Third Grade
Ms. Jones, Teacher
1. Carefully draw the molecule into the well.
2. Add B serum, then stir 15 seconds.
3. But make sure you do it in well B.
4. Finally repeat steps 1-3, and

Do not stir over 15 minutes!

What happened!
We did this test to find out who's blood was left on the microscope slide at the crime scene.

By Bella Adkinson, Third Grade
Ms. Jones, Teacher
Results for Blood typing Lab

<table>
<thead>
<tr>
<th>Suspects</th>
<th>Blood Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goude</td>
<td>type B</td>
</tr>
<tr>
<td>Jones</td>
<td>type AB</td>
</tr>
<tr>
<td>VanCleve</td>
<td>type B</td>
</tr>
<tr>
<td>Williams</td>
<td>type B</td>
</tr>
<tr>
<td>Stevens</td>
<td>type A</td>
</tr>
</tbody>
</table>

Results: The blood found at the crime scene was type B. The teachers that matched are Mrs. Goud, Mrs. VanCleve, and Mrs. Williams.

By Bella Ackinson
Third Grade
Ms. Jones, Teacher
FIBER ANALYSIS

ABSTRACT
In this lab we studied different fiber types and compared them to the fiber types left at the scene. The evidence was black wool. And we found that 3 suspects were connected to this evidence.

INTRODUCTION
A fiber was found at the crime scene. We studied the fiber to determine its type and color in order to narrow our list of suspects.

Hypothesis
If we can determine what kind of fiber was left at the crime scene and what clothing the suspects were wearing. Then we can find a match and narrow the suspect list.

Materials
1. Microscope
2. Fiber evidence from the scene
3. Fiber Types Description Sheet
4. Recording Sheet

By Rin M.
Third Grade
Mrs. Goude, Teacher
Procedure
1. Study the fiber types description sheet.
2. Examine evidence using microscope.
5. Determine fiber match.

Results

Our hypothesis was correct. We were able to narrow our list using our information.

Conclusion

The fiber found at the scene was black wool.

By Rin M.
Third Grade
Mrs. Goude, Teacher
Fingerprint Analysis

I. Materials
- Dusting powder
- tape
- mug (evidence)
or glass jar
- paint brush
- lotion
- paper

II. Procedures
1. Put the lotion on your finger.
2. Make your fingerprint on your jar.
3. Dip paint brush in powder and use it to dust the print.
4. Place a piece of tape on jar.
5. Press the tape down.
6. Gently remove the tape from the jar.
7. Carefully place the tape onto the paper.
8. Compare the lifted fingerprint with subspects fingerprints.

III. Data
- Right loop
- Left loop
- Whorl
- Arch
- Tent arch
- Matched subspect #14, which was Mrs. Vandeleve.

IV. Results
After comparing the lifted fingerprint with the fingerprints of the subspects, I noticed that it was tented arch. This tented arch matched subspect #14, which was Mrs. Vandeleve.

By Riley Jamison, Third Grade
Mrs. Williams, Teacher
Lipstick Test

Materials
- Acetone
- Chromatography paper
- 4 cups
- 1 cotton swab

We need to find out what lipstick the criminal had. We have 4 different lipsticks from 4 teachers.

Step 1. Cut a rectangle of your chromatography paper and put a line near the bottom.

Step 2. Get some acetone and pour it in a cup.

Step 3. Put a dot of one lipstick on the line.

By Elaina Morgan, Third Grade
Mrs. VanCleve, Teacher
Step 4. Put your paper with the lipstick in the acetone and leave it in for 15 minutes.

Step 5. Repeat with other lipsticks. Which ones match? You can measure and look at the details.

Which ones match?

By Elaina Morgan, Third Grade
Mrs. VanCleve, Teacher
**Results for Lipstick Lab**

<table>
<thead>
<tr>
<th>Suspects</th>
<th>Lipstick Chromatography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goude</td>
<td>D</td>
</tr>
<tr>
<td>Jones</td>
<td>C</td>
</tr>
<tr>
<td>VanCleve</td>
<td>B</td>
</tr>
<tr>
<td>Williams</td>
<td>A</td>
</tr>
<tr>
<td>Stevens</td>
<td>No lipstick</td>
</tr>
</tbody>
</table>

Results: I think that the lipstick found at the crime scene was B because the lipstick at the crime was reddish pink and it matched B on my test. The suspect that matched is Ms. VanCleve.

By Bella Adkinson
Third Grade
Ms. Jones, Teacher
DNA TYPING

You will need:
- Starter DNA code
- DNA sheet
- Magnifying glass
- Pencil

DNA code found on the mug:
TIGCACCCTGTAATCGCCTCCGG

1. Dr. T told us to read the directions to know how to read the suspect DNA code.

2. Next, Dr. T told us to look at the DNA codes.

Goudes DNA: CGCAGATTTTGCCCGTATG
Jones DNA: ATGGAATCGGGAAATG
VanCleve's DNA: TIGCACCCTGTAATCGCCTCCGG
William's DNA: GCAATTGGCGCGCTTATG
Stevens DNA: ACCGGTCAAATGGCGCGG

3. Then, see which suspect DNA matches the DNA on the mug at the crime scene.

By Camden Miles
Third Grade
Ms. Jones, Teacher
4. After looking at all the suspects' DNA, carefully look for the DNA on the mug.

5. Finally, look at the suspects' DNA closely to match the one on the mug with DNA on it. The one whose DNA that was on the mug was... Mr. VanSlyke!
Likelihood to Commit the Crime Based on Evidence

Ms. Stevens, Ms. Jones, Mrs. Williams, Mrs. Goude, Ms. Vandelay

By Florence Bavas and Anna Marie Hesse
Third Grade
Ms. Stevens, Teacher
On Tuesday night, Mrs. Vandeleve walked into the door of the science lab at around 6:00 P.M. She wanted materials for baking so she walked to the powder but accidentally spilled some. Then she wrote a sorry note. Then she was feeling nervous, so she drank out of Dr. T's cup, leaving lipstick on it. She grabbed the microscope and accidentally broke it and cut herself. After that she was too busy to notice she spilled more powder, leaving footprints in it as she scurried out the door. It turns out that Mrs. Vandeleve wasn't wanted a microscope so he could look at insects through it. She was going to tell Dr. T that she was borrowing the microscope but as third grade investigator she became more and more nervous. She decided to keep the secret, but when Dr. T found out, she apologized and Dr. T forgave her. Mrs. Vandeleve immediately gave back the microscope.

By Garrison M.
Third Grade
Mrs. Williams, Teacher
Conclusions

Mrs. Vancleve

She stolen the microscopes?

!! I was thinking about that in the
beginning one was thinking of her. Maybe
she so... nice no one is
going to think that she stole
the microscopes.

By Maryuri Esteban Lopez
Third Grade
Ms. Stevens, Teacher
The fourth grade students focused on electricity, renewable energy, and non-renewable energy. Students learned the pros and cons of various types of energy sources including biofuels, fossil fuels, solar, and wind. Students designed a tool or gadget powered by one or more of the energy sources studied in class.

**Table of Contents**

**Inventions Powered by Renewable or Non-Renewable Energy Sources**

**Rake-O-Matic 3000**  
Madilyn Davis  
Page 46

**Auto Compressor**  
Benjamin Cover  
Page 48

**Solar Powered Sprinkler**  
Landry Rose  
Page 50
Madelyn B. Rake-o-matic 3000

By: M.D. INC.

Seat Belt
Seat Button
Solar Panel
Trash Can (for bags)
Rake
The Bag Claw
The Bag Compartment
Gas Compartment (for clouds or nighttime)

By Madilyn Davis
Fourth Grade
Mrs. Reese, Teacher
This is the rake-o-matic 3000. Hate raking leaves? Rather sit down with a foot rest in front of you? Well now you can sit down, and just relax - while raking leaves with just a press of a button! It is even solar powered! It rakes the leaves and there is a bag compartment so if you press the the bag button (it is labeled with a "B") the bag claw grabs a bag, and scoops up the leaves. When the bag is full, the bag claw puts the bag in the trash can. When the trash can is full, the trash can claw picks it up, and puts it in front of your house for the trash truck! If it is cloudy or nighttime, there is a gas compartment. You can just sit down, put on the seat belt, and relax. In a matter of minutes, your yard will be as good as new!

By Madilyn Davis
Fourth Grade
Mrs. Reese, Teacher
Auto-Compressor
(Runs on Biofuels)

Fuel Chute

Screen (Shows press)

Start Button

Moving Platform

Casing

Sedimentary Rock Plant

Holding Platform

By Benjamin Cover
Fourth Grade
Mrs. Johannesen, Teacher
My Gadget
(The Auto-Compressor)

My gadget, the Auto-Compressor is useful for a variety of reasons. The Auto-Compressor’s use is to make gas, oil, and coal more renewable by making fossils which can be converted to gas, oil, and coal. The first use for it is making a non-renewable resource more renewable. Second, it would make oil rigs not be used as much, which means not as much pollution because oil rigs produce a lot of pollution. Third, it would eliminate coal mining and hundreds of people die every year from cave caving in. I chose (if it were real) that it would run on gig’s fuels. (Because why would it run on something it makes?)

By Benjamin Cover
Fourth Grade
Mrs. Reese, Teacher
By Landry Rose
Fourth Grade
Mrs. Johannesen, Teacher
Solar Powered Sprinkler

I made a solar powered sprinkler. The sprinkler is useful because it helps crops grow faster. The sprinklers power comes from the sun. I choose solar power because I admire the idea of using a renewable resource so we don't run out of fossil fuels. We need fossil fuels, and that is why we need solar panels.
How can I get involved?

If you would like to be a patron for the Budding Scientist...

- To those individuals who recognize the importance of supporting these students’ endeavors and successes and would like to make a financial contribution, please email the editor directly at lauren.m.tetz@vanderbilt.edu.

If you are a graduate student or a Metro Nashville Public School (MNPS) teacher...

- **Scientist in the Classroom Partnership Program** pairs graduate students from local universities with expertise in STEM fields, with middle and elementary school teachers from MNPS. Once a week the graduate student scientist joins their teacher in the classroom to plan and co-teach inquiry based, hands-on lessons based on the core curriculum. To learn more, go to www.vanderbilt.edu/cso/scp.

If you are a middle or high school student interested in research...

- **The School for Science and Math at Vanderbilt** provides the opportunity for high school students from MNPS with a strong interest in STEM to participate in a full day of interdisciplinary STEM education at Vanderbilt once a week through all four years of high school. Summers are spent in a research-based class. To learn more, go to www.vanderbilt.edu/cso/ssmv.

- **The Interdisciplinary Science and Research Program** is designed for high school students who want to learn more about research and STEM fields. Students take interdisciplinary courses during the year at Stratford or Hillsboro High Schools and during the summer participate in research projects that build their depth of knowledge. To learn more, go to www.vanderbilt.edu/cso/isr.

- **The Day of Discovery Program** allows interested students from Bailey and Litton Middle Schools to participate in STEM enrichment classes once a week at Stratford High School. In this program, students build critical reading, writing, and mathematics skills necessary for success in advanced courses in high school.

- **The Research Experience for High School Students Program** offers motivated high school seniors the opportunity to participate in a six-week, scientific research internship during the summer at Vanderbilt University, centering on full immersion in a Vanderbilt University research laboratory. To learn more, go to www.vanderbilt.edu/cso/rehss/.

About us...

Budding Scientist is a publication of the Vanderbilt Center for Science Outreach (CSO) under the directorship of Virginia Shepherd, Ph.D. The Vanderbilt CSO is dedicated to enhancing scientific and technological literacy through the establishment of unique partnerships between Vanderbilt University scientists, K–12 educators and students, and the local and global science community. The goal of this publication is to give students a platform to communicate their scientific knowledge to a broader audience.
Budding Scientist

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Sophia Tsinakis  
First Grade Teacher, Dan Mills Elementary

Mary Goude  
Third Grade Teacher, Dan Mills Elementary

Theresa Jones  
Third Grade Teacher, Dan Mills Elementary

Brittany Stevens  
Third Grade Teacher, Dan Mills Elementary

Kelly VanCleve  
Third Grade Teacher, Dan Mills Elementary

Colette Williams  
Third Grade Teacher, Dan Mills Elementary

Monika Johannesen  
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Postdoctoral Fellow, Vanderbilt Center for Science Outreach

Greta Clinton-Selin  
Data Management Specialist, Vanderbilt Center for Science Outreach

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Budding Scientist Editorial Board

Lauren Tetz, Ph.D., Editor

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