

04.24.20

TENNESSEE ASSOCIATION OF SCIENCE
DEPARTMENT CHAIRS

2020 RESEARCH SYMPOSIUM & COMPETITION

FOR COMMUNITY COLLEGE UNDERGRADUATES

Hosted by

Walters State Community College

Sponsors

TASDC extends its thanks to the following organizations for their sponsorship and overall support in making this event possible...

Walters State Community
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Event Program

Friday - April 24, 2020

8:00 - 8:05: "Introduction" - Conference Coordinator, Eugenie de Silva, BA, MA, ALM, MPhil (Cantab.), FRSA

8:05 - 8:15: "Welcome" - Vice President of Academic Affairs at Walters State, Dr. Donna Seagle, Ph.D.

8:15 - 8:35: "The Importance of Competing Research" - ***Guest of Honor*** Associate Vice Chancellor for Academic Affairs at Tennessee Board of Regents, Dr. Gregory A. Sedrick, Ph.D., P.E.

8:35 - 8:55: "Why Do Natural Scientists Tend to Make Poor Social Scientists?" - ***Keynote Speaker*** Professor of Science Education at University of Cambridge, Dr. Keith Taber, BSc (Hons), PGCE, DPSE, MSc, PhD, MA(Cantab), CSci, CChem, FRSC, CPhys, FInstP, CSciTeach, FHEA, FRSA

8:55 - 9:15: "Research and the Vision for the Future" - President of Tennessee Association of Science Department Chairs, Dr. Eugene de Silva, Ph.D, FRSA

9:20 - 9:40: "Comparison of Antioxidant Activities in Stem and Leaf Extract of Indian Borage" - ***Guest Speaker*** Colombo University - Majanitha Thanaventhan B.S, M.S

9:40 - 9:55: "pH Levels of Water Refill Stations" - Walters State Community College - Ashley Long

9:55 - 10:10: "A Survey of Podophyllum peltatum Antimicrobial Effects on Common Cutaneous Human Pathogens" - Walters State Community College - Stephen Cox

10:10 - 10:25: "Determination of Quality for Widely Known Water Purifiers" - Walters State Community College - Sheradyn Lawson

10:25 - 10:40: "Characterization of 21 new bacteriophages isolated from Middle Tennessee ecosystems" - Columbia State Community College - Tessa Cote

10:40 - 10:55: "Bacteriophages Research" - Columbia State Community College - Jenna R. St. Pierre

10:55 - 11:10: "An Investigation into TVA's Land Acquisition in the Cherokee Lake Area" - Walters State Community College - Zheyn Gerard

11:10 - 11:25: "An Investigation into the Nitrate Levels of Hallsdale Powell Utilities Water" - Walters State Community College - Seth Jackson

11:25 - 12:25: Poster Presentations

12:25 - 12:35: "A Vote of Thanks" - Conference Co-organizer, TN e-Campus Developer and Mentor, and Phi Theta Kappa Advisor,
Dr. Lisa Eccles, Ph.D., M.S., DLM(ASCP), C(ASCP)

Conference Judges:

Dr. Terry Rawlinson, M.S., Ph.D.

Elena Owen, B.S., M.S.

JOIN US VIRTUALLY

Zoom Link: <https://zoom.us/j/93879605568>

Conference Coordinator e-mail:

eugeniedesilvaofficial@gmail.com

WELCOME



**Dr. Donna Seagle, M.A., Ph.D.
Vice President for Academic Affairs
Walters State Community College
Tennessee**

On behalf of Walters State Community College Office of Academic Affairs, welcome to this Research Symposium and Competition – 2020 for Community College Undergraduate Students in TN. Due to the unfortunate, ongoing circumstances, this event has been moved to a virtual space. Nonetheless, we hope that once all is well, you will have the opportunity to visit us and meet us in person to connect and explore what Walters State has to offer. Our Walters State faculty have been working diligently by investing their time and energy to promote High Impact Practices (HIP) for the past two years. Research is one of such high impact practices through which we hope to increase the student engagement and academic success.

Walters State Community College's Multidisciplinary Research in Applied Science (MRAS) has enabled students to engage in research in a range of fields. Our students have even successfully secured internships at prestigious research centers, such as Oak Ridge National Laboratory (ORNL). We have presented multiple opportunities for students and faculty for scholarship and research through our work.

We hope to expand our research to collaborative projects with other educational institutes. I hope that you use this conference as an opportunity to develop collaborations to the benefit of our students and academia in its entirety.

We thank you for your participation today and look forward to working with you again in the future.



VISION OF TASDC



**Prof. Eugene de Silva, Ph.D, FRSA
President of TASDC**

In 2008, Tennessee Association of Science Department Chairs (TASDC) re-emerged with a new vision to rekindle the passion for science among students through the inclusion of multidisciplinary studies in science teaching. Along this path, TASDC invited educators from non-science fields to also join and collaborate with us. TASDC also developed international collaborations to provide the students with maximum exposure to multidisciplinary research. Our next step is to actively engage students in multidisciplinary research. We have held two international conferences to date. This is our first research competition. We hope to expand this initiative as an annual event and expand our competition beyond Tennessee to other states and countries through collaborative projects. Research is the fourth R after Reading, wRiting, aRithmatics in the realm of education. Research removes roadblocks, dispels delusions, creates concrete, evidence-based pathways to learning.

Therefore, TASDC has dedicated most of its work to introducing students to research and inculcating the fundamental skills necessary to conducting valuable, practical, relevant research through interdisciplinary/multidisciplinary approaches.

We will continue to promote research through awareness, advising, teaching and application in high-schools, colleges, and universities. This event would be a yearly event, open to students free-of-charge. Through our collaboration with WSCC and similar educational institutes, we hope to be of a beacon of good research practices for our students.

We hope that you enjoy our research symposium and join us in expanding our work through out the state of Tennessee.



THANK YOU



**Dr. Lisa Eccles, Ph.D., M.S., DLM(ASCP), C(ASCP)
Conference Co-Organizer**

This research symposium is a wonderful opportunity for us to join as a community of researchers, academics, and learners during this difficult time for the nation and the world. As a science practitioner, researcher, and academic, I have had the fortune of being involved in many events over the years to promote science and learning to our students in the state of Tennessee. Each time, I have been impressed with the talents and skill sets of our learners. And so, similarly, after reviewing all the hard work that you, as students in various disciplines, have carried out, I commend you and thank you for your contributions.

We must extend our thanks to our invited speakers who despite their busy schedules amidst this pandemic have joined us today. Firstly, thanks to our esteemed guest of honor, Dr. Gregory Sedrick, for taking the time to share his extensive knowledge with us. Secondly, thanks to our distinguished keynote speaker, Dr. Keith Taber, who joined us from across the pond in England to offer his expert opinions. Finally, thanks to Ms. Majanitha Thanaventhana, as the guest speaker for sharing her research and hard work in the natural sciences.

GUEST OF HONOR

RESEARCH IS FUN BUT HOW DO I GET THEM TO CARE?



**Dr. Gregory A. Sedrick, Ph.D., P.E.,
Associate Vice Chancellor, Academic Affairs
Tennessee Board of Regents
The College System of Tennessee**

The pursuit of expanding the body of knowledge through basic and applied research is a worthy goal in itself. However, when the desired outcome is to improve the human condition and the effort is funded by tax-payer dollars there becomes a professional and moral responsibility to share results as widely as possible. Dr. Greg Sedrick, Vice Chancellor of Academic Affairs at the Tennessee Board of Regents will BRIEFLY share tips from his thirty-eight years of applied research experience, which started when he was an engineering undergraduate. The discussion to be shared is not a reminiscing, but current practical tips to reach other researchers, funding agencies, law makers and most importantly the citizens who will benefit from your work.

KEYNOTE SPEAKER

WHY DO NATURAL SCIENTISTS TEND TO MAKE POOR SOCIAL SCIENTISTS?



**Dr. Keith S. Taber, BSc(Hons), PGCE, DPSE, MSc, PhD,
MA(Cantab), CSci, CChem, FRSC, CPhys, FInstP,
CSciTeach, FHEA, FRSA
Professor of Science Education
University of Cambridge**

In the English-speaking world, the word 'science' (when used without qualification) generally means the natural sciences, although in some other contexts it can refer to STEM more widely, or even include the social sciences. The social sciences are often considered to be modelled upon, or even to aspire to be like, the natural sciences. Yet, those trained in the natural sciences may perceive the social sciences to be imprecise, vague, verbose, and inconclusive. Studies may seem to lack validity or robustness: and the greater challenge of reaching consensus in the social sciences (when compared to the natural sciences) may appear to offer evidence of such a view. Yet when natural scientists venture into the social sciences they often show a bias towards inappropriate methodology that is not fit for purpose.

It is suggested that scientific training often lacks a level of meta-thinking (thinking outside the paradigm, so to speak) that blinkers natural scientists and channels a kind of tunnel-vision. This produces highly effective researchers within well-established, stable ('mature') fields - but poor preparation for appreciating more diverse areas of scholarship and research. This lacuna in scientific training is unhelpful when scientists venture into research focused on social phenomena (such as in science education). Moreover, this blind spot in scientific preparation supports a short-circuiting of the logic of research that could impede major developments within the natural sciences themselves.



GUEST SPEAKER

COMPARISON OF ANTIOXIDANT ACTIVITIES IN STEM AND LEAF EXTRACT OF INDIAN BORAGE



Majanitha Thanaventhana, BS. MS.
University of Colombo
Sri Lanka

Due to the undesirable effects of synthetic combinations of many chemicals used in food industry, investigating and studying the resources of natural antioxidants in order to replace synthetic compounds have become necessary. The plant *Plectranthus amboinicus* is an herbal plant used in Ayurveda and Siddha medicine in Sri Lanka, known as Country Borage. The antioxidant potential of ethyl acetate extract of leaves and stems of *P. amboinicus* was investigated by DPPH assay. The total phenolic content (TPC) and total flavonoid content (TFC) were determined by Folin-Ciocalteu and Aluminium colorimetry methods respectively. Partition was carried out by using methanol, hexane and chloroform solvents for ethyl acetate leaves extract only as it showed high antioxidant activity. TLC was carried out only for the fraction obtained from chloroform, since it showed high antioxidant potential compared with other two solvents when the DPPH assay was carried out.

Student Oral Presentations

Analytical Chemistry

Determination of pH Levels of Powell River

**Ashley Long and Eugene de Silva
Walters State Community College
Morristown, Tennessee**

Powell River is an important landmark in East Tennessee. This research focused on testing the pH levels of the river in pre-selected areas. The pH is an indication of the acidity and basicity of a solution. Therefore, random sampling of water from Powell River would indicate valuable information on the pollution threat to the river. Thirty water samples were tested for pH variations using LabQuest meters. The results were analyzed using statistical analysis to determine the significance; therefore, conclusions were drawn based on all the collected data.

Botany

A Survey of *Duchesnea indica* Antimicrobial Effects on Common Cutaneous Human Pathogens

Steven Cox, Eugene de Silva, Jaime Hinojosa*, Jeffrey Jones*

Walters State Community College

Morristown, Tennessee

***Lincoln Memorial University**

Harrogate, Tennessee

With the looming threat of antibiotic resistance, the demand for new sources of potent antimicrobial compounds has increased. Herbal medicine could be a potential starting point for said compounds. One such plant, *Duchesnea indica*, has previously exhibited both antibacterial and antifungal effects, meaning that the plant itself shows promise; however, further research is needed. For this research, *D. indica* was tested using *C. albicans*, *E. coli*, and *S. aureus*. First, a preliminary test was performed in which leaf, stem, and root fragments were placed in wells with nutrient agar and microbes were grown on the agar, after which the plate was incubated for 24 hours. Extracts were prepared by placing plant mass in 95% ethanol for 24 hours, after which the resulting liquid was filtered and centrifuged to obtain the final extract. Kirby-Bauer disc diffusion tests were also performed using plant extract and nystatin/gentamicin as controls. The preliminary tests showed promising results, as the leaves of *D. indica* showed what seemed to be inhibition of both *C. albicans* and *E. coli*. Results from the Kirby-Bauer disc diffusion test, however, showed no zones of inhibition against any of the tested microorganisms.

Due to the absence of zones of inhibition, it was determined that *D. indica*, at the given concentrations, was not effective at inhibiting bacterial or fungal growth; however, given previous work, as well as the results of the preliminary test and some rudimentary zones found on the *E. coli* plates, it is not yet confirmed that *D. indica* has no antimicrobial potential.

Chemical Engineering

A Comparison of the Efficiency of Two Widely Known Water Purifiers in Removing Nitrites

**Sheradyn Lawson and Eugene de Silva
Walters State Community College
Morristown, Tennessee**

This project compared PUR Faucet Filter model FM2000B connected to cartridge model RF 3375 with BRITA Faucet Filter model SAFF100 connected to cartridge model FR 200. The nitrite concentrations of tap water from ten houses were tested using a Hanna nitrite testing kit. Three tap water samples were taken from selected houses in Harrogate, TN to get an average value of nitrite without the faucets. Then, each faucet was connected to the taps and three samples were taken per faucet per house. There were 30 total number of test samples for each faucet type. The nitrite analyses of these samples were then compared to the average values from ten houses to determine the efficiency of the two faucets in removing nitrites from water. The results were statistically analyzed to determine the significance.

Microbiology

Characterization of 21 new bacteriophages isolated from Middle Tennessee ecosystems

**Tessa Cote, Gregory Markov, Ximena Leon, Jenna R. St. Pierre and
Elvira Eivazova
Columbia State Community College
Columbia, Tennessee**

The goal of this study was to isolate and characterize novel bacteriophages that can infect bacterial host *Microbacterium foliorum*. Students isolated 21 novel bacteriophages from different environments using enriched isolation on the same host bacteria. Collected samples were purified to ensure that clonal phage populations were generated for the characterization of specific morphologies. Transmission electron microscopy imaging was performed to survey morphotypes. TEM results showed that 19 phages belong to the family Siphoviridae while 2 likely belong to the Podovirida family. DNA was extracted from phages to perform gel electrophoresis with restriction enzyme digestion. Using enzymes *HaeIII*, *NspI*, and *SacII*, cleaved DNA fragments were separated by gel electrophoresis, and this was used as a diagnostic tool for phage comparisons. We demonstrated that the isolated phage population is characterized by morphological and size diversity. Our goal is to further explore the genetic composition of these novel viruses through genomic analysis.

Bacteriophages Research

**Jenna R. St. Pierre and Elvira Eivazova
Columbia State Community College
Columbia, Tennessee**

The purpose of this work was to extract bacteriophages, viruses that can infect bacteria, from soil samples and to further characterize them using host bacterium *Microbacterium foliorum*. Here, we isolated and characterized bacteriophage Magritte by performing a series of experiments. These included spot and phage amplification assays, assessing plaque morphology in culture, analysis of phage morphology and its size by transmission electron microscopy (TEM) and characterization of phage genomic DNA by gel electrophoresis. Our results showed that phage Magritte replicates inside the host by lytic mode with plaque morphology, characterized by extremely small plaques. The phage lysate titer was consistently low, ranging between 10^{-1} to 10^{-3} pfu/ml. The TEM morphotype analysis showed that phage Magritte belongs to the Siphoviridae phage family. Our future goal is sequencing and annotation of the phage genome in order to characterize it taxonomically.

Psychology and History

An Investigation into TVA's Land Acquisition in the Cherokee Lake Area

**Zheyn Gerard, Eugene de Silva, Susan T. Webb, and Whitney Jarnagin
Walters State Community College
Morristown, Tennessee**

The goal of this research was to understand the long-term effect on public relations the TVA's land acquisition methods have had within the Cherokee Lake area. This region was and is still primarily inhabited by low-income households and farmland that is often under-represented in academic research and politics. The first step for this research has involved an analysis of the method used by TVA to acquire the lands and comparison of that to the expected free market value for the lands owned by individuals/families. The next step was the collection of deeds data, from which a comparison with court records can determine a rough ratio of the landowners that fought to keep the land. The deeds' data were then used to find descendants of the original landowners through the census records. The opinions of these descendants were accordingly collected through a survey.

Water Chemistry

An Investigation into the Nitrite Levels of Hallsdale Powell Utilities' Water

**Seth Jackson and Eugene de Silva
Walters State Community College
Morristown, Tennessee**

This investigation was performed to determine the nitrite concentration levels in the drinking water supplied by Hallsdale Powell Utility located in the Halls area of Tennessee. Thirty samples were taken from ten different businesses that used Hallsdale Powell Utility services. All water samples were tested with a Hanna nitrite testing kit to determine the nitrite levels. A statistical analysis was performed to find the significance of the results. A discussion of the quality of the water supplied in the Halls area is given as a part of this research.

Student Poster Presentations

Astronomy

Black Holes

**Haley Hopper and Elena Owen
Walters State Community College
Morristown, Tennessee**

This work focused on black holes by explaining what is a black hole, and also presenting the different types of black holes that exist. A black hole is a place in space where gravity pulls so significantly that even light cannot get out. The reason that gravity is so strong within a black hole is because matter has been squeezed and compacted into a tiny space. Black holes are also invisible, yet special telescopes can be utilized to view them. These telescopes can also help to determine how stars that are close to black holes act differently than other stars. This helps detect the location of a black hole. Black holes can be big or small. A large black hole is referred to as "supermassive." Another type of black hole is referred to as "stellar." This work explains the differences between the two, in addition to whether or not a black hole affects Earth.

Worm Holes

**Karra Fields and Elena Owen
Walters State Community College
Morristown, Tennessee**

Worm holes are very complex. It was Albert Einstein who proposed that the topic of such existed. He had a helping hand in the research from a man that goes by the name of Nathan Rosen. Thus, as time progressed, another name for the worm hole came about; the Einstein-Rosen bridges. The worm hole is a way of traveling throughout time. This does not mean that it is a way to travel through any time, but rather it is said to simply be a "short cut." Within a worm hole, there had to have been a black hole in existence before. The worm whole is a link of the black and white hole, both. Visually, it is represented as a tunnel-like structure with two ends, both located in completely different places in time.

Botany

Developing a Working Classroom Herbarium

**Gunilla Kemmann and Mary R. Griffin
Walters State Community College
Morristown, Tennessee**

Development of relevant and usable year-round course materials for instruction is critical to student learning and appreciation of the botanical sciences. This presentation will outline the process taken in the development of a working classroom herbarium as well as provide an update on the project's current progress. For this project, a study was conducted of best practices utilized by several world-recognized herbaria. From this research, a pragmatic protocol has been established which can be used as the Walter State's Niswonger Campus Herbarium is further developed.

Developing an interactive virtual online experience, which features a community-based classroom arboretum

**Amanda Lee and Mary R. Griffin
Walters State Community College
Morristown, Tennessee**

This presentation will examine the processes involved in developing a community-based classroom arboretum, using representative trees from the community. This arboretum would be accessible both online and onsite. The arboretum-in-process is based currently upon four walking trails, described as the Greeneville Walks. Each of the trails commence from Walters State Niswonger Campus in Greeneville, TN. The primary purpose of the virtual arboretum is to provide an educational experience to students as well as increase their overall awareness of the value of greenspace in their community. In the future, it is our hope to involve the greater community as we attempt to highlight the cultural influences trees, shrubs and herbaceous plants mark in our history, architecture, food, medicine, art, literature and music.

Botany and Psychology

Psychological benefits of interacting with greenspace for the community's children

**Makayla Melton and Mary R. Griffin
Walters State Community College
Morristown, Tennessee**

This project examined recent literature regarding the psychological benefits of children and adolescents when provided with greenspace exposure. Some of the standardized outcome measures examined were mental well-being and resilience to risk. Studies consistently observed a benefit between exposure to greenspace and positive mental health performance. In children, empirical evidence showed benefits particularly with hyperactivity and inattention problems. It is our desire to bring exposure to the benefits of greenspace in order to aid city planners, mental health professionals and the general public as they prepare for future city development.

Earth Science

The Milky Way

**Tracena Noe and Elena Owen
Walters State Community College
Morristown, Tennessee**

The Earth and other planets belong to the Milky Way galaxy. This galaxy receives its name based on its appearance of a milky, glowing, white band that we are able to see in our night sky. This poster has provided the audience with an opportunity to consider data, such as how many stars are found within this galaxy and the location of the Sun and Earth. It is hoped that this work will offer insight to what lies beyond our blue skies.

Ecology

Observational research in the exploration of microbial biodiversity

**Kelly Jones, Jaime Parman-Ryans, and Mary R. Griffin
Walters State Community College
Morristown, Tennessee**

Identification of microbial species remains ongoing despite scientific and technological advances. Studies to identify microorganisms are imperative to accurately assess environmental biodiversity, which is vital to the proper functioning of ecosystems. In this observational study, examination and cataloging of microbial species was conducted over a six-month period. During this time, samples were collected from various sources, including soil, streams, mosses, lichens, collected rainwater, as well as temporary ditch water. Findings include various rotifer, tardigrade, algal, protozoan, nematode, bacterial and fungal species. Observational studies such as these are important because they encompass the identification of numerous taxonomic categories.

Environmental Science

The Environmental Affects Upon Drosophila And Their Consequences

**Meghan "Lee" Luttrell and Lisa Eccles
Walters State Community College
Morristown, Tennessee**

The objective of this study was to record the observational findings of the affects and their consequences of the growth and reproduction of *Drosophila melanogaster*, under which small populations were subjected to heat, light, and humidity. It is known that drosophila react significantly to temperature increases that affect their maturation and growth, as well as their egg laying capability. During this study, the subjects were kept under varying ranges of temperature (22-25 C), light sources (natural versus artificial), and dry to very damp levels of humidity to observe the outcome of these environmental factors. All the factors used in this experiment were essential stimuli to numerous species world-wide; the lack of ideal condition would deplete the population of similar species. This study aimed to demonstrate how environmental factors affect living creatures and their means of growth, reproduction, and quality of life.

Genetics

Does Mutation in *Drosophila melanogaster* Affect Their Attraction to Different Fruit Odors?

**Brittony Briscoe and Lisa Eccles
Walters State Community College
Morristown, Tennessee**

The purpose of this experiment was to determine if genetic mutations in *Drosophila* affect the preference they have in fruit odors. Three different mutation types of *Drosophila* were tested in the F2 generation: sepia x wild, vestigial x ebony, and white x wild. A wild-type population was used as the control. Six different fruits were used for the experiment: pineapple, grapes, oranges, strawberries, bananas, and apples. Q-tips that were cut in half swabbed each fruit, and different colors were drawn on the severed ends to keep track of the different fruit swabs. These swabs were placed in slits in the cover of the containers. The *Drosophila* landings were recorded for fifteen minutes. The number of landings among all mutant and wild-type populations were compared with each other. This study showed that each type had different fruit odor preferences.

Health Science

A Sugary Diet Versus A Hearty Diet in Drosophila

**Allison D. Caton and Lisa Eccles
Walters State Community College
Morristown, Tennessee**

During this research project, two different diets were tested on drosophila. The first diet was of a very high sugar content. The second diet was more wholesome and healthier. The control group were fed with basic potato mixture with water/broth. The testings were conducted to determine if the higher sugar diet lead to more deaths and decreased offspring, and what outcome resulted from the wholesome diet. The testing hypothesis was that the "sugar diet kills the flies more than the wholesome diet of potatoes and broth." The findings are given as a part of this research project.

Nutrition Science

Nutritional Impact on Reproductive Rates of *Drosophila melanogaster*

**McKenzie Hensley and Lisa Eccles
Walters State Community College
Morristown, Tennessee**

Drosophila melanogaster, commonly known as a fruit fly, is frequently used in genetic based experiments due to their short life cycles. In theory, modifying the diets of *Drosophila melanogaster* would play a role in their reproductive rates. By offering different food sources to different *Drosophila melanogaster*, conclusions were drawn as to how diet played a role in reproduction. The experiments were performed on wild, vestigial, and apterous types of flies. The presented data proved that *Drosophila melanogaster* with “healthier” diets had higher rates of reproduction, while those with the “unhealthy” diets had lower rates.

Soil Science

Analysis of Host Range Specificity of Bacteriophages Found in Soil

**Ava Brittain, Tessa Cote, Madeline Ellis and Elvira Eivazova
Columbia State Community College
Columbia, Tennessee**

Bacteriophages have been of interest to scientists because they can efficiently destroy bacteria, and therefore have much promising potential for phage therapy. Our objective was to isolate and characterize novel bacteriophages and to analyze their host range specificity. We isolated several phages from soil, using a well-established host *Microbacterium foliorum*. We observed both lytic and lysogenic life cycles: the lytic cycle where phages infect and rapidly kill their host, and the lysogenic life cycle where phages integrate into the host genome instead of directly killing their host. The phage morphology was determined using transmission electron microscopy. Host range assays were performed on all isolated phages using bacteria *Gordonia rubripertincta* and *Arthrobacter globiformis*. Both bacterial species belong to the phylum Actinobacteria and are typically found in soil. We concluded that the isolated phage populations were specific to *Microbacterium foliorum*, showing no lytic activity in the tested bacterial hosts.

Water Chemistry

Determination of Nitrite Levels in Powell Valley River Water

**William Russell and Eugene de Silva
Walters State Community College
Morristown, Tennessee**

Powell River water is an important resource in East Tennessee. This investigative research project was carried out to determine the nitrite concentration in river water. Thirty randomly selected samples were tested using Hanna nitrite testing kits. A statistical analysis was performed to determine the variation of nitrite levels and the significance of the findings. The environmental factors affecting Powell River pollution were also considered and discussed through this research.

Zoology

The Nutritional Effects of Reproductive Behavior, Health and Longevity of *Drosophila melanogaster*

**Rachel Ball and Lisa Eccles
Walters State Community College
Morristown, Tennessee**

The purpose of this project was to understand how different variances of drinks can affect the nutritional health of *Drosophila melanogaster*. The project looked at how their reproductive behavior, longevity, and overall health were affected by liquids with high caffeine, sugars, protein, and various vitamins. By using the method of experimental research, the health effects of mutant and wild type *Drosophila melanogaster* were observed. Each of the types were given five tubes, each containing a new liquid substance: a caffeinated drink, sugary drink, high protein drink, vitamin drink, and distilled water. The distilled water was the controller. The experiment aimed to show how newly added substances changed the health of the flies, just as they do in humans.