ANDREWS UNIVERSITY
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Office of Research & Creative Scholarship

SEVENTH-DAY ADVENTIST CHURCH
NORTH AMERICAN DIVISION

ANDREWS RESEARCH CONFERENCE

Early Career Researchers in STEM

PROGRAM

May 7-11, 2014

Andrews University

Berrien Springs, Michigan

WELCOME

The University is not just a place where knowledge is disseminated from professor to student or from research lab to outside companies. Rather, it is where inquisitive minds seek out new knowledge and a better understanding of ourselves and the world we inhabit, and where this knowledge may be applied for the benefit of others.

In light of this, the Andrews University Office of Research and Creative Scholarship, in cooperation with the North American Division Office of Strategic Planning and Assessment and the Andrews University STEM Departments, is pleased to host the first Andrews Research Conference: Early Career Researchers in STEM. Our hope for this conference is to network Adventist researchers across North America, building relationships and partnerships that will enhance the professional careers of the participants while providing a place for them to share their research in the context of faith.

The Office of Research is grateful for the help of our administrative assistant, Sarah Burton, and the STEM Coordinator, Rachel Boothby, in putting this conference together. We would also like to thank Grace Carlos and her team for providing the delicious food.

Please visit us at http://www.andrews.edu/research to learn more about research and conferences at Andrews.

Gary Burdick
Associate Dean for Research
Professor of Physics

CONFERENCE SCHEDULE

Wednesday, May 7, 2014

4:00 – 6:00 pm	Registration, Chan Shun Hall (CSH)
6:00 – 8:00 pm	Supper Reception, CSH Whirlpool Room

Thursday, May 8, 2014

7:30 – 8:30 am	Breakfast, CSH Whirlpool Room
8:30 – 8:35 am	Introduction by Gary Burdick, CSH Room 108
8:35 – 8:40 am	Welcome to ARC by Niels-Erik Andreasen, President
8:40 – 9:00 am	Devotional: Paul Brantley, NAD Vice President
9:00 – 10:30 am	Session A, CSH Room 108
10:30 – 11:00 am	Break, CSH Whirlpool Room
11:00 – 12:30 pm	Session B, CSH Room 108
12:30 – 2:00 pm	Lunch in the Lincoln Room, Campus Center
2:00 – 4:00 pm	Session C, CSH Room 108
4:00 – 4:45 pm	Break
4:45 pm	Meet at the PMC Parking Lot for departure to Lions Beach
5:30 – 9:00 pm	Supper and Volleyball at Lions Beach

Friday, May 9, 2014

7:30 – 8:30 am	Breakfast, CSH Whirlpool Room
8:30 – 9:00 am	Devotional: David Steen, CSH Room 108
9:00 – 10:30 am	Session D, CSH Room 108
10:30 – 11:00 am	Break, CSH Whirlpool Room
11:00 – 12:30 pm	Session E, CSH Room 108
12:30 – 2:00 pm	Lunch, Lincoln Room, Campus Center
2:00 – 4:00 pm	Session F, CSH Room 108
4:00 – 6:00 pm	Break
6:00 – 7:30 pm	Supper, Student Lounge, Buller Hall
7:30 – 10:00 pm	Vespers: Mickey Kutzner, Newbold Auditorium, Observatory viewing to follow (weather permitting)

Sabbath, May 10, 2014

8:00 – 9:00 am	Breakfast, Whirlpool Room, CSH
9:30 – 10:30 am	STEM Sabbath School, Room 108
11:45 am – 1:00 pm	Pioneer Memorial Church (PMC) Worship
1:00 – 2:30 pm	Lunch, Lincoln Room, Campus Center
Afternoon	Hike/Canoeing, meet at PMC Parking Lot
6:00 – 7:30 pm	Supper, Student Lounge, Buller Hall
7:30 – 10:00 pm	Vespers: Martin Hanna, Buller Hall Optional games to follow

Sunday, May 11, 2014

8:00 – 9:00 am	Breakfast, CSH Lobby
9:00 – 10:00 am	Closing, CSH Room 108

Thursday, May 8
PRESENTATIONS

Session A, Thursday 9:00-10:30 am
G. Brendan Cross, Chair

A-1 *Automatic summarization of clinical abstracts for evidence-based medicine*
9:00 Rodney Summerscales (Engineering and Computer Science, Andrews University)

A central concern in Evidence Based Medicine (EBM) is how to convey research results effectively to practitioners. One important idea is to summarize results by key summary statistics that describe the effectiveness (or lack thereof) of a given intervention, specifically the absolute risk reduction (ARR) and number needed to treat (NNT). Manual summarization is slow and expensive, thus, with the exponential growth of the biomedical research literature, automated solutions are needed.

We have developed a novel machine learning-based software system that generates EBM-oriented summaries from research abstracts of randomized controlled trials. The system has learned to identify descriptions of the treatment groups and outcomes, as well as various associated quantities. It distills these elements into summaries that include summary statistics calculated from the reported outcome values found in the text.

A-2 *Fragility and Glass Forming Ability of Ni-based Bulk Metallic Glasses*
9:30 Andrew Hoff (Materials Science, CalTech)

The liquid fragility of metallic glasses has been long recognized as an important part of understanding glass forming ability (GFA). However, there hasn't been a good understanding of how to relate the kinetics and thermodynamics of undercooled melts to GFA. In working with a new Ni-based system, a model has been developed that is able to explain the changes in GFA with composition, relying only on two experimental parameters: fragility and reduced glass transition temperature. Experimental results show a surprisingly large composition dependence on fragility, providing validation of the model and motivating a stronger emphasis on understanding the fundamental basis of fragility. These results present new opportunities to explain the nature of GFA for other well-known glass forming systems.

A-3 *Measuring the impact on the physical condition in school children exposed to*
10:00 *Exergaming*
David Duarte (Biomedical Engineering, Montemorelos University).

From the sociology's point of view, school age children are known as generation Z, a group known for their ability to embrace technology and the access to information at a rate faster than their predecessors. This has facilitated the transition to videogames that involve physical activity.

An initiative that has been created recently, is to use video game platforms to promote physical activity in children (Exergaming). Therefore it should be possible to promote a healthy lifestyle at this age. However, it is important to know the scope and limitations of the commercial version of these products, so we can measure their actual impact. This knowledge will help to generate improvements to the existing proposals, and develop, if feasible, holistic programs based on these platforms. For the reasons mentioned above, we propose an interdisciplinary study directed towards the exploration of the determinants that impact the effectiveness of physical activity based on video game platforms, in school-age children with obesity and overweight problems. The determinants to be examined are: Strength, psychomotor response and resistance, as well as a set of psychological variables such as learning modality, parental style and anxiety propensity. A sample of 100 school age children from Montemorelos, Mexico will be used for this study.

(This is the first scientific project propose by an SDA institution that is approved and funded by the Mexican Science Counsil).

Session B, Thursday 11:00 am-12:30 pm
Rodney Summerscales, Chair

B-1 11:00 *The electronic etching and characterization of Tungsten tips in preparation for production*
G. Brendan Cross (Physics, Andrews University)

The ability of high school students as well as small higher education institutions to perform valuable research is usually limited by the cost of equipment and supplies. With the advent of cheaper and more robust Atomic force microscopes the cost of spm probes becomes more of a limiting factor. We are able to individually produce etched tungsten probes that should be able to be mounted in an atomic force microscope and be used as a cheap training and measurement tip.

B-2 11:30 *Phytochemicals from Croton species of Trinidad and Tobago*
Simone Walcott (Chemistry, University of the West Indies)

Croton species from the Euphorbiaceae family are best known for the tigliane diterpenes which are tumor promoting. More recently, various other diterpene types have been isolated from *Croton*. In this presentation, the latex of C. gossypifolius along with the leaves and stems of Trinidadian *Croton* species, *Croton gossypifolius* and *C. hircinus*, were investigated for their secondary metabolites.

A novel cyclic nonapeptide, Crotogossamide, was isolated from the latex of *C. gossypifolius* along with the flavonoids, quercitrin, myricitrin and afzelin and the amino acid derivative tyramine. Brine-shrimp bioassay-guided fractionation of the crude extract of the leaves of *Croton gossypifolius* led to the isolation of the known vomifoliol, dehydrovomifoliol and hypoleucolide methyl ester, as well as pinoresinol and kaempferol as minor components. Three novel clerodane diterpenes, Crotohircin A-C were isolated from the leaves of *C. hircinus* along with the flavonoids artemetin and kaempferol.

The structures of the compounds were elucidated using a combination of the following methods: IR and UV-vis spectroscopy, mass spectrometry, and NMR spectroscopy utilising ^{1}H, ^{13}C, COSY, ^{13}C-^{1}H HMQC, ^{13}C-^{1}H HMBC, NOESY and DEPT experiments.

B-3 12:00 *Development of a spectrometer for diffuse reflectance of human skin for scientific and dermatological studies*
Rusbel Dominguez (Biomedical optics, Montemorelos University).

Skin lesions affect between a third to a quarter of the world population and 10-15% of the visits to general practitioners relate to this organ. This shows an opportunity to develop technology designed for the diagnosis of dermatological diseases.

From the optical perspective, skin in all its' layers have different or unique reflectance pattern that could help us to differentiate between normal healthy tissues, and any type of injury or pathology in skin. Optical techniques that characterize tissues have gained importance due to its noninvasive nature. This happens because skin has different compounds that absorbs a specific spectrum of light (chromophores).

Even though all the different tissues have different reflectance or absorption spectrums, they are constituted of specific physical structures that interact with a very particular light spectra, which brings the opportunity to reveal information that can be associated with any type of compound or structure that it can also be related to some type of pathology.

We propose a study to develop a diffuse reflectance spectrometer and the protocol that would allow the study of diffuse reflectance in skin, with the intention of obtaining a tool that will develop an alternative to existing pathological studies.

Session C, Thursday 2:00-4:00 pm
Gary Burdick, Chair

C-1 *Hot and Bothered: Climate Change, Cannibalism, and Ovulation Synchrony*
2:00 Shandelle Henson and James Hayward (Mathematics and Biology, Andrews University).

El Niño events can be used to study the effects of climate change on a short timescale. We found that (1) egg cannibalism in a seabird colony increased during El Niño events, when resources are scarce, and that (2) females laid eggs synchronously in dense parts of the colony. We use mathematical models and field experiments to test the hypotheses that (1) cannibalism can be adaptive when resources are low, and that (2) ovulation synchrony can be adaptive in the presence of cannibalism, because female gulls that lay eggs synchronously reduce the chance that their eggs will be cannibalized by neighbors.

C-2 *A Study of Atmospheric Effects in Open Space Optical Communications*
2:30 Enoc Gallegos (Optical Engineering, Montemorelos University)

Optical communications in open space refer to the transmission of a modulated laser beam across the atmosphere in order to establish a closed and safe communication channel. According to the Beer-Lambert law, an optical beam can be absorbed along the path followed in the atmosphere, having different effects on the features of the beam. Likewise, polarization and reflections generates effects in any optical signal.

This work proposes a preliminary study of these communication systems. Which is a recently explored technique, for which it hasn't been investigated for most of its capabilities and limitations in various scenarios and specific applications. Experiments will be designed by simulating optical effects of the transmission in the atmosphere through an emulsifier substances. In which a measurement of the features of an audio signal transmitted through a diode laser will be in study. It is also intended to make absorption and polarization experiments in order to define thresholds and get a better understanding on the functioning, limitations and advantages of these communications systems.

C-3 *Minimizing Side Reactions in Novel Peptide Ring Closing Metathesis Reactions*
3:00 Solomon Gisemba (Medicinal Chemistry, University of Kansas)

The opioid receptors, consisting of mu (μ), kappa (κ), and delta (δ) receptors, are important therapeutic targets in pain and mood disorders. Kappa opioid receptor (KOR) antagonists initially found utility as pharmacological tools, but more recently have shown potential for the treatment of depression and drug addiction. KOR selective peptide antagonists, such as the cyclized dynorphin (Dyn) A analog zyklophin, offer a promising profile for potential further development due to their short duration of action.

Arodyn (Ac[Phe^{1,2,3},Arg^{4},D-Ala^{8}]Dyn A(1-11)-NH_2, Figure 1), an acetylated Dyn A analog, has shown potent and selective KOR antagonism. Novel cyclization strategies via ring closing metathesis (RCM) are being pursued to enhance the metabolic stability and potentially stabilize the bioactive conformation of arodyn. Side reactions such as olefin isomerization involving O-allyl groups limit the scope of RCM, especially in probing pharmacological effect of modifying critical aromatic residues. A model dipeptide RCM precursor was synthesized to probe strategies to minimize side reactions and enhance reaction yields. The results of these different side reaction minimization strategies and the application of the modified reaction conditions to the synthesis of novel arodyn analogs will be presented.

C-4 *Structure and function of a unique proteolytic enzyme*
3:30 Peter Lyons (Biology, Andrews University)

Carboxypeptidases are proteolytic enzymes that are known to modify and degrade bioactive and dietary peptides. While many members of this family of enzymes have been characterized for decades, some members are poorly understood. Carboxypeptidase O (CPO) is one such poorly characterized enzyme. Recent experiments have shown that CPO is highly expressed by intestinal epithelial cells, where it is anchored to cellular membranes by a glycosylphosphatidylinositol group. It is found on the external plasma membrane, suggesting a role in digestion. The identity of associated internal membranes is not clear. Current research is investigating the subcellular localization of CPO and the manner in which this enzyme is regulated.

Friday, May 9
PRESENTATIONS

Session D, Friday 9:00-10:30 am
Lisa Ahlberg, Chair

D-1 9:00 *Preparation, isolation, and characterization of carcinogenic heterocyclic amines derived from arginine*
Ryan Hayes (Chemistry, Andrews University)

It is well established in scientific literature that cooked meat and fish produce carcinogenic heterocyclic amines (HCA) which are derived from creatine found in muscle tissue. Our research and peer-reviewed literature suggests HCA can be derived from arginine, found in proteinaceous plants, rather than creatine. We have conducted cooking experiments with arginine and phenylalanine, performed a series of separations, and have isolated three new HCA candidates. These compounds are being characterized for their chemical structure and toxicity but their low yields present challenges. This new class of carcinogens will aid in assessing risks with the cooking of protein-rich plant products.

D-2 9:30 *Facing Uncertainty in Web Service Compositions*
Germán H. Alférez (Computer Science, Montemorelos University)

Web service compositions run in complex computing infrastructures where arising events may affect the quality of the system. However, crucial Web service compositions cannot be stopped to apply changes to deal with problematic events. Therefore, the trend is moving towards context-aware Web service compositions, which use context information as a basis for autonomic changes. Under the closed-world assumption, the context and possible adaptations are fully known at design time. Nevertheless, it is difficult to foresee all the possible situations arising in uncertain contexts. In this paper, we leverage models at runtime to guide the dynamic evolution of context-aware Web service compositions to deal with unexpected events in the open world. In order to manage uncertainty, a model that abstracts the Web service composition, self-evolves to preserve requirements. The evolved model guides changes in the underlying WS-BPEL composition schema. A prototype and an evaluation demonstrate the feasibility of our approach.

D-3 10:00 *Study of Fluid Characterization by Interferometry Techniques*
Lizsandy Torres (Optical Engineering, Montemorelos University)

Optical interferometers are instruments that can make very precise object measurements using the interference pattern of two waves of light. These devices have been used to characterize materials and to study their properties. In this research we propose a study to develop a fluid characterization protocol for samples made of the same components at low concentration differences.

The methodology consists of analyzing samples consisting of mixtures of colloids of the same components at different concentrations. Once standardized, a software will be developed in order to make a comparison of the interferograms using Fourier analysis (correlation).

Similar studies results show that by optical arrangements like interferometers and image processing, it makes possible a fluid characterization, this nondestructive protocol being a tool for various applications in engineering and science.

Session E, Friday 11:00 am-12:30 pm
Ryan Hayes, Chair

E-1 *Investigation of 1,3-Dipolar Cycloadditions: Synthesis of Isoxazoline and*
11:00 *Thiolactam Heterocycles as anti-* M. tuberculosis *Compounds*
Lisa Ahlberg (Chemistry, Andrews University)

Development of highly antibiotic resistant strains of infections such as staphylococcus and tuberculosis warrant the search for new antibacterial chemotherapies. With vanishing antibiotic therapies available for such infections and with little pharmaceutical company input into these developing world problems, it is critical for many researchers to investigate novel therapies against these bacterial threats. We are particularly interested in 1,3-Di-polar cycloaddition chemistry as an approach to heterocycles that may be pharmaceutically useful against such threats.

E-2 *An Introduction to Knot Theory*
11:30 Anthony Bosman (Mathematics, Rice University)

Knot theory is an active area of study in topology, an area of mathematics studying shapes and surfaces. The study of knots was motivated by an attempt to classify the elements, but has become its own area of mathematical interest. A primary method is to develop invariants (such as numbers, polynomials, and other mathematical objects) that describe a knot and distinguish it from others. Despite a century of progress, many easily formulated questions in the field remain unanswered. Knot theory has applications to other areas of topology, such as the study of 4-manifolds, as well as some promising contributions to the life sciences, such as understanding the knotting of DNA.

In this talk, we will review a basic overview of knot theory and see one or two knot invariants. Time permitting, we'll discuss open questions of research interest and applications.

E-3 *Study of Experimental Validation for Negative Pressure Wound Therapy*
12:00 Gener Aviles-Rodriguez (Biomedical Engineering, Montemorelos University)

In recent years there has been an increase in overall life expectancy, which entails the fact of facing a different kind of diseases and their complications. Today, non-communicable diseases (NCD), mainly cardiovascular diseases, cancer, diabetes, obesity and chronic respiratory diseases are a major threat to human health.

Chronic wounds are being associated with various conditions involved with NCD, such as diabetic ulcers and pressure wounds. Which is a condition that has generated a very high cost both in a financial perspective, as in the complications associated to such diseases. In developed countries, it is estimated that between 1-2% of the population will suffer from a chronic wound during their lifetime. A widespread treatment for chronic wounds is the Negative Pressure Wound Therapy (NPWT). This method that has caught the attention of health professionals due to its effectiveness. However, for most of these professionals is still unknown what are the biochemical and biomechanical process behind this therapy

Therefore, we propose an interdisciplinary research on NPWT in order to understand in greater detail the healing process induced by this therapy. In addition, engineering tools will be used in order to design inexpensive NPWT prototypes that could be applied in a wider range of people.

Session F, Friday 2:00-4:00 pm
Gerardo Cardenas, Chair

F-1 2:00 *Novel Synthesis of 6,7-bis(alkylthio- or alkylamino-substituted)quinoline-5,8-dione via Nucleophilic Addition/Oxidation of Alkylthio and Alkylamino Derivatives to Quinoline-5,8-dione*
Candace Olusola (Chemistry)

A new variety of 6,7-bis(alkylthio- or alkylamino-substituted)quinoline-5,8-diones were prepared from the addition of mercaptans or amino nucleophiles to quinoline-5,8-dione after subsequent oxidation with NaIO4. Mono addition of the nucleophiles to the quinoid ring was observed for the case when the first nucleophilic addition would produce steric hindrance for a second nucleophilic attack. The core quinoline-5,8-dione intermediate was prepared from the oxidation of 5-quinolinol or 8-quinolinol with [bis(trifluoroacetoxy)iodo]benzene, PIFA, in the presence of water and acetonitrile as solvents. No good leaving groups were utilized to insert the alkylthio or alkylamino groups into the quinoline ring. The synthesized compounds will be tested for their anti-inflammatory, anti-bacterial and tuberculostatic inhibition activities.

F-2 2:30 *Effect of doping and defects on the electronic structure of DWCNTs*
Matias Soto (Materials Science, Rice University)

Theoretical studies regarding the electronic properties of double-walled carbon nanotubes (DWCNTs) have found that the interaction between tubes has interesting consequences on the electronic structure [1]. The modification of the electronic structure would inevitably affect the transport through DWCNTs. In this work, the electronic properties of DWCNTs were calculated computationally via first-principles simulations. The first approach to the problem was to study the effect of different possible chirality combinations on the electronic structure of DWCNTs. After which, the effect of doping on the electronic structure of DWCNTs was simulated. For this purpose, the use of iodine as well as some transition metals as dopants in DWCNTs was studied using the SIESTA method. Finally, structural defects such as vacancies were also incorporated into DWCNTs structures to assess their impact on the electronic structure of these molecules. For the intertube interaction, the electronic band structure of the individual CNTs is modified when simulated in a DWCNT configuration, as observed around the Fermi level. The addition of dopants and defects to DWCNTs causes shifts in the electronic band structure, which ultimately affects the transport through the DWCNTs.

F-3 3:00 *A Study of Birefringence in Sweeteners and the correlation with metabolic processes and reactions in teeth*
Luis Pantaleon (Physics, Montemorelos University)

It is known that optically active substances rotate the plane of polarization of linearly polarized light. A sugar crystal or solution are optically active. This investigation proposes the study of optical activity in different artificial sweeteners in order to find a relationship between physical and biochemical properties. A preliminary study allowed us to find optical activity in various commercial beverages whose composition includes sweeteners.

This raises several questions regarding the purpose and effect of sweeteners in the body, which leads us to propose an interdisciplinary study to solve those questions. Currently, various academic and health institutions are conducting studies with similar objectives. For this, we propose to build a polarimeter illuminated with HeNe laser (532nm) and develop software to streamline the process of detecting light and clearly understand the birefringence effect of the various sweeteners. It also intended to study the biochemical effects in the metabolism of sweeteners.

The project is an interdisciplinary work between the School of Engineering and the School of Health Sciences. This project will promote the formation of a research group in biomedical engineering.

F-4 3:30 *Improving Mortar Crack Resistance with Hardwood Pulp Fiber as an Internal Curing Agent*

Johnson Luma (Civil and Environmental Engineering, University of Tennessee, Knoxville)

Early-age crack development in cementitious materials often poses concerns over the long-term durability of the structure in which they are employed. When restrained, cracks develop in a concrete or mortar specimen as a result of tensile stresses. Tensile stresses result from shrinkage attributed to water loss. Efforts contributing to a reduction of water loss can be made via a process known as curing. Although external curing can help prevent water loss by continuously depositing water on the surface of the cementitious material, internal curing allows for interior distribution of water with the aid of the constituents of the concrete/mortar itself. The objective of this research was to observe and assess the effects of hardwood pulp fiber in cement mortar as a potential internal curing agent. Two similar volumes of mortar were cast on the same day: one with fiber and another as a control-cast without fiber. With various ASTM standards (C1581/C1581M-09A, C157/C157M-08, C596-09, C215-08, and C496-04) as guide during the experiments, comparisons of the two types of mortar mixes indicated that the hardwood pulp fiber not only facilitated in a reduction of autogenous shrinkage in the tested mortar bar specimens, but also a three to four day delay of the visible cracking of the restrained mortar specimens.

ABOUT THE PRESENTERS

Lisa Ahlberg (E-1)

Dr. Lisa Ahlberg graduated from Andrews University with a BS in Biochemistry, with Honors. She earned a PhD for research in Organic Chemistry from the University of California, Davis in 1997. Before teaching several different chemistry classes and labs, at schools in both California and the Michiana region, she worked at a small biotech company, Hermes Biosciences in South San Francisco, synthesizing anti cancer agents for liposomal drug delivery. Her research has been published J. Am. Chem. Soc., J. Org. Chem., and Tetrahedron.

Germán Alférez (D-2)

Germán Alférez is an associate professor at the School of Engineering and Technology, Universidad de Montemorelos, Mexico. He holds a Ph.D. in Computer Science from the Universitat Politècnica de València (Spain), a MSc in Information and Communication Technology from Assumption University (Thailand), and a BSc in Computer Science Engineering from Universidad EAFIT (Colombia). He is currently working on international research projects with researchers at Universitat Politècnica de València (Spain) and Université Paris-1 Panthéon-Sorbonne (France). His research interests include Services Computing, Model-Driven Engineering, Models at Runtime, Autonomic Computing, and Dynamic Software Product Lines. He has contributed to publications in international conferences, such as SPLC, ECOWS, MODELS, and ICWS. He has worked in universities, IT companies, and research groups on four continents (America, Asia, Australia, and Europe).

Gener Aviles-Rodriguez (E-3)

Gener Aviles-Rodriguez is a Medical Doctor at Montemorelos University. He is a key collaborator in the development of EPODE International Network through one of it´s founding programs. He is currently working as County Health Director and Research and Medical Education coordinator at "La Carlota" Hospital community clinics. He is also a Research and Bioinformatics instructor at the school of Nursing and Medicine.

Anthony Bosman (E-2)

Anthony completed his BS degree in mathematics with honors from Stanford University. He is now pursing a PhD in pure mathematics at Rice University. His area of research interest is topology, especially knot theory and the study of 4-manifolds. Outside of math, he enjoys campus ministry, nature hikes, and avocados!

G. Brendan Cross (B-1)

Brendan Cross joined the physics faculty in 2010 after completing a Masters Degree in Aerospace Engineering. His undergraduate degree was in Mechanical Engineering with second major's in Math and Physics. At this point in time Brendan is focused on the laboratory education of our students, but his academic interests include studying the properties of nano-structures and increasing the access that high school and younger students have to scientific equipment.

Rusbel Dominguez (B-3)

Rusbel Dominguez was born in Ocosingo, Chiapas, México and is an engineering major. He is about to obtain his Bachelors degree in Telecommunications and Electronics at the University of Montemorelos. He has presented this research paper at the Mexican National Physics Conference last October.

David Duarte (A-3)

David Duarte is a Computer Systems Engineering student. He is currently working on the development of the ETMASD software, which is a multipurpose skeletal-data-analysing program that focuses on detecting problems and tracking the development of patients undergoing physical therapy thus allowing a complete real time, free-moving, easy-adapting way of diagnosing and treating a patient during the whole process of rehabilitation.

Enoc Gallegos (C-2)

Enoc Gallegos was born in Villahermosa, Tabasco, Mexico and is finishing a BS in Electronics and Telecommunications. He is currently working in the Department of Biomedical Research on the topic of "Atmospheric Effects in Optical Communications at Open Space." This research was presented at the National Congress of Physics.

Solomon Gisemba (C-3)

Solomon Gisemba completed his B.A in Chemistry-Biochemistry at Colby College, Waterville, ME in 2011. He completed an Msc. in Medicinal Chemistry at the University of Kansas School of Pharmacy, Lawrence, KS in 2013 and is currently a PhD candidate there.

Ryan Hayes (D-1)

Dr. Ryan Hayes is finishing his fifth year of teaching general and analytical chemistry at Andrews University. Dr. Hayes is actively researching how burned foods produce carcinogens, how to optically sense metal ions in water, and how to characterize nanoparticles called dendrimers. He also helps manage Andrews ChemServices, a company specializing in manufacturing, distribution, and sale of dendrimers to researchers around the world. Before joining Andrews University, Dr. Hayes worked for nine years in industry as an analytical chemist, research scientist, and a director of business development. Ryan is married to a microbiologist named Suzi, and they have three young scientists: Carter, Christiana, and Cadance.

James Hayward (C-1)

James Hayward is a Research Professor of Biology at Andrews University. Hayward has studied the behavioral ecology of marine birds, bald eagles, and seals for the past four decades. He has authored and coauthored more than 50 papers in the peer-reviewed literature. Currently his research interests include the interaction between egg cannibalism and reproductive synchrony in gulls, and the use of modern eggshell as a tool for understanding ancient dinosaur reproductive strategies.

Shandelle Henson (C-1)

Henson is a mathematical ecologist and is chair of the Department of Mathematics at Andrews University. She applies dynamical systems theory to ecological systems and animal behavior to construct mathematical models that can describe, explain, and predict the future state of systems. She has authored more than 60 peer-reviewed publications, including the book Chaos in Ecology: Experimental Nonlinear Dynamics (Academic Press, 2003). She has studied the behavioral ecology of marine birds and mammals on Protection Island, WA, since 2002 with her ecologist husband, Jim Hayward.

Andrew Hoff (A-2)

After graduating from Andrews University in 2011 with a BS in physics, Andrew Hoff joined the materials science program at Caltech where he is a third year PhD candidate. Besides researching nucleation and viscosity in metallic glasses he is learning Mandarin and enjoys doing culinary experiments and hiking.

Johnson Luma (F-4)

Johnson Luma was born in 1993 in Les Verrettes, Haiti. His parents brought the family to the United States in 2000 not only for a better education but also for a "better life". Always examining his life, he does know that he has been extremely blessed in all facets. Johnson is an undergraduate student in Civil and Environmental Engineering at the University of Tennessee, Knoxville.

Peter Lyons (C-4)

Peter Lyons received his PhD in Biochemistry from Dalhousie University in Canada. He subsequently did postdoctoral work at both Dalhousie University and Albert Einstein College of Medicine in New York. Prior to coming to Andrews, Dr. Lyons taught for one year in the biology department at Manhattan College. Most of his research has revolved around the role of metallocarboxypeptidases in human health and disease. He combines biochemical studies with cell biology and zebrafish development to get a well-rounded picture of how these enzymes work and what they do.

Candace Olusola (F-1)

Candace Olusola is a May 2013 graduate of Southern Adventist University, where she obtained her B.S. in Chemistry with an emphasis in Biochemistry. In her time there, she was a Survey of Chemistry and General Chemistry grader for three years, as well as a Calculus tutor.

Luis Pantaleon (F-3)

Luis Pantaleon was born in Mexico City in 1983 and is currently studying Engineering in Electronics and Telecommunications. He is in his 8th semester at the University of Montemorelos and is part of the Investigation and Innovation team from that Institution working on the polarimeter prototype project for the research on sweeteners.

Matias Soto (F-2)

Originally from Mexico, Matias Soto received a B.S. in Aerospace Engineering from The University of Texas at Austin. He received a Master's degree in Manufacturing Systems in the area of Advanced Materials from Monterrey Technological Institute. Currently, he's part of the doctorate program in Materials Science at Rice University.

Rodney Summerscales (A-1)

Rodney Summerscales joined the department of Engineering and Computer Science at Andrews University in 2013. He holds a PhD in Computer Science from the Illinois Institute of Technology. His current research uses machine learning to summarize scientific publications.

Lizsandy Torres (D-3)

Lizsandy Torres was born in 1991 in Allende Nuevo León, Mexico. She spent her whole childhood in the south of México, and received all basic education in Adventist Schools. She is currently working on a BS in electronics and telecommunications at Montemorelos University. She participated in a national conferences in Mexico with this interferometry project.

Simone Walcott (B-2)

Simone Walcott has been a Seventh-day Adventist her whole life. She has served in her home church in various capacities and is functioning as Women's Ministries leader/assistant AY leader, Sabbath School superintendent, chorister in one of the churches in her husband's District of Churches (Malabar Church) and is Vice President of the Shepherdess Association in the South Caribbean Conference. She is currently the Chief Technician at the University of the West Indies, St. Augustine Campus, Trinidad. She loves learning about history, doing floral arranging, glass etching and she speaks a little French.

Notes