Friends, I am glad you are here. Thank you for your dedication to science, and thank you for being a member of the Indiana Academy of Science.

Our day-to-day reality continues to be impacted by spread of the novel coronavirus. Many of us have been directly impacted by COVID-19. For all of us, uncertainty about the future and concern for our loved ones, friends, students, and communities weigh heavy. We are all tired. In the midst of this, I see how you are working tirelessly to advance science in our state. I see how you are spending extra time and effort to ensure that our students receive the best possible scientific education. I see how you are taking steps to keep workplaces as safe and accessible as possible. Thank you. Promising news about vaccine development reminds us there is light at the end of the tunnel. In the meantime, we will continue to work at local and statewide levels to promote science and science education effectively and safely.

Planning is underway for the 136th Annual Meeting of the Indiana Academy of Science, which will be virtual. I want to thank our Executive Director, Dr. Delores Brown, our Section Leadership, and members of the Meeting Planning Committee for their heroic efforts in planning what promises to be an exceptional meeting, scheduled for March 20, 2021. Among other highlights, the Annual Meeting will feature two outstanding keynote presenters.

Dr. Robert Fullilove is a civil rights activist, and his research is in the area of racial disparities in public health outcomes. You might enjoy listening to an interview with Dr. Fullilove on a recent episode of the podcast, This Week in Virology (https://www.microbe.tv/twiv/twiv-655/). He is Associate Dean of Community & Minority Affairs, Mailman School of Public Health, Columbia University. Dr. Bill Sullivan is the author of Pleased to Meet Me: Genes, Germs, and the Curious Forces that Make Us Who We Are. Dr. Sullivan’s official site, which features information about his book and recent interviews can be found at https://authorbillsullivan.com/. He is Showalter Professor of Pharmacology and Toxicology, Indiana University. I’m also delighted to report that Dr. Maresa Murray, Assistant Dean of Diversity, Inclusion, and Organizational Climate at Indiana University – Bloomington, will lead an interactive workshop for our members in the area of racial equity and allyship.

Finally, I express gratitude to Academy members who have volunteered to serve on our Task Force for Diversity, Equity, and Inclusion. For the first time in Academy history, these colleagues are formally addressing how our Academy can better welcome and meet the needs of all scientists in our communities. Please join me in thanking Samina Akbar, Samantha Beck, Naureen Aslam, Marcia Gillette, Jennifer Kowalski, Patrick Motl, Dean Wiseman, Luis Palacio, Xianzhong Wang, and Carrie Wright for initiating this important work.

I wish you good health and peace this holiday season. Please take good care of yourself. All the best, —VJ Rubenstein
From the Executive Director

Hello Academy Members,

As we close 2020 we of course acknowledge the challenges we’ve had to all experience with the COVID 19 pandemic this year, but there is also a side of this year that can make us smile. Moving to the virtual platform for the contributions the Academy continues to make to the Indiana community this year has allowed many of you to more actively participate in the work of the Academy. ZOOM meetings, though admittedly a bit exhausting, have had their rewards.

Members of the Indiana Academy of Science come from all over the state of Indiana, from the very smallest towns, to the largest of our state’s cities. We represent a wide spectrum of backgrounds and interest, with the common denominator being our love for and belief in science. Virtual opportunities to come together this year have allowed us to know each other better, while working together on project after project for the good of Indiana science. This year has been outstanding in that regard. Our numbers continue to grow as we get closer and closer to 1000 members representing scientists from Indiana industry and academia; science students from our Indiana graduate and undergraduate colleges and universities; science educators from Indiana private, corporate and government institutions; science teachers from Indiana high schools and middle schools; and science enthusiasts from the broad Indiana community. We celebrate a surprising number of individuals who have held Academy memberships for over 40 years, and many invested in life memberships in the Academy. We are proud of who we are and what we do together to promote science research, science education, and collaboration in Indiana.

I look forward to seeing all of you on March 20, 2021 at the first virtual meeting of the Indiana Academy of Science, the 136th Annual Academy Meeting.

Extending goodwill to you and yours in this season and beyond—with our heartfelt thanks for your dedication and commitment to science, and the work of the Indiana Academy of Science. Happy Holidays!
— Delores G. Brown, Ph.D., Executive Director

Membership Renewal

If you have not yet renewed your Academy membership for 2021, to do that this month is very important. December 31 is the end of the year for current yearly memberships. Membership dues are preferred online with a credit card. Remember, if you have a problem with online membership renewal (or with registering a new membership), you can quickly go to the navigation bar at the top of the Academy Website homepage and click on CONTACT US. There will be a form that appears that will allow you to share your problem or concern with the Academy Webmaster, Dr. Sarah Mordan-McCombs. She will be back in touch in short order, once she receives the completed form from you.

IAS Senior Research Grants Deadline

The Indiana Academy of Science Senior Research Grants Program makes awards of up to $3000 to Academy members or students they sponsor to purchase supplies, support travel and field expenses, pay research assistants, and provide other items required to conduct novel scientific research. The deadlines for the submission of proposals to the chair of the Research Grants Committee are 1 March and 15 September of each year. Visit the webpage below for more details.

<https://www.indianaacademyofscience.org/research-grants/senior-research-grants>
Fall 2020 Senior Research Grants

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan Froese</td>
<td>Development of Novel Dioxygenase Catalysts with Expanded Synthetic Utility through Directed Evolution</td>
<td>Ball State</td>
</tr>
<tr>
<td>Elsayed Zahran</td>
<td>Multicomponent Photocatalysts for the Degradation of Halogenated Volatile Organic Contaminants</td>
<td>Ball State</td>
</tr>
<tr>
<td>Henry Loope</td>
<td>Research Glacial Geologist Provenance and chronology of deposition of wind blown silt (peoria Loess) during the last glacial period, central Indiana</td>
<td>Trustees of IU, Indiana Geological and Water Survey</td>
</tr>
<tr>
<td>Amanda Anne Burtt</td>
<td>A multimethod approach to investigating the diets of dogs from Angel Mounds, Indiana Building Genomic Resources for Study of Fish Color Pattern Development</td>
<td>IUB, Indiana State</td>
</tr>
<tr>
<td>Peyton Blount</td>
<td></td>
<td>Indiana State</td>
</tr>
</tbody>
</table>

Winona Welch Award for Botanical Biodiversity Research

Established by funds donated to the Academy by Winona Welch, Ph.D., this award is intended to support biodiversity research (e.g., surveys and systematics) of plants and their allies (e.g., algae and fungi). One award of $2500.00 will be made each year for worthy proposals. Proposals are due February 15; announcement of the award will be made about March 1. Recipients must submit a final written report and make a presentation at the annual meeting of the Academy. All recipients are encouraged to submit a manuscript for publication to the Proceedings of the Indiana Academy of Science. For more details on this program, see below.

https://www.indianaacademyofscience.org/research-grants/winona-welch-award

Great Lakes Fish and Wildlife Restoration Act Funding

Funding Opportunity Number: F21AS00187

The U.S. Fish and Wildlife Service is pleased to announce the availability of funding through the Great Lakes Fish and Wildlife Restoration Act. The purpose of the Great Lakes Fish and Wildlife Restoration Act (GLFWRA) is to assist States, Indian Tribes, nonprofits, and other interested entities to encourage cooperative conservation, restoration and management of the fish and wildlife resources and their habitats in the Great Lakes Basin.

- Estimated Total Funding: $1,790,000
- Award Ceiling: $565,000
- Award Floor: $2,000

Closing Date for Applications: February 16, 2021 for pre-proposals & Regional Project proposals
For additional Information: https://www.grants.gov/web/grants/view-opportunity.html?oppId=330412


If you have difficulty accessing the full announcement electronically, please contact Rick Westerhof at rick_westerhof@fws.gov
136th Annual Academy Meeting (virtual)
March 20, 2021

The Indiana Academy of Science has been an important voice of Indiana science since its inception in 1885. It continues to enjoy a rich tradition of science excellence, as well as a high professional stature with membership that includes many of the state of Indiana's premier scientists and science educators, and graduate and undergraduate students. It will bring together nearly 500 Indiana scientists, science educators and science students to share some of this country's latest developments in scientific research, and practice.


Prepare now to share your research and insight--The Indiana Academy of Science encourages abstracts from Indiana field scientists, academic scientists, industry scientists, science educators, graduate science students, and undergraduate science students whose work could be of interest to Indiana scientists, science educators and science students. Abstracts are approved by the Academy Section Chair before being presented. The Section Chair is the point of contact for Academy members who would like to discuss their abstract before submitting it for review (contact information can found online at http://www.indianaacademyofscience.org). Contact information for technical questions and general questions are found in the Presenter Guidelines, available online in December. Abstracts will be published on the Indiana Academy of Science Website following the 136th Annual Academy Meeting.

General Criteria
• Due to constraints of a virtual meeting, you must be an Academy member to submit an abstract this year.
• The research must be of sufficient scientific importance.
• Abstracts are limited to 300 words.
• Science presenters must register for the 136th Annual Academy Meeting and pay the Annual Meeting registration fee before an abstract can be uploaded. Academy members receive a discount Annual Meeting registration. Update your membership or obtain a new Academy membership for 2021 at https://www.indianaacademyofscience.org.
• All presentations will take place on Saturday March 20, 2021. See guidelines for preparing abstracts and other presentation submission materials at http://www.indianaacademyofscience.org).
• A single individual may submit only one abstract (Science Research or Poster) as the first author. It is expected that this individual will make the presentation.

Technical Requirements
Abstracts must be submitted on the on-line submission form, together with the other required presentation materials found at (http://www.indianaacademyofscience.org)
Profiles: Herman O. Sintim, Ph.D.

Herman O. Sintim is Drug Discovery Professor of Chemistry, Organic Chemistry and Chemical Biology at Purdue University. He received his B.S. in Medicinal Chemistry from University College London. He did his DPhil, funded by an ORS fellowship, in organic chemistry at University of Oxford under Prof. David Hodgson. He held postdoctoral positions at Oxford and Stanford Universities (with Profs. Tim Donohoe and Eric Kool respectively) before joining the University of Maryland at College Park (UMD) in 2006 as an Assistant Professor. In 2012, Herman received tenure and was promoted to Associate Professor. In 2015, he was promoted to the rank of Professor at UMD. In October 2015, Herman was awarded an endowed professorship in drug discovery at Purdue University and moved his group to Purdue. Herman’s research interests include the chemical biology of bacterial virulence and biofilm formation, novel antibacterial and anticancer agents. Dr. Sintim presented a Hot Topic at the 2019 Indiana Academy of Science Annual Meeting, focusing on "potential novel therapeutics for relapsed and refractory leukemia." (Source: 2019 Annual Meeting Program: page 15). Dr. Sintim was interviewed by email in September of this year for this profile and provided the following.

1. Share your scientific journey.
   I studied Medicinal Chemistry at University College London. During my undergraduate period I did a summer internship at SmithKline Beecham Pharmaceuticals, now GlaxoSmithKline and it is during this period that my interest in drug discovery increased. I decided to pursue a PhD in organic chemistry (natural products synthesis) at Oxford to learn how to make complex molecules, with an eye towards becoming a molecule designer in future. Following Oxford, I had a brief stint in industry, only a few months, at Evotec OAI (a drug discovery and development company) in Abingdon, Oxfordshire before deciding that I wanted to become an academic. So, I returned to Oxford as a postdoctoral fellow for two years, working on natural product synthesis and then took a second postdoc at Stanford to do chemical biology research.
   In 2006, I took my first independent position at the University of Maryland, College Park as Assistant Professor in Chemistry and rose through the ranks to become a full professor in 2015 before relocating to Purdue University. As an independent researcher, I have been working on various topics related to bacteria and cancer.

2. Tell us about your current work in science.
   I am currently developing potential therapeutics for relapsed cancer and multi-drug resistant bacterial infections. We are interested in designing small molecules that target kinases, which are very important drug targets for various diseases, especially cancer. We are also developing compounds that activate immune system to fight cancer. Specifically, we are interested in activating innate immune pathway, such as STING pathway.

3. Provide a link to your webpage, social media profile, or any other online resources you’d like to invite members to visit.
   https://sites.google.com/site/sintimgrouphomepage/
News from the Engineering Section: TechPoint SOS Challenge

IRENE REIZMAN (Rose-Hulman Institute of Technology) reports that several Rose-Hulman students participated in the TechPoint SOS Challenge this summer, which brought together students in Indiana in computer science, business, and engineering to address challenges related to the COVID-19 pandemic. A link to the press release from TechPoint is below: https://techpoint.org/2020/08/techpoints-s-o-s-challenge-yields-promising-solutions-to-problems-created-by-covid-19-pandemic/

News from the Earth Science Section:

DARRELL SCHULZE (Purdue University) reports that Version 2.0 of Soil Explorer for iOS was released in July. Soil Explorer is now available on iPhone and iPad (Apple App Store), Android devices (Google Play), and as the SoilExplorer.net website. Soil Explorer provides highly detailed maps of selected soil properties such as soil parent materials and drainage classes overlaid on a detailed hillshade basemap. With Soil Explorer you can explore soil landscapes and geomorphic features, search for ecological sites, see the original extent of the Kankakee marsh on King’s 1852 map, or just browse for fun whenever and wherever you want.

BILL ELLIOTT (University of Southern Indiana) reports that the Indiana Geological and Water Survey has released a series of new trail maps for selected Indiana State Parks. These include new maps for Starve Hollow SRA and Jackson-Washington State Forest, Clark and Jackson-Washington State Forests, Charles C. Deam Wilderness, and Brown County State Park. These trail maps are available from the IGWS Bookstore.

The Indiana Geological and Water Survey launched a new open access serial publication, the Indiana Journal of Earth Sciences, to serve as a top-tier outlet for earth science-related research having regional impact. Articles that present or synthesize data, maps, archives, or methods that relate to the earth sciences in our region, and specifically Indiana, are welcome to submit their manuscripts to this journal. For more information, please see https://igws.indiana.edu/ijes/.

Indiana Plant Photographic Scavenger Hunt 2021

Paul Rothrock & Eric Knox, Indiana University Herbarium

Objective: a first call for participants in a statewide photographic scavenger hunt.

Background: The successful completion of the Indiana University (IU) Herbarium Digitization Project provided public access to its 161,000+ specimens, as well as species-level information and plant identification tools for a modern Flora of Indiana (see midwestherbaria.org). The species-level resources include detailed descriptions, observations from Deam’s Flora of Indiana (1940), distribution maps based on digitized specimens, and for some species, good photographs of living plants that highlight their identifying features. In addition, the website’s Golden Key uses readily observable features and simple terminology to aid users in species identification.

The remaining resource to be added to midwestherbaria.org is good quality diagnostic photographs for poorly illustrated Indiana plant species. For this we need the assistance of scientists and citizen-scientists from throughout Indiana. While some species grow in many parts of the state, many have restricted distributions in certain counties because they are primarily northerly or southerly species, or only grow in specialized habitats, or are simply rare.

Continued on next page.
Call for Participants: Thanks to generous funding from a four-way partnership, including our own Indiana Academy of Science, the IU Herbarium will serve as an organizing center for receiving, processing, and uploading photos to midwestherbaria.org. If you are enthusiastic about nature photography and think you might enjoy contributing to this effort please 1) contact Paul Rothrock (perothro@indiana.edu) to be added to the mailing list; 2) watch for more details at the virtual IAS meeting in March.

Witch hazel (Hamamelis virginiana) provides an example of a complete species page from midwestherbaria.org. It includes a high quality banner photo showing the yellow flower and capsule fruits, additional photos that highlight diagnostic features, descriptions, and a link to the species map.
Straggling St. John’s wort (*Hypericum dolabriforme*), a species limited in Indiana to the Ohio Valley, lacks colored photos of live plants. Instead a series of herbarium specimens is on display.

*Hypericum dolabriforme* Vent.

**Go To Encyclopedia of Life...**  
**Family:** Hypericaceae  
Straggling St. John’s-Wort

Vascular plants of NE US and adjacent Canada

Spreading or ascending perennial 2-5 dm, somewhat woody below, often rhizomatous but the stems clustered; lvs linear to linear-oblong, 2-4 cm, without evident lateral veins; cyrnes compact and few-fld; sep very unequal, the outer pair ovate or broadly lanceolate, 7-12 mm, the others smaller; pet 9-13 mm; stamens 120-200; stigmas 3(4), minute; fr ovoid, 5-8 mm; seeds 1.5-1.8 mm. Limestone outcrops, cedar-glares, etc.; Ky. and s. Ind. to Go. June-Aug.


©The New York Botanical Garden. All rights reserved. Used by permission.
Members of the Indiana Academy of Science are proud to present: **Kitchen Table Science**

The links below are short videos to engage your high school students in science from around the state and beyond! These short videos were produced (or identified) by members of the Indiana Academy of Science, to include Indiana senior scientists, graduate science students and undergraduate science students from multiple science disciplines. The videos are designed to enhance critical thinking skills through the use of scientific method in addressing a problem that has surfaced in a particular science discipline, graphically present the daily use of science, or simply share knowledge about a topic of science that is of major interest today.

**Physics**
- Rotation**al Inertia** with Dr. Patrick Motl, Indiana University-Kokomo
- Regelation Experiment by Dr. Patrick Motl, Indiana University-Kokomo

**Human Biology**
- Forensic Anthropology with students from the University of Indianapolis

**Ecology**
- Paleoe**cological Methods** with Dr. Anthony Swinehart, Hillsdale College

**Graduate Studies**
- A Day in the Life of a Graduate Student with Mary Woodruff, Indiana University

**Undergraduate Research**
- Undergraduate Research: What it is, Why do it, and How to find opportunities? with Undergraduate Members of the Rubenstein Lab, Ball State University

**Resources from the Indiana State Museum**
- Behind the Scenes: Fossils
- Behind the Scenes: The Mann Site
- ISM and Historic Sites At Home

**State Historical Sites**
- Gene Stratton-Porter State Historic Site
- Limberlost State Historical Site

**Astronomy from the Ethos Innovation Center, Elkhart, IN**
- One Degree of Sky Time
- Fun astronomy in the evening
- What is the "ecliptic"? Part 1
- Are all stars the same color?
- How do astronomers make those amazing images?
- Fun astronomy in the morning
- What is the "ecliptic"? Part 2

**Physics Web Resources**
- Waves: An Interactive Tutorial
- Sound: An Interactive eBook
- CRISPR-Cas9 Technology - 2020 Nobel Prize in Chemistry!
- CRISPR: Gene Editing and Beyond
- Expanding the CRISPR Toolbox - Nature Collections
- What is CRISPR? - Paul Anderson, Bozeman Science

Feel free to share these remarkable videos with parents, students, and teachers of high school and middle school students. Channel 4 and Fox News Indy advertisement of **Kitchen Table Science** follows:

https://cbs4indy.com/community-calendar/#!
https://fox59.com/community-calendar/?_escaped_fragment_=show/?start=2020-04-10#!
Fall Council Meeting Minutes
Friday, November 6, 2019, 9:30 a.m.
ZOOM Meeting


AGENDA: Action items requiring Council decision

Academy President Dr. Eric (VJ) Rubenstein presiding

1. Eric (VJ) Rubenstein: President’s Remarks and review of the agenda

2. Sarah Mordan-McCombs, Don Ruch: Awards
   - Sarah Mordan-McCombs moved that the academy consider Dr. Mark Jordan, Associate Professor of Biology, Purdue Fort Wayne, be approved by the Council for an IAS Fellow Award. The motion was seconded by Luke Jacobus. Vote passed unanimously by written vote (8-0).
   
   Background and reminder: Last spring the Awards Committee agreed to send forward for the 2021 Annual Meeting the same name we sent forward for last year’s meeting that was cancelled. We did leave the possibility for additional nominations for the IAS Fellow Award. The Council agreed with our recommendation. Thus, the following names have been sent to the Council as a reminder.
   
   - Distinguished Service Award: Patricia Zeck, retired science teacher from Northwestern High School, Howard County, Indiana
   - Distinguished Scholar Award: Dr. Don G. Ruch, Professor of Biology, Ball State University
   
   Fellow Awards:
   
   - Dr. Delores Brown, Executive Director, Indiana Academy of Science
   - Ellen M. Jacquart, Retired from the Nature Conservancy
   - Dr. James (J.D.) Mendez, Professor of Chemistry, Indiana University-Purdue University Columbus
   - Dr. Darrell G. Schulze, Professor of Soil Science, Purdue University

3. The following proposed amendment to the IAS Bylaws is put forth to the Council; to be brought before the general membership for a vote:

   One of the first recommendations to come out of the DEI Task Force is the formation of a standing elected committee on Diversity, Equity, and Inclusion. Establishment of such a committee will ensure that Diversity, Equity, and Inclusion remain a long-term priority of the Academy.

   VJ Rubenstein moved that the academy amend the IAS Bylaws by bringing the following statement before the general membership for a vote:

   “Diversity, Equity, and Inclusion (DEI) Committee. The DEI committee shall consist of five members elected for rotating three-year terms, plus a council member-at-large as an ex officio member, but without vote. The committee shall design, implement, and oversee efforts to promote diversity, equity, and inclusion in the Academy, and in the Indiana scientific community. The committee shall report regularly to the Council. The motion was seconded by Jessi Haeft and passed unanimously with a written vote (8-0).

The following constitutes a recommended timeline from the Council:

1. In January/February 2021, we will share the proposed addition to the Bylaws with the IAS membership.
2. In March, IAS members will vote on the Bylaws. Normally, such votes would occur at the Annual meeting. However, since the meeting will be virtual, we will work with our Webmaster (Sarah Mordan-McCombs) to arrange a vote through the website (as we do for elected Academy positions)
3. Assuming the membership votes to approve, it will be too late to organize an election for the 2021-2022 cycle. Therefore, the current President (VJ Rubenstein) will work with our President-Elect and ascending President (Paul Doss) to appoint five members to the Task Force (two for a 1-year term, two for a 2-year term, and one for a 3-year term).
4. In March 2022, the Academy will elect two members to the task force; two 1-year appointees will leave the task force.
5. In March 2023, the Academy will elect two members to the task force; two 2-year appointees will leave the task force.
6. In March 2024, the Academy will elect one member to the task force; one 3-year appointee will leave the task force.

**Actions needed:** Bring the motion to vote before the IAS membership.

4. Luke Jacobus and Sarah Mordan-McCombs suggest changes or information is needed for interacting with membership, *especially to create ‘constant contact.’* For example eliciting Facebook likes, issues with e-mail spam filter issues, engagement with the website and having an idea of how many people read the newsletter. It was suggested that sectional leadership be invited to contribute posts to social media outlets.

   a. **Action item:** Sarah Mordan-McCombs will look into adding a social media widget to the website to attract more attention to IAS social media.

5. J.D. Mendez gave a summary on grant applications. There were 11 proposals submitted, representing only three universities. It was emphasized that greater outreach needs to occur.

   **No action item created.**

6. Dr. Delores Brown announced the 136th Annual Academy Meeting. A preliminary plan will be available in early November through the meeting vendor, Glisser (online meeting vendor). Council members are encouraged to attend the Glisser meetings on November 11th and 12th (Dr. Brown will send a zoom link via email). A final plan will be completed by November 20th after discussion with the vendor and sectional leadership.

   a. Dr. Delores Brown advised that compressing the meeting may include the amount of time for speakers, availability of posters before the meeting, oral presentation videos posted prior and during the meeting, and potential turbo (elevator) talks instead of a live presentation of research. Many guidelines will be designed to make it easy for attendees to access despite technological skill. Dr. Delores Brown asked for recommendations on how to give awards in this new setting to ensure our awardees are properly honored. Dr. Delores Brown also asked for advice on the membership summit where the gavel is usually passed to the next president.

   b. **Sarah Mordan-McCombs has recommended the awards be pre-recorded, that the Bylaw vote be taken in advance, and the gavel be passed ahead of time on video and played for the membership.**

      i. It was suggested to make the video for the passing of the gavel be creative and fun.

7. VJ Rubenstein thanked the Youth Activities Committee and recognized that Michael Finkler shared a budget document. There was no official report for today. Checks were sent for grant funds and grant coordinators were contacted.

8. Michael Finkler thanked Dr. Delores Brown for securing a large grant to allow younger scientists to participate in the meeting this year.
9. Dr. Delores Brown mentioned that the J.W. Marriott has been in touch asking about the annual meeting for 2022. The council suggested waiting to find out how successful an online meeting could be after we experience it in 2021.

10. The Council had a brief discussion on former academy presidents. The Diversity, Equity, and Inclusion (DEI) Task Force is drafting an expanded formal DEI position statement. It was suggested that this statement include an acknowledgement of our history as it emphasizes our current values and who we aim and desire to be.

11. Marc Milne informed the Council that the Bioblitz will likely be staggered next year over a short timeline for sampling to prevent congregations of people for COVID purposes.

VJ Rubenstein adjourned the meeting at 10:51 AM.

---

**Member Spotlight: Luis A. Palacio, P.E., Ph.D.**

Luis is Executive Director and CEO of Health & Science Innovations, Inc. He is a Licensed Professional Engineer in the state of Indiana and a Bio-Physicist. He holds a B.S. in Mechanical Engineering from the University of Puerto Rico, Mayaguez, and a Ph.D. in Physics from Purdue University. As an engineer he worked for General Electric Power Conversion at their Global Engineering Headquarters for over 4 years, and at Alivio Medical Center for over 2 years. As a scientist he is currently leading an investigation that studies changes in molecular structure of proteins that are associated with lung diseases and blood clotting. He has conducted research at Oak Ridge National Laboratories, Argonne National Laboratories, and IUPUI. Luis has more than 3 years of combined experience as an educator at the undergraduate level and at the high school level. Luis has been a consultant for GE Electric Power Conversion, Uncommon Engineering, National Institutes of Health, VoCare, and MedDiary. After 2 years of serving as Director of Programs and Research, Luis now serves as Executive Director and CEO of Health & Science Innovations, Inc.; an Indiana based non-for-profit 501c3 organization serving the community through education and innovation. Luis is actively engaged in the community directly serving in various advisory boards, teaching, mentoring and using his engineering skills to design solutions to workforce development, poverty, diversity, and other challenges that affect society. (source: The Society of Hispanic Professional Engineers, Indiana Chapter. http://www.shpe-indiana.org). Dr. Palacio was interviewed by email in September of this year and provided the following.

1. Share your scientific journey.
Since I was a kid, learning about the amazing discoveries done during the era of great philosophers (pre-science), was always fascinating to me. As I progressed in school and took science and math classes I felt a stronger desire to pursue a career where I could invent (or innovate) and discover. With this guiding principle and with exposure to role models like Astronaut Franklin Chang-Díaz and learning about heroes like Albert
Einstein I ventured into starting my career path as a Mechanical Engineer (which I viewed as applied science). After my first year working for General Electric I felt the urge to continue my studies, but this time pursuing a B.S. in Physics (part time). After completion of my B.S. in Physics, I decided to pursue graduate studies in Physics full time and pursue research in Biophysics. During my graduate studies I worked on two main projects:

- **Study of the statistical mechanics theoretical aspect of Protein Folding using knowledge based potentials as applied to coarse-grain protein models.** The purpose of this type of research is to improve the level of predictability of the structure and function that a chain of amino-acids will adopt. This would then lead to applications in medicine, agriculture, and space travel for example.

- **Experimental study of protein structures under different physical conditions that test the stability of the native conformation of the subject proteins.** Experiments were conducted at Oak Ridge National Laboratories, and at Argonne National Laboratories using Small Angle Neutron Scattering, and Small Angle X-Ray Scattering instruments. This type of research aims at contributing to the fields of medicine, pharmaceutics, physical chemistry, radiation therapy, radiation protection, and protein energetics.

In addition to the research I was conducting during my graduate studies, I was awarded a NSF GK-12 Fellowship for two years, where I was placed in a local high school to co-teach with a STEM teacher and bring my research into the classroom. At that time I realized that much more needed to be done within the educational system to provide more and better STEM opportunities for our children and youth. With this in mind, I started looking for opportunities to volunteer in the community and schools. That search led me to starting a job with my current employer: Health & Science Innovations. A philanthropic organization that would allow me to keep doing my line of research, to continue to practice engineering, and have an impact in our community through STEM education.

**2. Tell us about your current work in science.**

I continue to do research studying protein structure, protein interaction with other plasma molecules (e.g., lipid membranes, cholesterol), and protein energetics (i.e. developing models that connect observed protein deformations to changes in chemical potential, or energy of radiation, or osmotic pressure). I serve as an advisor and mentor to students for a variety of short term research and innovation projects. STEM education is a large component of the work I do today, serving thousands of children with various programs aimed at providing high quality authentic STEM experiences. STEM outreach and opportunities is another area of work that I am engaged in to increase the diversity and pipeline of STEM talent within Indiana. I have joined the IAS Diversity Equity and Inclusion Task Force where I am leading the subcommittee on strategic planning.

**3. Provide a link to your webpage, social media profile, or any other online resources you’d like to invite members to visit.**

www.linkedin.com/in/Luis-A-Palacio-PE  
www.scienceinnovations.org  
www.facebook.com/healthscienceinnovations  
www.twitter.com/HS_Innovations  
www.instagram.com/HS.Innovations
**Member Honors: Arden Lee Bement, Jr., Ph.D.**

Indiana Academy of Science Past President (2014) Dr. Arden Lee Bement Jr., was recently awarded the Arthur M Bueche Award (2020) by the National Academy of Engineering, for contributions to science and technology advancement, international relationships, policy development, and Academies studies, from executive positions in government, industry, and academia.

He commented: “I believe that my service with the Indiana Academy of Science was a factor in my selection.”

**Biography.** Dr. Arden L. Bement Jr. is the David A. Ross Distinguished Professor Emeritus of Nuclear Engineering in the College of Engineering, Purdue University. He began his academic career with adjunct professorships from the University of Washington and Oregon State University at the Hanford Graduate Center in Richland, Washington (1960–70). From 1970 to 1976 he was a professor of nuclear materials at MIT with joint appointments in the Departments of Nuclear Engineering and Materials Science and Engineering.

He began his tenure at Purdue University in 1993 as the Basil S. Turner Professor of Engineering with joint appointments in the Metallurgical Engineering and Electrical and Computer Engineering Departments. He was later head of the School of Nuclear Engineering (1998–2001) and chief global affairs officer (2010–12). He also held courtesy appointments in the School of Industrial Engineering and the Krannert School of Management.

During his academic career he directed three university-wide research programs: the Fusion Technology Research Program at MIT and, at Purdue University, the Midwest Consortium for High-Temperature Superconductivity (1993–98) and the Global Policy Research Institute (2010–12). He also served as a member of the board of visitors for the National Intelligence University (2012–18), a trustee of the Skolkovo Institute for Science and Technology in Moscow (2012–15), and member of the US-USSR Bilateral Exchange in Magneto-hydrodynamics (1973–75).

He held appointments under six presidents: director of the Office of Materials Science, DARPA (1976–80), deputy undersecretary of defense for research and advanced technology (1979–80), and director of the National Institute of Standards and Technology (2001–04) and National Science Foundation (2004–10).

He served in the US Army Corps of Engineers (1954–92) following his commissioning as a 2nd lieutenant at the Colorado School of Mines until his retirement as lieutenant colonel. He was a councilman and mayor pro tem for the city of Richland (1968–70). On behalf of the US State Department he served on the US National Commission for UNESCO as co-chair of the Science and Technology Committee (2004–09), and he was a participant in US delegations to OAS science and technology meetings in Lima (2004), Mexico City (2008), and Panama City (2011); member of the USAID mission to Thailand (1983); head of the US delegation to the dedication of the King Abdullah University for Science and Technology, Saudi Arabia (2010); and US signatory for bilateral exchanges with Norway and France (2008–09). On behalf of the UN International Atomic Energy
Agency he was technical advisor for both the National Research Council of Taiwan and the National Institute of Atomic Energy, Mexico (1970–75).

In his industrial career Dr. Bement was a senior research fellow at the AEC Hanford Laboratories operated by General Electric Company (1954–65), manager of the Metallurgy Research Department and Fuels and Materials Department at the Pacific Northwest National Laboratory operated by the Battelle Memorial Institute (1965–70), and vice president for technical resources and chief science and technical officer for TRW (1980–93). He has also held board directorships at the Keithley Instrument Company (1984–97), the Lord Corporation (1987–2001), and Radian Research Inc. (since 2011).

For his achievements in government, industry, and academia, Dr. Bement has received several national and international honors and distinctions. He received the White House Distinguished Federal Executive Award (1980), the Department of Defense Distinguished Civilian Service Medal (1980), and the Department of Commerce William C. Redman Award (1995). He is a member of the National Academy of Engineering and the American Academy of Arts and Sciences, and a fellow of the American Association for the Advancement of Science. Over his 37 years of membership in the NAE, he has been active in a variety of capacities. He chaired the NRC Materials Advisory Board and the Commission for Engineering and Technical Studies (1986–92) and participated in 21 study committees, of which he chaired or cochaired 8 and served as report review monitor for 3.

He has received honorary doctorates from seven universities in the United States, Korea, and China. He was inducted as an honorary member of the graduate faculty at the Chinese Academy of Sciences (2008), awarded the Order of the Rising Sun with Gold and Silver Star by the emperor of Japan (2009), the Order of the Legion of Honor with rank of chevalier by the president of France (2011), and Chieftain of the Sagamores of the Wabash by the governor of Indiana (2012).

He holds an engineer of metallurgy degree from the Colorado School of Mines, and a master’s degree from the University of Idaho and PhD from the University of Michigan, both in metallurgical engineering.

**Antibiotic Resistant Bacteria at the EcoLab: An Urban Wetland Ecosystem**

_Azeem Ahmad, PhD, Assistant Professor, Biology and Samina Akbar, PhD, Associate Professor, College of Osteopathic Medicine, Marian University, Indianapolis_

A rapid emergence of antibiotic resistant bacteria has been occurring globally, making currently used antibiotics ineffective in treating commonly encountered infections. Doctors rely on effective antibiotics to treat common bacterial infections. Though, in the last decade or so, it has become apparent that the current rate of use, misuse and overuse of antibiotics will render many of these therapeutics useless, making bacterial infections a threat of worldwide significance. In order to effectively treat common bacterial infections, it is imperative that doctors can rely on a constant supply of new and effective drugs through a large pharmaceutical research effort. Unfortunately, despite many bacteria posing an urgent and serious threat,
new drug discovery and development by pharmaceutical companies have become stagnant due to minimal economic incentives and strict regulatory control. Under these circumstances, determining key components which control the occurrence and transmissibility of antibiotic resistance is critical. Though healthcare acquired infections (HAIs) make the top of the list as focal points of the antibiotic resistant bacteria, current data are quite limited in determining the extent of the spread of antibiotic resistance in natural environments.

The Indiana State Department of Health (ISDH) implemented an action plan in 2018, to combat HAIs and antibiotic resistance [https://www.cdc.gov/hai/pdfs/stateplans/in-p.pdf](https://www.cdc.gov/hai/pdfs/stateplans/in-p.pdf). The comprehensive plan dovetails with national response to antibiotic resistance and includes every aspect from developing infrastructure, to training and educating personnel, conducting surveillance and providing timely response to outbreaks or threats from antibiotic resistance. In order to be part of these national and state-level efforts, an antibiotic resistant bacteria project at Marian University (ARBP-MU) was initiated in 2019. The research project is ongoing and is being conducted with the help of undergraduate and graduate students in the authors’ laboratory. The objective of this research is to gather data on the prevalence and distribution of ARBs in the urban wetland ecosystem, with initial sampling at EcoLab located on the campus of Marian university. This survey is important in determining the full extent of state-wide distribution of antibiotic resistance at a time when ARBs are posing a threat to the state’s medical programs and economic resources.

Following the initial ARB surveys in wetland sites near Indianapolis in 2019-2020, subsequent studies are planned over next three years to accomplish the following:

1. Compare preliminary ARBs data collected and analyzed from several sites characterized as potential reservoirs for the State level surveys.

2. Collaborate with other ongoing studies to confirm the extent of ARBs spread to areas previously not known to be reservoirs and determine the true extent of the ARBs problem.

3. Analyze factors contributing to the spread of ARBs and establish a long-term surveillance plan for undisturbed or so-called “pristine” wetland environments.

4. Develop novel in vivo molecular methods for rapid enumeration of target ARB groups identified from the initial studies.

The project provides invaluable experience and learning opportunities to student researchers at Marian University, Lauren Blair, Ranu Verma, Stephanie Brown, Madison McReynolds, Jane Pangburn and Kelsey Ramp who are currently working on the project. These students, who have not had similar level of research experience before this opportunity are enthusiastic about continuing their research into 2021. It is to be noted that research allows these students to learn new skills in experiment design, use scientific logic, analyze data and – thereby – do independent research acquiring laboratory skills beyond classroom.
Search for collaborators: trans-phylogenetic evidence-based paleopathology

Bruce Rothschild <spondylair@gmail.com> has a broad spectrum of endeavors with which he would like to interest potential collaborators. Ongoing research includes, but is not limited to:
1. Dinosaur growth.
2. Cranial (not brain) circulation patterns
3. Establishing evidential base for recognition of tumors in the archeological and geological record
4. Behavior patterns in birds as possible explanation of arthritis patterns
5. Validating techniques utilized in paleopathology and physical anthropology
6. Assessing evidential support for long standing, but previously untested perspectives/speculations in physical anthropology and paleopathology.

Representative Publications from past 12 months:
Cruzado-Caballero P, Diaz-Martinez I, Rothschild B, Bedell M, Pereda-Suberbiola X. A limping dinosaur in the Late Jurassic: Pathologies in the pes of the neornithischian Othnielosaurus consors from the Morrison Formation (Upper Jurassic, USA). Historical Biology Doi: 10.1080/08912963.2020.1734589
Rothschild BM, Jellema L. Periosteal reaction recognition and specificity assessed by surface microscopy Intl J Osteoarchaeol Doi: 10.1002/oa.2864
Rothschild BM. Camelot: There once was a more congenial spot, but the times they are a‘changing. The Rheumatologist (in press).
Rothschild BM. Rheumatology is exiting the age of “can we” (we certainly can) and now must entertain the question “should we”? Arthritis Care Res 2020;72(9):1340-1341.
Rothschild BM. Lumbar spondylosis. 2020 https://authoring.medscape.com/content/249036/view/print-view
Rothschild BM. Diffuse idiopathic skeletal hyperostosis: Addressing confusion with ankylosing spondylitis/spondyloarthropathy. SN Comprehensive Clinical Medicine, 2(8), 1141-1144. Doi: 10.1007/s42399-020-00406-w


Rothschild BM. Surface magnification, a sixth window to recognition and attribution of structural alterations in the recent, archeologic and geologic record. Proc Indiana Acad Sci 2019;28(2):231


Rothschild B, Zdilla M, Jellema L, Lambert H. Cribra orbitalia is a vascular phenomenon unrelated to marrow hyperplasia or anemia: Paradigm shift for cribra orbitalia. Anat Rec Doi: 10.1002/ar.24561


Procedures for Nomination of Individuals for IAS Fellows

The Awards Committee of the Indiana Academy of Science accepts nominations any time of the year. Forms for Fellow may be found at http://www.indianaacademyofscience.org/award-fellows. Please keep in mind that Recommendations for Academy Fellows are put forth by Fellows of the Academy only. Recommended nominees must be current members of the Indiana Academy of Science. Please direct questions or send nominations to: <awards@indianaacademyofscience.org>.

Find us on Facebook Please like us at https://www.facebook.com/IndianaAcademyOfScience/.

UPCOMING NEWSLETTER DEADLINES

Send items to the Editor, Luke M. Jacobus, Imjacou @ iupuc.edu

- Feb 1 for February 2021
- April 15 for May 2021
- Aug 15 for September 2021
- Nov 15 for December 2021