

## 2020 Spring Semester Research Newsletter

**Foreword:** The 2020 spring semester was affected by the COVID-19 pandemic. UNLV transitioned to remote instruction on March 23 and the campus was closed shortly afterwards. The research at College of Sciences (COS) also entered the remote mode. The pandemic has influenced the research of everyone. Our faculty, postdocs and students have tried to continue research within their capacity. This newsletter highlights these achievements during this difficult time.

### COVID-19-related Research Activities:

- A team of College of Sciences faculty, graduate students & staff have made Viral Transport Medium (VTM) for COVID-19 test kits for the Southern Nevada Health District using UNLV research infrastructure. In total, the team has now made 117 liters of VTM(S) for our state, or 39,000 tubes (for 39,000 test kits). The UNLV medium has been used to test the most vulnerable in our county/state (those without insurance, etc). It is also routinely used by Southern Nevada Health District (SNHD) strike teams that go out into heavily affected areas, prisons, nursing homes, etc. All the members of the team are volunteers who have not received any financial support. The team includes:

- **From School of Life Sciences:**

- **Helen Wing** (Prof - Leader)
- **Monika Karney** (Wing lab manager - co-leader)
- Holly Martin (Grad Student)
- Tatiana Ermi (Grad Student)
- Shrikant Bhute (Post-doc)
- Isis Roman (Undergrad)
- Boo Shan Tseng (Asst Prof)
- Cody Cris (Undergrad/Future Grad)



- From Department of Chemistry and Biochemistry

- **Ernesto Abel-Santos** (co-leader)
- Naomi Okada (Grad Student)
- Jacqueline Phan (Grad Student)
- Amber Consul (Grad Student)
- Chandler Hassan (Grad Student)
- Lara Turello (Grad Student)
- McKenzie Washington (undergrad)



- From School of Medicine:

- James Clark (Med student)
- Michael Briones (Med student)
- Liz Groesbeck (Med student)
- Anita Albanese (Med student)

- Faculty throughout the COS donated crucial equipment to local medical community during COVID-19 pandemic:

- **Simon Jowitt** (geoscience) donated surgical and N95 masks to a local hospital.
- **Boo Shan Tseng** (life sciences) donated gloves to the Cystic Fibrosis Center of Southern Nevada and to Sunrise Hospital.
- **Aude Picard** (life sciences) donated gloves to Sunrise Hospital.
- **Pamela Burnley** (geoscience) donated face shields, booties and gloves to Sunrise Hospital.
- **Ernesto Abel-Santos** (chemistry and biochemistry) donated gloves and disinfectants to the UNLV Student Health Center and the Las Vegas Metropolitan Police Department.
- **Laurel Raftery** (life sciences) donated gloves to the UNLV Student Health Center.
- The College of Sciences **Dean's office** donated 500 masks to the UNLV Student Health Center.
- Systems in the **Department of Physics and Astronomy** that are idle have been contributing computer processing time to Folding@Home coronavirus simulations.
- **Brenda Buck** and **Rod Metcalf** (geoscience) donated protective equipment that included a powered air-purifying respirator, reusable respirators, half mask and full mask protection with numerous particulate filters, full body protective suits, booties, goggles, and N95 and N100 masks.

- **Simon Jowitt** (Department of Geoscience) conducted research on the impact of COVID-19 on global mining industry. He published a paper in [SEG Discovery](#) on this subject, and gave an [online presentation](#) on this subject.



- Research has been done utilizing equipment in the [UNLV Genomics Core Facility](#). **Daniel Gerrity**, who holds dual positions as an Associate Professor in the Department of Civil and Environmental Engineering and Construction in the Howard R. Hughes College of Engineering at UNLV and Principal Research Scientist at the Southern Nevada Water Authority, and his postdoctoral research associate, **Katerina Papp**, conducted wastewater surveillance of the genetic fingerprint of SARS-CoV-2 in Las Vegas sewersheds with the goal of raising awareness of how environmental surveillance through wastewater analysis can be used as a public health tool to monitor the prevalence of SARS-CoV-2 in communities. Their research and findings, which were supported through use of instrumentation in the UNLV Genomics Core Facility, were presented by Gerrity on May 21st during a virtual Congressional Briefing, hosted by the Water Research Foundation (WRF).



## Newly Awarded Major Research Grants (>\$100,000):



1. **Shichun Huang**, (Geoscience) received award from [National Science Foundation](#) Faculty Early Career Development (CAREER) Program with a total budget **\$558,238**. This project, titled “Petrogenesis of Hawaiian lavas; Constraints from metal stable



isotopes”, will focus on understanding the source of the magmas that erupt in Hawaii. Hawaiian volcanism is often used as the best example of magmatism formed by the rise of a mantle plume from deep in

the Earth's interior. In this study, Huang sets out to use several state-of-the-art geochemical and isotopic tracers to understand the evolution of Hawaiian volcanism, and its implications for the mantle plume hypothesis. He also plans a summer education program focusing on analytical geochemistry, which complements the existing strong field-oriented research and education activities in the Geoscience Department at UNLV. research grant from the. This program will acquire a Multicollector Inductively Coupled Plasma Mass Spectrometer (MC-ICP-MS) which will provide high-precision isotope measurements of multiple elements that may be found in minute quantities and support on-going research in the broad field of Earth, environmental and planetary science at UNLV.

2. **Brenda Buck** (GeoScience) had a **\$1.4** million grant funded to Forest Inventory and Analysis Information Management Research (UNLV-FIA).



3. **Bethany Coulthard** (GeoScience) received a grant (\$125,981) from **National Science Foundation** Paleo Perspectives on Climate Change program titled "Spatiotemporal variability in western United States snowpack during the Common Era".



4. **Elisabeth (Libby) Hausrath** (GeoScience) was selected as one of ten Returned Sample Participating Scientist on the **NASA's** Mars2020 mission. She has received multi-year funding star starting from fall 2019. The Mars2020 mission is a historic mission to Mars to find evidence of life on the red planet. It will be the first time a sample of rocks and soil from Mars will be brought back to earth. The mission is launched by the end of July 2020.







5. **Cory Rusinek** and **Art Gelis** (both Chemistry and BioChemistry, Radiochemistry program) received a grant (\$480,000) from **Department of Energy** Nuclear Energy Nuclear Programs titled "Single- and Polycrystalline Diamond Electrodes for Spectroelectrochemical Characterization of Various Molten Salts". The project centers around using Boron Doped Diamond electrodes to study corrosion potential in molten salt reactors



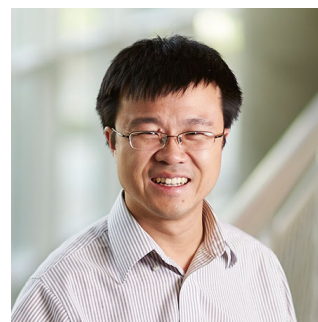
6. **David Hatchett** (Chemistry and Biochemistry) received a grant (\$186,897) from **Mission Support and Test Services (MSTS)** titled "Oxidation of UF<sub>6</sub> from Ionic Liquid". The project will utilize electrochemical oxidation of UF<sub>6</sub> dissolved in IL to regenerate the volatile species for analysis.



7. **Hong Sun** (Chemistry and Biochemistry) received a three year **National Institutes of Health (NIH)** grant from the National Cancer Institute with a total budget \$437,152. The title of the proposal is "Novel Regulation of the Activation and Assembly of the Heterimeric Receptor Tyrosine Kinase Complexes for Cell Signaling".







8. **Zhaohuan Zhu** (Physics and Astronomy) and graduate student **Shangjia Zhang** received a three-year grant from **NASA** in the Future Investigators in NASA Earth and Space Science and Technology (FINESST) program to fully support Zhang's research on "Self-consistent Dust and Thermal Structure in 3-D Protoplanetary Disk Models: Constraints on Disk and Young Planet Properties" for three years. Another graduate student **Ian Rabago** received the NV Space Grant Graduate Fellowship for the 2020-2021 academic year under the supervision of Zhu.
9. **Simon Jowitt** (Geoscience) received a **\$37,500** grant titled "GR10449 Tellurium Supply Potential from Gold Tellurides".



### High-impact publications:

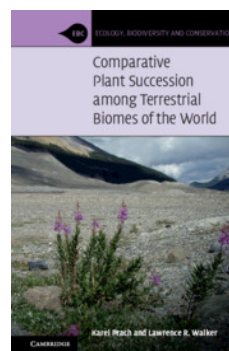
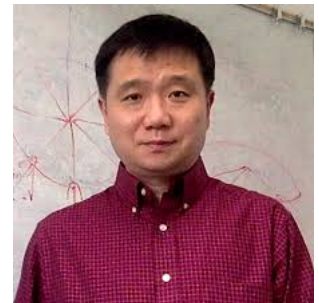
1. **Gary Kleiger** (Chemistry and Biochemistry) published one paper in **Nature** (2019 impact factor = 42.78) titled "NEDD8 nucleates a multivalent cullin-RING-UBE2D ubiquitin ligation assembly". He and collaborators also published one paper in **eLife** (2019 impact factor = 7.08) titled "Robust cullin-RING ligase function is established by a multiplicity of poly-ubiquitylation pathways".
2. **Brian Hedlund** (School of Life Sciences) published three high-impact papers. The first one is "A High-Fat/High-Protein, Atkins-Type Diet Exacerbates Clostridioides (Clostridium) difficile Infection in Mice, whereas a High-Carbohydrate Diet Protects" published in **mSystems**, which was chosen as "Editor's Pick". The second one is "Function-driven single-cell genomics uncovers cellulose-degrading bacteria from the rare biosphere" published in the **ISME Journal** (2019 Impact factor = 9.18). The third one is "Roadmap for naming uncultivated Archaea and Bacteria" published in **Nature Microbiology** (2019 Impact factor = 15.54).



3. **Artem Gelis** (Chemistry and BioChemistry) Art Gelis has been recognized for his article, "[Closing the Nuclear Fuel Cycle with a Simplified Minor Actinide Lanthanide Separation Process \(ALSEP\) and Additive Manufacturing](#)" which was among the top 20 downloaded chemistry papers for *Scientific Reports* in 2019. The recognition carries the designation of [Top 100 in Chemistry in Nature Research](#). The paper was downloaded 2,717 times. *Scientific Reports* published more than 688 chemistry papers in 2019.
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4. **Donald Price** (School of Life Sciences) published one paper "[A Whole-Genome Scan for Association with Invasion Success in the Fruit Fly \*Drosophila suzukii\* Using Contrasts of Allele Frequencies Corrected for Population Structure](#)" in *Molecular Biology and Evolution* (Impact factor = 11.062).
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5. **Matthew Lachniet** (GeoScience) published a paper titled "[Initiation of a stable convective hydroclimatic regime in Central America circa 9000 years BP](#)" in *Nature Communications* (Impact factor = 12.121).
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6. **Simon Jowitt** (GeoScience) published two papers in high-impact journals: "[Reviewing the material and metal security of low-carbon energy transitions](#)" in *Renewable & Sustainable Energy Reviews* (Impact factor = 12.110), and "[Arc-Type Magmatism Due to Continental-Edge Plowing Through Ancient Subduction-Enriched Mantle](#)" in *Geophysical Research Letters* (Impact factor = 4.339, Nature index journal).
7. **Pengtao Sun** (Mathematical Sciences) published two papers with his student/collaborator in two top journals in mathematics: "[A monolithic arbitrary Lagrangian-Eulerian finite element analysis for a Stokes/parabolic moving interface problem](#), Rihui Lan, Pengtao Sun, *Journal of Scientific Computing*" published in *Journal of Scientific Computing* and "[Energy-preserving finite element methods for a class of nonlinear wave equations](#)" published in *Applied Numerical Mathematics*.
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8. **Helen Wing** (School of Life Sciences) published one paper "[The Antiactivator of Type III Secretion, OspD1, Is Transcriptionally Regulated by VirB and H-NS from Remote Sequences in Shigella flexneri](#)" in *Journal of Bacteriology*.
9. **Ernesto Abel-Santos** (Chemistry and Biochemistry) published one paper "[A High-Fat/High-Protein, Atkins-Type Diet Exacerbates Clostridioides \(Clostridium\) difficile Infection in Mice, whereas a High-Carbohydrate Diet Protects](#)" in *mSystems*.
10. **Daniel Proga** (Physics and Astronomy) and his team published one paper "[Clumpy AGN Outflows due to Thermal Instability](#)" in *The Astrophysical Journal Letters* (Impact factor = 8.374, Nature index journal).
11. **Bing Zhang** (Physics and Astronomy) published an invited "News and Views" paper titled "[Unexpected emission pattern adds to the enigma of fast radio bursts](#)" in *Nature* reporting the discovery of periodicity in a fast radio burst. He also wrote an invited "Comment" titled "[Synchrotron radiation in γ-ray bursts prompt emission](#)" in *Nature Astronomy* (2019 impact factor = 10.500).
12. Emeritus professor **Lawrence "Lars" R. Walker** (School of Life Sciences) recently published a book, [Comparative Plant Succession among Terrestrial Biomes of the World](#), which provides a comparative approach to plant succession among all terrestrial biomes and disturbances, helping to reveal generalizable patterns.





## Featured research:

1. COS faculty members spoke to the media on various aspects regarding COVID-19:

- **Brian Hedlund** (Life Sciences) was interviewed along with four other panel members to discuss “Testing, Drug Discovery, Infectiousness, and more” at a Virtual Press Conference with a [News\(Wise\)](#) Live Expert Panel. He also spoke to [Healthline](#) about how to clean and kill COVID-19 without using harsh chemicals.



-**Michael Pravica** (Physics and Astronomy) explained a concept of possibly using X-rays to develop virus vaccine, see [News 3 Las Vegas](#) and [Gaudian Liberty Voice](#).

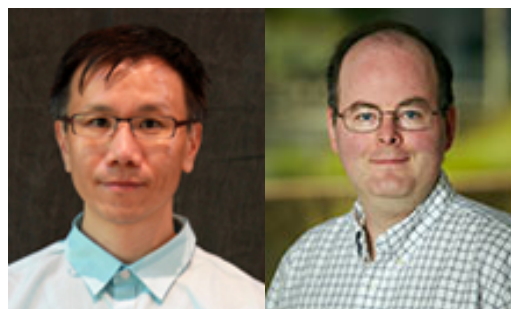
-**Jason Steffen** (Physics and Astronomy) discussed how coronavirus may change the way people board airplanes, see [Daily Star](#) and [BBC](#).



2. **Elisabeth (Libby) Hausrath** (GeoScience) was selected as one of ten Returned Sample Participating Scientist on the NASA's Mars2020 mission. The Mars2020 mission will be a historic mission to Mars to find evidence of life on the red planet. It will be the first time a sample of rocks and soil from Mars will be brought back to earth. The mission will be launched on July 30, 2020 and land on Mars in February 2021. Dr. Hausrath's contribution to the mission has been widely reported. See: [KNPR](#), [KTNV](#), [Las Vegas Review Journal](#), and [News\(Wise\)](#).



3. **Jun Yong Kang** and **Paul Forster** (both Chemistry and Biochemistry) have been awarded a [patent](#) for the invention “N-Heterocyclic Phosphines.” The chemical reagents, N-Heterocyclic Phosphines, enable a rapid synthesis of potential bioactive phosphorus-containing compounds and active pharmaceutical ingredients (API) under toxic metal-free conditions.



4. The study of **Matthew Lachniet** (GeoScience) on the outsized influence of ocean temperatures on central American climate was reported in [ScienceBlog](#) and [ScienceDaily](#) after being published in Nature Communications. He also discussed “what happens in Vegas, may come from the Arctic” at [Phys.org](#) and [ScienceDaily](#), and [EurekAlert](#). His study on ‘worst case’ climate scenario for Nevada was reported in [Las Vegas Review Journal](#).
5. **Arya Udry** (GeoScience) wrote an article for [The Conversation](#) titled “Meteorites from Mars contain clues about the red planet’s geology”. See also [RocketSTEM](#).
6. **Daniel Proga** (Physics and Astronomy) and his team’s theoretical work “why clouds form near black holes” was feature in [NASA](#) press release.
7. One Nature paper reported the discovery of a periodic fast radio burst. **Bing Zhang** (Physics and Astronomy) commented on the significance of this discovery, see [DailyMail](#), [NewScientist](#), and [Express](#). Also his [paper](#) published in The Astrophysical Journal Letters was feature in [AASNova](#).
8. **Jason Steffen** (Physics and Astronomy) wrote an article for [The Conversation](#) titled “How Europe’s CHEOPS satellite will improve the hunt for exoplanets” and discussed the current and future exoplanet missions at [WGN Radio 720](#).
9. The study of **Brian Hedlund** (Life Sciences) and **Ernesto Abel-Santos** (Chemistry and Biochemistry) on clostridioides difficile bacteria and high-fat, high-protein meals was reported in multiple media such as [The Medical News](#), [EurekAlert](#), [ScienceDaily](#), [News\(wise\)](#), [Devdiscourse](#), [MDIndia](#), and [NDTV Food](#).
10. **Wanda Taylor** (GeoScience) spoke to [News 8 Now](#) to discuss how Tonopah earthquake raises questions of seismic safety in Las Vegas valley.
11. **Simon Jowitt** (GeoScience) discussed whether we are ready to recycle the “rare earths” behind an energy revolution at [ars Technica](#).



## Awards and Recognition:

### Faculty Awards and Recognition:

1. **Ashkan Salamat** (Physics & Astronomy) received the Nevada System of Higher Education **Regents' Rising Researcher Award**.
2. **Bing Zhang** (Physics and Astronomy) received **UNLV Distinguished Professor Award**.
3. **Brian Hedlund** (Life Sciences) received **UNLV Barrick Distinguished Scholar Award**.
4. **Shichun Huang** (GeoScience) received **UNLV Barrick Scholar Award**.



5. **Gabriel Judkins** (GeoScience) received **Alex G. and Faye Spanos Distinguished Teaching Award**.



6. **Kathleen Robins** (Chemistry and Biochemistry) received **CSUN Faculty Achievement Award**.

7. **Eduardo Robledo** (Life Sciences) received **UNLV Academic Advisor Award**.



8. **Kevin McVay** (College of Sciences Advising Center) was honored **UNLV Outstanding New Advisor**.



9. **Martha Schumacher** (College of Sciences) received **COS Distinguished Professional Staff Award**.



10. **Balakrishnan Naduvalath** (Chemistry and Biochemistry) received **COS Distinguished**



## Researcher Award.

11. **Wanda Taylor** (GeoScience) received **COS Distinguished Teaching Award**.
12. **Helen Wing** (Life Sciences) received **COS Distinguished Service Award**.
13. **Zhaohuan Zhu** (Physics & Astronomy) was appointed as the **editor for the Publications of the Astronomical Society of Japan** (PASJ), an international journal established in 1949.

## Student Awards and Honors:



1. **Cindy Kha** (Life Sciences, advisor **Kelly Tseng**) received **President's UNLV Foundation Graduate Research Fellowship**.



2. **Francisco Valenzuela** (Life Sciences) received **UNLV Student Service Award**.



3. **Alex Newsom** (Geoscience) received **Lance and Elena Calvert Award for Undergraduate Research**.



4. **Rachel Rahib** (Geoscience, advisor **Arya Udry**) received **UNLV Outstanding STEM Thesis Award**.



5. **Joshua Sackett** (Life Sciences, advisor **Brian Hedlund** and **Duane Moser**) received **UNLV Outstanding STEM Dissertation Award**.



6. **Bhagya De Silva** (Chemistry and Biochemistry, advisor **Ron Gary**) received **UNLV Outstanding Graduate Student Teaching Award**.