

# Preparing the problem-solvers of tomorrow

Appalachian State University serves NC by advancing research, knowledge and innovation



Dr. Baker Perry, National Geographic Explorer and professor in App State's Department of Geography and Planning, led a successful return expedition to Mount Everest in April and May 2022, coordinating the maintenance of weather stations at the top of the world. The expedition built upon the record-breaking National Geographic and Rolex Perpetual Planet Everest Expedition in 2019. Photo by Dawa Yangzum Sherpa/National Geographic

Under the leadership of Chancellor Sheri Everts, Appalachian State University's research enterprise has grown substantially since 2014. Last year, the university set a record for external funding from grants and contracts, and plans for future growth in research and creative activities continue.

One of the hallmarks of App State is its emphasis on undergraduate research, which gives students the opportunity to work side by side with faculty and present their findings at regional, national and international conferences.

"The advancement of knowledge through scholarly and creative activities is fundamental to our teaching mission," said Provost and Executive Vice Chancellor Heather Hulburt Norris, who added that such pursuits keep faculty current in their fields, leading to valuable classroom experiences for students, and also provide significant benefits to society through the generation of new knowledge, innovations, discoveries and processes.

App State is home to multiple research institutes and centers, including the Appalachian Energy Center, Center for Appalachian Studies, Center for Economic Research and Policy Analysis, Transportation Insight Center for Entrepreneurship, Research Institute for Environment, Energy and Economics, Blue Cross and Blue Shield of North Carolina Institute for

Health and Human Services and Center for Judaic, Holocaust and Peace Studies.

With funding from the North Carolina General Assembly and Governor Roy Cooper, App State broke ground on the first phase of its future Innovation District in March 2022. The first academic building in the Innovation District will be the Conservatory for Biodiversity Education and Research. Proposed additional facilities include renewable energy labs and spaces for research, multidisciplinary projects, teaching and demonstration.

Read more about recent research endeavors at App State:

## Dr. Baker Perry leads climate science expedition to the world's highest mountain

Dr. Baker Perry, National Geographic Explorer and professor in App State's Department of Geography and Planning, led a successful return expedition to Mount Everest this spring, coordinating the maintenance of weather stations on the world's highest mountain.

On May 9, the National Geographic Society expedition team, in collaboration with a group of elite climbing Sherpas, installed a new weather station at Bishop Rock, located just



Assistant professor Dr. Michael Reddish, left, and Ethan Harris '22 test samples in the lab in fall 2021 to investigate treatments for triple-negative breast cancer. Photo by Chase Reynolds

below the summit of Mount Everest, at an elevation of 8,810 meters (28,904 feet).

The installation, along with essential maintenance of four other automatic weather stations at various points on the mountain, builds upon the record-breaking National Geographic and Rolex Perpetual Planet Everest Expedition in 2019.

The Bishop Rock installation replaces the Balcony station (elevation 8,430 meters, or 27,657 feet) installed in 2019. The Balcony station, which was impacted by severe weather, was the world's highest automatic weather station at the time of installation.

This weather station network on Everest provides unparalleled and critical data on how climate change impacts the planet. Data from the stations — managed by Perry at App State in collaboration with other partners — can help communities respond to climate risks that threaten the lives and livelihoods of more than 53 million people who live in the Himalayan Mountains region.

Real-time wind, temperature and precipitation measures from the stations are also improving climber safety on the main Mount Everest climbing routes. Worldwide, the data are enabling scientists to learn more about climate at high altitudes and its impact on glacier health and water supply, Perry said.

## App State team researches treatments for aggressive breast cancer

An App State research team is investigating effective treatments for one of the most aggressive types of breast cancer — with the goal of reducing adverse side effects.

Dr. Michael Reddish, assistant professor in App State's A.R.

Smith Department of Chemistry and Fermentation Sciences, was awarded a grant from the North Carolina Biotechnology Center to study medications proposed to treat triple-negative breast cancers, which he said have "the least number of and least effective treatment options available."

According to the National Breast Cancer Foundation Inc., a diagnosis of triple-negative breast cancer means the three receptors that fuel most breast cancer growth — estrogen, progesterone and the HER-2 gene — are not present in the tumor, and common treatments like hormone therapy are ineffective. Approximately 10% to 20% of breast cancers are triple negative.

## Examining ancient evidence in mass extinctions

App State's Dr. Sarah Carmichael describes her job as similar to that of a crime scene investigator — and the evidence she examines is more than 350 million years old.

Carmichael — a geochemist, a National Geographic Explorer and a professor in App State's Department of Geological and Environmental Sciences — specializes in Devonian period research, studying the causes and effects of mass extinction events that occurred 350–417 million years ago.

"The Devonian period contains pulses of extinctions that, taken together, constitute one of the top five most severe mass extinction events in Earth's history," Carmichael said. "The events decimated coral reefs and marine ecosystems and changed the evolutionary trajectory of fish."

Many scientists have studied these extinctions — thought to be caused by anoxia (oxygen loss) — but the reasons behind the change in oxygen levels remain a mystery, Carmichael said. For clues, scientists study fossils and chemical compositions preserved in rocks.

By studying extinction events from the past, Carmichael said scientists can look for similar trends in sediments today — and better understand and predict potential outcomes.



Dr. Sarah Carmichael is pictured during a field expedition in Mongolia in 2018, where she and her team evaluated specimens preserved in volcanic rocks. Photo by Felix Kunze

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