

copies of a single gene may determine a strain's levels of cannabinoids—the unique cannabis compounds responsible for psychoactive and, probably, medicinal effects. That same year, researchers from GW Pharmaceuticals, a Cambridge, U.K.-based firm developing cannabis-based therapies, correlated sequence variation in the genes for two enzymes involved in cannabinoid production with variation in levels of those compounds.

To solve a related puzzle, plant systematist George Weiblen from the University of Minnesota in St. Paul and his colleagues bred hemp and marijuana varieties to track down the genes that make the cannabinoid content of those botanical twins so different. Hemp has high levels of cannabidiolic acid, for example, whereas marijuana makes lots of tetrahydrocannabinol (THC), which underlies the drug's "high." The difference results at least in part because marijuana varieties lack a functional version of an enzyme that produces cannabidiolic acid, Weiblen's team reported in *New Phytologist* in 2015. Hemp strains may draw on up to nine members of that enzyme family, researchers from the University of British Columbia in Vancouver, Canada, reported 29 March in *PLOS ONE*.

Whereas some company scientists may be using those findings to design better marijuana, others are eyeing ways to improve the plant for other purposes. Several studies in the past 5 years have concluded that hemp can be viable for making bioethanol and other feedstock chemicals, requiring fewer nutrient inputs than other crops, Fike says. Other work shows that hemp can be turned into biodegradable packaging or building materials and that an extract from it may control aphid infestations. "Different researchers are trying to see how best to produce the crop under their conditions and what they may make or do with the materials," Fike says.

But those are just the first steps toward harnessing this ancient crop, and research in North America still faces steep hurdles, Fike warns. The United States continues to class cannabis with heroin and other Schedule I drugs. Getting the right permits and authorizations to study it is almost impossible, Vergara says. "Many 'simple' studies can't be conducted because of the legal restrictions." And funding from the National Science Foundation (NSF) or National Institutes of Health (NIH) is scarce at best.

But Vergara thinks the ever-growing approval of recreational and medical uses of marijuana portends a broader opening for plant biologists. "This clock is ticking; [cannabis research] will be legal worldwide in no time," she predicts. "Once it's legal everywhere, applying for funding to NSF or NIH for cannabis will be the same thing as applying for tomatoes or sunflowers." ■



## RESEARCH INTEGRITY

# Society labels harassment as research misconduct

Geophysicists' plan to merge harassment with traditional forms of misconduct is unwise, critics say

By Maggie Kuo

A major U.S.-based scientific society is about to expand its definition of misconduct in scientific research to include sexual harassment.

The 60,000-member American Geophysical Union (AGU) wants to emphasize the serious threat to science from harassment and other forms of discrimination, society officials say. But some experts on research ethics question the wisdom of merging two categories of undesirable behavior and worry that doing so could complicate efforts to promote ethical conduct. AGU's pending move also could revive a bitter debate in the 1990s that led to the slimmed-down definition of misconduct that U.S. government agencies and universities now use.

Harassment "damages the scientific enterprise, and that's why we went the step of defining [it] as scientific misconduct," says Michael McPhaden, a former AGU president and chair of the society's ethics committee, which drafted the society's new guidelines. AGU's current code of ethics does not cover harassment and other behavior, notes McPhaden, a senior scientist at the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory in Seattle, Washington, and members have "let us know loud and clear" that AGU should be explicit on its expectations for behavior.

Widely reported incidents in other fields prompted the society propose changes, which it posted last month for member comment.

In investigating allegations, AGU expects to follow the process it uses for misconduct claims stemming from articles in its journals. Any allegation that staff cannot resolve would go to a specially created committee. If federally funded research is involved, AGU will notify the alleged perpetrator's employer and determine whether AGU or the institution should carry out the investigation. Sanctions will range from a ban on attending an AGU meeting to expulsion from the society.

Although experts agree that sexual harassment should not be tolerated, some think it should not be lumped with scientific misconduct. Misconduct relates to science as a profession, says Mark Frankel, the former longtime head of the scientific responsibility program at AAAS (which publishes *Science*) who is based in Gaithersburg, Maryland, whereas sexual harassment, bullying, and other behaviors are inappropriate not only in science but also in the larger society.

One practical reason for keeping the two forms of misbehavior separate is the different expertise needed to investigate them, says Alan Price, a former federal misconduct investigator. Price, now a consultant in Austin, says, "my concern would be that [the investigation] wouldn't be done well" if the two were put in the same category.

The current federal definition of research misconduct covers fabrication and falsification of data as well as plagiarism. For many years, however, the National Science Foundation included a fourth category, “other serious deviations from accepted practices,” that allowed it to investigate a variety of inappropriate activities. Many scientists said it was too vague, and the U.S. government adopted the narrower definition in 2000.

The draft AGU guidelines explain that harassment should be grafted onto the conventional definition of misconduct because “these actions violate AGU’s commitment to a safe and professional environment required to learn, conduct, and communicate science.” Still, officials recognize that people filing sexual harassment complaints may need additional safeguards. According to the draft policy, such protections could include “barring the respondent from a complainant’s talk, barring a respondent from an AGU activity, or providing the complainant with an escort during AGU activities.”

The proposed guidelines call for the complainant and defendant to participate in a meeting (held in person, by phone, or through the internet) in which the allegations are presented and discussed. But some misconduct experts expressed concern about that arrangement, which is unusual in investigating harassment. They worry that such a confrontational approach, combined with the lack of anonymity for the complainant, could deter many alleged victims from filing a complaint.

“The act of bringing forward an allegation [of research misconduct] can be very intimidating, and there’s often a power differential between the two parties as well,” says Luran Qualkenbush, research integrity officer for Northwestern University in Evanston, Illinois. “So we do everything possible to keep them apart.” Qualkenbush, who is also vice president of the fledgling Association of Research Integrity Officers, emphasizes that she is not familiar with the AGU guidelines and has no experience investigating sexual harassment.

AGU officials admit that the society lacks a track record of investigating allegations of sexual harassment and other forms of discrimination. But that is changing. AGU received four reports of improper conduct during its 2016 annual meeting last December in San Francisco, California, McPhaden says. AGU also is “in litigation” on a case involving a member who is active within the society, CEO Christine McEntee last month told a panel of the National Academies that is examining sexual harassment in academia.

AGU members have until 28 April to submit comments. AGU officials expect the new policy to go into effect this fall. ■

## POLAR RESEARCH

# Scientists hope risky winter voyage yields icy rewards

## Expedition aims to discover why sea ice in Antarctica is expanding as Arctic packs shrink

By Warren Cornwall



**T**wo dozen scientists set sail last week from Lyttelton, New Zealand, heading south into the gray Southern Ocean. Their goal is to help solve one of Antarctica’s big mysteries: Why, at a time when icy landscapes across much of the world are melting, is Antarctica’s Ross Sea covered in more sea ice than it was 3 decades ago?

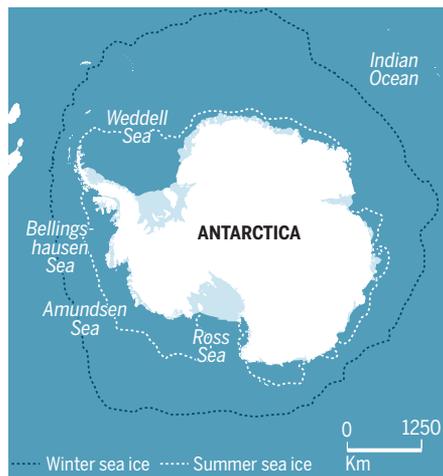
The 2-month expedition aboard the

*Nathaniel B. Palmer*, a 94-meter-long U.S. icebreaker capable of smashing through meter-thick ice, is headed for one of the planet’s least hospitable places during its harshest season. After the *Palmer* enters the Ross Sea, off the Antarctic coast, researchers are bracing for nearly round-the-clock winter darkness, freezing temperatures, hurricane-force winds, and sea ice so heavy it could trap the ship. It’s the first winter research voyage into the Ross in nearly 20 years, and Marilyn Raphael, a geographer and climatologist at the University of California, Los Angeles, who is not taking part, says the crew is “taking their lives into their hands.”

The lure is the prospect of a better understanding of how the Ross Sea’s harsh winters give birth to its floating ice, which has expanded even as ice packs in the Arctic and some other parts of Antarctica have shrunk (see graph, next page). At its winter maximum, the sea ice can cover some 4.5 million square kilometers—more than half the area of the continental United States. And of all the Antarctic seas, the Ross has experienced the biggest overall increase in ice cover in recent decades. Gains there and in other parts of the Southern Ocean more than make up for losses in the nearby Bellingshausen and Amundsen seas, producing an overall increase in Antarctic sea ice since the 1970s. It’s a perplexing trend that defies existing climate models, which

### Following the pack

Antarctica’s sea ice expands and contracts with the seasons, but not all of the mechanisms are well understood.



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