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## NextGen VOICES: Research resolutions

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## Authors

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# INSIGHTS

## LETTERS

### NEXTGEN VOICES

## Research resolutions

We asked young scientists this question: **What is your New Year's resolution for your field? Describe one thing that your field's research community could do better in the coming year.** We received responses from scientists around the world representing a variety of fields. Excerpts of their responses are printed below. —**Jennifer Sills**

### Communication and outreach

Environmental scientists should connect with people who depend on natural resources, such as farmers, fishermen, and hunters. This year, we should strive to start a dialogue, build trust, and ultimately create collaborative research projects for more sustainable use and management of natural resources.

#### Felicia Olmeta-Schult

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In a world where fact checking is at an all-time low and the positive public perception of science is dwindling, scientists

must learn to effectively communicate. Plant pathologists are in an ideal position to address this issue—they are centered between farmers, scientists, and the public. This year, it is imperative that our field works toward meaningful and targeted collaboration.

#### Lauren Massa Segal

Department of Plant Pathology, University of Nebraska-Lincoln, Lincoln, NE 68583, USA. Email: lsegal3@gmail.com

Forensic statisticians need to do a better job of communicating with lawyers, judges, and other practitioners. Poor communication in the forensic and legal fields can lead to miscarriages of justice.

It is our responsibility to work with practitioners to improve forensic science techniques and the discussion of such techniques in the courtroom.

#### Sam Tyner

Center for Statistics and Applications in Forensic Evidence, Iowa State University, Ames, IA 50014, USA. Email: sctyner@iastate.edu

Earth scientists should resolve to talk more publicly about what we do know. Traditionally, scientists emphasize uncertain results that require more research. But taking this tack with the public invites confusion. Instead, we should be talking about our well-established findings. For example, we are certain that Earth's ice is melting, with substantial consequences for coastal erosion and flooding, saltwater inundation, and water security. We are also certain that human action can postpone the arrival of the most dire effects.

#### Twila Alexandra Moon

National Snow and Ice Data Center, University of Colorado, Boulder, CO 80309, USA. Email: twila.science@gmail.com

In the current U.S. political climate, science is under attack. Our representatives circulate falsehoods that blatantly contradict scientific literature. This year, the medical research community's



A natural historian resolves to better explain the value of museum collections to the public.

engagement in politics must expand beyond matters pertaining to the NIH budget. We can begin by pressuring our representatives and making our voices heard. But to initiate the path toward systemic change, we must ultimately cultivate challengers of the political status quo from within our research communities. It is time to bring our passion from the lab bench to the podium.

#### **Ryan Dz-Wei Chow**

Yale School of Medicine, New Haven, CT 06510, USA.  
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My New Year's resolution for biologists: Do a better job explaining to the public why natural history museum collections are important. Natural historians are sometimes misunderstood as hunters or stamp collectors, but their collections, when curated ethically and legally, can open up a world of knowledge about our planet.

#### **Prosanta Chakrabarty**

Museum of Natural Science, Louisiana State University, Baton Rouge, LA 70803, USA.  
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Deep sequencing and genome-editing technologies make personalized medicine, gene therapies, and transgenic livestock possible. Yet manipulation of genetic material carries a social stigma, due to ethical and ecological concerns. To overcome this stigma, the gene-editing community needs to better communicate the implications (good or bad) of our research to the public.

#### **Martin Pacesa**

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## **Interdisciplinary collaboration**

In 2018, I hope that human genetics researchers will increase our understanding of the biological mechanisms underlying genome-wide association study data by collaborating with computational and experimental scientists.

#### **Anna Igorevna Podgornaia**

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When infectious diseases strike, serum from survivors can be administered to others to confer passive immunity. However, serum-based therapy is inefficient and expensive. Moving forward, immunologists and public health officials should strengthen their pipelines to identify such survivors and sequence their antibodies,

thereby enabling mass production of the protective antibodies.

#### **Jennifer Chen**

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I hope that computational biologists can take part in more multi-institutional projects that involve both computational and experimental researchers from academia and industry. Such collaboration could help us solve real-life practical problems.

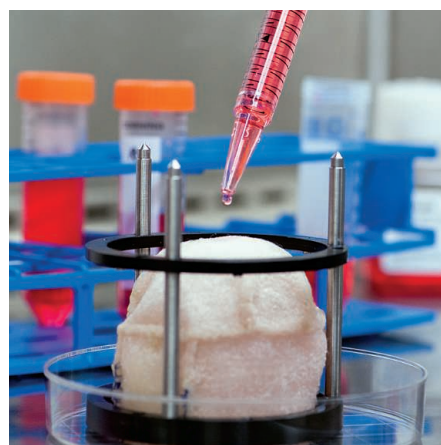
#### **Bipin Singh**

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For kidney disease researchers, interdisciplinary collaboration between scientists focusing on renal diseases, cell reprogramming, 3D printing, and biomechanics is urgently needed this year to push forward the development of artificial organs.

#### **Bo Cao**

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A kidney researcher hopes that collaborations will lead to artificial kidneys similar to this bladder.

Neuromorphic engineers try to create circuits and algorithms that function like the human brain. However, once a basic biological model is implemented, most efforts focus on algorithmic efficiency, which makes the system less realistic. We need more input from neuroscientists. My New Year's resolution is to create a close-knit community of engineers and scientists.

#### **Rishi Raj Singh Sidhu**

Electrical Engineering, Centre of Excellence in IC Design (VIRTUS), Nanyang Technological University, Singapore, 639798, Singapore.  
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## **Data sharing and analysis**

In an era of next-generation sequencing and artificial intelligence processing of large amounts of biological data, the field of molecular biology should go beyond statistical power and fulfill three criteria: statistical, biological, and clinical significance. Often, statistically significant associations in the laboratory do not have significant clinical utility. We should adopt a clinical perspective that allows clinicians and scientists to harness the power of big data to improve the lives of patients.

#### **Bryce W. Q. Tan**

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The life sciences community should resolve to generate and interpret data more responsibly. We need to dispel myths and fears surrounding data analytics, adequately train our scientific workforce, and encourage open data and protocol sharing. We need to prevent data dredging, encourage complete and transparent reporting, avoid financial and nonfinancial conflicts, and reward reproducibility as much as novelty.

#### **Prashant Sood**

MRC Centre for Medical Mycology, Institute of Medical Sciences, University of Aberdeen, Aberdeen AB25 2ZD, UK. Email: drprashantsood@gmail.com

This year, geologists should emphasize observation-driven over model-driven science. Our models may speak to physically possible hypotheses, but they often fail to be predictive.

#### **Stuart Parker**

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My New Year's resolution for psychology and neuroscience is to move beyond a "one-size-fits-all" approach to mental health treatments. We could improve treatment effectiveness by taking individual variability into account. In the next year, I hope that the field works to identify neurological, genetic, and psychological markers of who will best respond to specific interventions or combinations of interventions.

#### **Matthew A. Scult**

Department of Psychology and Neuroscience, Duke University, Durham, NC 27708, USA.  
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In 2018, I think my field of cancer nanotechnology could benefit from more complete reporting of experimental details, particularly nanoparticle concentrations, animal experiment details, and cell experiment details. Most publications

provide minimum explanation in these areas, which can make reproducing the findings difficult.

#### Desiree Van Haute

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My 2018 resolution would involve a community effort by biologists to integrate data from various sources in databases, which would become available to everyone as fast as possible. Analysis of these data by research labs with diverse interests would lead to an explosion of scientific discoveries.

#### Nikos Konstantinides

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I wish that the field of education research could come together to (finally) agree upon a common core. Without agreement on the foundations of learning and teaching, the field remains divided and of limited use to practitioners and decision-makers.

#### Beat A. Schwendimann

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## Affordable research benefits

Arsenic in rice is a huge problem in Southeast Asia. My New Year's resolution for environmental scientists is to come up with low-cost and easily applicable solutions that allow local farmers to grow safe rice crops.

#### Sudhakar Srivastava

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At its current cost, there is no hope that next-generation sequencing will be accessible enough to affect medical diagnosis. Sequencing has become a profit-driven business. This year, biotechnology companies should take seriously the task of creating a \$100 genome, a cost directly controlled by reagent pricing. A lower price tag would make personalized medicine a global possibility, give better data sets for population studies, and make academic research more feasible.

#### Raffaele Fiorenza

Sequencing Operations Lab, New York Genome Center, New York, NY 10013, USA.  
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This year, we need to discuss how we will achieve sustainable and affordable oncology with relevant stakeholders, from consumers, researchers, and clinicians to leaders in industry and government. Exploring new funding models and financial structures that continue to incentivize discovery and innovation will be critical for our continued success in treating late-stage cancer.

#### Ken Dutton-Regester

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## Diversity in science

My research resolution for ecology would be to ensure that those who have the chance to research biodiversity are as diverse as the communities we study. Ecologists need to do more to recognize the contributions of women and minority researchers and to break down systemic barriers to their

inclusion, such as the prevalence of unpaid "voluntary" field experience positions. We study behavior and species interactions in the field; let's be as aware of our own biases.

#### Rachel Hale

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In 2018, instead of focusing on postdoc positions, physics advisers at research institutions should customize career plans for their Ph.D. candidates that take into account each individual's goals, interests, and abilities.

#### Emre Ozan Polat

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Postdoctoral fellows are a major driving force of biomedical research, but many postdocs are undercompensated and underrecognized. Our field should remedy this by acknowledging their role as intellectually independent scientists. More invitations could be directly extended to postdocs to pen commentaries, serve as panelists, review grant proposals, and referee manuscripts. Many postdocs already assist their lab heads in review tasks; inviting them to formally serve as reviewers will be a major step toward better postdoc recognition.

#### Edward Lau

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My New Year's resolution for ecologists: Pay more attention to the science produced by women and underrepresented minorities. Ensure diversity of keynote speakers, panels, journal editors, and awards. Insist upon field excursions and labs that are supportive and inclusive so that all trainees can thrive.

#### Audrey L. Mayer

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Although biology graduate programs now have a balance of men and women, the leaky pipeline persists. One challenge to increasing diversity is ongoing sexual harassment on campus, at conferences, and during field work. Such a hostile environment prevents us from creating an inclusive community. Everyone, men in particular, must step up to combat sexual harassment.

#### Easton R. White

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An environmental scientist hopes to help farmers, such as this one in Thailand, affordably grow safe rice crops.

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