

International graduate students struggle amid COVID-19

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At a media briefing on 11 March, the director general of the World Health Organization (WHO) declared COVID-19 a global pandemic. While governments rushed to draft contingency plans to contain the virus, universities in Europe and the US worked to minimize the impact of COVID-19 on the higher education system. However, on 24 September, the Department of Homeland Security proposed limiting the duration of initial admissions for F and J visa holders and nonimmigrants to four years, which would have a huge negative impact on international students, especially international graduate students.

The more complex circumstances of graduate education and research have

left graduate students surrounded by uncertainty with little to no instruction for how to cope during the crisis. With professional reputations, future job prospects, and even next semester's funding on the line, should they continue to conduct research as usual? Or should they socially distance themselves, halting hands-on experiments while focusing more on simulations and writing papers?

The confusion and angst in the broader graduate student community has only been exacerbated for international students. Some of them are trapped in their home countries because of the necessary international travel restrictions, which has prevented many of them from sat-

isfying the enrollment criteria needed to maintain valid immigration status. Those away from home do not have family to care for them should they fall ill. What is clear is that their research is being affected in this global crisis, and the subtle dynamics between them and their advisers put them in a more vulnerable situation. They continue to struggle while their advisers expect progress.

With immigration policies that continue to aggravate the situation, the COVID-19 pandemic imposes unprecedented challenges for international graduate students. We hope academic authorities make extra efforts to create a more supportive environment so that international graduate students, especially during the pandemic, can manage with greater security and relief.

We gratefully acknowledge P. James Schuck at Columbia University for his valuable review and comments.

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On the stature of Cecilia Payne-Gaposchkin

Having recently published a book¹ with a chapter on Cecilia Payne-Gaposchkin, I read with interest David Weintraub's review of *What Stars Are Made Of: The Life of Cecilia Payne-Gaposchkin*, Donovan Moore's new book on the prominent astrophysicist (PHYSICS TODAY, April 2020, page 46). Although I have not yet read Moore's book, aspects of Weintraub's review took me aback.

I concur with Weintraub's claim that Payne-Gaposchkin "should have been Harvard University's first female recipient of a PhD in astronomy." But that understates her importance: It was due to

Payne-Gaposchkin that Harvard established an astronomy department in the first place. She should have been the first *person*, male or female, to receive a PhD in astronomy from Harvard.

In addition, Weintraub comments on Payne-Gaposchkin's "Forrest Gump-like habit of running into some of the greatest physicists of the 20th century." Gump careened from one famous encounter to another, as an outsider even when inadvertently influencing an event. Payne-Gaposchkin, on the other hand, was a first-rate scientist. Attending physics classes at Cambridge University provided her with the connections and training to land a fellowship at Harvard—should we be surprised that she encountered eminent physicists along the way? Would we ever characterize a male contemporary (say, J. Robert Oppenheimer) in that way?

Then there is the thorny matter of Payne-Gaposchkin's discovery that stars are made mostly of hydrogen. Several aspects of that history are not in dispute: that Payne-Gaposchkin made the discovery, that in later years it was often incorrectly attributed to Henry Norris Russell, and that Payne-Gaposchkin's gender was the primary reason for her lack of credit. But if we are to correct such injustices and prevent them from recurring, it is crucial to understand the mechanism by which they occur.

Much ink has been spilled on how Payne-Gaposchkin's discovery ended up credited to Russell; in my book, I examine six distinct explanations, all advanced at one time or another. Weintraub's review, however, includes several claims that are not backed up by the historical record.

That Payne-Gaposchkin's "accomplishments were initially pooh-poohed by her field's most eminent scientists" is incorrect. Her conclusion that the Sun was made mostly of hydrogen was indeed dismissed by Russell, but he and others consistently praised her accomplishments. In fact, Payne-Gaposchkin was one of only 250 scientists added to the 1927 edition of *American Men of Science*, which had last been updated in 1921.

Russell did not "[force] her to change the conclusion of her dissertation"; he made the suggestion that she change it, and she accepted his assessment. Saying that she was forced takes agency away from Payne-Gaposchkin, who in other

contexts demonstrated that she was not afraid to challenge authority figures—including Russell—when she was sure of herself.

Weintraub also writes that Payne-Gaposchkin should have received a Nobel Prize, "but because of Russell, that was not to be." Although Payne-Gaposchkin's work was of Nobel caliber—hers is one of the most important doctoral dissertations in the history of astronomy—astrophysicists were not generally considered for Nobels in the first half of the 20th century. Thus, neither Payne-Gaposchkin nor Russell would have been considered serious candidates regardless of who received credit for Payne-Gaposchkin's discovery.

There is a long history of praising female scientists for their discoveries and abilities and then denying them the tangible benefits of such accomplishments, including fair pay, sufficient research funding and the ability to direct it, and such positions of authority as department chair. To the extent that we mischaracterize the historical record, I am concerned that we will not learn the lesson that recognition of accomplishment is not enough to prevent unfair treatment.

Reference

1. S. Calvin, *Beyond Curie: Four Women in Physics and Their Remarkable Discoveries, 1903 to 1963*, Morgan & Claypool (2017).

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David Weintraub's review (PHYSICS TODAY, April 2020, page 46) of Donovan Moore's *What Stars Are Made Of: The Life of Cecilia Payne-Gaposchkin* brought back several memories. When I was a freshman at Harvard University in September 1959, Payne-Gaposchkin was "chairman" of the astronomy department. Chain-smoking in her office, speaking with an English accent, and becoming as tall as I—six feet—when we stood up, she was intimidating. Only years later did I learn that she was the only woman regularly appointed to tenure on the Harvard faculty at the time.

Donald Menzel reported that when he became director of the Harvard College

Observatory in 1956 and discovered "Mrs. G.'s" status and salary, he quickly improved both, pushing through her professorship with suitable compensation.

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► **Weintraub replies to Calvin:** The Forrest Gump metaphor was admittedly imperfect, as Scott Calvin suggests. But I disagree with Calvin's other criticisms. Whether Henry Norris Russell forced her or Cecilia Payne merely chose to modify her dissertation conclusions after Russell advised her to do so, her decision to capitulate is the nearly universal response to *force majeure*. When the most prominent scientist in one's profession dismisses the work of a graduate student as wrong, the student ignores that criticism at great peril to their career. This is true now and was certainly true a century ago.

Payne did what she had to do to secure a necessary signature and her doctoral degree and to transition into the next phase of her career. Any other decision would have been professional suicide. To imply that Russell made a suggestion Payne could ignore is to misrepresent the power dynamics of the situation, one in which Russell was extremely powerful and Payne was powerless.

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Majorana and the lone-genius myth

The June 2020 issue of PHYSICS TODAY contained an excellent article entitled "Majorana qubits for topological quantum computing" (page 44) by Ramón Aguado and Leo Kouwenhoven. It opened with a description of Ettore Majorana attributed to Enrico Fermi: "There are various categories of scientists, people of a secondary or tertiary standing, who do their best but do not go very far. There are also those of high standing, who come to discoveries of great importance, fundamental for the development of science. But