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### Feature Article: Celebrating Thirty-Five Years of Undergraduate Research

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## **Celebrating Thirty-Five Years of Undergraduate Research**

—Paige Fanneron, Savannah Salvage, Anna Schiefele

For thirty-five years, the Hamel Center for Undergraduate Research has promoted and supported substantial research endeavors by over 3,000 undergraduates at the University of New Hampshire. Through its programs UNH undergraduates serve as apprentice researchers alongside faculty mentors, earn credit for research work during the academic year, conduct independent projects over the summer that often extend into senior theses and capstones, travel across the globe to conduct research, and learn to polish their writing about research and share it with a wide audience. Students also receive funding to present their research at professional conferences across the country, and here at UNH, thousands of undergraduates each year participate in the annual Undergraduate Research Conference (URC), which since 2016 has been coordinated campuswide by the Hamel Center.

*Inquiry*, where UNH undergraduates can share their research with a wide audience, is published through the Hamel Center. In the spirit of the Hamel Center's high expectations of undergraduates, we asked three members of our student editorial board to help commemorate the Hamel Center's 35th anniversary by writing feature articles on the impact of undergraduate research. We hope that *Inquiry* readers will celebrate with us by enjoying these snapshots of the Hamel Center's invaluable work.

## From Its Start, Undergraduate Research at UNH Has Inspired

—Savannah Salvage

I am a senior neuroscience and behavior major at the University of New Hampshire (UNH), and I wanted to write this feature article focusing on the earlier days of the Hamel Center for Undergraduate Research because I was interested in its impacts on former students. My own research experiences inspired questions for my interviews with Donna Brown, the founding director of the Hamel Center, and Jill Sible, one of the first undergraduates to receive a research grant.

The Undergraduate Research Opportunities Program (UROP)—the original name of the Hamel Center—was established thirty-five years ago, in 1987. (Click here for a [timeline](#).) To learn about the program’s early days, I met with founding director Donna Brown. Brown recounted the process of establishing what was then known as UROP, and some important developments over its history, and she conveyed to me how its programs have impacted individual students, faculty, and UNH as a whole.

Brown noted that the Hamel Center made it possible for students in *all* disciplines to get funding for their research. Supporting students from all disciplines remains an essential mission for the Hamel Center. The founders of the Hamel Center also wanted to provide a complete learning experience for students. Brown told me that student feedback showed that the Hamel Center bolstered not only academic growth, but also time management, professionalism, confidence, independence, and emotional maturation. Brown said, “Research is different from writing class papers and studying for tests. There is a creative element and the need to troubleshoot and deal with the unexpected when you have to rethink or go in a different direction. One science student in biochemistry was getting strange results from a test-tube experiment only to discover that the test tubes hadn’t been properly cleaned. . . that experience of having to deal with something frustrating and figure out how to go on after losing time . . . it happens in the real world and it’s good to figure out how to deal with it.”

I asked Brown about the qualities of successful undergraduate researchers, and she said such students have initiative and are conscientious and respectful. But Brown also pointed out, “Sometimes students will surprise you, blossom, and absorb and take advantage of the situation and surprise themselves. Others come with confidence and bulldoze ahead and get all the benefit.”

There are many different ways to enter into undergraduate research and to reach some students who might not otherwise apply. The Hamel Center programs, while competitive, provide various research options that allow unsure students to participate and begin to develop skills. For example, undergraduates can get a first taste of research by earning course credit through INCO 590. With their faculty mentor for INCO, they plan the number of hours a week they’ll work on the research, and the course credit they earned reflects those hours. As Donna said during our interview, “The Hamel Center encourages all students to get involved.”

I asked Brown about some of the challenges that undergraduate researchers face. She said that in the early days of the Hamel Center, they realized that a major challenge was learning how to write a proposal. Proposal writing was new for almost all students. By applying for a research grant, students are able to get help from mentors and be walked through the process by the Hamel Center. Students are taught that every organization soliciting proposals has its own requirements and formats, and they need to make sure to answer every question effectively. The Hamel Center continues to regularly offer proposal writing workshops, supporting undergraduates through the whole process of research. The Hamel Center nurtures students along the way and teaches the important role of mentors.

As undergraduates began participating in research, Brown recalled, it became clear these programs also benefited their faculty mentors. Mentors had experience collaborating with graduate students, but often had not worked with undergraduate students. Mentoring Hamel Center researchers helped those faculty better understand how undergraduates learn.

After Brown helped develop the Hamel Center, it became an important contribution to UNH's mission as the flagship research university in New Hampshire. She described the exciting development when Dana Hamel and other generous donors made it possible for the Hamel Center to be fully endowed.

I asked Brown about some particularly memorable students she met while working at the Hamel Center. She remembered former undergraduate researcher Jill Sible, an honors biochemistry student at UNH (class of 1990). I reached out to Sible to ask how her undergraduate experiences affected her life after graduation. For Sible, the impact of her undergraduate research experiences was so profound, she said she can almost trace the whole trajectory of her life back to them.

Sible was a first-generation college student and was admitted to UNH on a scholarship, and to support her education she worked at a grocery store every weekend and full-time during summers. Sible knew that she loved science and ever since she could remember, she thought she wanted to go to medical school. With her undergrad experience, she had the freedom to conduct research. She said that she "got the bug"—she loved working with other students and liked the lifestyle of a professor, which entails continuous learning and teaching. Sible received a Summer Undergraduate Research Fellowship (SURF) in 1989 for her first research project, which allowed her to focus on the project and afford research expenses. As a result of the SURF, she published a first-author paper with her faculty mentor, Dr. Charles Walker, on cell cycle regulation in a starfish model. (See the article [here](#).) Later she attended her first research conference in Virginia with Dr. Walker. Sible said that her UNH research experiences enabled her to have grad-like experiences like this as an undergrad.

Sible told me that she realized the positive, healthy environment a university was, and how much it enriched her life. She then knew she never wanted to leave academia and she pursued further education through graduate school and post-doctoral studies.

Sible went on to become a professor of biological sciences at Virginia Tech, beginning as an assistant professor in 1998. And it's indicative of her belief in the benefit of undergraduate research that she's still involved in it even as a tenured faculty member. Currently, she oversees the Office of Undergraduate Research at Virginia Tech. In this position, she advocates for resources for undergraduate research and other student programs. Two of her main goals are making student learning more active and engaged, and making research more accessible to students from lower income and minority backgrounds. Sible believes undergraduate research is one of the best ways to learn professional skills such as communication, work ethic, and teamwork.

My interviews with Donna Brown and Jill Sible made me even more aware of the profound, lifelong impacts of undergraduate research made possible by the Hamel Center. Brown's account of the Hamel Center's history captured its successes and founding objectives: to provide the resources and financial support for the research, scholarly, and creative projects of UNH students in all disciplines. Sible's story, passion, and persistence resonated with me, an undergraduate researcher in biological science like she was. Students conducting research may not realize the magnitude of their work and the extent of their personal and professional growth. But, as these interviews show, undergraduate research has far-reaching benefits: for mentors, the UNH community, and especially the students themselves.

## **Learning What They Are Capable Of: UNH Undergraduates Researching Abroad**

—Paige Fanneron

I am a first-year student at UNH, and although I have been working with the Hamel Center for Undergraduate Research as a member of the journal *Inquiry's* editorial board for only a brief period of time, the experience has already had a large impact on my life and has created opportunities that I would not have had otherwise. One of these opportunities was to work on this article about undergraduate international research programs supported by the Hamel Center. In 1997, ten years after its first grants were awarded for undergraduate research on the UNH campus, the Hamel Center established the International Research Opportunities Program (IROP). IROP was the first program of its kind in the nation, and since 1997 UNH undergraduates have traveled to over fifty different countries to conduct independent research through IROP and the Summer Undergraduate Research Fellowship (SURF) Abroad program. When I began learning about the international research programs, I was unsure of how these programs were different from university study abroad programs, but I learned how unique the Hamel Center programs are in the sense that they give undergraduate students an opportunity to understand how real-world research works as well as an insider view to all these different cultures.

Both IROP and SURF Abroad provide financial support for undergraduates to conduct research full-time over the summer months and conclude with presentations at the International

Undergraduate Research Symposium each fall. IROP and SURF Abroad have long-lasting impacts on students from academic, cultural, and professional standpoints. To learn more about these programs, I first contacted and had the privilege of speaking with Georgeann Murphy, who was the Hamel Center's international research coordinator from 2001 to 2020. I visited Murphy at her home in Madbury, New Hampshire, where she shared memories of her work with the Hamel Center as well as reflections about her own days as a young teacher and researcher.

Murphy studied English and drama as an undergraduate student at Furman University. In graduate school at Tulane University, she completed a dissertation on Shakespeare's play *Love's Labour's Lost*, focusing on how the classical era through the renaissance influenced the play. Later, after earning her master's and Ph.D. at Tulane University, Murphy began a teaching career at a small college in Kentucky. There, her involvement with research lessened, because that school put more emphasis on teaching than on publishing new research.

When she first came to UNH in the 1990s, Murphy began by teaching courses in the humanities, but in 2001 she took a position with the Hamel Center as coordinator of the international undergraduate research programs. When she became more involved in undergraduate research through this position, she was at first skeptical of how well undergraduates would be able to handle the in-depth research projects that IROP and SURF Abroad entailed. However, she soon realized that these students were more than capable of conducting independent research—even in foreign countries.

Both the IROP and SURF Abroad programs require a minimum GPA, and there are many other expectations of these students as well. For example, in addition to preparing an extensive research proposal and planning a reasonable budget, they must research their host country and plan for any cultural adjustments that might be required, familiarize themselves with essential foreign language terms, and coordinate with their foreign mentor to find a place to live while abroad. I was very surprised and impressed to learn about these programs and how much support these students receive as well as the type of work ethic and determination that students must have to be successful in these programs. Working with undergraduate researchers had a big impact on Murphy too. She realized how capable and responsible undergraduate researchers could be. "These students are heroes," she said. I asked Murphy to share a few memories of these researchers.

Nursing student Bri McGrath went to South Africa in 2019 to get a better understanding of how the health care system worked (read about her research [here](#)), and she found that she had learned just as much about the culture during her time there as about her actual research topic. Specifically, she gained a better understanding of racism within South Africa. Murphy mentioned another student "whose bassoon adventures in Milan were really memorable" (read about the impact of the bassoon adventures [here](#)) and a "superstar" student who started his research in Cairo, Egypt, and finished it in Amman, Jordan (read about his experience and its impact [here](#)).

IROP and SURF Abroad students are required to have faculty mentors from UNH as well as mentors from their international research location. The research mentors are experts in the



fields that the undergraduate researchers are going into. While abroad, students in the IROP and SURF Abroad programs not only obtain more information for their specific project but also explore a new culture. Although mentors are a very large help throughout a student-researcher's project, it is mostly up to the researchers to hold themselves responsible for making the most of their time while abroad. "They have to have a certain degree of courage because so much of undergraduate research is self-directed," Murphy explained.

The Hamel Center shared information about some former researchers that demonstrate this courage. Alana Gudinas, a former physics student who researched in Switzerland and France through IROP, had the opportunity to solve an issue with lab equipment that had stumped the graduate students in the lab she was visiting, even though one of those grad students told her that attempting the task wouldn't be worth the time. Gudinas proved him wrong, and she said "it was immensely satisfying" to put to the test what she had learned and realize the expertise she had gained. Emma Clarke, another physics student, studied in India through IROP. She appreciated experiencing the different style of teaching and mentoring that she encountered abroad. She said it was "very enlightening to see how things that might seem very standard can be done differently, and then you can learn what methods work best for you and what you want to look for in future work environments." Clarke also appreciated that her research site and colleagues in India helped her structure her exploration of the culture with support and guidance, which has made her more confident in traveling solo now.

I wanted to talk in person to a former UNH student who had done international research, and Murphy suggested I contact Fran Gesel. Gesel traveled to Hamilton, Ontario, in Canada to conduct research in the field of exercise science at McMaster University as a SURF Abroad awardee. Gesel originally became involved in undergraduate research as a sophomore through the McNair Scholars Program, which helps first-generation college students with financial need and underrepresented students get involved with research. This led Gesel to look for more undergraduate research opportunities, and he discovered SURF Abroad through the Hamel Center. Gesel appreciated the many connections that he made throughout his time researching in Canada. He feels that the SURF Abroad experience will certainly help him on a graduate school application when he eventually pursues this. Throughout his time in Canada, Gesel found that the quality of his time at the research lab was the most memorable part of his experience. He called the research that he did through the Hamel Center a "moving experience."

The Hamel Center has helped many students like Gesel to gain experience in research as undergraduates. The Hamel Center's work goes beyond its research grant programs. Working on the journal *Inquiry's* student editorial board has helped me to explore what I would like to major in. I have gained real-life experience as an editor and writer and I have realized that I want to pursue a career in those fields. Working for the *Inquiry* board also has given me a greater appreciation for the work that goes into undergraduate research. Even though I would feel nervous about conducting research abroad, I would also feel excited about being able to experience a new culture while researching a topic that I was interested in. The Hamel Center

has even given staff members like Georgeann Murphy a new view on undergraduate research and on the strength of knowledge undergraduates own.

Because of the COVID-19 pandemic, international research programs have been on hiatus since 2020, when Murphy retired. However, the Hamel Center looks forward to restarting these important research opportunities soon.

## **The Versatility of Undergraduate Research and How It Can Impact a Student's Experience**

—Anna Scheifele

I joined *Inquiry* as a student editor in fall 2021, and since then I have learned about several fascinating research projects conducted by talented undergraduates at the University of New Hampshire (UNH). Whether it was by reviewing an article draft by a research student or by writing their bio for *Inquiry*, I have become more familiar with the research process and how it impacts students. As a sophomore majoring in French and English, I was intimidated at first because I assumed that all researchers were STEM students. But as I read about the *Inquiry* authors' research experiences, I learned about the broad range of disciplines that undergraduate students choose to study independently through programs at the Hamel Center. The Hamel Center for Undergraduate Research supports undergraduate research through many different programs, including the Research Experience and Apprenticeship Program (REAP) and Summer Undergraduate Research Fellowships (SURF). Students from any discipline can apply for these and other Hamel Center grants to conduct independent research on any topic they're interested in. The students work closely with very supportive and experienced faculty mentors in that field, who oversee and advise them through the research project. In all of the projects I've heard about, students enjoy the independence of research but also strongly value the connections they create with their mentors, graduate students, and others involved in the collaboration. The Hamel Center is still quite new to me, but in the past six months editing and writing for *Inquiry*, I have learned that the Hamel Center encourages students to view research as a way to build on their current passions and work toward their goals.

To learn more about the impact of research on a student's undergraduate career, I interviewed Samuel Mercer. Sam is a junior from Sanford, Maine, majoring in chemical engineering. Since he began his college education at the age of fifteen, he has thrived as an undergraduate researcher here at UNH. Sam told me that the summer before starting at UNH, he devoted a lot of time planning which courses he would take and which clubs he wanted to join, but what first struck his interest was the prospect of research. "I was interested in research, and I knew that UNH was really well known for research," he says.

In the first week of school, Sam got his first taste of research by applying for the Innovation Scholars Program through the College of Engineering and Physical Sciences. Then, after just two months as a college student, Sam started contacting faculty members about how to get more



involved. He discovered the Hamel Center's Research Experience and Apprenticeship Program (REAP), for which his chemical engineering professor Dr. Nan Yi served as his mentor in summer 2019. The next spring Sam was awarded a SURF by the Hamel Center, but before he could begin his research, the COVID-19 pandemic hit. Sam's project had to be revised as a result of the need to work remotely instead of in the lab, but looking back, he says that although it was a struggle to complete the project, the overall process taught him the value of perseverance. Sam published a commentary about his SURF experience during the pandemic in the 2021 issue of *Inquiry*.

Sam has always been interested in energy, and his current project investigates converting methane into a substance that is more economically and environmentally friendly (methane conversion catalysis). Recently, he encountered a setback when his catalyst didn't succeed in converting the methane; at this Sam laughs that from this observation has grown yet another branch of research within his larger project. With nearly three years of research experience under his belt, Sam shrugs off challenges such as these and welcomes any question or hypothesis that can be further tested if it means he still has a goal to work toward. When asked what advice he would give his past self or a new researcher, he suggested going into every project with an open mind and a positive attitude even if the area of research is unappealing or not your forte. "Even if you don't like it at the very beginning, I think there's a way to find the skill sets in something else that you like much more."

Approaching new opportunities without preconceptions and "what-ifs" is what makes a good researcher, and it looks as if Sam has honed this skill over the years and will continue to do so. For him, what is so cool about research is its versatility and how there is no one perfect way to find the answer to a problem. "There are millions of ways to solve it, but what's the way you're going to choose? That's up to you. That's the thing I like about research; it's kind of its own little journey."

Working as an editor for *Inquiry* has taught me just how driven and forward-thinking student researchers are. I was not only astounded and intrigued by Sam's accomplishments and ambition, but by his zeal for research (and for his side-hobbies and interests), which is rare, admirable, and inspiring. He has taken advantage of multiple different opportunities offered by the Hamel Center and showed how one research experience builds upon another. For sure, the Hamel Center should be proud for opening so many doors for students seeking independent research over the past thirty-five years. It has made a positive impact on students from all disciplines who are interested in doing more for their communities and advancing research within their respective fields, giving them the added bonus of meeting new people, learning more about themselves, and contributing to a greater cause. I am inspired to apply for a research grant and start an independent study of my own. As for what issue or topic I would study, I don't know yet. I have a long list of interests that I have to narrow down. For now, I'm focusing on the project of planning for studying abroad in France next spring. I am so grateful for my position on *Inquiry's* editorial board and anticipate discovering even more about undergraduate research as I go forth in my academic career.