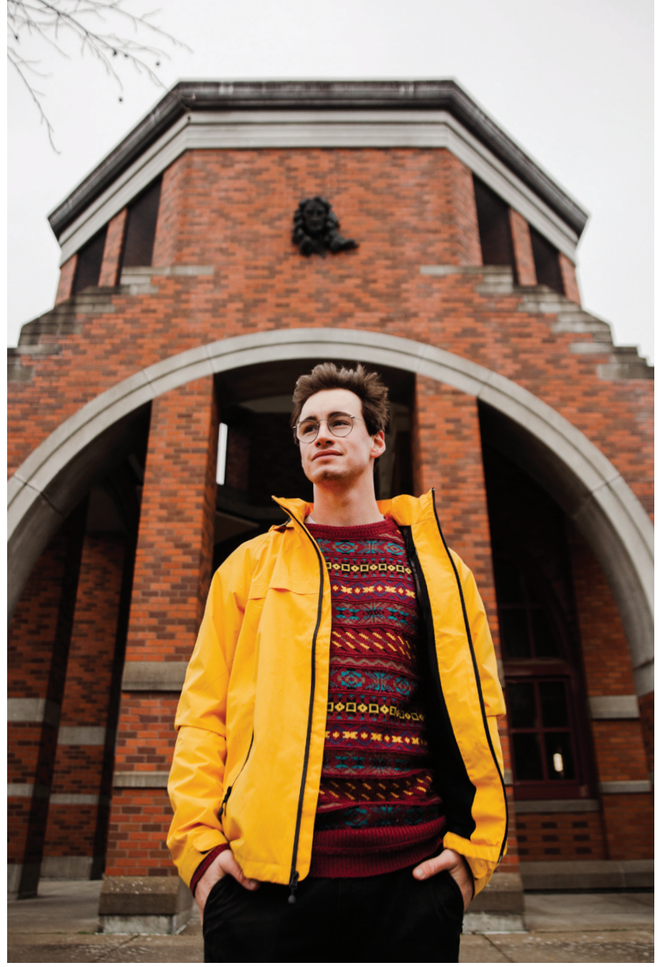
Left to right:
Griffiths stands outside Willamette Hall, home to the UO Physics Department and the Fractals Research Laboratory.

Griffiths' vision loss occurs from the periphery inward, leaving him in what he describes as a constant state of tunnel vision. "That's the beautiful thing," Griffiths says about his research. He's able to focus on the task that's right in front of him.



As he sat at his desk in Willamette Hall, Willem Griffiths began to sweat. It was fall of 2017 and he was in his first general physics course; he sat among over 200 other wide-eyed students likely dealing with similar first-day anxieties. The room quickly hushed as a man with long, curly grey hair appeared and prepared to introduce himself. It was Richard Taylor, the head of the University of Oregon's physics department.

Taylor, who grew up in England and who has been teaching at the university since 1999, began explaining his background, his British accent still apparent. He talked about his various research projects, including his research in nanoscience and visual art, specifically that of Jackson Pollock. But one project in particular stood out to Griffiths. It was about Taylor's work in leading a research team to develop a retinal eye implant that actually restored vision loss.

After the class ended, Griffiths eagerly walked up to the front of the room to have a word with the man he'd heard speak only minutes earlier. The project that Taylor had just described served as a potential cure for a disease Griffiths has lived with his entire life—one that could leave him completely blind. Griffiths has Retinitis Pigmentosa (RP), a rare genetic eye disease that causes gradual vision loss and eventually leads to blindness.

"When I was first diagnosed at age 3, they didn't know if I would be blind in a year or if I'd have some of my vision for my entire life," Griffiths, now 24, says.

Looking at Griffiths, the disease isn't obvious. The glasses he wears, thin black frames, look like the standard you'd see people with common visual impairments wearing. While the disease is genetic, neither of his parents have RP, but both he and his younger sister, Marley, were diagnosed at a young age. The disease begins in the outer corner of the eye, diminishing one's peripheral vision over time and eventually causing blindness. There is no cure. Griffiths lives with this reality of his future every day. His introduction to Richard Taylor's research into retinal eye implants made him realize he could be a part of finding his own cure.

"If Taylor hadn't presented his research at the beginning of class I would've never known that opportunity was available here," Griffiths says.

While Griffiths has always lived with the inevitability that comes with his disease, it never stopped him from dreaming about his future. As a child, growing up in Utah, he wanted to be a professional soccer player, a professional skier, and a botanist. But as he grew older, his interests shifted more in the direction of science—specifically, biology. When he first came to the University of Oregon, he joined biology professor Monte Westerfield's lab studying Usher Syndrome, the leading cause of combined deafness and blindness. RP is what causes the blindness in people with this condition. The lab exposure allowed him, for the first time, to research his own disease through the lens of Usher Syndrome. He graduated with a degree in biology in 2018 and is set to begin his Ph.D. program this year. Learning of Taylor's project is one factor that influenced this trajectory.

According to Taylor, once humans reach age 65, there's a 25% chance they'll naturally lose some or all of their vision over time. For people with RP, one of the only eye implants available is Argus II, and this is normally used for late-stage patients. This implant is surgically put in the eye, and the person must then wear glasses with a camera that sends video signals to the implant. Rather than restoring the person's vision, the glasses supplement it with video input.

Taylor's research project, however, aims to create an eye implant that restores the subject's natural vision rather than supplementing it with images. The goal is also to create an implant that acts as a natural extension of the body, that the cells in the eye will interact with and attach to.

"For most of the implants, the body doesn't respond well when you insert them in the eye, and they trigger these immune responses and reject the devices," Taylor says. "We're turning it completely around, so we're fooling all of these cells into thinking our electronics are fellow cells, so not only do our devices not get rejected, but the cells actually want to come and interact."

Griffiths' initial interest in the project has evolved into his current role as part of the research team. In the lab, Griffiths constructs the electrodes on the implants; these electrodes are conductors through which electricity can enter and leave the eye, allowing the person to receive visual feedback. He then lowers the implant into a culture of cells in a petri dish, examines them under a microscope, and uses radiation to analyze how the cells interact with the device.