

## Mind Over Natter

ANNA FRANCIS '19 AND THE ALZHEIMER'S PUZZLE

STORY BY Alison Frye



Above: Anna Francis '19 doing the detail work of Alzheimer's research. Right: Anna at work in Putney's Wender Arts Building, 2019

NOT LONG AFTER DEATH, the human brain begins to liquefy. Anna Francis '19 and her colleagues work quicky to preserve it, retrieving the right hemisphere from the morgue, slicing it themselves, and keeping it in a laboratory freezer from which they can retrieve the millimeter-size samples that fuel their research into one of the most confounding of human diseases: Alzheimer's.

Driven by her own curiosity about diseases, and an ever-deepening commitment to helping solve the Alzheimer's puzzle, Anna⊠ a biology major at Oberlin and two years into her work on one of the world's leading Alzheimer's teams<sup>∞</sup> explained to me the team's ambitious purpose. "We're studying Alzheimer's disease and the mechanisms behind it Why do people develop Alzheimer's disease? Why do people develop early onset versus late onset? SpeciZcally, the Selkoe Laboratory at Brigham and Women's Hospital team is known for its breakthrough research called the Amyloid Hypothesis, which is one of the theories for what causes Alzheimer's disease. Anna elaborates, "Why do some people exhibit high levels of the protein that causes Alzheimer's disease, which is known as amyloid beta? Why do some people show very high levels of amyloid beta, but don't have any cognitive decline? Whereas other people may express lower levels but may have higher decline?⊠

⊠ e body produces amyloid beta naturally. ⊠ e protein aids in neuroplasticity and normal neural processes. But in Alzheimer's disease, amyloid beta accumulates abnormally, in the brain's gray matter and around blood vessels, inhibiting synaptic functions essential to the formation of memories and the retention of long-term memories. Anna has learned all of this information on the job, and she speaks about it with depth, expertise, and admiration for her colleagues.

"People around me have MDs, they have master's of science degrees, they have bachelor's degrees, they have PhDs, they have MD/PhDs. I talk to a lot of people, and they all have a non-linear path that brought them to Brigham⊠

REWIND NINE YEARS. Anna came to Putney from suburban Connecticut. A shy 10th grader, she landed in White Cottage dorm, paired with a roommate who would become a soulmate friend, and she started to explore. "At Putney, you are able to ask questions, explore, get feedback, and get your hands dirty⊠ rather than just read from a textbook⊠ without fear of judgment. I took ballet, did jazz dance, ballroom dance, and Caribbean drumming⊠⊠ e work also offered an intellectual depth that her public high school lacked. Science classes had

ogy, plant physiology, rats, crickets, the lymphatic system⊠ lots of random things. at's where I learned I really like cells and bacteria and diseases⊠ BACK IN the lab, Anna's quotidian tends toward the repetitive. Her routine centers around immunoprecipitation (a technique that isolates an antigen). "Every day is different. In this speciac three-day experiment I'm doing, I spend Mondays, Tuesdays, and Wednesdays dedicated to one experiment. And then Wednesdays, ☑ ursdays, and Fridays, it's the same procedure, but a different brain that I'm studying⊠⊠ e team as a whole is focused on an overarching hypothesis. "We've been studying ARIA, which stands for amyloid-related imaging abnormalities⊠ In July 2023 the FDA approved a drug

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structure, but also room for creativity. She built a water Altration and harvesting system for Project Week. "Project Weeks made a huge impact on me. It's only two weeks, but when you think about it, that's two weeks to do whatever you want Like Caleb Erksine '15 (Ingenuity & Access, page 10), she too built a dulcimer with George Haggerty. "Putney helped me tap into my artistic, creative side, because I came from public high school where everything was very regimented, and the curriculum was built toward a certain type of student. Coming to Putney was a breath of fresh air

At Oberlin, she leaned Ørst toward environmental studies. But aØer learning that curriculum was humanities-based, and realizing her own love of science and lab work, she made the switch to a biology major. "Ø ey exposed us to everything. We learned about anatomy and physiology, plant physiology, rats, crickets, the lymphatic systemØ lots of random things. Ø at's where I learned I really like cells and bacteria and diseasesØ that removed amyloid beta from the brain. But people who receive the treatment are showing imaging abnormalities during brain scans and MRIs. "I ese anti-Alzheimer's antibodies are causing brain bleeds and subdural effusions, which causes the tissue to get thinner and weaker I e drug is supposed to delay Alzheimer's progression. Anna is helping to study why it's causing brain bleeds. She forms a hypothesis, writes a procedure, conducts her research, summarizes her results. "I analyze it, make assumptions, and let my boss take a look and make the Inal conclusion I

Anna's work as a research assistant has shown her the inside world of institutional research, from the funding of the work, to the scienti⊠c and research processes. Even in the professional world, her passion for learning feeds her, "I don't feel like I'm coming in to do work. I'm coming in to learn⊠

