A rare few people end up in the career they decided for themselves as children. More often, the question “What do you want to be when you grow up?” yields an answer upon which most of us look back with a smile, a laugh, a shake of the head. We make plans and find ourselves, years later, doing something entirely different from what our younger selves imagined. Dr. William Tarpeh, Assistant Professor of Chemical Engineering at Stanford University and head of the Tarpeh Lab, is no different. In an interview with The Water Research Foundation (WRF), William revealed his childhood dreams of digging up dinosaur bones. "I was always broadly interested in science, but the first science that caught my heart was paleontology.”

Thankfully for the water sector—and at the expense of paleontology—William’s interests shifted. “I wanted to solve problems that I could put my hands around, big and challenging problems,” and the “people-focused” nature of water and wastewater treatment enticed William more than anything else.

Dr. Tarpeh’s path to the water sector seems almost written in the stars. He grew up outside of Washington, D.C., just across the river from Blue Plains Advanced Wastewater Treatment Plant (now part of DC Water). William recounted what it was like crossing the bridge day after day, smelling Blue Plains: “Somewhere along the way I thought, ‘Okay, water and wastewater treatment—they seem to be invisible, but clearly there are experts who do something with our water that we don’t see.’” Little did he know that he would soon be one of those experts. And not just any expert, but one paving a new way for the entire water sector.

“How do you make a career in water?”

A high school service trip to Ethiopia, during which William witnessed and pondered the more intricate
workings of water infrastructure, and a globalization
class covering quality of life disparities between dif-
ferent countries sealed the deal for William. “That
was when I really thought: ‘Okay, I think I can do
something about this.’” From there, he asked himself
a question that would define the rest of his life: “How
do you make a career in water?”

Dr. Tarpeh earned his Bachelor of Science in Chemical
Engineering from Stanford in 2012 and went on to
pursue his Master of Science and then PhD in Envi-
ronmental Engineering at the University of California,
Berkeley, completing his studies in 2017. William’s
fledgling career in water quickly guided him to WRF.
He served as Principal Investigator for WRF Project
4976, Characterizing, Categorizing, and Communicating
Next-Generation Nutrient Removal Processes for
Resource Efficiency, an undertaking that, unbeknownst
to him, would pave the way for his future endeavors.
This project yielded insights on the five major barriers
to nutrient removal and recovery—insights that now
help academics and industry practitioners determine
impactful directions for the work they’re doing. In Dr.
Tarpeh’s words, “We’re giving language to the valley of
death that we talk about in broad terms.” With Project
4976, William and his team unveiled the questions
so that his future work could aim for answers. Which
brings us to today and the revolutionary research being
conducted at the Tarpeh Lab.

“We’re giving language to the valley of death.”

At WEFTEC 2023, the Water Environment Federation’s
Technical Exhibition and Conference, Dr. William
Tarpeh was awarded WRF’s esteemed Paul L. Busch
Award for the work he and his students are doing to
revolutionize wastewater resource recovery. The Paul
L. Busch Award recognizes an individual for innovative
research in the field of water quality and the water
environment, with a special focus on those who show
promise and make significant contributions in bridging
research and its practical application. The Award
carries with it a $100,000 grant, allowing recipients
to continue their work, take risks, and explore new
directions. This Award has provided $2.3 million in
funding to up-and-coming researchers making major
breakthroughs in the water quality industry. Dr. Tarpeh
will now constitute a part of this Award’s legacy. And
rightly so.

The specific project for which Dr. Tarpeh was recog-
nized—Selective, Regenerable Adsorbents for Electro-
chemical Wastewater Nitrogen Recovery—aims to
optimize the processes by which nitrogen is recovered
from wastewater. William explained it as solid recycling
but with wastewater: “Our job is to design these boxes,
or these processes, that wastewater can come into. And
then we can produce high purity things like fertilizers,
fuels, and commodity chemicals that industries buy
and sell with this toolbox of really selective processes.”
The lens through which William views wastewater is
innovative in and of itself; to him, recovering different
elements from wastewater need not be done in indi-
vidual vacuums. Rather, he views the recovery of things
like nitrogen, phosphorus, and potassium as similar
problems. “We have to get molecular in terms of how
to separate one thing at a time, but the principles we
use are translatable between compounds.”

And the principles being put to the test at Tarpeh Lab
are also breaking new ground. Dr. Tarpeh and his
team are using electrochemistry to drive reactions
and transformations. This technological innovation
promises several benefits. Firstly, it’s modular, meaning
these electrochemical techniques can be scaled up
fairly easily. “Another huge benefit is that this makes
water treatment really plug and play with renewable
energy. If I can use electrons as the driving force and
control current and voltage, I can, in simple terms, ‘hook
This forward-thinking approach has defined Dr. Tarpeh’s career and continues to shape the role he plays within the water sector and beyond. Part of his passion for building a stronger foundation for future generations stems from being underrepresented as a black man in science. “There have been times when I’m the only one in the room, which is not something I enjoy.” Despite facing this deeply rooted and complex challenge, William persevered. “I found the pockets and places that really welcomed me and helped me do my best work. And now I feel very secure in that I belong, because this has been my community for a long time, and it really drives me to continue to open the door.” With his open-minded approach to research and his passion for teaching, Dr. Tarpeh is creating a safe space for the next generation of water scientists to unleash their innovative ideas. “When I think about being a professor of color for students who walk into my intro to chemical engineering class, and they see me at the front of the room, I’m like, ‘Wow, I would have really enjoyed that.’ I would have felt like someone like me can do this.”

Now, Dr. Tarpeh is demonstrating to young minds that anyone can do anything—whether that be digging up dinosaur bones or reinventing wastewater recovery. Having just welcomed his newborn daughter into the world, William is more inspired than ever to show the coming generations that what we view as “waste” now could be “liquid gold” tomorrow.