earned the Ugandan name, Nansubuga, meaning she is a daughter of the Lung Fish Clan. "This has helped me build fictive kin networks and gain acceptance in places where I am visibly an outsider," she says.

While overfishing, especially of *Lates niloticus* — the Kenyan Nile perch — is a concern there, "The crisis is different for different people, and there's more than the single story of declining exports," she has found.

In her work, part of Purdue's Building Sustainable Communities initiative, she's learned about their trust-based economy, women's vital roles and the importance of multiple fish species, beyond the Nile perch.

"People do what makes sense for them," Johnson says. "There are important reasons why, and we benefit when we understand that."

Jennifer Johnson

PHOTO BY VINCENT WALTER

PHOTO BY MARK SIMONS

Pablo Zavattieri

MIMICKING NATURE'S STRENGTH

Odontodactylus scyllarus | "Nature uses efficient, elegant approaches to create materials," Pablo Zavattieri says, pointing to the tiny dactyl club on the mantis shrimp he holds. "Can we replicate it?"

A civil engineering associate professor, he's interested in the club's strength and newly discovered sinusoidally architected helicoidal structure — a herringbone/spiral staircase pattern. "How the fibers are arranged is the new part," he says, and his team would like to apply that to construction materials, sports helmets, body armor and other applications.

Zavattieri got involved when an interest in corals led him to read about *Odontodactylus scyllarus* tucked inside ocean rocks in home aquariums. Owners would hear knocking and often discover aquarium glass shattered by the shrimp's dactyl club.

How did the clubs withstand the impact, he wondered, mentioning it to a colleague, David Kisailus at the University of California, Riverside, who was already researching it. Zavattieri joined him, private sector and other university researchers on the project. It is supported by the Air Force Office of Scientific Research and the National Science Foundation, through Zavattieri's CAREER award.

Besides the unique structure, they found stress-resistant nanoparticles in the club's outer layer.

"Purdue's most important contribution was building computational and 3-D printed models and explaining how the material behaves, especially this mechanical hammer," Zavattieri says. "It should shatter, but it doesn't."

Today, their quest continues to one day transfer nature's design to manmade materials.