

Washington scientist works to digitize all fish

By PHUONG LE
Associated Press

SEATTLE — University of Washington biology professor Adam Summers no longer has to coax hospital staff to use their CT scanners so he can visualize the inner structures of stingray and other fish.

Last fall, he installed a small computed tomography, or CT, scanner at the UW's Friday Harbor Laboratories on San Juan Island in Washington state and launched an ambitious project to scan and digitize all of more than 25,000 species in the world.

The idea is to have one clearinghouse of CT scan data freely available to researchers anywhere to analyze the morphology, or structure, of particular species.

So far, he and others have digitized images of more than 500 species, from poachers to sculpins, from museum collections around the globe. He plans to add thousands more and has invited other scientists to use the CT scanner, or add their own scans to the open-access database.

"We have folks coming from all over the world to use this machine," said Summers, who advised Pixar on how fish move for its hit animated films "Finding Nemo" and "Finding Dory" and is dubbed "fabulous fish guy" on the credits for "Nemo."

He raised \$340,000 to buy the CT scanner in November. Like those used in hospitals, the CT scanner takes X-ray images from various angles and combines them to create three-dimensional images of the fish.

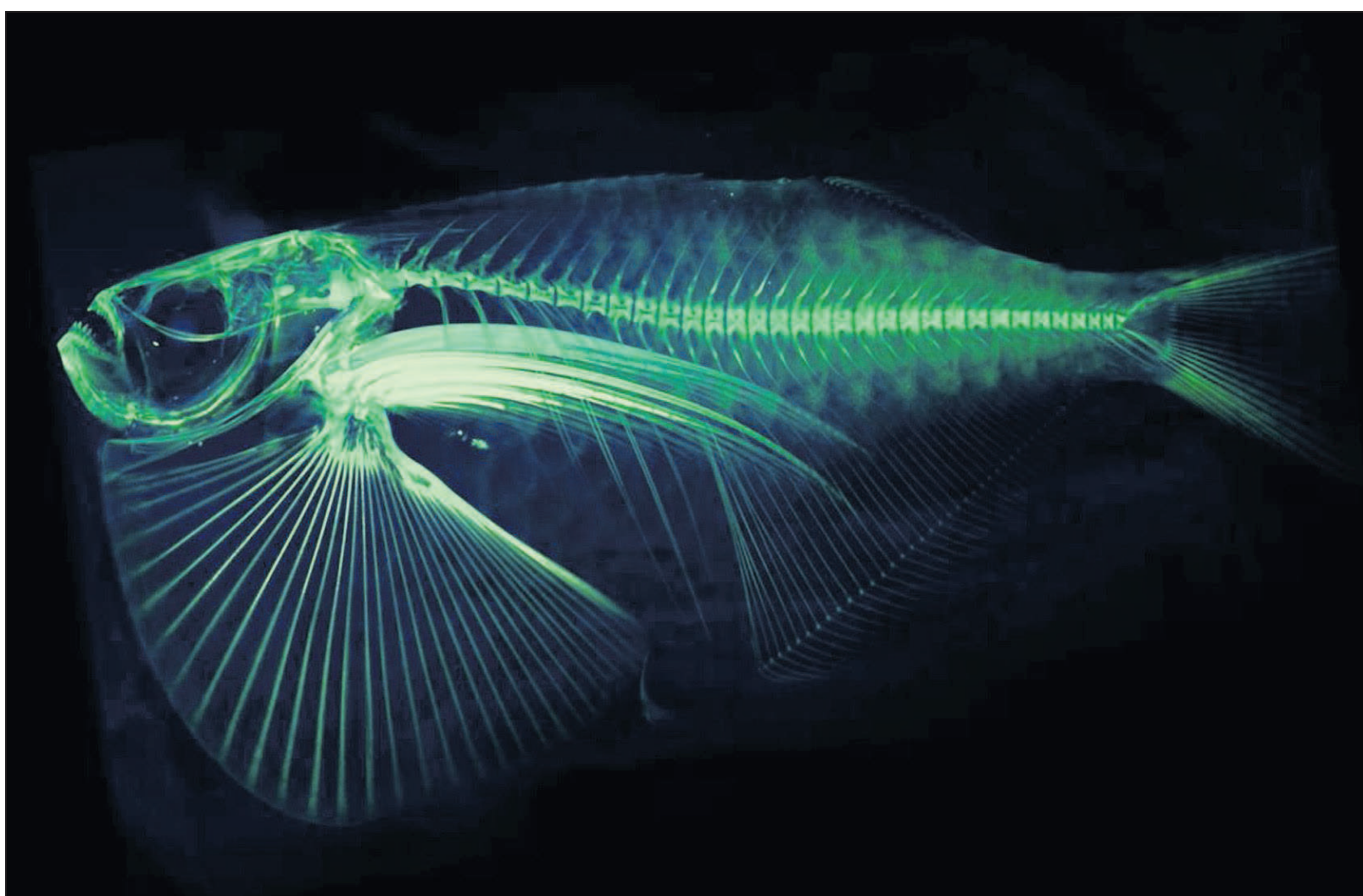
With each CT scan he posted to the Open Science Framework, a sharing website, people would ask him, "What are you going to scan next?" He would respond: "I want to scan them all. I want to scan all fish."

Then he developed techniques, such as scanning multiple specimens, that made the goal within reach, he said, and suddenly a project that easily could have taken 50 years boiled down to just a few years.

"It wasn't just a joke anymore. We could actually say it and have a hope of actually getting every fish scanned," he said.

Scans typically cost \$500 to \$2,000 each, but Summers' project provides free access to scans. Summers recalled how as a graduate student 17 years ago he bribed a hospital technician with Snickers bars to scan large stingrays in its CT scanner.

At the time, he wanted to know how an animal with a skeleton composed of cartilage could do such "a crazy thing" as crush hard prey, such as snails and mussels. The medical CT scan helped offer an answer: the sting ray had mineralized tissue in its cartilage.



In this undated image provided by Adam Summers, a University of Washington professor in the department of Biology and the School of Aquatic and Fisheries Sciences, a scan of the *Thoracocarax stellatus* species of fish is shown, with color added by computer to enhance the rendering of the structure of the bones.

So began his fascination with CT scans as a way to uncover other puzzles: What's the structure of a sting ray's wing? How does one scale in armored fish overlap with another and what are the implications for movement?

"It's been a long road from getting them for free, paying some money for them, using hospital facilities in the middle of the night," Summers said.

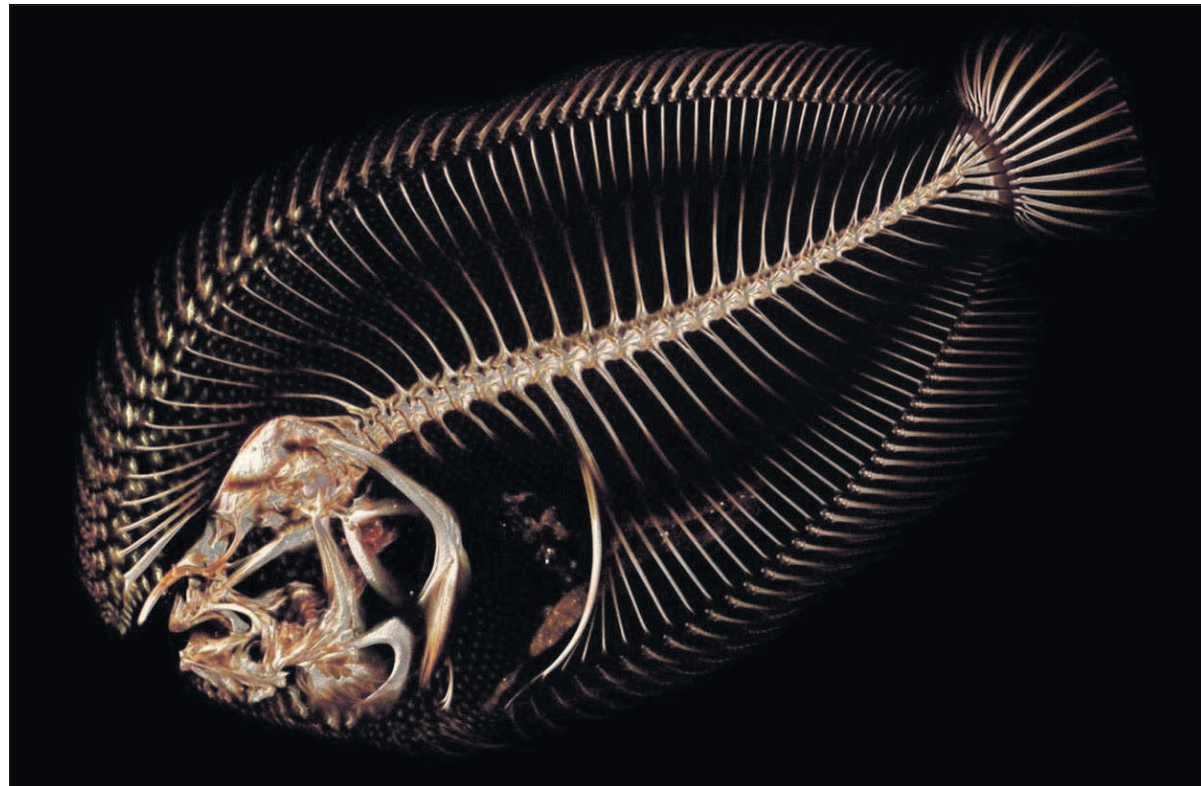
The scanner, about the size of two dorm refrigerators, is housed at the UW's marine lab on Friday Harbor, 80 miles north of Seattle.

He is also known for his fish photographs — stunning images of fish that have been stained with red and blue dyes to highlight cartilage and bone — which were shown at the Seattle Aquarium.

The scanner can handle smaller fish; about two grapefruits stacked on top of each other. The average fish is about a foot long, so he said he can cover half the world's fish. He's hoping to scan large fish using industrial scanners elsewhere, including at the University of Washington.

Malorie Hayes, a graduate student at Auburn University, took Summers up on his offer to use the scanner after hearing him talk about the project at a recent conference.

In two weeks, she'll fly to the lab to scan over 200 species of African



In this undated image provided by Adam Summers, a University of Washington professor in the department of Biology and the School of Aquatic and Fisheries Sciences, a scan of the *Trianectes maculatus* species of fish, also known as the Hogchoker, is shown.

barbs, a small freshwater fish.

Such fish are rare and difficult to obtain, she said. To look at their skeleton, you typically would have to destroy the specimen.

CT scans offer a non-destructive way to study those bones. "Instead

of having to cut them open, I can visualize the skeletons," she said. "There are lots of questions that can be answered just by looking at their skeletons."

Summers has been fascinated with how researchers are using the

scans. Some are making computer graphics models and animating the fish. Another group colorized the skulls to show what bones were what.

"The reason this can happen is, it's free an open access," he said.

BLOOMIN' BLUES

Plant only found atop Mt. Howard

By BRUCE BARNES
For The East Oregonian

Name: Greenman's Biscuitroot

Scientific name: *Lomatium greenmanii*

This dwarf member of the carrot family holds a unique place among the plants of northeast Oregon. It is federally listed as a threatened plant species. That is primarily because it is only known to exist in one place, that being on the top of Mt. Howard, overlooking Wallowa Lake.

I'm sure most visitors to the top of Mt. Howard don't know of the plant's existence there. In the winter it is completely buried under the snow. In the summer, even those who are inclined to pick wildflowers in spite of obvious posted signs on the peak forbidding the activity are not likely to notice the tiny flower clusters, nor likely to pick them if they do.

I've watched children picking wildflowers there with the encouragement of their parents, who either are oblivious to the signs or don't care, and they walk by the biscuitroot without seeing it. So the plants happily proceed to produce



Photo courtesy Bruce Barnes

Greenman's Biscuitroot

new seeds and maintain their presence on the peak.

The plants on the mountain are too few to justify laboratory study.

In writing this article, I'm trusting the readers to look if they wish, and to allow the plants to stay where they are. They cannot survive transplanting. Aside from that, it would be a federal offense.

The collection of rare plants has become a problem to the extent that botanists, government agencies, universities, and managers of botanical gardens often will not reveal the exact location of rare plants. I've seen this shift in practice take place

over the last 30 years.

The plants on the mountain are too few to justify laboratory study, and there is no record of any uses by local Indian tribes. The carrot family includes enough highly poisonous plant species to discourage anyone even considering eating any of it.

The plant in the photo is typical, a flattened mat three inches across with a couple of tiny yellow clusters of flowers. Each flower is about a sixteenth of an inch wide. The leaves are obscurely pinnately compound with a few elliptical leaflets near the tip.

Where to find: Along the trail at the Mt. Howard summit. This year most of the plants are well past blooming already.

Tourists might get access to Sumpter Dredge's top floor

By FORREST WELK
Baker City Herald

SUMPTER — Rella Brown stands on the top center deck of the Sumpter Dredge, admiring the massive mining rig built in the Great Depression.

A ranger assistant of Oregon State Parks, Brown points to a large metal structure partially sticking out the ship's front. It looks like a rusty Ferris wheel, featuring multiple spoon-shaped buckets that each weigh a ton.

The hopper, as it's called, was used to carry ore into the ship by scooping it up and rotating it toward the dredge's mouth. From there, the rocks were washed and filtered for gold in a metal container called the neck.

Brown uses anatomical terms including mouth, neck and belly to explain the complex machine to children.

Today, the former workplace is a tourist attraction restored by Oregon State Parks and Friends of the Dredge, an organization devoted to continued preservation of the historical piece.

One floor below, curious tourists pass by and look up to hear Brown's distant explanation of the hopper's function. The public isn't allowed on the top floor due to safety concerns, and Brown usually has to explain the elevated hopper by using a laser pointer from the ground floor.

"People really want to come up," Brown said. "Every day."

The stairway to reach the top floor is blocked by locked doors. Brown said she still occasionally finds people climbing over and sneaking upstairs. She is limited in her tours to the downstairs area.

Board members with Friends of the Dredge are looking to change that. Jack Wells joined Brown on a rare top deck tour last week. He sees the value of the investment because of the historical significance of the dredge.

"Why save anything?" Wells said. "It's a place to get an appreciation. Where would we be today if we didn't have our history?"

Brown has a slightly different perspec-

tive. Beyond present day, she sees the dredge as a lesson for the future.

The tour is an opportunity to show people the pros and cons of dredging, she said.

Before the 1,260-ton structure was built, the area was a grassland used to grow crops and graze animals.

The dredge churned the valley into a series of gravel piles and ponds.

"History helps you to see, so that you can make a good determination," Brown said. "Do I to tear up the land to get the gold — is it worth it? Or is the land more valuable?"

She feels her tours can be more informative if the top floor is opened. Before it can, restoration must start from the bottom up.

The first priority is addressing uneven support structures at the dredge's foundation, Walls said.

Since the park bought the dredge in 1992, the hull's wooden support beams have slowly rotted away.

"They look like a beaver has been down there and chewing on them," Walls said.

He speculates that the 18 inches of water filling the hull likely contributed to the wood decay.

The park has hired an historical architect to examine the state of the foundation. The visit is planned for early August.

Walls is confident that before anything else is done, the water in the hull must be drained or pumped out. After that, he wants workers to replace the wooden beams with concrete, though no plans are definitive.

Park Manager Dennis Bradley is unsure what the cost of the project would be without a structural assessment. Whatever the case, Friends of the Dredge is constantly on the hunt for grants from private organizations.

Workers recently restored the rotten beams on the dredge's roof using over \$77,000 in grants. That's relatively cheap compared to previous projects.

The hull's foundation is a different story.

Though future projects don't have an estimated cost attached to them yet, Walls estimates the hull work could cost over \$1 million.