A crane hefts Ventana from Monterey Bay. The submersible clutches the three-legged research device that it retrieved from the seafloor.

Eye in the Sea

Deep-ocean animals have long evaded scientists' elaborate probes. Now, a tough little camera catches them on video.

BY JANE BRAXTON LITTLE

Edie Widder paces the deck of the *Point Lobos* as it plows across California's Monterey Bay. Alongside the 110-ft. research vessel, double-crested cormorants cruise silently above white-capped waves. Widder grabs a rail, steadying herself against the ship's incessant pitching. She is nervous about the scientific mission ahead: retrieving a three-legged, 200-pound contraption she left two days ago 2600 ft. below the ocean's surface.

"You put it down on the bottom, cross your fingers and go away, hoping you'll find it again," Widder says of the invention she calls "Eye-in-the-Sea." While at Florida's Harbor Branch Oceanographic Institution, the marine biologist designed the underwater camera system to unobtrusively observe deep-ocean creatures. Unlike submersibles, which broadcast their presence with bright lights and noise, the Eye sits dark and silent on the ocean floor.

"We're peeking into this world for the first time in a way that doesn't scare everything out of its wits," Widder says. Oceans represent 99 percent of the planet's living space, but scientists have explored less than 5 percent of it. The potential for discovery is enormous. In the Gulf of Mexico, the Eye recorded a 6-ft. squid new to science. A 12-ft. shark was caught shaking the apparatus in another clip. Something even bigger may have wrestled with it the time the crew located the Eye dataless and facedown in the mud 50 yards from where it had been dropped. No wonder, then, that Widder is anxious about what they will find today.

Candid Camera

When the *Point Lobos* begins to slow, I follow Widder into the control room, where 17 computers track everything from Greenwich Mean Time to the water's oxygen content. Several monitors are connected to a camera on the Ventana, a Volkswagen-size robotic submersible that a crane has just dropped overboard to search for the Eye.

PHOTOGRAPHS BY MARK RICHARDS

"It's so simple, it's a shame no one thought of it sooner," says marine biologist Edie Widder (right) of the undersea camera she invented.

We watch its descent through layers of darkening water.

Suddenly Widder points at a screen. "There it is! Still standing upright!" Through the dark blue haze, the Eye looks more like an oversize insect than an elegant research device. Its aluminum frame supports an orange battery box and a steel cylinder that contains a computer, a high-intensity camera and an f 0.98-aperture lens capable of gathering huge amounts of light. Perched like antennas atop the 7-ft. frame are two low-level infrared lights.

An arm baited with fish heads extends from the Eye's base; we watch as a crab reaches a crusty claw toward it. At the end of the arm, an electronic jellyfish lure—a 6-in.-dia. disc encircled by LEDs—flashes the pattern that real jellyfish use to call for help. The camera films any predator that arrives to devour whatever is "attacking" the lure.

Widder's system is triggered by bioluminescence, the eerie light generated by some animals for communication and defense. Bioluminescent light near the Eye causes the video camera to begin recording. After a few seconds, infrared lights turn on to reveal the animal source.

Scientists know very little about bioluminescence, Widder says, "but we do know it may be the most common phenomenon on the planet." To a depth of 3200 ft., 90 percent of marine animals are bioluminescent. The Eye may help explain how they use light to survive. In the lab, bioluminescent compounds also help scientists understand human survival—by literally shedding light on cellular activity.

What Lies Ahead

When the crane lifts Ventana out of the bay, the Eye-in-the-Sea dangles next to it like a gangly parasite. Widder retrieves the computer from the still-dripping cylinder and hooks it to a monitor. Soon, a cheer rings out. Data, and lots of it, she reports with a grin.

The video has captured an explosion of light bursting like a blossom on the stem of a sea pen—the first record of natural bioluminescence in the primitive mud dweller. In another segment, an enormous shadow passes before the camera, but the animal itself eludes it.

While the ship motors to a site farther out in the bay, Widder and her crew remount the camera, rebait the arm and install a new battery. They watch as the crane lifts Ventana and the Eye from the deck, and releases them both into a swirl of sea-green foam. A flock of gulls circles the spot, hoping for something more edible than pure science.

Instead of redeploying the Eye every 48 hours, Widder eventually will be able to leave it on the seafloor for up to six months. Early next year, it will be plugged into the 32-mile web of copper and fiber-optic cables called MARS—the Monterey Accelerated Research System. MARS's eight ports will be able to deliver 10 kilowatts of electricity and stream data directly to shore.

Once it is no longer dependent on batteries, the only limit on Eye-in-the-Sea will be the length of its extension cord. **PM**

ON THE WEB

To see video from the Eye's camera, go to: *popularmechanics.com/eyeinsea.*