SEA BASE ALPHA

The dream of undersea colonies lives on in Key Largo, where aquanauts roam the reefs and a cadre of true believers design new outposts for life in the deep.

BY BEN HELLWARTH

D.J. ROLLER/LIQUID PICTURES 3D

IF THERE IS ANY PLACE ON EARTH YOU MIGHT EXPECT TO FIND them—the true believers in the imminent coming of manned undersea outposts or spectacular domed colonies on the ocean floor—it would be here, in Key Largo. This first major stop along the 100-mile Overseas Highway to Key West is home to the world's only underwater hotel, the only continuously operating underwater lab and classroom, and the only undersea research base. And it is in Key Largo that you find divers like Ian Koblick, whose even tan hints at his lifetime of outdoor ventures. His hair and trademark goatee are graying, although for a septuagenarian he looks as if he takes regular dips in the Fountain of Youth. Like so many others along this steamy island chain, he's wearing shorts and a billowing Hawaiian shirt. No matter that he is seated behind a large desk in the kind of high-backed executive chair more often associated with Brooks Brothers.

The wood-paneled walls around Koblick's office are filled with memorabilia that attest to his years as an undersea pioneer and a genuine player in a decades-long quest to turn ordinary divers into "aquanauts," the name applied to those equipped to live on the seabed, much as crews launched into space get to be called astronauts.

Koblick was among the early converts to the concept of undersea living when it came of age in the 1960s, in the shadow of the momentous achievements of the race to the moon. But the nascent quest to equip aquanauts to live in "inner space," as some called the vast undersea realm, never got anything close to the billions of dollars pumped into launching the Apollo astronauts into outer space, birthing an industry and defining the global zeitgeist.

Koblick's early brush with official indifference convinced him that the government would never support an undersea corollary to the space program. So he went looking for entrepreneurial solutions to creating underwater habitats: school bus–size seafloor shelters that give aquanauts a pressurized, climate-controlled base, just as the International Space Station gives astronauts a hospitable home in orbit.

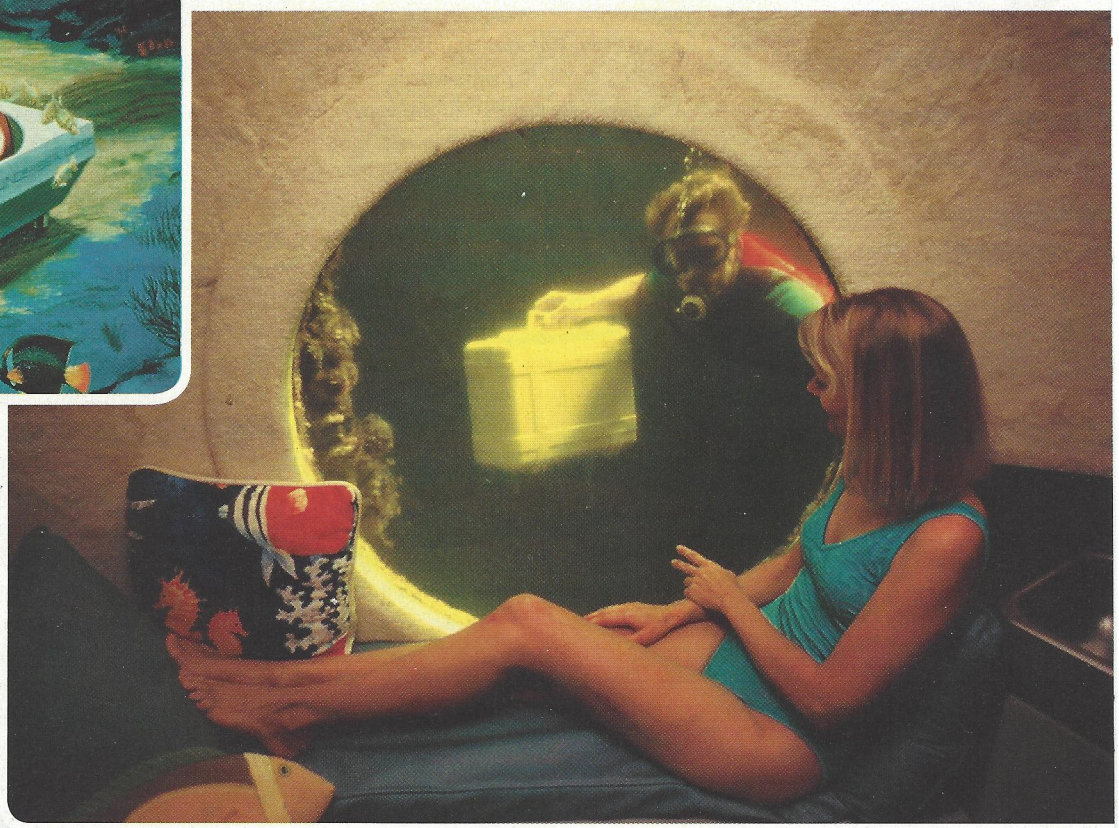
A prominent example of such a habitat, called Jules' Undersea Lodge, lies a stone's throw from his office, submerged in a lagoon that juts like a cul-de-sac into Key Largo Undersea Park. Part tourist destination and part science center, the park has a homegrown feel and a touch of that easygoing kitsch that seems to permeate the Florida Keys. How Jules' Lodge—once a state-of-the-art, research-oriented seafloor habitat of Koblick's design—came to be a novelty underwater hotel in a lagoon says a lot about the struggle to keep the concept of manned sea dwellings alive.

Koblick may sound like a romantic dreamer for his enduring belief in the value of seabed habitats and his persistent efforts, over many years, to create new ones. But he is not alone. Just a couple of miles from Koblick's office along the Overseas Highway, you'll find a cadre of believers, a dozen or two of them, depending on the day. They work out of a pair of canalfront houses whose interiors have been transformed over the years into mission control for the world's only surviving full-fledged sea base, called Aquarius. Owned by the National Oceanic and Atmospheric Administration (NOAA), Aquarius has spent more than two decades perched out on a reef 60 feet below the surface and 9 miles from shore, serving as a scientific research base in the Florida Keys National Marine Sanctuary. The combined activities of this public, science-oriented habitat and Koblick's private Undersea Park make Key Largo the kind of mecca where aquatic dreams live on.

THE ONLY SURVIVING SEA BASE ON EARTH, AQUARIUS IS SUBMERGED 60 FEET UNDERWATER ON A REEF OFF THE FLORIDA KEYS.

UNTIL JUST HALF A CENTURY AGO, the idea of housing human divers on the seabed was pure science fiction. Even with the advent of modern scuba in the 1940s, strict depth and time limits were inevitable because of the physiological effects that come from breathing underwater and under pressure. In order to avoid painful internal injuries and even death, typical dives to modest depths of, say, up to 100 feet lasted only minutes, not the days or weeks that would be necessary to live and work out of a seafloor habitat.

Then, in the late 1950s, a genial, charismatic U.S. Navy doctor named George Bond, who had been trained as a diver, caused a stir by questioning the conventional diving limits. Despite resistance from Navy skeptics, Bond began a series of experiments at the Navy's submarine base at New London, Connecticut, where he was in charge of the medical research lab. Much as NASA used simulators to test dogs and monkeys before launching them into space to gauge the physiological effects of g-forces and weightlessness, Bond sealed animals, and eventually human volunteers, in pressurized tanks to simulate a deep-sea habitat. Instead of weightlessness, the aquanaut would have to endure, among other things, artificial atmospheres with gaseous mixtures different from what we breathe on land, maintained at significantly higher pressures than those at sea level to match the water pressure at depth. One problem is that when divers descend more than about 130 feet, customary levels of nitrogen (78 percent of air on the surface) have a narcotic effect. Bond found that helium proved a suitable replacement on long-duration dives. Oxygen, making up 21 percent of the air at sea level, can cause convulsions and death if pressure gets too high, so oxygen had to be progressively reduced with every foot of descent, and then slowly raised as a diver came back up.



In making these adjustments, Bond and his team were testing a concept known as saturation diving, which turned out to be the key to prolonged stays underwater and under pressure. Much as a sponge absorbs liquids, bodies absorb gases through the process of respiration. A body becomes "saturated" as the gases a person breathes disperse into the blood and tissues. At greater depths, a diver has to breathe higher-pressure gases so his lungs are not crushed by his higher-pressure surroundings. As pressure goes up, so does saturation, like a dry kitchen sponge absorbing more liquid the longer it's held underwater. Once a diver was saturated with the right gases for a given depth and pressure (a process that took a day), he could safely remain at that depth indefinitely. The finding was a revolutionary advance that changed what could be done on the seafloor—provided, of course, that divers, once saturated, had a properly equipped, pressurized habitat as a dry shelter. No one had ever built such a thing.

Favorable results from Bond's lab compelled Jacques Cousteau and the American inventor Ed Link to jump into the Mediterranean with small ocean habitats in the fall of 1962, just a few months after the first orbital spaceflights. Link's prototype wasn't much larger than a phone booth, with room for just one diver. Cousteau's was little more than a cylindrical tank, shorter than a school bus but with beds and amenities enough to accommodate two aquanauts for a week. These and the other early underwater habitats had dry interiors, pressurized to match the water pressure outside. That meant a hatch in the floor could remain open without the sea rushing in, and the aquanauts living inside had ready access to the sea outside at any time of day or night. By 1964 the Navy had launched Sealab I, 40 feet long and 9 feet in diameter. Equipped like a camper, it had bunks, galley, toilet, shower, and a hole in the floor so that four aquanauts could come and go.

The first Sealab aquanauts were deployed to the seabed southwest of Bermuda for 10 days at a depth of nearly 200 feet. They demonstrated the ability to spend hours in the water and work outside the habitat, all while undergoing physiological testing to make sure they weren't killing themselves by living in this alien environment.

WHILE ALL THIS WAS GOING ON, Koblick was graduating from college in California and setting his sights on a graduate program in marine biology. His interests led him to become an early devotee of scuba, the perfect tool for gathering fresh seaweed samples offshore from Monterey, where he had an internship at Stanford University's Hopkins Marine Station. That experience convinced him that to truly know the ocean, a scientist had to work in the ocean—or better yet, live in it just as Jane Goodall lived in the jungle to study chimps. He felt so strongly that he turned down a scholarship to Duke University, putting off graduate school and moving

Jules' Undersea Lodge: A postcard from the 1980s (left) and a patron awaiting dinner (above). On page 33: a marine scientist explores near the still-active sea base Aquarius in the Keys.

JULES' UNDERSEA LODGE (2)

with his wife and young son to the Virgin Islands, where the seawater would be warmer than at Monterey. He soon landed a job at the newly formed Caribbean Research Institute and took the lead in establishing an ecological research station at Lameshur Bay on St. John.

Koblick's timing was perfect: A second Sealab trial came in the summer of 1965, this one located off the coast of San Diego. The new habitat, looking like a cross between a submarine and a railway tank car, accommodated three separate teams of 10 aquanauts for two weeks each. It was followed a few years later by the 60-foot-long, cylindrical Sealab III, which was designed so a dozen aquanauts at a time could conduct experiments at a depth of 600 feet, a giant leap out onto the continental shelf.

When a delegation from Washington, D.C., came to scope out the Virgin Islands as a possible site for a new, still more advanced habitat, it was as if the candy store had come straight to the kid. Koblick saw his chance to become an aquanaut. He eagerly led the sales pitch, showing visiting representatives everything he could think of—including a sampling of the tasty, cheap local rum—to convince them that the waters around the Virgin Islands would be ideal for their prototype. He called it Tektite, for meteors that survive their fall through the atmosphere, crashing into the ocean and leaving pearl-like fields of debris along the seafloor.

The pitch paid off. Tektite, jointly funded by the Office of Naval Research, NASA, the Department of the Interior, and General Electric, the habitat's builder, was approved and placed in Lameshur Bay. Whereas Sealab had a military orientation, Tektite focused on marine biology and geology, and on duration more than depth. NASA's interest was in the psychological lessons that might be gleaned from observing people living in cramped quarters in a hostile environment—conditions similar to long-duration spaceflights. Instead of a more common horizontal tank, Tektite had side-by-side vertical tanks, each about 12 feet in diameter and two stories tall, that were mounted on a rectangular base, like upside-down bell jars on a shoe box. Four divers from the Department of the Interior were selected as aquanauts, but Koblick had argued for a few alternate aquanauts—just in case—and he was soon off to Washington and Philadelphia for physical tests and training to be one of them.

Tektite's inaugural mission began in February

36,000 Feet Under the Sea

Even the most outlandish of the proposed undersea colonies would sit just a few hundred feet below the waves. To really plunge into the ocean's dark mysteries, you need a submersible–as director James Cameron splashily demonstrated in March when he descended nearly seven miles (35,756 feet, to be exact) aboard *Deepsea Challenger*, a 24-foot vessel equipped with a robotic sampling arm. Cameron dived to a part of the Pacific's Mariana Trench that was visited just once before, by a U.S. Navy sub that spent 20 minutes there in 1960. Cameron stayed at the ocean's deepest spot for three hours. *Deepsea Challenger* belongs to a generation of craft that are opening the ocean's extreme depths to direct exploration; if sea colonies are space stations, these are missions to Mars. Other players in the seven-mile-deep club:

Triton 36000, the world's deepest-diving multipassenger sub (shown at left). Built by Triton Submarines around a superstrong glass sphere, it can carry a crew of three to a depth of seven miles in 75 minutes.

Virgin Oceanic, a one-person sub backed by billionaire adventurer Richard Branson. The vessel uses airplanelike wings to "fly" across the bottom of the ocean for distances of up to six miles.

Deepsearch, designed by DOER Marine, will be capable of eight-hour missions, giving marine biologists a chance to perform extended field studies of extremely deep aquatic life. ERIC A. POWELL

COURTESY TRITON SUBMARINES. OPPOSITE: DOER MARINE

1969. The habitat's depth was about 45 feet, a fraction of the 600 feet or more that Sealab had been aiming for—so less complexity was needed for the pressurized gas recipe and the aquanauts' eventual decompression. But the 60-day mission there set a duration record and marked another significant step in undersea habitation. As an alternate aquanaut, Koblick did not get to stay inside the habitat but was in the water every day to help carry out Tektite science projects, especially chasing down lobsters to attach color-coded tracking tags. Though the narrow focus was lobster biology, Tektite's overarching mission was exploring just how marine research might most effectively be carried out from a seafloor base.

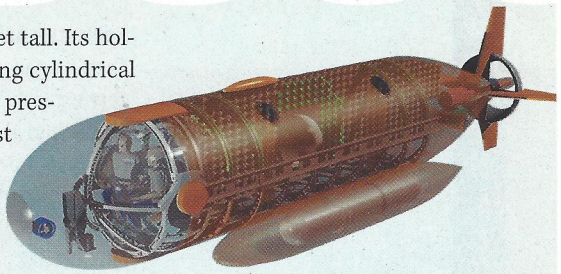
When Tektite came to a successful end, Koblick was appointed special assistant to the governor of the Virgin Islands for undersea programs and immediately started lobbying the Interior Department to get a chunk of the money needed to bring the Tektite habitat back to the same spot.

TO TRULY UNDERSTAND THE OCEAN, A SCIENTIST HAD TO LIVE IN IT–JUST AS JANE GOODALL LIVED IN THE JUNGLE TO STUDY CHIMPS.

It took some doing, but a year later Tektite II was launched. This time Koblick got his wish: a shot at being a bona fide aquanaut who lived under the sea. For three weeks he and others on the crew set up beacons outside lobster dens, part of a signaling system that alerted them whenever lobsters were on the move. To Koblick it felt as though they were firefighters, leaping into action at the sound of the alarm. Over the weeks of residence, they also studied the fluctuations and migrations of planktonic organisms in the water column, still a focus of research today. Tektite II operated successfully for seven months, through the fall of 1970, housing a total of 53 marine scientists.

THE TEKTITE II PROJECT had been so costly that there would be no Tektite III. But soon after, Koblick and his newly formed nonprofit, the Marine Resources Development Foundation, approached the Puerto Rican government with an idea of his own. Could he help them launch a similar habitat program to size up offshore resources and inventory sea life on nearby reefs? That's how a new and improved habitat—whimsically called La Chalupa, Spanish for a type of fishing boat with a tendency to capsize—got its start.

While most habitats had a tanklike appearance, La Chalupa looked more like a barge, about 50 feet long, 20 feet wide, and 10 feet tall. Its hollow interior contained two adjoining cylindrical chambers that could be sealed and pressurized as living quarters. A ballast system took in and released water to help sink and raise the habitat, which was designed for easy towing. It could house up to five aquanauts at a time for two weeks, at depths ranging from 50 to 106 feet.



Project Deepsearch sub: Designed by marine consulting firm DOER, it will reduce transit times to the deepest parts of the ocean and provide an expansive view.

On one of La Chalupa's first missions, in 1972, scientist-aquanauts surveyed nutrients and bottom sediments and described algal populations, identifying some 30 new species. On a later mission they collected fish to determine their food sources. They studied the behavior of reef fishes and fish parasites, as well as coral's ability to slough off silt that could drift in from nearby dredging operations. They also tested a saturated aquanaut's ability to reach depths down to 300 feet, extending the possibilities for exploring from a habitat placed at 100 feet. Koblick himself was a Chalupa aquanaut in the spring of 1974 when his mission almost came to a tragic end.

KOBLICK AND HIS DIVE BUDDY, Al Waterfield, a research diver from the University of New Hampshire, were 150 yards from La Chalupa unspooling a transect line, a cord to keep track of their whereabouts. Koblick was wearing a closed-cycle rebreather—a complex piece of gear that could supply breathing gas for longer periods in dives to 300 feet. He took a breath at one point and also sucked in some water: The gear had sprung a leak. To make matters worse, the water was laced with the chemical compound the rebreather used to absorb carbon dioxide, causing a burning sensation in his mouth and throat.

Koblick gave an emergency signal to Waterfield, who went to get help. Meanwhile, Koblick used the transect line like a handrail to pull himself along the seabed, but he felt that the ocean was closing in on him. The coral in his peripheral vision began to blur. His field of vision narrowed, as if he were looking through a telescope. Before long all he could see were his hands grasping the line in front of him. "Mother Ocean, you are not going to get me," he said to himself, just before coming over

a rise, the habitat no more than 20 yards away. Then he passed out. Next thing he knew, he was getting slapped in the face. His fellow aquanauts had managed to drag him up through the entry hatch in the floor of La Chalupa and resuscitate him. He sputtered and coughed up water. His throat still burned and he developed a painful ear infection, but he was alive.

Before the mission was over, Koblick and the Chalupa crew were struck anew by their front-row view of the dynamic undersea environment. The four aquanauts were lying in their bunks, looking out a port window as big around as a manhole cover, sipping rum and Cokes—the soda was flat because of their pressurized surroundings. A smattering of small fish and crabs mingled outside on a grassy patch of sand. A gurnard fish entered the scene, using its winged pectoral fins to cruise along the bottom. Out of nowhere a fish the size of an overstuffed golf bag appeared—some kind of snapper, perhaps, though no one was sure. It hovered near the gurnard, moved in, and—slurp!—sucked it up like a vacuum cleaner, leaving a puff of sand. The big fish started to swim off, then stopped and spit out the gurnard, which hastily swam away.

A FISH THE SIZE OF AN OVERSTUFFED GOLF BAG APPEARED, HOVERED NEAR THE GURNARD, MOVED IN, AND–SLURP!–SUCKED IT UP LIKE A VACUUM CLEANER.

Koblick hoped La Chalupa would open a deep-sea vista for more scientists, but when the Puerto Rican missions ended in the mid-1970s after a new round of funding cuts, he could find no other takers for his state-of-the-art habitat. So he towed it back to Florida, where it languished for almost a decade, until his foundation converted it into Jules' Undersea Lodge—named for Jules Verne, of course. It's like a cozy cabin that sleeps up to six, in considerable comfort, and has been doing so since the mid-1980s, when it was placed in Emerald Lagoon, in about 30 feet of water at Key Largo Undersea Park. Koblick co-owns and operates the park with his longtime business partner, Neil Monney, a former professor and director of ocean engineering at the U.S. Naval Academy. The two met during Tektite, and Monney later signed on as a Chalupa aquanaut. While teaching at the Naval Academy he instigated the small tank of a classroom called MarineLab, which is next door to Jules' Undersea Lodge in the lagoon. With Jules' Lodge and MarineLab, the two partners could continue to offer a window into the underwater world and provide a taste of the freedom that comes from having an open hatch in the floor.

The habitat movement might have stalled there, but the National Oceanic and Atmospheric Administration had Aquarius built in Victoria, Texas, in 1986. At 43 feet in length, the tanklike Aquarius, dispatched to the Virgin Islands, could accommodate six aquanauts to depths of 120 feet. But after hurricane Hugo walloped the islands in 1989, Aquarius was moved to the Florida Keys. Its current assignment in the Florida Keys National Marine Sanctuary enables study of the third-largest living coral barrier reef system in the world.

IT WAS TYPICALLY WARM in Key Largo last August as staffers prepared to cruise out to Aquarius aboard the *George F. Bond*, NOAA's 46-foot research boat that's named for the father of Sealab. They were about to meet up with researchers who, nine days earlier, had jumped off the stern of the *Bond* and swum the 45 feet down to where they could enter the habitat through its "wet porch," a water-filled foyer the size of a Jacuzzi. Team leader Chris Martens, a marine biologist at the University of North Carolina at Chapel Hill, had lived and worked out of Aquarius a half-dozen times before. So had his coinvestigator, Niels Lindquist, a UNC marine scientist. Now they were using their days in Aquarius to zero in on the causes of ocean acidification, which may be contributing to the degradation of coral reefs. Of particular interest: whether some acidification might be caused by respiration of bottom-dwelling creatures like sponges, or whether most can be attributed to

Challenger Station: Atlantica Expeditions hopes to deploy this hub by 2014 as the first module of an expanding undersea community.

BRENT HARTWIG. OPPOSITE: AP PHOTO

carbon emissions from an industrialized world.

Using more than a dozen instruments placed around the habitat, including a first-of-its-kind underwater mass spectrometer that tracks fluctuations in key gases up and down the ocean waters, aquanauts watch readouts in real time on computer screens. When alerted to interesting changes on the reef, they quickly gear up and swim out, like Koblick in the lobster-tracking days of yore, to supplement that information with their own firsthand reports. Through this combination of instrumentation and on-site measurements, the scientists are putting together a more precise picture than ever before of what's happening on Conch Reef, as the Aquarius site is known.

"The habitat allows you to become part of the surroundings," says Martens, echoing Koblick almost word for word. "You watch twilight come, nighttime, you see things happening, you understand what's going on. It allows you to go out the next morning and ask the next question, because you're looking for something new. It's an immersion kind of thing."

But sending down human explorers instead of using robot submersibles brings pitfalls and risks. Stings around Martens's face and neck attest to attacks from jellyfish, noticeably more abundant on this mission, and a curse but in some ways a blessing as well. The surge in moon jellies might be fodder for a future mission, and yet another research paper on top of the 300 Aquarius has already spawned in top-notch journals—assuming the missions can go on. That has been in question since 2009, when a diver was returning alone to the habitat from a work site about a hundred yards away. Something went wrong with his breathing gear and, just as Koblick did during that close call outside La Chalupa, he passed out. But by the time the stricken Aquarius diver could be hauled back to the habitat, he was already dead. On top of that are the national pressures to slash government spending. Aquarius must compete with other NOAA programs for a slice of the agency's annual budget of about $5.1 billion, most of it devoted to weather and satellite studies.

"We are very precariously near the tipping point of losing Aquarius," says former congressman Brian Baird, who represented southwestern Washington State for a dozen years until January 2011 and served on the House Committee on Science and Technology. "If I had to bet, I'd say it's very possible we do lose Aquarius, and I think that would be such a shame."

The situation echoes Koblick's frustration of years ago, when Tektite was stymied by governmental ambivalence. Yet four decades later, the Key Largo dreamers are still at it, seeking a formula for dwellings on the ocean floor. Tourism is one recurring theme. Former congressman Baird likes the idea of a government-sponsored habitat that would be open to the public, with user fees defraying costs as in national parks. Submersible builder L. Bruce Jones is forging ahead with the Poseidon Undersea Resort, a $200 million development on a Fijian island. The centerpiece will be two dozen podlike underwater rooms, 12 along either side of a corridor as long as a football field. Each 550-square-foot luxury suite is to be encased in a clear acrylic shell, about 40 feet below the surface, a depth similar to Aquarius's. The resort has no firm opening date, but Jones claims the market for this five-star approach to undersea living is out there, even at a projected price of $15,000 for seven days and six nights.

Sylvia Earle, the leader of five female aquanauts in the Tektite II project, rehearses for an undersea mission in the Virgin Islands in July 1970.

A RESEARCH-ORIENTED project called SeaBase1 aims to tap the ecotourism market by giving recreational divers a chance to live as aquanauts and work alongside scientists, lending a hand with tasks like reef restoration. The hope is to place SeaBase1 on the east side of Ambergris Caye in Belize, where the local reef joins a contiguous, 500-mile-long chain that is second in length only to Australia's Great Barrier Reef. "The charge on us is to get her built, and once she's built we feel very confident that users will pay the operational costs," says Chris Cooper, vice president of SeaBase1 and the son of the project's founder,

CONTINUED ON PAGE 66

CONTINUED FROM PAGE 39

Richard Cooper, a former Sealab and Tektite aquanaut and a longtime University of Connecticut professor of marine sciences who died last year. The group hopes to raise the $35 million it will need to create the habitat, a boxy structure that would accommodate 25 aquanauts at depths up to 60 feet.

THE MOST FORWARD-THINKING of the new undersea habitats may be a vessel called SeaOrbiter, currently funded by an international consortium. The vertically oriented structure, which stands 170 feet tall, is a massive buoy that looks like the fusion of a spinnaker sail and the Starship *Enterprise*. Designed by the renowned French architect Jacques Rougerie, SeaOrbiter would float and drift with currents, with more than half of the towering craft below the waterline at any given time. A one-fifteenth scale model has passed muster in a Norwegian wave tank. The submerged part of SeaOrbiter is designed to house a team of a half-dozen saturation divers, about a third of the planned crew, at a storage depth of about 40 feet. From one of the vessel's lower modules, they would be able to swim directly into the sea or ride an elevator down to 150 feet. A two-person submersible could dive from the mother ship to 2,000 feet.

SeaOrbiter: The planned mobile vessel also qualifies as a habitat because its scientists will be able to live underwater for weeks or months at a time.

"We just received funding to go forward with this project, and we're going to realize it, and it's quite incredible," says Bill Todd, a project manager of NASA's Neemo group, which is tasked with running experiments and training sessions at Aquarius. Todd has worked with the SeaOrbiter group for a decade. Years of engineering evaluations have been done, as have final drawings and technical schematics, and a contract has been hammered out with a shipyard in France to build SeaOrbiter. They could be cutting metal on the project in time to deploy the craft on its first mission by next year. "It's going to revolutionize 'inner space' exploration," Todd promises.

Finally there is Dennis Chamberland, a NASA engineer who has been trumpeting the cause of aquatic habitats for years. Chamberland leads a private effort to build a prototype underwater community. Though he prefers not to discuss the details with members of the press, his sci-fi-sounding effort, Atlantica Expeditions, calls for a true undersea colony, where "families live and work" and "children go to school." He says his vision of a high-tech cluster of habitats would deliver "a new ocean civilization whose most important purpose will be to continuously monitor and protect the global ocean environment."

Chamberland's first expedition, Atlantica 1, planned for the summer of 2014, aims to send three aquanauts on a 100-day underwater mission, longer than any yet recorded, to test "systems intended for permanent human residence of the undersea world." But most important, he is designing his habitats so they will not require compression diving. "Just like a moon base, the permanent facilities of the new world of Aquatica will have a constant, safe, close to Earth-normal living environment with lockout access to the remote and extreme external environment," he says. "It is a preeminent paradigm shift that allows the frontier to be opened where it was not practical before."

If that sounds like a habitat too far, more pragmatic plans are brewing all the time back in Koblick's office. The topic of the day is marine archaeology, a job for which a habitat could be the perfect tool (see the interview with George Bass, page 40). The marine archaeologist's work can be as detailed, painstaking, and slow-paced as that of terrestrial counterparts, so having a base near the site of a shipwreck would offer enormous advantages over repeated short-duration dives.

The key for Koblick is that archaeology could underwrite new habitats, providing a money model for bases on the seafloor. Toward that end, he recently asked the European Union to fund excavation of a 500-year-old wreck off the coast of Croatia. The request was denied, but it will not be his last. What remains as clear as the view out the window of La Chalupa is that the dream lives on.

Ben Hellwarth is the author of *Sealab: America's Forgotten Quest to Live and Work on the Ocean Floor.*

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"We're trying to learn how the lifeblood of the planet works. That means we have to be there."

—OCEANOGRAPHER JOHN DELANEY, PAGE 32

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