Marine Lab Weathers a Storm

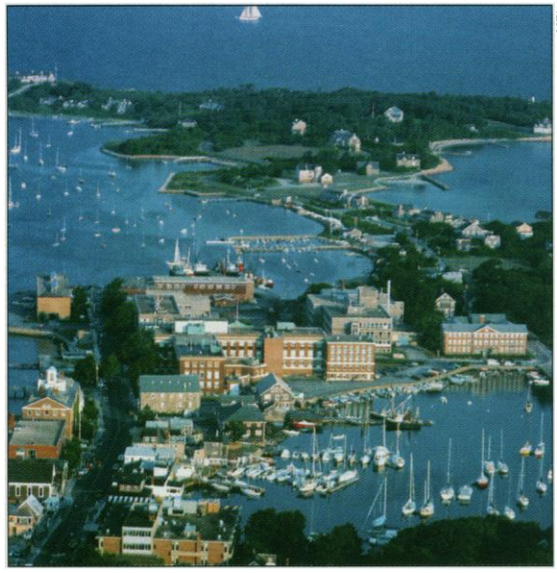
The Marine Biological Laboratory has been home (at least temporarily) to more Nobel Prize–winners than perhaps any other U.S. institution. But it has recently hit rough waters

WOODS HOLE, MASSACHUSETTS—As the summer sun burns off the morning mist over Eel Pond and Buzzards Bay, two bells called Mendel and Pasteur ring out their traditional 7:00 A.M. wakeup call to the residents of this small Cape Cod fishing village. It's the start of another busy day at the 105-year-old Marine Biological Laboratory (MBL), the nation's oldest marine lab. The venerable institution is bustling at the moment, jammed with its annual influx of nearly 900 students and researchers from around the world, a migration that quadruples MBL's year-round population and one that has made it famous as the summer resort for the serious scientist.

Throughout Woods Hole, in labs and on the beach, over drinks at Captain Kidd's or in the stacks of the famous always-open MBL library, the salty air is dominated by chatter about squid, sea urchins, horseshoe crabs, and the host of other sea creatures that researchers here use to explore fundamental questions in biology. That's a welcome change from recent times when scientists also found themselves bitterly arguing such topics as budgets, governance, the future of MBL, and—most divisive of all—molecular biologist Harlyn Halvorson, who became a lightning rod for discontent during his tenure as the laboratory's director from 1987 to 1992. "In past years, it was a most highly politicized environment. It was awful," recalls Duke University's David McLay, who co-directs MBL's 100-year-old embryology course. "People here were emotionally wrung out and tired. The laboratory cannot afford another eruption as we had," agrees Tufts University's Carol Reinisch, a year-round investigator at MBL who studies leukemia in clams.

Now, on the surface at least, the mood is upbeat. "I haven't had one conversation about politics in the hallway this summer," comments one relieved investigator. The main reason for the sea change: a new director—the first ever from outside MBL. Coupled with what for MBL is a radical new governing system (see box), the arrival last September of marine biologist John Burris, who formerly headed up the National Research Council's Commission on Life Sciences, has lifted spirits and soothed ruffled feelings.

But while the emotional barometer is definitely rising, many of the lab's underlying problems remain. Operating almost entirely on overhead revenue generated from "soft" grant money, MBL is particularly vulnerable to the whims of federal funding and, like most marine labs, lives life on the budgetary edge. It has only a $17 million endowment, a paltry sum for a place of its size, stature, and history. In part because of this financial precariousness, the lab has found it tough to hold on to top-flight researchers—almost one-fifth of MBL's group leaders have left over the past few years. And as MBL struggles to build up its small year-round program to provide greater financial stability, the laboratory must find new scientific relevance in a world where fewer and fewer biologists depend on marine organisms for their work. Add it all up and even some of MBL's most loyal fans must wonder if its best days are behind it. But that's a sentiment the new director refuses to consider. "I'm confident the Marine Biological Laboratory will survive another century. We're not only going to survive but flourish," says Burris.



MBL

Science by the seashore. MBL's attractive venue.

Cradle of biology

MBL's fabled past owes much to a quirk of geography: the confluence of the cool, northern Labrador current and the warm, southern Gulf Stream, which brings an incredible diversity of marine organisms close to Woods Hole's shore. These organisms, in turn, have attracted a diversity of biologists ever since MBL first opened its doors in 1888 under the direction of Charles Whitman, a zoologist who envisioned a marine station devoted to excellence in both research and education. There's ample evidence to suggest that the lab has succeeded in both missions. "In my opinion, this place is the cradle of American biology," asserts University of Kansas cell biologist Robert Palazzo, a former year-round MBL scientist and now summer investigator.

Taught by leading figures in science, who often keep students in the lab past midnight, MBL's rigorous summer courses in physiology, neurobiology, embryology, and a variety of other disciplines have shaped generation after generation of experimental biologists. All in all, more than three dozen Nobel laureates have spent time here teaching and doing science by the seashore. It was at MBL that Thomas Hunt Morgan conducted his acclaimed genetic studies of fruit flies in the 1930s, H. Keffer Hartline broke new ground by examining the eyes of horseshoe crabs, and neuroscientists revolutionized their field using the squid's giant axon. And in just the past decade, experiments with MBL's sea creatures bequeathed key new cellular proteins such as cyclins, which govern when a cell divides, and kinesin, a "motor molecule" that drives the trafficking of vesicles in cells.

In striving to explain MBL's special character, summer researchers here speak of an informality and intellectual overflow rarely found in their academic homes, a combination that drives impromptu partnerships, perhaps the backbone of MBL's success. Scientists find it almost impossible not to chat with colleagues while waiting for the local drawbridge to close or relaxing near the historic sundial. "A lot of the informal and psychological barriers to collaboration are broken down here," notes invertebrate immunologist Peter Armstrong of the University of California, Davis, explaining that this year he has already hooked up with someone from MBL's parasitology course and a visiting trio from Austria.

Back to the future

In many ways, however, MBL is a victim of its own success. The generations of scientists it has trained, and the fields it has helped open, have contributed to an explosive growth

Scientists Loosen Their Grip

It was like letting the lunatics run the insane asylum, laughs one Marine Biological Laboratory (MBL) researcher, of the laboratory's lengthy experiment in democracy. Whether that's an accurate depiction of scientists governing themselves is highly debatable, but MBL is clearly ready for change (see main story) and has begun by revamping its unique government.

In the past, the laboratory's governing structure began at the bottom with the 700 MBL researchers, year-round and summer, who anteed up yearly dues of $125 to "own" a piece of the lab. This so-called Corporation thus had the privilege of electing the lab's board of trustees, who in turn controlled the choice of MBL's director. Until 1987, when a local businessman was added to the board to bolster fundraising, it was a completely incestuous affair, with the trustees and director being working scientists drawn from the Corporation.

That may have been fine back in the lab's early days when science was cheap, funding plentiful, and the director's job uncomplicated, but MBL now has a $17 million budget and faces significant financial challenges as it strives to continue its successful scientific tradition. So 2 years ago, in parallel with the search for a new director, an ad hoc committee began looking at how to provide a fresh start for a century-old institution. It presented its final thoughts at the annual Corporation meeting last August.

In the key change, the committee, in effect, asked the scientists to vote themselves out of power, so that the board of trustees could reconstitute itself as an independent and self-regenerating governing body. Slimmed down from 40 to 24 members, the new board would guarantee only six slots to scientists elected from the Corporation; the rest would go to influential, experienced fundraisers from the New England community and industry, trustees with more business sense than scientists and in a better position to line MBL's coffers.

Such a board follows the lead of almost all nonprofit research institutions, but it was a radical step here. "The discussion of the report was earnest and lively," is how MBL's official newsletter records the event; less diplomatic Corporation members recount the day as "wild and tumultuous," "stormy," and "heated." Yet there was a sense of inevitability to the changes, especially if MBL wanted to snag the outside science administrator already tapped to be its new leader. "Doing this was really a prerequisite to get John Burris as director," says trustee Thomas Pollard of Johns Hopkins University, a claim that Burris suggests is an "overstatement." Whatever the truth, MBL's new look was approved with votes to spare.

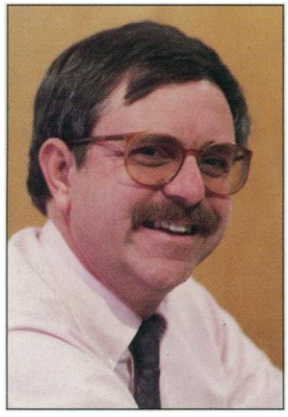
Minor grumblings are still heard today that the changes went too fast and are too radical, but most investigators are simply happy to again focus on their lab work, not politics. In fact, most view the shakeup as another grand experiment—one with MBL's future at stake. Says Jerry Melillio, co-director of the laboratory's Ecosystems center: "MBL has done everything it can to get its house in order. Now the proof will be in the pudding."

–J.T.

in life sciences over the past two to three decades, a spurt that has deprived MBL of its uniqueness by creating hundreds of world-class institutions devoted to basic biological research. Moreover, the rapid development of new animal models, including fruit flies, nematodes, mice, and other rodents, as well as the ascent of molecular biology, has largely freed biology from its dependence on the fresh sea creatures that MBL could so amply supply.

Younger investigators, working on more molecular topics like immunology and genetics, no longer see summers in Woods Hole as necessary. One obvious result of these trends has been a visible "graying" of the lab's summer influx. Summer attendance has even eroded somewhat. For a long time, steep demand for summer lab space had allowed MBL to screen applications and pick out the best; now, the place is open to virtually anyone who has the money to rent space.

One problem, however, is that fewer and fewer researchers have that money. Grants are shrinking and the price of summers in Woods Hole, which has become a tourist haven, has skyrocketed, particularly the cost of housing. Investigators might spend $10,000 to $20,000 to transplant their labs temporarily—enough money to fund an additional research assistant for a year. One of the crucial goals for the new administration, as it was for the last one, is to provide more summer fellowships.



MBL

Calming influence. John Burris, MBL's new director.

But there's a lot of competition for any new cash that MBL might raise—particularly from the comparatively few scientists who brave the long, lonely winters in Woods Hole. That's a relatively new problem since, until the 1970s, MBL used to lock up its buildings for almost 9 months a year, turning the place into a "morgue," says developmental biologist John P. Trinkaus of Yale University, who first visited Woods Hole in 1939. But as the practice of science became more and more expensive, it was financially impractical to have all the labs and equipment sit unused for most of the year.

One answer was the establishment in 1975 of the Ecosystems Center, a facility for studying global ecology and the first significant step in creating a year-round presence for MBL. At first, the summer researchers looked upon the center with suspicion, partly because its mission has little to do with marine life and partly because they feared that year-rounders would crowd out the summer folk. Ecosystems, however, proved wildly successful in obtaining private funding and federal grants and, through the grants' reimbursement for overhead costs, helped stabilize MBL financially. The center even has its own $4 million endowment.

That certainly makes it the envy of more than a dozen other full-time investigators who now head up independent labs at MBL. Why? With its economic security, the center is able to support its researchers for a while if they temporarily lose their outside funding. That's not unusual; in fact, it's the rule at many research institutions. But MBL, with its precarious financial health, can't carry researchers who don't have a current grant—and that makes it hard to attract, or keep, up-and-coming young investigators as year-rounders.

Robert Palazzo's reluctant move last year to Kansas illustrates the problem. Palazzo came to MBL full-time in 1989 to study the cell's centrosomes, which govern chromosome replication, using clams as a model system. His research soon blossomed and he secured three lucrative grants. But after getting married and having a child, Palazzo decide to leave Woods Hole when MBL could not guarantee any "safety net"—at least partial salary support—if his grants weren't renewed sometime in the future. "MBL is not for the faint of heart. If I lose my grant, I'm up the creek. I was basically forced into seek-

ing a position with more security," explains Palazzo. He's not alone. Within the past year or two, five heads of full-time labs, out of the less than two dozen at MBL, have decided to leave for greener, and more secure, pastures in academia and industry. "I've simply got to get more money to support year-round science," acknowledges Burris, listing that as his highest priority.

Strife by the sea

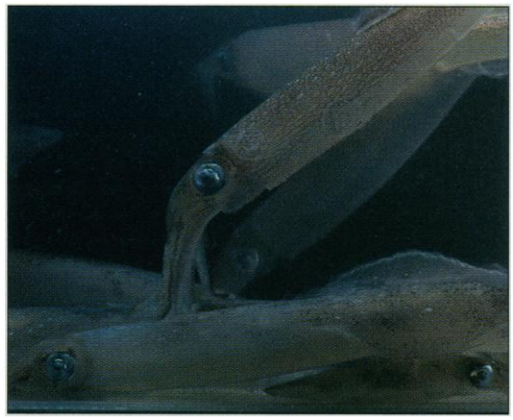
Not all the recent defections can be attributed to economics, however. Some were veteran investigators, like Raymond Stephens, who is abandoning Woods Hole after 31 years of research here. He says he was tired of the civil war that afflicted MBL during Halvorson's reign. Halvorson, who had taught courses or studied bacteria at MBL since 1962, "came in with much fanfare and great hope," recalls Jane Maienschein, a science historian at Arizona State University who has closely followed MBL and wrote an "autobiography" of its first 100 years.

Halvorson was determined to change MBL's character—and that often led to conflict with a conservative Woods Hole population. Hoping to duplicate Ecosystem's success in establishing collections of scientists working in one area, for instance, he helped MBL cell biologist Shinya Inoué start a center to study cell architecture, and he launched a center for molecular evolution by bringing in geneticist Mitch Sogin from National Jewish Hospital in Denver. Those moves were generally lauded, but Halvorson came under fierce attack for his ambitious plans to thrust MBL to the forefront of biomedical research with two new buildings for year-round use while, complained critics, existing labs went without needed repair or improvement.

The first stage of Halvorson's vision, MBL's new $11 million Marine Resources Center (MRC), was dedicated just last year. Replacing a small, outdated supply facility built in 1917, this huge, sophisticated holding facility can duplicate a variety of ocean environments and should allow marine research animals to be raised in captivity, crucial to ensuring that they are pollutant-free and genetically pure. With this building, said Halvorson, MBL could develop marine organisms that model human diseases, providing so-called white mice of the sea. The scheme disturbed some traditionalists who saw MBL shifting from a mission of basic research; other critics complained that the MRC was too extravagant and objected when MBL obtained the money for the building by lobbying Congress for earmarked funds. "You should invest in people not buildings," says Stephens.

The MRC was not Halvorson's only trouble. MBL's year-round watchmen, supply personnel, and other nonscience staff unionized in the belief they needed more protection, says Maienschein. And, in an episode whose details are still angrily debated around Woods Hole, Halvorson purchased precious laboratory-owned land on which to build a house for himself. The transaction bitterly divided MBL, as colleagues fought over whether the acquisition was ethical or even legal.

Halvorson has always maintained that the controversial land deal was perfectly legal and suggests that much of the turmoil under his rule stemmed from difficult financial decisions he had to make and MBL's reluctance to accept the steps necessary to reclaim its scientific leadership. "All changes are made against a background of static and noise," he says. Nevertheless, in 1991, MBL's trustees voted to look for a new director, instead of overriding the mandatory retirement age of 65 and asking Halvorson to stay for a second 5-year term. "Given the erosion of trust and all the controversy, it was probably wise for him to step down," says Garland Allen, a former MBL trustee.



RICHARD HOWARD

Fading model? Marine organisms such as the squid no longer play quite such a key role in biological research.

New director, old problems

Now Burris has the MBL helm and, even though many of the same difficulties remain, smiles can be seen around Woods Hole again. "The attitude and atmosphere has changed. The pessimism is beginning to leave," says year-round investigator Alan Kuzirian. A cautious, soft-spoken consensus-builder, Burris' first job has been to mend fences and allay concerns. He has reassured those summering at Woods Hole that their basic research will always be at the heart of MBL. "It's central to the charter of the institution," he told *Science*. The new director has also won praise from year-round investigators for improving their working conditions by, among other things, sinking money into badly needed renovations of the building that houses most of the full-time labs.

Ironically, however, Burris' vision for MBL may not differ that much from that of his controversial predecessor. He shares Halvorson's belief that marine biotechnology and biomedical research will be crucial for the laboratory's future. "[The MRC] is a tremendous move in the long run," says Burris, but he acknowledges that the facility is tremendously underutilized for the moment and that he has put on hold Halvorson's plans for a second new building devoted to biomedical studies. Instead, he wants MBL to bolster the year-round centers it already has, like Sogin's and Inoué's. Also in the planning stage is a neurobiology center, exploiting MBL's traditional strength in that area.

All that will take money, something of which MBL still has little to spare. To bring in more cash, the laboratory is now renting some of its vacant lab space to a small biotech firm started by an MBL researcher (*Science*, 4 June, p. 1429). While the move has disturbed some Woods Hole regulars who fear any industrial intrusion upon a place of basic research, the majority recognize the economic imperative driving the move and have adopted a wait-and-see attitude—the same approach many are taking to Burris.

In addition, the laboratory under Burris is being much more aggressive about fundraising, something it virtually ignored for most of its life as it rode high on grant money and its tradition. MBL's development office, which didn't even exist a decade ago, is now working furiously to raise the lab's visibility on the assumption that MBL will fare well, if only it would try, in obtaining the private and foundation support that other top-flight research institutions attract. "I think the MBL has been a well-kept secret among the lay audience," says director of external affairs Frank Carotenuto.

Will all this be enough? Despite the early kudos, Burris' report card is full of incompletes and MBL's future is far from assured. His final grades will ultimately depend on his administration's ability to bolster MBL's coffers and expand the year-round presence, all without harming its magnificent summer tradition of research and education.

Consider the formidable challenge implicit in the views of two MBL researchers. "The thing to remember about MBL is that it is a summer camp in the best sense of the word. It's a place where young people discover themselves and science. It would be a shame to lose that," comments summer laboratory veteran Gerald Weissmann of New York University. "The key to MBL's survival is change. I don't think it can survive as it was," says year-rounder Reinisch. Are those sentiments incompatible or is there a middle ground that blends the new with the old? As one summer scientist aptly put it, the laboratory will have a tough job living up to its history.

–John Travis