



## Economic Leadership

# Researchers discover key to successful abalone cultivation

**L**IKE SO MANY OTHER MARINE delicacies, abalone suffer from a bad case of over popularity.

The culprit: overfishing, combined with high demand—especially in Asia, where a single, 15-ounce can of premium abalone can fetch an astonishing \$59. Even in the U.S. market, live, farmed abalone go for upwards of \$18 a pound.

Little wonder that science and industry have tried for decades to come up with an effective, economical system for farming the footed molluscs, to mixed degrees of success. The barrier, to date, has been feed. Abalone eat seaweed—traditionally, seaweed harvested in the wild from kelp beds which, in many parts of the world, are now designated as protected habitat.

Seaweed has proven tricky to grow in the on-land tanks preferred by abalone aquaculturists.

Now, a new feeding system developed with the support of Oregon Sea Grant and other agencies appears to show promise of solving the problem—enough promise that an international investment group is betting the bank on it.

The company, Big Island Abalone Corp., broke ground this spring for a new, 40-acre abalone aquaculture site in the state-owned Hawaii Ocean Sciences and Technology Park near Kona, Hawaii. The company, which has been operating a smaller hatchery



Until now, efforts to cultivate abalone have been thwarted by a lack of understanding of the mollusc's nutritional needs.

and nursery based on Sea Grant research since 1998, expects to begin regular shipments this fall.

“It’s nice to see all our research come to fruition,” says Chris Langdon, the Oregon State University (OSU) researcher who has led the abalone culture investigations at OSU’s Hatfield Marine Science Center (HMSC) since the mid-1990s.

Like most researchers, Langdon and his colleagues built on what other scientists before them had discovered. Earlier research on abalone nutrition had indicated that abalone grew particularly well

on a diet of *Palmaria palamata*, an Atlantic seaweed commonly known as dulse. The HMSC team found that a close relative, Pacific dulse (*P. mollis*), worked just as well—in fact, better. Langdon and a research assistant found that abalone fed on *P. mollis* grew “exceptionally” well, more than half again as fast as the standard set by the California aquaculture industry for abalone fed on kelp.

Even better, *P. mollis* proved particularly effective at removing carbon dioxide and ammonia, both by-products of abalone metabolism, from the water. That indicated a

potential for dramatic savings in the costs of pumping and aerating water, the methods usually used to remove waste.

With that knowledge, Langdon and graduate researcher Carl Demetropoulos focused on refining their system, using high tech analytical tools to determine exactly what micronutrients it takes to produce a healthy crop of dulse, what substances might inhibit the algae's growth, and how much sunlight the marine plant requires.

Once they understood the plants' requirements, the scientists went on to grow the plant in the lab to determine how those natural requirements could best be approximated in the production environment of commercial aquaculture.

One side benefit of using dulse to feed the abalone is that the seaweed itself is a marketable commodity. Long popular as a "sea vegetable" in Ireland and maritime Canada, dulse is making inroads into the health food and supplement markets worldwide because of its fiber and mineral content and is

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used in food processing as a thickening agent. Dried dulse fetches as much as \$36 a pound in health food stores.

Langdon's research attracted the attention of Big Island Aquaculture (BIAC), and research team members Demetropoulos and Ford Evans worked with the company to transfer the technology into the commercial setting. Evans produced an economic model that helped the industry determine that the coculture approach would be commercially viable, and BIAC has now commercialized the system under the Polygrow trademark. Another Langdon graduate stu-

dent, Michael Buchal, hired on as the new venture's vice president of operations after graduation.

“This project serves as a good example of how research sponsored by Oregon Sea Grant, in combination with other funding sources, can lead to a dramatic improvement in a marine industry,” Langdon observed. “Over a period of about six years, it was possible to develop a new way of commercially culturing abalone that is more environmentally friendly and potentially more profitable than the traditional approach.”