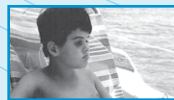




The Life of Barnacles



A Young Man's Legacy



Our Ocean Backyard

odyssey NEWS

The Life of Barnacles— Our Most Beloved Meroplankton

BY LAURA BARNES WALKER, EDUCATION COORDINATOR, OSO

In OSO's Marine Biology station, our students, teachers and instructors make fascinating discoveries in the world of oceanic microbiology. There is an endless number of organisms in the ocean that are invisible to the naked eye, but none are more exciting to our staff than barnacle larvae. Between their short, but dramatic planktonic (drifting) stage, and their long sessile (attached) stage, barnacles give our instructors ample opportunity to discuss our most beloved type of plankton.

Barnacles are crustaceans and arthropods, which means that they are related to crabs and distantly to spiders. Barnacles spend part of their lives as plankton, or drifters, and the rest of their lives attached to the ocean floor, a rock in the intertidal zone, a piling under the wharf or even the bottom of a dock. Barnacle plankton belong to a category called meroplankton, which means that they only spend part of their lives as drifters.

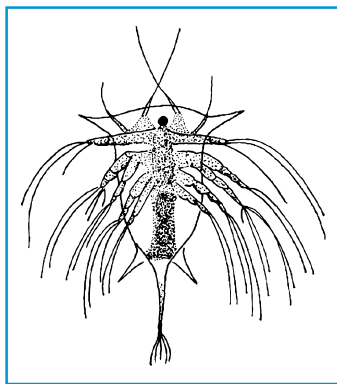
The OSO instructors take plankton samples by surface tow, which allows us to encounter barnacle larvae frequently, especially when we take our sample near the Santa Cruz Wharf or right next to the

Mile Buoy. After mating with close neighbors, the fertilized eggs develop into naupliar larvae within the test, another name for the calcareous volcano-shaped shell that the barnacles form during their adult stage. These larvae are released into the water and drift for 10 to 45 days, which is a tight window of time to find a permanent home that will be suitable for the rest of their 10 year lifespan (think about that

the next time you look for an apartment). The nauplius larvae are easy to spot under the microscope because they are fast swimmers and are hard to follow as they zoom around the slide. While the barnacle nauplius drift, they use their single eye spot to find sunlight, which will lead them to phytoplankton, or plant plankton, which is their food source. During this stage the barnacle larvae will

feed as much as possible to store fat for the next stage of development, called the cyprid stage. The cyprid barnacle larvae have only 13 days to find a place to attach themselves or they will run out of energy reserves and die. When barnacles go through the cyprid stage of development, they look almost exactly like another type of plankton called an ostracod, also a crustacean known as a seed shrimp. It's difficult to tell them apart when we find them in our samples.

Selecting a good home is a critical decision for a barnacle, since relocating will be impossible later. The home must be located in a place where there is a lot of water movement so that food and oxygen are available, but it must also be close to other barnacles to facilitate mating. Once a suitable home site is found, the barnacle adheres one of its appendages down and proceeds to spend the next twelve hours building a shell. Within this shell, enough water can be stored to survive the drought of low tide. The barnacle will stand on its head within this shell and catch (**'Barnacles'** continued inside)



*Barnacle Nauplius larvae,
Scientific Illustration by
Sean Walker.*



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Autographed Copy of *Jack O'Neill: It's Always Summer on the Inside*



Full of unique, personal stories and photos of the life and times of Jack O'Neill, this beautiful 250 page coffee table book is a rarity, but when coupled with his autograph...wow. With a \$500 donation to the O'Neill Sea Odyssey, you will receive one of these unique books, complete with a letter of authenticity. Originally, this book was sold at retail stores for \$40 and even more than that online. Hurry, because there are just a few remaining! Donate at www.oneillseaodyssey.org ♦

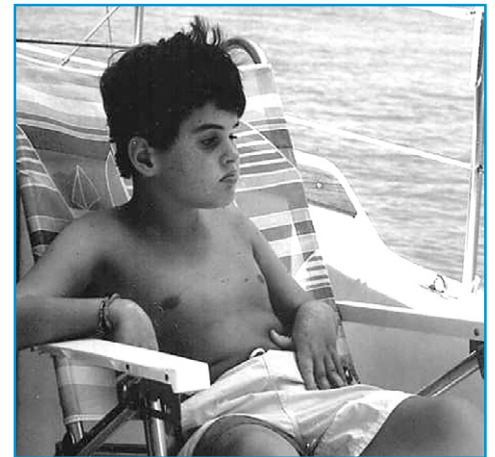
A Young Man's Legacy

BY JACK, BRIDGET & TIM O'NEILL



In 1999, O'Neill Sea Odyssey's new Executive Director Dan Haifley received a phone call from Judy Webster, who along with her husband Tom had been active in the Santa Cruz Yacht Club and in other civic affairs. Their son Adam, an extraordinary young man who had cognitive disabilities, had passed away. Tom and Judy had decided to turn their personal loss to do some good for the community: they resolved to establish a fund to enable youth with physical and cognitive disabilities to participate in O'Neill Sea Odyssey. After a lot of thoughtful effort, Tom and Judy Webster and OSO's staff established a protocol for a safe and effective learning environment for special needs youth of all types.

To date hundreds of youth have been served, thanks to the fundraising that Tom and Judy have done and the generosity of many businesses and individuals. For



Tom and Judy Webster and their friends, it is a labor of love, as the mission statement that they penned for the fund clearly demonstrates. It appears below.

"The vision of the Adam Webster Fund of O'Neill Sea Odyssey is to provide a successful but not purely intellectual or academic learning experience for individuals with special needs in the context of the ocean environment. There won't necessarily always be an academic curriculum, but there will always be a plan. A plan to open the doors of life and living closed by physical, social, intellectual, and emotional barriers.

Special needs individuals may benefit from learning about navigation, but perhaps just as much from feeling the rolling motion of the ocean as the wave movement stimulates a body and a sensory system that has been immobile and confined to a wheelchair for years. ('Webster' cont. next page)

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Leave a Legacy for Youth and the Ocean

You're part of the reason we're here and you can also be part of the reason we'll be here 100 years from now. Since 1996, O'Neill Sea Odyssey (OSO) has served nearly 75,000 youth with a free, ocean-going science and environment program.

This has been possible in part because you have provided much-needed and deeply appreciated support for OSO's program for area youth. In 2005 OSO's Board of Directors made a commitment to raise funds to ensure

our future by establishing a permanent endowment fund for OSO which is housed at the Community Foundation for Santa Cruz County.

We would like to invite you to help us build a future foundation for our program, for the kids, and for the ocean. You can do this by naming OSO's permanent fund at Community Foundation of Santa Cruz County in your estate plan. There are also many ways to leave a permanent legacy and reap some significant financial benefits before hand, including: a beneficiary designation in your retirement fund or insurance policy, gifts from a will or living trust, an annuity that provides you with lifetime income, gifts of real estate, and charitable trusts.

We would be honored to meet with you to discuss supporting our permanent fund in a way that works best for you. Please contact Dan Haifley at **(831) 465-9390** or at **dhaifley@oneillseaodyssey.org**, or fill out the attached form and mail it to us. Thank you! ♦

Enrollment Form

- ☐ I have named OSO in my estate plan (we will contact you relative to recognition)
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(‘Webster’ cont.) It is never known what new experience will create a new learning opportunity, intellectual or social milestone in the special need individual's journey toward opening the next door. A door through which lies development and fulfillment in a life limited in many ways.

Our friends the dolphins know it. In open water they often swim with, and ahead of these individuals almost as if they are leading them to new adventures and protecting them on their journey. We should too. That is our vision.”

Thank you to everyone who supports the Adam Webster Memorial Fund! ♦

Thank You Union Bank!



Jack O'Neill receives a generous donation from Union Bank Senior Vice President David Jochim

(‘Barnacles’ continued) plankton with its hairy feet for the rest of its life.

Next time you are at the tide pools, take a moment to appreciate the barnacles. The ones that you see attached to the rocks are there because they survived predation in their planktonic stage and beat the odds and their biological deadline to find a beneficial home. They have been through a lot! ♦

Our Ocean Backyard:

What Happened to Oil from Tanker Sunk in World War II?

BY DAN HAIFLEY,
EXECUTIVE DIRECTOR

The beaches of Monterey Bay were prepared for war, but didn't see battle during World War II. There was a report in the Santa Cruz Sentinel-News which the Navy wouldn't officially confirm or deny of a Japanese submarine firing on but missing an oil tanker "20 miles off the southern tip of Monterey Bay" in the weeks after the attack at Pearl Harbor.

Another tanker wasn't so lucky. Two days before Christmas 1941, a torpedo from Japanese submarine I-21 sunk Union Oil's SS Montebello, which was headed north after loading a cargo of Santa Maria crude oil at Port San Luis. All 38 crew members escaped in life boats. In 1996, its wreckage was located in 900 feet of water near the southern boundary of the Monterey Bay National Marine Sanctuary off the town of Cambria. Concerned about an environmental hazard, scientists wanted to find out if oil was still aboard.

Robert Schwemmer, West Coast Regional Maritime Heritage coordinator for the National Marine Sanctuary

system, participated in a manned submersible visual survey in 1996 funded by the National Oceanic and Atmospheric Administration's West Coast National Undersea Research Center, and a second survey in 2003 by the Monterey Bay National Marine Sanctuary. "I was able to determine that the 18 cargo, 12 summer and 2 bunker oil tanks had not been breached by the torpedo impact and the shipwreck's infrastructure could possibly retain over 3 million gallons of crude oil," Schwemmer told me.

Becoming concerned after he read a newspaper story about the shipwreck in 2009, then-Assemblyman Sam Blakeslee asked California's Department of Fish and Game's (now Wildlife) Office of Spill Prevention and Response to investigate whether oil could escape from the vessel. In 2010, the Monterey Bay Aquarium Research Institute conducted a sonar survey of the shipwreck and the nearby sea floor and the following year the US Coast Guard hired Global Diving and Salvage to investigate the oil threat.

"A neutron back-scatter device was used to determine if oil or water existed

in each of the tanks," Schwemmer said. "Tanks with the highest probability of oil content were drilled and samples were drawn. A visual inspection indicated there is no quantifiable amount of oil onboard," he said.

So what happened to the crude oil? "There were no reported leaks in recent history, but at some point since 1941 the reported 3,089,982 gallons of crude oil cargo was released," Schwemmer said. "That's not to say there's no oil aboard but the US Coast Guard reported in 2011 there is no substantial threat."

Using a model of currents and winds, Schwemmer concluded that "most of the oil likely remained offshore and headed south, some would have evaporated within the first few days, and the remainder may have washed ashore but may have been so widely scattered it went unnoticed," he said. "There are a number of unknowns so we will probably never know exactly what happened to the oil." You can learn more history at tinyurl.com/ojs6op6 ♦

This column appeared in the Santa Cruz Sentinel on May 24, 2014.



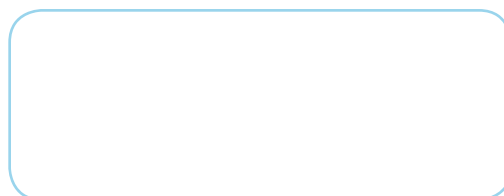
Aerial view of the SS Montebello



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Taste of the Harbor

Santa Cruz Harbor Beach

4:30 p.m. – Sunset.

\$60 at the door, \$54 in advance at

www.tasteoftheharbor.com

Saturday, October 25

Adam Webster Memorial

Fund Dinner

Time and place TBD

Contact dhaifley@oneillseaodyssey.org
for details.



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