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Dolphins on Duty

Smart cetaceans go to college at UCSC's Long Marine Lab

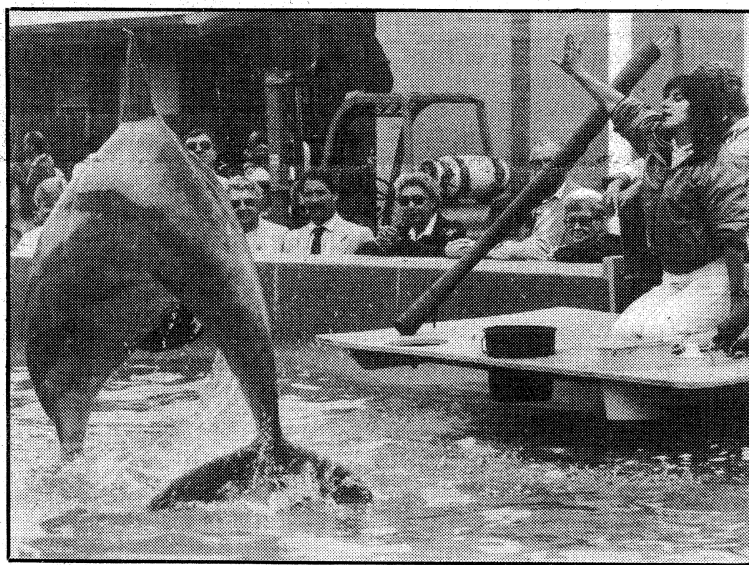
By Terri Morgan

Two Navy surplus dolphins who found a new home in Santa Cruz two summers ago are giving their hosts at the Long Marine Lab an opportunity to study them and how they communicate. The pair, 22-year-old Josephine and 17-year-old Gwendolyn, are giving the researchers a chance to study echolocation, the cetacean world's version of sonar.

Jo and Arrow, as their trainers call them, were among the five Atlantic bottlenose dolphins, originally from Florida, that the Navy was scrapping as surplus from their dolphin research program. Because the dolphins had been in captivity as research animals most of their lives, the Navy doubted their ability to survive in the wild. So the Navy, like a lot of parents who are unsure of what to do with their recalcitrant, overgrown children, decided to send them to college.

The Navy offered the animals to several universities and UCSC accepted Arrow, who was scrapped from the Navy's research center in Hawaii, and Josephine, who was dropped by the Naval Ocean Systems Center in San Diego. Arrow had been part of a breeding colony. Dolphins breed well in captivity; Arrow gave birth to a calf who remained at the research center. Josephine was used for biomedical studies. The Navy was studying echolocation in dolphins, "doing similar work to ours, but asking different questions," says her trainer, Michelle Jeffries.

To accommodate the two coeds, the first to reside in the Long Marine Lab's dolphin facility, three



Josephine and her trainer, Michelle Jeffries

interconnected tanks, complete with underwater viewing stations and a bioacoustics lab were constructed. The tanks were designed to facilitate bioacoustics research. To minimize echoes, making life quieter for dolphins and better for sound recording, the walls of the largest tank are concave, with no parallel surfaces. This prevents the clicks, and other sounds the dolphins make, from bouncing back and forth across the pool like an echo in a canyon. And for the dolphins' comfort, the walls are dark blue, mimicking the color the dolphins would see in the ocean.

A study into how dolphins use underwater sound waves to communicate, navigate, and locate and capture food got underway in February. Funded by

the Office of Naval Research, the project will run for three years.

According to Ken Marten, who is in charge of the bioacoustics lab, the major goal of the project is to study the temporal pattern of clicks that a dolphin emits while using sonar to locate an object. "These clicks come out in a non-random pattern," says Marten. "Our goal is to try to understand that pattern."

By cracking the code, researchers hope to discover what the informational limits of dolphins are. "We're looking at cognition in dolphins," Randall Wells, coordinator of the dolphin research facility, explains, "at how they process sound information. We're going back further than language acquisition, we're looking at the precursors of language, how the dolphins package their language.

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"We know they comprehend information in 'packet' form," Wells adds. "Each packet is a piece of information and we want to know how much they can understand at one time. We're trying to identify those packets of information by how they are produced."

Three times a day Josephine, who weighs in around 520 lbs. and Gwendolyn, a svelte 370, are fed by Jeffries and her crew. Jeffries runs them through drills, rewarding the correct response with a piece of fish.

Dolphins are almost universally everyone's favorite marine animal. They are cetaceans, and are related to the whales and porpoises. In fact, dolphins and porpoises are so closely related that the two names are often used interchangeably.

Dolphins are intelligent creatures. Brain size is one indication of intelligence; the human brain weighs in at 1200 grams. In contrast, an adult dolphin's brain averages between 1300 and 1700 grams.

Dolphins communicate through sounds, whistles and clicks, and echolocation, as well as through body language and eye contact. They are social animals, and travel in schools, with the older males patrolling the outside of the group, protecting the mothers and children inside. Dolphins understand the concept of distress, and will stay with an injured companion or an adrift human until the end, or until they are well or rescued. They also display altruistic behavior, helping one another out even if it is an inconvenience or trouble. Females will often babysit for each

other, and usually get on well. Males, at times, can be more aggressive and will sometimes fight. Researchers are still unraveling the mysteries of the dolphins' social structure.

Dolphins are carnivores, and adult bottlenose dolphins, like the pair at the Long Marine Lab, eat about 20 pounds of fish a day.

Dolphins and their cousins are the most highly adapted marine mammals, and the most intelligent. They re-entered the ocean more than 40 million years ago, have adapted well to life in the water and breed, birth and nurse their young in the ocean. Cetaceans breathe oxygen, and must surface for air. Under normal conditions they take a breath every 30 seconds, although they can remain submerged for up to six minutes.

Scientists are not sure of the exact site of dolphin sound origination and reception, but suspect they produce their clicking noises in their melons, the hollow space in their foreheads. They also suspect dolphins receive sounds through a concave jawbone and pass it along to their inner ear.

Two species of dolphin, the common dolphin and the Pacific white-sided dolphin, are commonly found in the Monterey Bay, as are two close cousins, the harbor porpoise and Dall's porpoise.

If you'd like to take a firsthand look at Josephine and Gwendolyn, head up to the Long Marine Lab, located at the northern end of Delaware Avenue in Santa Cruz. The lab is open to visitors Tuesday through Sunday, from 1pm to 4pm. Docents at the aquarium will be happy to answer any questions and escort you to the viewing platforms at the dolphin and sea lion tanks, and to the museum. If it's a slow afternoon, they might take you to the cliffs and point out the local sea otters that feed in the kelp beds.

The docents are trained volunteers who, because of their love for

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marine life, have donated their time to educate others. Identifiable by their badges, they are personalized information centers and tour guides. During the week, when it's not crowded, it's possible to get private tours. In addition, the docents often tailor their tours to what the group wants to see.

Unless the dolphins are in a training session they can be viewed from a second-story balcony landing near the tank.

Long Marine Lab hosts an open house this Sunday, October 4, 10am to 4pm. For more information, call 429-4087.