Academy of Sciences display: Skulls tell life stories

By Julian Guthrie

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The massive skull of an African elephant greets visitors near the entrance to the academy's "Skulls" exhibit. Photo: Brant Ward, The Chronicle | **Buy this photo**

Surprising Mutations

The biochemistry of life is complex and ever-changing. While genetic change provides the diversity necessary for evolution, sometimes changes in a genetic sequence (or simple developmental abnormalities) can lead to unexpected consequences.

Ray Bandar was 26 years old in 1953 when he found his first dead harbor seal at San Francisco's Ocean Beach. He ended up bringing the head of the seal home on the bus and cleaning it in one of his mom's pots.

Next, he found the remains of a young female California sea lion. This time, after doing the decapitation, he buried the skull in his back yard and let bugs do the cleaning.

More than a half-century later, Bandar - "just call me Bones," he says - is 87 and has one of the world's largest private collections of animal skulls. Bandar's bones make up nearly all of the 640 different skulls and skeletons on display in one of the California Academy of Sciences' latest exhibits, "Skulls."

"I have an appreciation for art, and I started to look at bones as pieces of sculpture," Bandar said, sitting in front of the exhibit's signature piece, "A Sea of Sea Lions," a 90-foot-long wall with more than 400 California sea lion skulls - the largest such collection in the world.

The skulls on display in the Academy's 4,000-square-foot second-floor Forum Theaterand Gallery range from an enormous African bull elephant to a tiny bat, from frogs and fish to giraffes and walruses. There are interactive displays that simulate the vision of predator and prey, and allow visitors to be hands-on with cast skulls. Another part of the exhibit shows live dermestid beetle larvae cleaning delicate bones (the larvae can scour the flesh of a small skull in three days). And there is an interactive 3-D display developed by Google that allows visitors to view skulls from various angles.

"A skull provides important information about a species' evolution and reveals secrets about that individual animal's life," said Moe Flannery, collections manager of ornithology and mammalogy at the academy.

Walking through the exhibit, Flannery added, "By searching for clues written in the bone, we can follow the story of an animal's life, from birth to old age. We can learn what the animal ate, how it defended itself, communicated, interacted with its environment, and often how it died - all by looking at its skull."

The exhibit begins with the massive African bull elephant skull, which belonged to a member of the largest living species of land mammal. At 218 pounds, the skull is relatively light because of the honeycomb-like spaces in its forehead, allowing the animal to hold its head up.

To give the skulls context, many of the exhibits were designed with photographs of the animals in their natural settings. One of the more memorable displays shows the antlers of two deer that were locked in combat. The deer were unable to unlock their antlers and died of starvation.

"When people first see a skull, their first thought is often about death," said Scott Moran, the academy's director of exhibits. "But the skulls in this

exhibit really tell a story about life. It's nature's art. They help us understand the living world."

Moran noted how many of the displays illuminate evolutionary similarities and differences. The skulls of a bottlenose dolphin, a horse and a human are compared. A small skull of a helmeted hornbill shows a large, boney casque - a helmetlike structure - there to magnify its call in the rain forest. The skull of an anaconda reveals how the snake can de-articulate its jaw to fit around a large animal.

"Look at the different teeth," Moran said excitedly, pointing to the skulls of a shark, a camel and a Siberian tiger. "The bull shark actually has row after row of teeth. The tiger has these four big canine teeth. The camel's teeth are really sharp and scary."

Moran looked at another display case and noted the importance of looking at the shape, size and placement of the eye sockets in the skull. The placement indicates the animal's role in the ecosystem, and whether it was pursued or pursuer.