Articulating Hope
By Eliza Dawson 2011

The backbone of a whale hangs in front of me. Each vertebra ripples into the next, locking in place to form a sturdy yet flexible spine. The light from the windows dances on the bones as they hang in a perfect arc suspended on ropes from the ceiling. Some vertebrae are stubby and fat while others are graceful and slender but together they form a majestic column representing both strength and splendor. As I stand back and look, for the first time I can imagine what the orca will look like when it is articulated, its graceful curving spine, its strong powerful flippers, its enormous boney head and its ribs spanning the vertebrae all suspended from the ceiling.

One week ago, the Marine Science Center began buzzing with life as volunteers eagerly took on the tasks of articulating an orca whale skeleton named Hope. All the bones were out, leaning against walls, sitting on tables and laying on rugs. Excitement was building. Lee Post the "Bone Man", who is in charge of the articulation arrives from Alaska and soon we each have a job. With our bodies full of excitement and our heads concentrating on our work we slowly begin to articulate the orca.

It all started in 2002 when a dead female orca was beached near Dungeness spit. The whale was buried in a nearby farmer's field until the flesh decomposed. Then the Marine Science Center asked to have the skeleton. From then on, there has been a lot of work done on the bones. We have photographed the bones, cleaned the bones and made casts of the teeth. Each project has been done with the dream that one day the skeleton will be articulated. Now, nine years later it is finally happening.

Teeth lay in egg cartons waiting for their dentists to pick out tiny pieces of clay hidden in cracks and crevasses and sand their bases to make them slide perfectly into the jaw, forming two rows of beautiful, sharp white teeth. Vertebrae are being cleaned, counted and checked. Cotton swabs are being slid into the nasal holes on the skull giving it a last cleaning, and the flipper bones are being pulled out of boxes and set on diagrams as they are checked for missing bones.

My sister Chloe and I set to work on mapping the curve of the backbone. Taking a miniature model skeleton we enlarge the curve of the backbone to full size, then trace it onto a large piece of paper. Later a long metal pole will be bent to the curve we have made. Then vertebrae with holes drilled in the middle of them will slide onto the pole. The pole will form the curve of the backbone. For the rest of the articulation Chloe and I have a nickname: "The Curves".

A few days later Chloe and I are back at the Marine Science Center and once again step into the world of articulation. On one side of the room, chipped bones are being patched with epoxy clay and painted to match the original color. On a table, flipper bones are being laid out and are beginning to get articulated. Excitement fills me as they begin to get attached to a metal rod and screwed together. I watch as the jumble of individual flipper bones begin to disappear and instead five long boney fingers start to

form. In the center of the room, the metal pole for the backbone is bent now and lies on the floor. Its curve is perfect! A power tool sits on a table and vertebrae are being lined up next to it waiting their turn to have a hole drilled into the middle of them so that they can slide onto the metal pole.

As the morning sun fills the room the following day, we are met with a surprise. In front of us the metal pole hangs from the rafters. But the most exciting thing is that on it sit a few vertebrae! Many other exciting things are going on too. One flipper has all its bones articulated. Connecting each bone is a small metal bar. The metal bar forms the shape of the flipper but it does not look pretty. So silicone gets squirted between the bones to resemble the whale's real cartilage. When the silicone gets squirted out it is bumpy, so people then smooth the silicone with fingers dipped in bubble soap so they don't stick. But there is a problem. The silicone "cartilage" has little puddles of yellow liquid. We spend the morning making experiments trying to figure out what caused it. Finally we figure out that it is the kind of silicone we are using. The mold inhibitor is acting up with the bubble soap. We switch to one without the mold inhibitor and the problem is solved.

After going home for lunch we spend the rest of the afternoon by the phone eagerly waiting for a call from the Marine Science Center telling us that they are ready for the next step. When the call finally comes, we head over and quickly get absorbed in assembling the vertebrae onto the backbone. One by one we slide each vertebra onto the metal pole, each separated by a foam disc. Gradually the metal disappears and is replaced by a perfect line of vertebrae, the backbone of an amazing aquatic beast.

With the vertebrae on, it is now time to put silicone between them. Each with our little cups of bubble soap we set to work smoothing the silicone as soon as Lee finishes squirting it on. The silicone starts to set after just a few minutes so we have to work quickly but carefully, or there will be bumps. Taking my finger wet with soap I begin to carefully smooth one side. If you do it right the silicone can get as smooth as glass. After patting it a little I dip my finger in the soap again then begin to gently rub. Just as I am finally starting to get one side to look good, I remember that the other side is still very lumpy and the silicone is starting to dry. With a racing heart I duck under the vertebrae and quickly start smoothing it on the new side. When I am finally starting to feel like both sides are looking pretty good I discover a bump. I try to smooth it but then a wrinkle starts to form. I try to smooth the wrinkle but then another shows up. In desperation I touch the silicone again but by now my finger does not have enough bubble soap on it anymore and it sticks to the silicone pulling it out as I pull my finger back. In disgust I dip my finger in the bubble soap and try to smooth it but now it is not perfect. I am glad it is not the last layer. It is rumored that Lee will do the last layer so that it turns out perfect.

As the skeleton gets put together it becomes more and more alive. One morning when Chloe and I arrive we are given a project that we will be in charge of. We are going to prepare and articulate the fourteen chevron bones. They will be attached to the bottom of fourteen vertebrae. Chloe and I are thrilled. We soon begin looking through

our new treasures. They are odd looking bones that are shaped like V's and Y's. We examine each one as carefully as mother cats examining their kittens. Any bones with chips or broken off pieces we set in a pile. These we will carefully rebuild with putty. One chevron is missing a very large chunk of bone. We think it must have been sawed off when the bones were being cut out of the flesh. After getting some basic directions from Lee we spend hours rebuilding it. We begin by making a sketch of what we think the missing section should look like. Then gently we drill tiny holes into the surface of the bone that we are rebuilding and attach a wire frame to hold the putty. Finally, we mix up the putty and slowly blob it onto the frame until we are satisfied with the shape. After waiting a few hours the putty starts to get hard but not rock hard yet. This is the part I am most nervous about. We now have to chip at the putty to make it look like bone. When we put the putty on it was completely smooth and did not match at all. So with dental picks in hand we start chipping at the bone. I examine the real bone, looking for small cracks or other patterns that I can carefully copy into the putty. Little by little the putty starts to transform and by the time we are finished the only way you can tell the difference is a slight change in color. I am proud of our work. It looks great! Lee thinks we did a great job too.

Last weekend two dentists came by. Crazy about teeth they quickly took over putting the teeth in the jaws. Now jagged white teeth jut up from the jaw aligned perfectly so that when the mouth shuts the teeth fit together like a jigsaw puzzle.

We spend all morning working on the next step in the chevron project. Holding one chevron at a time below the vertebrae we puzzle over the way each one fits. Finally we feel pretty sure of our decision and begin drilling holes into the top of the chevrons. I find it a very nerve-wracking process because the area we have to drill into is so small. We then begin sticking our carefully measured rod into our holes with a two-part epoxy glue. The other half of the rod will go into a hole drilled in the base of the vertebra. We finally wash our hands free of the sticky bad-smelling glue and begin on a new project. We learn how to mix up a two-part clay and begin wedging it between the teeth in the lower jaw. A layer of silicone was squirted in, to hold the teeth in place, and now we are going over it with the clay. Chloe and I begin sticking in the clay, our eyes examining for any little bump in our work. Though it was sometimes hard to smooth the clay between two close teeth, with the aid of a tooth brush bottom or paint brush, the clay ends up looking very nice.

All the major bones are now assembled. The middle section of vertebrae is hanging in the center of the room, the tail section is on the table, the skull is perched on a big cardboard box and the flippers are on another table waiting to be attached to the middle section. Hope is being articulated in three sections it will make it easier to store until she is officially displayed. Now, with most of the bones articulated, it is time for the final silicone layer. With so many cracks and crannies between bones there is a lot to be siliconed. After much hard work, Chloe and I have mastered smoothing the silicone. Though at first we were not very good we have now risen to the top. Today Lee told us that we are the best and that he wants us to do the final layer, He decided not to do it himself!

As the end of the month is drawing closer, the end of loose bones is drawing closer too. I find my self staying later and later into the night not wanting to miss out on the last bits. Each morning when we walk in, more of the skeleton is complete. Today Chloe and I finished the chevron project. As we stand back, proud of our work, looking at our fourteen little bones hanging below, spanning the gap between the vertebrae, we also feel a bit of sadness knowing this exciting project is coming to an end. We spend the afternoon, our hands slimy as frogs, busily smoothing silicone and as the afternoon switches to evening much of the silicone is done.

With the hyoid bone and pelvic bones attached. Hope is now in three complete sections. But as Saturday morning dawns, a new excitement is taking place. Each volunteer is getting up and hurrying over to the Marine Science Center. We are going to assemble the entire skeleton for a final open house before Lee leaves. We all busily hurry around, some of us straining under the the weight of the massive skull, some of us holding up the large arching middle section, some carrying over the tail section and some of us laying on our backs as we position the flippers on the scapulas. A last excitement rings in the air as the skeleton takes its full form. The skull gets slid onto the front vertebrae and a secret screw gets tightened. The skeleton gets raised, then the tail gets slipped on followed by the flippers. As the ropes get tied off we proudly step away, our eyes fixated on our masterpiece, our beautiful 22 foot orca hanging in front of us.

As I stand back and look, I see Hope in front of me, her graceful curving spine, her strong powerful flippers, her humungous boney head and her ribs spanning the vertebrae all suspended from the ceiling. This great beast is once again swimming, beginning a new and exciting journey in her life. With many careful hands, Hope has been put back together. But this time in a new form. With her beautiful skeleton hanging in front of me, she now has a new story to tell.