

The Thrill is Never Gone

“Where is the mouth? How does it bite? Does it have a brain? How big is it? Do the eyes work like ours?” These are questions that I hear every time that a group of children views a Humboldt squid specimen laid out before them. This squid, also known as the jumbo flying-squid, can be as big as they are, and inevitably they want to poke the firm flesh, pull on the tentacles, touch the internal organs, hold an eye in their hands, and feel the sharp beak on their fingertips. “Ohhhh, that’s gross” followed a heartbeat later by “Can I touch it?” It is as predictable as finding two gills inside when we cut the squid open.

For the last several years my lab has been engaged in an outreach effort, “Squids-4-Kids”. We take Humboldt squid specimens (or send them via FedEx) to schools, museums, and science events throughout California and the rest of the country and provide associated on-line materials – images, video clips, fact sheets, anatomical diagrams, lesson plans, etc. The goal is to provide a hands-on platform for introducing students of all levels to the mysteries of nature, the importance of the ‘natural world’ to our own survival, and how we fit into the functional system called earth. It works really well.

Humboldt squid are large, strange predators that are ecologically vital and economically important in the eastern Pacific Ocean, particularly from Mexico to Peru. They are powerful, highly-migratory swimmers that produce tens of millions of offspring during their short life cycle of 1-2 years. They are also incredibly adaptable and can tolerate (and even capitalize on) large changes in temperature, oxygen concentration and prey availability. This allows the squid to respond to climate change on a variety of time scales by extending its presence through pulsatile fingers on the northern and southern fringes of its large range. For example, during the last 10 years they have moved from Monterey Bay in central California to southeast Alaska. In short, this is a fascinating creature that readily lends itself to discussions of structure-function and convergent evolution with fish, predator-prey interactions, use of oceanic habitats including oxygen-minimum-zones by marine animals, effects of climate change and commercial fishing. Oh yes – and there is communication by color changes of the skin. These are just cool animals that kids of all ages find intriguing.

By all ages, I really mean all. The most ambitious Squids-4-Kids outing was the First National Science and Engineering Festival on the National Mall in Washington DC in October, 2010. During one weekend, 200,000 people visited 500 exhibitors. For two days children and parents of all ages, races, nationalities and backgrounds poked and prodded four Humboldt squid that we simultaneously displayed at our “Science at 20,000 Leagues” booth. I’m not sure what the title means – somehow it got attached to the project and was printed on our huge banner. But it sounded catchy, and we stuck with it. Perhaps the cryptic nature is good – science is nothing but questions.

But the most amazing presentation had to have been in August, 2011 when I pulled out a big squid from a cooler at SciFoo – a weekend conference sponsored by O’Reilly Media, Nature Publishing Group and Google at the Google campus in Mountain View, CA. This informal and eclectic gathering is designed to foster discussion between people doing interesting things who ordinarily would not talk to each other. The goal is to encourage truly interdisciplinary collaborations. Here you will find artists, physicists, engineers, biologists, journalists and just about any other specialty you can imagine, discussing any subject that a participant puts forward as a conference ‘session’ – How to bridge science with humanities and creative arts, how to provide the world with fresh water, how to teach college-level courses in real time to tens of thousands of on-line students. SciFoo is a chrysalis from which new ideas emerge --- an immersion in emergence.

How does a dead squid fit into all of this? Well, give them a squid and they will come – at least the curious. And there were a lot of curious people at SciFoo – that’s why they are invited in the first place. For two and a half hours groups of 4-40 professional thinkers gathered in front of a dead squid and asked

the identical questions posed above that are the standard fare of children at Squids-4-Kids outings. What was so fascinating? I didn't ask anyone that seemingly simple question, but the next day I realized that the question has deep roots. The answer? -- Nothing more than novelty or anomaly -- something unexpected and totally out of their realm of professional experience, training and avowed interest triggered that same joyous spark of exploration and discovery that they all had as children. In some that spark lingers and has a hair trigger. It only takes a big squid on a table to set it off and transport the subconscious back to when exploration and discovery were vital to our survival as infants.

Somehow these SciFoo campers have remained curious children at heart. What was different about their experiences growing up -- at home, at school, at summer camp, at church? I'd be willing to bet that a simple polling would show that they were encouraged to explore their natural world as small children, be it true wilderness, suburban woodlands, vacant lots in cities -- or in my case the old Lehigh Canal, a place that is mapped deeply in my mind. To get to this special place I had to walk across about 20 parallel sets of railroad tracks in an active switching yard. My father only had to tell me once about how dangerous it was to step between the rails of a quiescent switching track -- once I saw one switch, I never forgot it. It is the same with hearing a buzzing rattlesnake for the first time. Yes, there are dangers for our children out there, but there always have been. The real danger for the next generation is not from their local environment but from losing contact with it. They need to see it and feel it and smell it, perhaps even taste it. They need to look closely at, and maybe collect, insects and leaves, rocks and fossils, whatever catches their eye and curiosity. And their parents need to read to them about these wonders, because this exploration starts early, very early. When these children feel this empowerment, they will cling to exploration as to a life raft no matter where they find themselves for the rest of their lives.

If we want the next generation to care deeply about the planet, and that is our only hope for survival, we need to do all we can to reward the curiosity and exploration in our children starting from very young age. They probably need to have it well before they ever get to school in order not to lose it to the facts of formal education. Let them explore on their own and reward their discoveries. It is a positive feedback cycle with huge payoff.

When I go back to the canal now, I drive a car and avoid the tracks. The locks no longer hold the deep water that was always mysterious. The fast-water shunt that bypassed the locks (we called it "the swifties") and where we caught chubs has been filled in, graded, covered with grass, made safe. One of my most vivid memories was catching a trout in this run -- if you know the Lehigh Canal, you will probably suspect that I may be the only person ever to do so. The old wooden dock-like structure with the best bluegill fishing no longer exists; only a few scrawny iron fingers poke up from the bottom. But my mental map persists as clearly as when I was ten. What if I had never noticed these details more than fifty years ago? Would I be the same person today? Would the world be the same place it is today? As John Steinbeck taught us in *The Log From the Sea of Cortez*, all of it is important or none of it is.

William Gilly, Ph.D.
Stanford University
Hopkins Marine Station