The conservation of evolution education in zoos

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For anyone working at a zoo today, it is no secret that conservation is now the primary focus of educational missions, with the theme influencing all aspects of exhibit design, interpretive labeling, visitor brochures, advertising, guided tours, lecture series and even official zoo logos. Indeed, most if not all of the international organizations of zoos (and aquariums) are devoted to encouraging their member institutions to become even more committed to communicating conservation messages to visitors. Although this increased emphasis on conservation is invariably assumed to be a positive trend, it is worth considering, briefly, what type of educational content has been sacrificed to make room for the conservation message. This article is an exploration of one consequence, the diminished emphasis on evolution education. For example, at the Philadelphia Zoo in Pennsylvania, USA, a facility with approximately 1,600 animals, the words "speciation", "evolution", and "natural selection" do not appear on a single exhibit label, while almost 100% of the exhibits, even those of non-endangered species, feature a conservation theme (from personal observations, August 2005).

In evaluating the loss of natural history information it is useful to understand why zoos have adopted conservation as their primary educational mission. There seem to four reasons. The first is that zoo directors believe that informing visitors about the plight of endangered animals might motivate visitors to become more active in global conservation efforts. The second is that zoos can inoculate themselves against criticism from animal rights activists and other animal welfare organizations by emphasizing that the role of zoos as recreational venues is secondary to their new role as breeding centers for endangered species.

The third is that zoos have simply responded to the public's increasing appetite for "save the world" themes, lessening the guilt of visitors whose increasingly consumptive lifestyles rather directly contribute to the destruction of the planet's wilderness areas. Lastly, it's cheap and easy: designing an educational program that mentions habitat destruction and that publicizes pre-existing, on-site breeding efforts does not require the effort that might normally be involved in exhibit design featuring natural history.

All of the above reasons strike me as reasonable and expected, and none suggests that the conservation theme was simply invented in order to replace evolutionary themes. Still, there seem to be additional factors, independent of the conservation push, encouraging the extinction of evolution as a popular zoo topic. Some zoo personnel I have spoken to have suggested that evolutionary topics are simply "too hard" for an average zoo visitor to understand. An amusing (and hopefully untrue) variation of this excuse is that label design committees (composed of education staff, graphics people, curators and keepers) invariably contain at least one member who does not fully understand or appreciate evolution, and thus a general impulse for an evolutionary focus becomes derailed due to a lack of consensus. Another popular (albeit strange) reason that is voiced is that properly explaining evolutionary concepts would cause word-limit restrictions on labels to be exceeded. These reasons for actively avoiding evolution seem, to me, to be only moderately convincing.

In the United States (and elsewhere, I suspect, to a lesser degree), there is an additional factor that contributes to the shrinkage of evolutionary content in zoos: the pressure brought by religious fundamentalists. Christian fundamentalists, for example, believe in the literal truth of The Bible, insisting that all animals were created by a supernatural being, several thousand years ago, in their present forms.

The evolution exhibits at the US zoos in St. Louis, Missouri, and in Tulsa, Oklahoma, have both drawn criticism from religious activists, and the latter responded by erecting a disclaimer at the zoo's entrance that reads,

"There are many views on the origin of biological species and their behaviors. The information that accompanies our displays is based on compelling evidence of the natural sciences. Because scientific knowledge is subject to change, these displays may be revised as new information becomes available".

This disclaimer greatly pleases fundamentalists because the zoo has suggested that a future experiment might, possibly, show that the world and its denizens were, as Creationists insist, created in six days by an all-powerful entity. This same zoo also briefly planned a creationism exhibit to appease local Christians who were jealous about a statue of Ganesh (an Indian god) near the elephant enclosure. And at the Knoxville Zoo in Tennessee, USA, staff members were instructed to avoid mention of the word "evolution" in educational programs (from private conversa-

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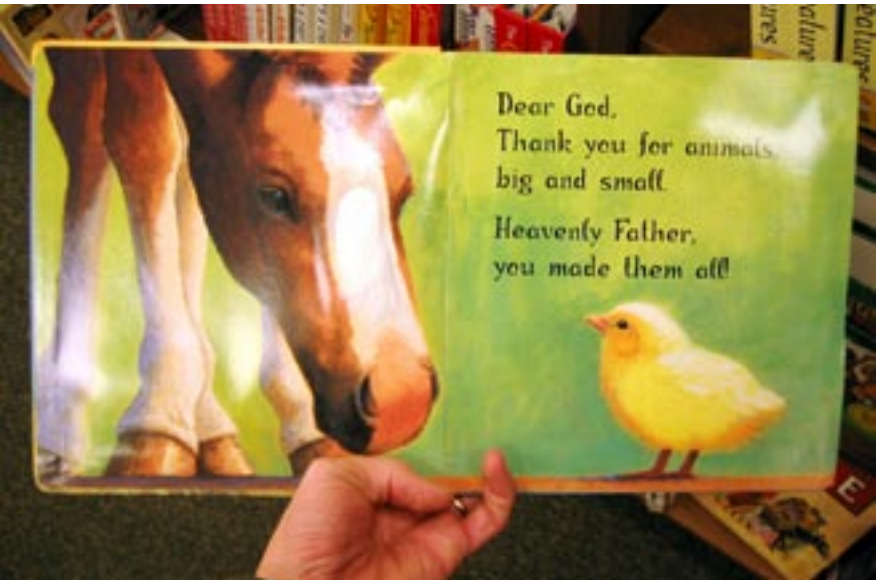
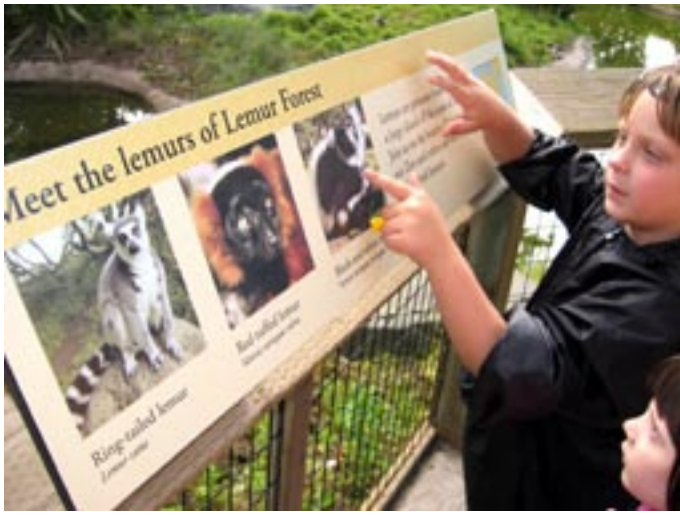


pages from a book detailing the Genesis creation myth



children at San Francisco Zoo interacting with a label at the lemur exhibit; even pre-readers enjoy graphics about natural history, including evolutionary trees equipped with photographs

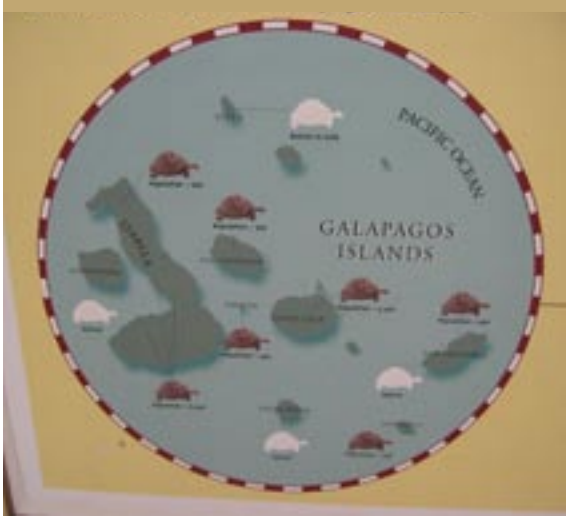
tion with former Knoxville Zoo staff member, April 2005). More broadly, The American Association of Zoos and Aquariums (AZA) has recommended to its member institutions, "Don't alienate people with traditional belief sets", a directive that is likely to further reduce zoos' interest in evolutionary themes (see http:/www.aza.org/ConEdHistory3/). These examples are ones that I could easily uncover with about one month of effort (I have a day job, after all), but I am fully confident that many other zoos have similar stories. And I would not be surprised if zoo staff regularly discuss such pressures from fundamentalists via e-mail and zoo newsgroups, alongside queries about enrichment and diet supplements for their animals.

If evolutionary facts were only remotely related to the educational possibilities of a zoo, then the avoidance of such topics would not be especially alarming or regrettable. But a zoo is often the only place where children can come and witness the diverse end-points of hundreds of millions of years of speciation and marvel at the often bizarre effects that natural selection and sexual selection have had on morphological and behavioral traits. And of all places, the local zoo is the site where young minds might begin to appreciate (with help from parents and appropriate interpretation) that humans are just a minute tip on one branch of an enormous tree of life whose roots began billions of years ago as single cells. In fact, when P.T. Barnum started amassing and touring with exotic animals in the 1870s, local newspapers in the United States made the connection to evolution immediately: "He has crowded natural history into the spectacle of an evening; he has simplified for ordinary minds the Darwinian controversy by bringing all the animals concerned together and leaving them to speak for themselves".

Another factor that tends to inhibit the use of evolution in informal learning centers such as zoos is the effect of pedagogy theorists. There is a curious belief in science education circles that evolutionary topics are somehow only appropriate for mature teens and adults. This conclusion is based mainly on the assumption that younger children are developmentally incapable of understanding evolutionary processes. As any parent knows, however, young children are fascinated by the origins of life, of species and of adaptations.

For people without children, a short trip to the local bookstore will provide conclusive proof that young children are ready for this type of information. On the shelves housing religious literature for babies, toddlers and preschoolers, there will be dozens if not hundreds of books that detail myths of creation, of species' origins, of extinctions and of the causes of adaptations. Children love it. Developmentally, their brains are fully able to absorb the relevance of what is read to them, and they can communicate these myths to other children when asked. Young children absorb scientific knowledge in the same way. Once they know that all animal species evolved from previous species, children develop an insatiable desire to know about the predecessors of their favorite animals. What species did dogs evolve from — a wolf or a fox? Did whales really evolve from land-dwelling mammals, and what did this ancestor look like?

Questions about processes are formulated just as easily. Why did whales evolve to live in the ocean? How many generations would it take to domesticate possums into lovable house pets? The problem is not that very young children cannot conceptualize or appreciate the relevance of evolution, but rather that children quickly begin formulating questions that most parents (and teachers) feel ill equipped to answer. Therefore, if zoos were to retool exhibits to pander to the interests of children, a focus on evolutionary themes would be pedagogically desirable. With their cu-



this graphic on the distribution of Galapagos tortoises is part of a 1,000-word piece on their conservation status; despite the importance of these animals to Darwin's theory of natural selection, evolution is not mentioned

riosity piqued, children might consume far more exhibit label information than they currently do, even if they have to beg their parents to read the signage for them.

Coupled with the many reasons why evolution should go back into zoos are several indications that conservation themes should be scaled back (and not just to make room for evolution). Foremost among these reasons is that conservation issues are often of the "gloom and doom" type that can repel the interest of a casual zoo visitor. Habitat destruction in war-torn regions, rare-animal slaughter for bushmeat and the illegal pet trade are all topics that increasingly dominate exhibit labels to the exclusion of biological information. To make visitors pay attention, and especially to make the visitors donate money to zoo-sponsored conservation projects or to become activists, exhibit designers sometimes make the interpretive graphics even more forceful (e.g., a photograph of an orphaned elephant standing next to a slowly-dying parent whose tusks have just been sawed off by ivory poachers). For the average visitor such a tone can be a step too far, and he or she will simply stop reading the signs.

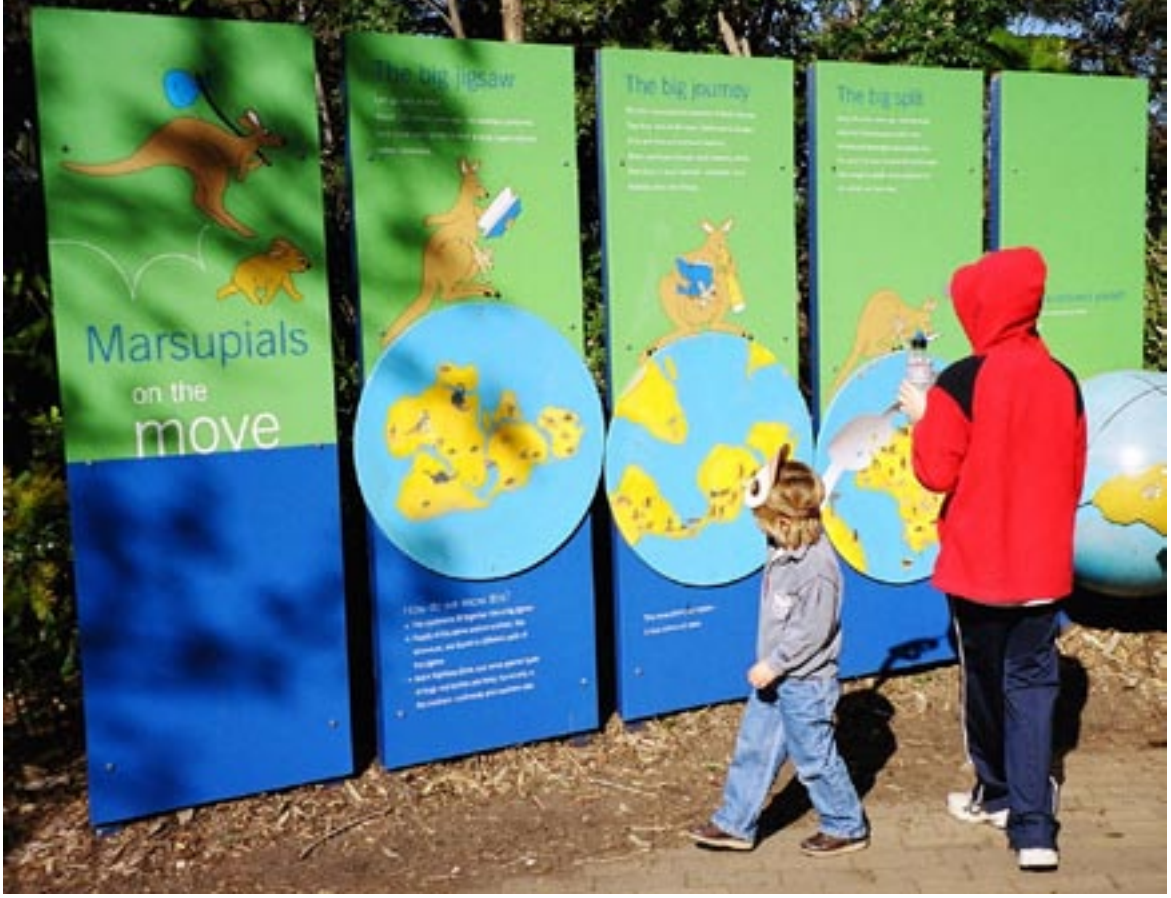
Part of the problem is that the typical zoo visitor already has a fairly modern view of animals and the challenges they face. Most people know, before they come to the zoo for the first time, that the world's population is increasing at the same time that specialized habitats are disappearing, and that the two facts are not coincidental. And most people believe that citizens should conserve natural areas locally and, if possible, should donate to organizations that do the same on a global scale. In addition to already believing in the ideology behind animal conservation, visitors are bored by any element of signage that seems repetitive. When the Philadelphia Zoo asked a large sample of visitors whether they preferred newer conservation-themed signage to the older plaques that featured natural history, participants in the study voted for the natural history signage, as did the resident curator (from Chambers, P. (1986). Animal identification signs at the Philadelphia Zoo: A research report. Philadelphia Zoo Review, 2(1), 28-44). (The zoo ignored the study results and converted the labels to highlight conservation issues regardless.)

Zoos might also consider the wisdom of exposing young children to too many depressing facts. Developmentally, children who are able to read labels can also understand – and feel – the sadness brought by evil, loss and suffering. However, because children are helpless in the face of world devastation, such sadness will more than likely be channeled into a desire to stay away from animals so that the feeling does not resurface. Zoos, when their message is too gloomy, are in danger of slowly generating a population of adults that have been traumatized into not caring about the hopeless causes of the natural world.

Zoos, however, often seem to believe the opposite, and that alerting young kids to the bushmeat trade, toxic waste and suburban sprawl will make them, eventually, into adults who can prevent these activities. Naturally, only a long-term study comparing adults who have and have not been exposed to conservation exhibits as children, would answer this question. If ever such a study were made, it would be invaluable to also include a group of adults who were exposed, as kids, to really interesting natural history labels – it is these children, once they grow up, who might translate a profound curiosity of nature into a love of saving endangered plants, animals and habitats.

Given all the reasons why zoos want to push a conservation message – and its appeal to corporate sponsors who wish to put a shine on their public image is not to be ignored here – it is unlikely that zoos will ever fully restore natural history content to labels. But many conservation issues can be pitched in evolutionary terms without too much difficulty. For example, explaining to a viewer that extinction is a natural process might be worthwhile, clarifying the differences between mass extinctions (from meteors, from human activities) and normal ("background") extinctions. Or perhaps the viewers can be educated about why certain species seem to be responding, via natural selection, to the changes in their environments while other species remain unchanged (and thus remain in danger).

A zoo director who wants to encourage staff to bring evolutionary topics back into education can do so easily. The first is to simply clarify to zoo staff that although a zoo's primary mission might be the breeding of rare species, cooperating on habitat restoration or facilitating conservation research, the educational emphasis should do something more than simply publicize these



part of the interpretation, aimed at young audiences, on marsupial evolution at the National Museum of Australia

activities. Zoo staff, and educational staff in particular, should feel free to include evolution themes in labels to better improve visitor understanding and better integrate with the pedagogical desires of visiting schools. Second, zoo directors can subscribe to several technical journals in which useful evolutionary information is regularly published. Some examples are Evolution, Science, Nature, Natural History, Scientific American, National Geographic, and Smithsonian – all serials whose focus is not 100% conservation.

Third, directors might encourage members of signage committees to solicit label ideas from external experts whose primary focus is not conservation biology. Faculties at colleges and universities are generally delighted to be consultants on labels when the featured animal is their research focus, and the Internet makes finding these people easy.

Lastly, zoo directors should initiate more serious evaluation of education offerings, asking specifically whether a conservation-only view of education is truly best for cultivating a love of nature.

Zoos are obviously torn in opposing directions in their need to be recreationally attractive but at the same time appear maximally involved in conservation efforts. Labels that inform visitors of the trade-offs in zoo management might produce a public that is, marginally, more understanding of these trade-offs, and might make it possible for zoos to evolve into institutions that were more devoted to conservation than to conservation education. This, in turn, would allow a greater emphasis on non-conservation education content.

Because there are so many zoos in the world, and because exhibit labels are rarely available online, part of my interest in writing this article is to find zoo educators who might be willing to share and discuss the signage at their zoos. Because zoos do not directly compete with one another, it seems that if one zoo has an amazing plaque showing how tortoises arrived at the Galapagos Islands and subsequently differentiated into distinguishable subspecies, it could share the text and illustrations with other zoos around the world. Such a site is available at www.flickr.com/groups/exhibitlabels, where photographs of exhibits and exhibit labels can be uploaded (for free), “tagged” with species names and commented upon for the benefit of the world zoo community. Sharing creative ideas with other zoos (and natural history museums) would help peers at different institutions interact at global level.

Another goal in preparing this article is to influence, perhaps, international and regional associations of zoos and aquariums, as well as educational committees and associations whose interests converge on label design, zoo education and the role of informal learning centers in the science education of children. My plea, hopefully evident above, is that highlighting basic biology is important, especially in countries such as the United States where science literacy among the general populace is low. Because evolution is the foundation for all other facts about morphology, physiology, and behavior, zoos should treat it as their primary educational theme. At the very least, evolution should not be completely ignored.

New interpretive displays

in Johannesburg Zoo

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A new master-plan was designed for Johannesburg Zoo in the nineties, although we struggled to develop it due to a lack of funds. Most of the designs were huge new complexes that required a lot of funding.

At the end of 2003, Jenny Gray was appointed as the new Director. An engineering graduate with energy and practicality, she set about redesigning the master-plan as an exciting, achievable project. We still needed a lot of funding, but somehow Jenny started the ball rolling and the rest is now history.

The implications for the Education Department were not apparent in the beginning. We were more used to complaining that we could not do a thing without any budget than actually planning new designs. This all changed with budget allocation...and did our ball start rolling.

What was our task? The zoo would be divided into six new zones – Heart of Africa, Spice Route, Southern Africa, Amazonia, Extreme Environments and the new Children's Farmyard. Our task was to develop informative signage that differed from zone to zone.

The first zone included the Ape House, which needed desperate measures to ensure a larger living space for our chimpanzees. This was the great start of the "Heart of Africa".

The buildings were done in the typical mud style of Africa and various designs were added in earthy colours. The "Celtic" cross was added as it originated in Africa, symbolising earth, wind, fire and water. Mosaic brightened the entire structure in imitation of the use of mirrors in certain parts of Africa. The interior was decorated with wood chips, clay pots and the same mud style with mosaic. We added masks made of recycled drums.

Our signage was developed with a certain theme – the colours would be jungle greens, yellows and browns. The posters would have a specific border to signify the zone, in the case of Africa consisting of masks and jungle plants.The content would be new. Animal information would be included, but we wanted to add more to our visitors' knowledge base. We therefore added information on the bush meat trade. This was a first for us and even though we started quite low key, we had a number of visitor reactions. People were horrified by the idea of chimpanzees being eaten, and of the many other species that suffer the same fate.

Poetry was included – a new dimension to encourage reading and the appreciation of language.

With further progress in the "Heart of Africa" zone, a new poster series was developed, on red river hogs, bongos, sitatungas, red duikers, Ross turaco and guinea fowl. Poetry was again included and the ecology around a tree. Some interesting facts about pigs concluded the series. Again we used jungle colours in the background, within exactly the same frame.

Technical aspects

Our challenges with designing these exhibits have so far consisted of finding the correct information, portraying it as naturally as possible and saying just enough to educate our public. We also faced the problem of sourcing photographic references available for use free of charge (fees can range from R100-00 to R1000-00 per picture; R100 = £8-34). The picture quality needed to be clear enough to be portrayed on an A1 poster.The posters also had to withstand our climate and so Correx, a highly durable, light material was used. Colour quality was guaranteed for two years, with a 5% fading factor thereafter. The posters were displayed in a clip frame for easy removal and maintenance. Minimal damage has been experienced so far – only two have lost some of their lamination due to extreme weather exposure.

Producing posters in this way also lends itself to recognizing sponsors cost effectively as we simply add their logo to the appropriate poster instead of reproducing a different plaque.

This exercise has turned out to be quite a learning curve for us but has also inspired us to an improved product. We are very happy with our progress so far but need now to implement the next interactive phase – monkey puzzles, feeler boxes, foot prints and biofacts on display will be our next challenge, combined with an "Origin of Man" display.

In the meantime, the master designs for the other stages are being developed and we are looking forward to the warm reds of the Spice Route and the bright colours of Amazonia.

Educational displays need to have an effective message, be cost effective and applicable for a few years. They need to follow the particular educational message of the institution concerned and convey the four recognised objectives of any zoo: conservation, research, education and recreation.

We, as the Education Department, find this

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