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## THE NATURAL HISTORY CONUNDRUM REVISITED: MAMMALOLOGY BEGINS AT HOME

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This commentary is the text of an oral presentation delivered at the 88th Annual Meeting of the American Society of Mammalogists in Brookings, South Dakota, on 22 June 2008 to recognize receipt of the Joseph Grinnell Award for Excellence in Education in Mammalogy. Much has been written by previous recipients of the Joseph Grinnell Award about the declining interest in natural history and organismic biology in academia and in society in general. In the course of 40 years of university teaching and student advising, as well as field research with students on 5 continents, I too have witnessed this increasing abandonment of the natural world. This phenomenon seems to stem from changes in the early experiences of children and young people over the past 40 years and, thus, I would advance the premise that mammalogy and other branches of natural history begin at home. Three types of learning seem important to the developing mind. First is the time and opportunity for unstructured, unforced exploration of the local environment—time to develop from the inside out rather than merely as a shell coated with a number of intellectual veneers. Second is learning from the example and caring instruction of enthusiastic parents, teachers, and mentors. Third is the transfer of information—from personal experience, reading, teaching, and selectively from a vast array of electronic sources—once again with time for synthesis and contemplation. All 3 types of learning appear to be critical to an appreciation of the natural world. Unfortunately, these processes have been grossly distorted by the loss of outdoor experience, by parental fears and ambitions, and by a kind of electronic idolatry associated with constant entertainment, instant gratification, and virtual relationships. Such an upbringing may affect not only a child's physical and mental health, but his or her future commitment to preserving the natural world as an adult. Published studies of “nature deficit disorder” and “videophilia” now describe this phenomenon and challenge families, schools, and scientific organizations to respond in a timely way.

Key words: child development, electronic idolatry, natural history, parental pressure

It is difficult to express the surprise and gratitude I felt when I was notified last June that I had received the Joseph Grinnell Award, especially since I was being prepared for a knee operation and could not attend the meeting. I am profoundly grateful to the American Society of Mammalogists and to those exceptionally sneaky, current and former students who quietly handled the nomination. Thank you.

But such an award prompts a certain amount of contemplation too. I have now completed 40 years of teaching, advising, and research at Wake Forest University, during which I engaged in field study with students on 5 continents as well as regional fieldwork as part of regular classes. In that time I have listened a great deal to students, parents, and colleagues and have started to explore the diverse literature on our national

relationship with the natural world. Those experiences have led to the perceptions I discuss today.

As Schmidly (2005), Hafner (2007), and others in the American Society of Mammalogists have previously pointed out, we have a problem that is both daunting and pervasive: the overwhelming abandonment of the natural world by much of the population of the United States. Although the causes of this situation have been variously attributed to curricular changes, scientific trendiness, and American lifestyles, I would argue that the problem at its most basic level is the result of changes in the early experiences of children over at least 2 generations. In short, I would maintain that mammalogy begins at home—as do other fields linked to natural history. Let me briefly attempt to document this idea and suggest what we as scientists, parents, citizens, and members of the American Society of Mammalogists might do about it.

I will start with a story. Some years ago a 2nd grade teacher asked me to talk to her class about the places I had visited and the animals I had studied. So, I scrunched down in one of those classrooms with the tiny desks and chairs and talked about the

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pictures and objects I had brought along for the kids to see. I had a very enthusiastic audience, and when I was done, one little guy raised his hand and asked, "Gee, that's neat! But, what are you going to do when you grow up." Wow! That certainly caused me to pause—for 2 reasons. First, I enjoy the work I do and the people and places I have come to know. If "growing up" means abandoning that, then I shall never grow up; I will remain an academic Peter Pan. Second, what had happened to this kid that caused him to think that the very activities that excited him were not what serious grown-ups might do? According to this philosophy, what is worthwhile really shouldn't be enjoyable, should it? Sadly, the kid wasn't alone. I well remember when a nationally famous comparative physiologist scandalized a group of hyper-serious, well-funded biologists by saying the reason he pursued his research was largely just because it was fun.

Back at my university the boy's question became prophetic. After years of teaching courses in ecology and vertebrate zoology to packed classrooms and coping with waiting lists for field trips, in the last 4 years, I, along with many of my colleagues, have become aware that fewer and fewer students wish to take such courses—especially if they have laboratories or off-campus field trips. At first I thought I had lost my touch as a teacher, but since my other courses were always full, I tentatively ruled that out. What had changed?

As the university has become more upscale and expensive, we are admitting increasing numbers of more affluent, urban, and suburban students. Most of these have spent little time outside, nor have they any desire to do so. Many have never planted a garden, observed a wild animal, or even mowed the lawn. Many consider college as a necessary and burdensome stepping stone to some occupational goal such as medicine, law, or business, not as a worthwhile experience in itself. They are often interested in environmental studies, especially if these have a technological or economic emphasis, but only if they require a minimum of science. Don't ask some of these folks to experience environments 1st hand—unless, of course, they have continuous access to cell phones, laptops, and iPods. To my surprise it wasn't just the students who seem to have changed but their parents—including some colleagues—as well. Thus, we may be talking about a multigenerational shift that has become a dominant element in our current world view.

Some people take exception to this assessment and have relegated me to the status of curmudgeon. But the concerns I have expressed have now received considerable national attention, not only here in the American Society of Mammalogists but in a growing body of literature. Some of these studies, like Louv's (2005) book, *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*, and papers by Pergams and Zaradic (2008), Zaradic and Pergams (2007), and Kellert (2002) reveal that an upbringing without experience in the natural world not only influences later preferences, educational practices, and national policy on the environment, but has a marked effect on physical and mental health as well as learning capacities. There also is a strong link between the life of sedentary, indoor kids and a national epidemic of obesity and diabetes. Add to this an almost complete ignorance about

foods—their sources, variety, and quality—as revealed in the writings of Pollan (2006, 2008), Kingsolver (2007), and even Wendell Berry (1977, 1987) and the disconnect between the culture and its support system is even clearer. And strangely we live in a world preoccupied by concerns for laboratory animals and livestock, but oblivious to practices that routinely mistreat and sentimentalize pets. Finally, I won't even go near our irrational national policies involving energy, food, soils, water supply, and species preservation.

So it appears there is a problem, and I approach it from the vantage point of a teacher, biologist, and parent. I believe that much of the problem is developmental, stemming from the experiences of young people growing up in the past 40 years or so.

At least 3 major processes are critical to developing minds. First is the time and opportunity for unstructured, unforced exploration of surroundings, ideally including the natural world—time to observe, to touch, to wonder, to play—to develop from the inside out rather than as an empty shell coated with a number of forcefully applied veneers. Second is learning from the example and caring instruction of enthusiastic relatives, teachers, mentors, and peers. Third is the transfer of information—from personal experience, reading, teaching, and, selectively, from a vast array of electronic sources—once again with time for contemplation and synthesis. All 3 of these processes can be critical to an appreciation of the natural world, especially if they are operative early in life.

What has happened over the past 40 years to these developmental processes and how have any changes affected our relationship to the natural world?

What about the 1st learning process mentioned? What happens early in life often determines a child's direction and capacities. This process has changed radically. In addition to the increasing unavailability of the natural world to many urban and suburban children, the main problems appear to stem from parental fear and avoidance of outdoor surroundings and the elaborate channeling of children to be perfect performers in carefully selected fields. For many parents the natural world is dirty and dangerous—even disgusting. Kids can get messy and bruised and run into dangerous and painful pathogens, insects, spiders, snakes, mice, and even a territorial mockingbird. This is the yuck factor, and kids respond to it quickly, often by 1 trial learning. A child has only to see a parent freak out once at the sight of a salamander, insect, or snake to learn fear and abhorrence of a large percentage of living things. This phenomenon was brought home to me recently when my help was desperately requested by students and staff who work in the circulation department of our main library. A dangerous and gross animal had been sighted, and I was implored to remove it by people standing on chairs and clinging to the walls. There it was—a lively, fat cockroach! Yes, we have large roaches in the south, and in a few areas, they may be considered the state bird. But dangerous, never! So I walked over and stepped on it. Then I caught hell for not reverently carrying the roach outside and releasing it. St. Francis of the roaches I'm not! What I wish to emphasize is that the disgust and fear parents display toward animals, foods, places, and,

yes, even people, makes an indelible impression and becomes a barrier to nature. In reality, it can be shown that exploring the backyard or local woods is *much* less risky than riding in a car or crossing the street. There also is substantial evidence that demonstrates that the less-sanitized natural world is good for the development of the immune system (Dunne and Cooke 2005). Certainly physical activity and exploration provide huge benefits to the average child.

But the main fear of parents—beyond all others—is the abduction and abuse of children by strangers while they are enjoying their outdoor surroundings. Contrary to this belief, Louv (2005) and recently Skenazy (National Public Radio interview, 9 April 9 2008: <http://www.npr.org/templates/story/story.php?storyId=89502019#email>, accessed 1 September 2008) have pointed out that the chances of kidnapping by strangers is extremely low and actually declining—in 2006 maybe 50 kids out of 75 million children. Most abductions are carried out by relatives, and most kids return. So how on earth did we get the idea of such stupendous danger lurking outside our doorways that children must be kept inside or severely monitored at all times? The answer may be quite simple. The relatively few kidnapping cases—especially if they involve cute, affluent, and white children—are a media bonanza and a lawyer's delight. Days and years of media sensationalism have conditioned such a fear in society that parents don't dare let go, even for a minute. In addition, consider how commonly fear has been used for political and entertainment purposes in these post 9/11 years. Is it any wonder then that an atmosphere of abject terror about one's surroundings has been the result? Thus, for many, nature has been written off.

The other adverse aspect of early development is associated with parental control and ambition. Parents who lived through the turbulent 1960s and 1970s generally had fewer children, but they decided that, by golly, these kids would be brought up to be perfect performers. Add to this anxieties about the job prospects and the lifestyle concerns of those finishing college, and you have a mix that can force kids into well-defined pathways at an early age. And those pathways rarely include unstructured exploration of fields, woods, and streams or even backyards. From an early age many kids are pushed hard to master verbal and number skills, athletic and artistic performance, and a range of other endeavors. Recreation may consist of TV and computer time, formal play dates, and highly supervised religious and other activities. So, finally, the day arrives when a parent can say to his son or daughter "Well, little Jacob or Emily, mom and dad are really proud of you. You are doing well in reading and writing, making progress in math and Swahili and can recognize the themes from the first 10 Mozart piano concertos. And, think of it—next week you start preschool!" We are back to Garrison Keillor's Lake Wobegon community where "all the children are above average."

What follows? Schools without recess, teaching to the test, highly competitive, organized sports, summer camps dedicated to technology or some specialized activity but no nature, science—all glassware and gadgets and no organisms or time outdoors. Sounds like fun, doesn't it? The right teachers; the

right schools. Nothing left to chance. And the goal of all this Skinnerian conditioning: perhaps a place at Amherst, Harvard, or Berkeley in a flurry of parental pride—or a stressed, rebellious, sedentary, overweight kid who neither knows nor cares about the natural world or anything else.

This brings me to the 2nd learning process—the one that involves other people, such as parents, mentors, and teachers. Young children often quickly bond with adults who accept them as individuals, provide them with guidance, but allow them to explore the world on the basis of their interests and sense of curiosity. Research has shown that such experiences not only provide inspiration and self identity, but also help overcome learning and behavioral problems. I am willing to bet that most of the people here today had some mentor who encouraged their exploration of the natural world. However, many children don't have this experience. Some kids, as previously mentioned, lead highly structured lives under the tutelage of ambitious adults. Eventually, performing and pleasing adults becomes the major goal of learning and the ultimate measure of self-worth, and the young people bring this attitude all the way to college, often still monitored by helicopter parents. In other cases, both parents must work, out of necessity, or to provide the extras considered essential to the American lifestyle. Any quality time with children then becomes especially important, but there may not be time or opportunity to visit natural areas. One can only hope that someone can take the kids outside so they won't be abandoned to those ultimate mind-numbing baby sitters—the world of video screens.

Having already discussed some aspects of school and camp, what can I say about the potentially rich mentoring and firsthand experience in college when students might be exposed to dedicated faculty, field opportunities, and real organisms? In many universities organismic biology has been dropped in favor of fields that are currently more popular and bring in more overhead. Fears of liability suits and restrictions on working with animals have greatly limited fieldwork and many behavioral studies. Economic constraints at some institutions have brought back large classes and reduced the quality of laboratories. Professors are often harried and remote to all but those likely to work in their own laboratories. And field studies are considered too time consuming and expensive to be part of the curriculum. Course content may be limited to condensed, predigested material, projected and read in darkened rooms and then loaded up on Blackboard to be memorized and later regurgitated. Lucky is the student that still has access to personal advising, some small classes, labs, and fieldwork with an enthusiastic instructor, and assignments that require reading and writing. Somehow, I always thought that the essence of education involved people—teachers and students exploring ideas and the world.

Having commented on the importance of early experience and the influence of special teachers in appreciating the natural world, let me briefly mention the 3rd process—information transfer. Although personal experience is critical and mentors catalytic to learning, most knowledge comes from the evaluation of stored information. This means reading—lots of

reading—from a wide range of sources. Unfortunately, reading is often seen as excessively time consuming, demanding, less than entertaining—and exceedingly lonely. Some discover enjoyment and escape in reading, as the Harry Potter series and certain novels have recently made clear, but many young people rate reading at best as a necessary evil. In fact, the word “boring” comes to mind. Why read widely when there are all kinds of condensed sound bites and summaries on Google or Wikipedia? And if you can find a few concise articles on the Web, why read more extensively? Surely you wouldn’t use books—too much work and too low tech. My students are certainly not illiterate—but some are “aliterate”—they don’t read unless they have to and learning about biology or the natural world suffers accordingly.

But wait a minute. Why can’t the electronic media solve this problem? There is no doubt that the Web is a great source of information and entertainment and an effective means of communication. I wouldn’t be without it. However, as Zaradic and Pergams (2007) have stated, we now suffer from “videophilia,” a kind of electronic idolatry where video screens of various types—TV, computers, games, and cell phones—have replaced much real experience of the world around us. And, while we can stay constantly in touch with our 300 closest friends by cell phone, e-mail, Facebook, IM, etcetera, people are finding that virtual relationships may not be entirely satisfying. At the same time one often gets the impression that some people harbor a deep-seated fear that if the message input should ever stop, they might cease to exist at all. We are back to the “lonely crowd” described in a best seller over 50 years ago (Riesman 1950).

My concerns center on the impact of all this connectedness and our complete electronic absorption. Kids who are always entertained indoors and always connected on the Web eventually become cut off from the natural world. The constant stimulation from TV programs and YouTube and the ability to get what one wants instantly have rendered anything less hyped and instantly gratifying pale by comparison. The natural world, whether the African plains or the teeming rain forests of Borneo or the backyard, cannot compete with this continuous, passive entertainment. Studying organisms and natural communities takes time, patience, and concentrated observation. For many, that is too much work. Go to the zoo sometime when there are school groups there. The kids are disappointed: the animals are not hunting or fighting; they are sitting there. *Boring!* Time to pound on the glass or throw things. Since 1989 there has been a 20% decline in national park visitation. Park appreciation requires hiking and looking around and often separation from electronics. Worse still, visiting parks or taking long trips is often no longer a time for viewing scenery or discussing surroundings. Thanks to backseat DVD players in today’s cars, you can now keep your kids quiet watching videos from DC to San Francisco. No need to look out the window at all. Finally, one last story. As a former runner, I loved jogging along trails or in natural areas. There were things to see, hear, and smell, and you could note the progression of the seasons year after year. Now I notice that almost no one jogs or walks without an iPod. People who wear an iPod are

a mugger’s or an attacker’s dream. They are in their own personal cocoon; they are almost completely oblivious to the world around them. At Wake Forest there is a paved trail through a small wooded area leading to a large estate. This trail is used by scores or hundreds of walkers or joggers everyday, most with iPods. One of our graduate students (who does not use an iPod) kept telling me she saw snakes along the path, but I couldn’t tell from her description what they were. In frustration, she photographed them. The photos revealed several venomous copperheads both along and on the trail. They are often there, could easily be stepped on, but remain unnoticed by the iPod-clad exercisers. My point: our electronic assets are wonderful if they don’t become addictive, increasing self-absorption, instant gratification, isolation and, most importantly, complete obliviousness to the world around us.

So what is the solution to our natural history predicament? In terms of the learning processes described, I think the answers are fairly obvious, but will require a lot of thought and effort in our own homes, communities, and schools. Already a small backlash has started, detectable in the flood of books, articles, and blogs that run the gamut from serious works in education, psychology, and natural science to popular nature publications to Web sites like that of Skenazy (<http://freerangekids.wordpress.com/>; accessed 9 September 2008). In the past 2 years I have observed some change in attitude and activity in the students I teach. But we have a long way to go. Perhaps the current economic and energy turmoil will stimulate some changes in thinking and policy in the coming years.

One institution, though, has always represented an oasis in this desert of distraction and nature abandonment and that has been the American Society of Mammalogists. For this organization, whatever its faults and limitations, has a membership that values and strives to understand organisms and the natural world. Over the years it has welcomed and encouraged students of all ages and backgrounds; it is less concerned with hierarchy and more interested in new ideas and experiences. Of all the meetings I attend, this is the one that always makes people welcome. The opportunities for learning, mentoring, and growth have been a major asset of this society. In the final analysis, what is the role of the American Society of Mammalogists? Research and training in mammalogy and related fields and the dissemination of ideas, of course. However, I would suggest that, although we may individually turn out good or occasionally great research, this body of work is often transitory; it will be extended and possibly replaced by future studies. Therefore, I would contend that our main legacy is people—our children, our students, our colleagues, and associates to whom we pass on our enthusiasm and our knowledge.

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