Sue's Several Heads

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Just as Hamlet contains "words,words, words", museums hold and display objects, objects, objects. Depending on how they are presented these objects may be seen as art, or as entertainment, or as embodiments of knowledge and ideas.

This article is about the meaning of artifacts displayed in a natural science museum. It starts from a single object, a dinosaur fossil very conspicuously advertised and displayed by Chicago's Field Museum of Natural History. That fossil, and its surrounding exhibits, are used as tools for the examination of the science museum in historical context, to see the museum's relation to our society, to corporate culture, and to science itself.

The Heads

Start with Sue's heads. Sue is a *Tyrannosaurus rex*, said to be the largest fossil of her species in the world. Her skull is on display in two different places in the Field Museum. First it sticks forward from an armature holding a 42-foot long arrangement of Sue's bones placed in a lifelike and menacing pose. The fleshed out dinosaur can be simultaneously seen in a painting of a ferocious Sue set into an architectural niche above the skeletal display. Another skull can be found on a balcony above the primary display in an exhibit devoted to explaining how the skeletal remains were cleaned, prepared, and put together to produce the effect seen below.

At first, I was confused by the apparent doubling of what must be a unique artifact. How could Sue have two heads? As a physical scientist I like puzzles and their solution. So I set out to learn more. The placards on the exhibits said that the upstairs head was the real one and that the downstairs head was a facsimile. The sign also said, rather implausibly, that the steel framework was not strong enough to hold the real skull, necessitating putting the constructed one in its place.[1] The visitor was also informed about which of Sue's displayed "bones" were reconstructions rather than parts of the fossil.

Often, scientific exhibits employ distinctions of color or texture to enable the viewer to distinguish the actual remains from reconstructed parts. Art objects, on the other hand, tend to be reconstructed without visible distinctions so that the view might get a feeling for the intentions of the original artist. This scientific convention conveys the verisimilitude of the ancient objects and conveys the importance of the "original', true thing. Sue's reconstruction enjoys no easily visible distinctions. It seemed to me that in constructing this display the Field had aimed at creating a thing of beauty, but in the process missed out on an opportunity to show a special regard for a scientifically important object

According to Steven Conn's book, *Museums and American Intellectual Life, 1876-1926*, the entire rationale for having a museum was to store and display artifacts.[2] In the Nineteenth Century curators argued that by a proper arrangement and display of appropriate artifacts a museum could bring the public to appreciate and understand nature's creation. Why does the Field now seem to make Sue's fossil into an art object?

A little History

So I began to read about this exhibit, the Field Museum, and about natural history museums in general. I particularly wanted to know how and why the Field Museum had come to house such an peculiar mixture of entertainment, art, and science. How could it employ almost seventy Ph. D. scientists while constructing displays that appeal mostly to family groups and pre-teenagers? How can it be a nature museum, with vast and wonderful stores and displays of all kinds preserved animals, plants and

human artifacts, but have so very little up-to-date science. For example, there is almost no molecular biology or treatment of ecology? Why is there little discussion of pollution, extinctions, or AIDS?

Natural history museums did not start out as attics, filled with objects put on display for the edification and enjoyment of school-children. They come from a much worse beginning. In *Stuffed Animals and Pickled Heads,* Stephen T. Asma[3] argues that they go back to private collections of "curiosities". Peter the Great of Russia[1672-1725] had one such collection, including many rare butterflies on view to the public, and some more private specimens, for example, the pickled head of his wife's lover. Starting from Peter, displays of natural history can go only uphill. Asma describes John Hunter's [1728-1793] collection as the embodiment of his biological, medical, and surgical curiosity, including such things as a graft of a human tooth into a rooster's head, a stomach partially digested by its own juices, and an enormous human skeleton boiled-down by Hunter himself. Later on natural history displays became less bizarre and more systematic. In her book, *The Dinosaur Hunters*[4], Deborah Cadbury describes how the natural history collections of such scientists as George Cuvier[1769-1832], Gideon Mantell[1790-1852], and Richard Owen[1804 - 1892] enabled them to compare different kinds of fossils and to imagine how separated bones from different individuals might fit together. Thus their collections became crucial for their scientific work and their scientific arguments.[5] But the specimens were also put on display. The Nineteenth Century curator would arrange his collection of once-living specimens to show the nature of creation, or of a creator, or even of an autonomously functioning universe. Conn quotes Louis Agassiz[1807-1873], of Harvard's Museum of Comparative Zoology: "the great object of our museums should be to exhibit the whole animal kingdom as a Manifestation of the Supreme Intellect". In contrast, Conn sees the American Museum in New York as a glorification of what scientists could discover, and rich men could buy. ' "The trustees preferred to support research that had spectacular physical objects and large concrete fact such as dinosaur skeletons.... for its subject matter." '[7] He says that the collections of the nineteenth century, are "constituent piece[s] of the culture of acquisitiveness" and conspicuous consumption. The Chicago Museum's first major benefactor was Marshall Field [1834-1906], who

created Chicago's first modern department store.

Meanings of Objects

So a museum can invest its objects with meaning and intellectual content. The objects can be viewed as pawns to be deployed in arguments about creationism versus Darwinism. They might be arranged to show a static world or an improving (or at least changing) one. This form of argumentation combines elements of rational and scientific thinking with other elements, more subjective and less rational. In his book, *Mystery of Mysteries: Is Evolution a Social Construction?* Michael Ruse[6] argues that evolutionary thought, and by extension all the subjects displayed in natural history museums, can not be viewed as the highest form of scientific activity. Particularly in the earlier period, and to some extent even now, evolutionary scientists' claim to be objective and "scientific" is, according to Ruse, blunted by their preconceived and quite subjective views on such topics as "progress" and "man's place in the universe". This peculiar mixture of the objective and the subjective can make both the arguments and the conclusions around such topics as evolution, ecology, and natural history quite suspect. This suspicion leaves the natural history museum as, at best, a doubtful purveyor of objective truth.

Of course, it is hard to be objective about the history of life on earth. In contrast, one can spend a lifetime in my field-- the physical behavior of liquids-- and never make professional contact with the issue of mankind's place in the universe. But students of natural history must confront the answers to such questions as the age of the earth (does the traditional biblical interpretation of 6000 years make sense); the source of different species (created or evolving?); the existence of the soul (a unique prerogative of one species?); and to the source of the whole process (unguided development or direction from above?). Nobody would want to be completely objective on these issues. But the scientist is professionally committed to objectivity "on the job". A study of natural history may leave the professional scientist as uncomfortable as the proverbial Christian Scientist with appendicitis.

Right next to Sue's skull (the real one) sits a little exhibit devoted to a discussion of objective truth. Much of the discussion is exactly what a scientist like myself might find praiseworthy. In a series of display-boards, the exhibit-constructors make the distinction between a

scientific “fact”, a “theory”, and a “conjecture” based upon their relative degree of support in objective, observable reality. Facts are certain knowledge; theories are rationally constructed, and based upon facts, but subject to change; and conjectures are guesses unsupported by fact or theory. This discussion is, of course, aimed at describing the status of the theory of evolution. One illustrative example used is the “theory” that dinosaurs are related to birds. It is supported by the facts of anatomical similarity as illustrated by specifically mentioned features of Sue’s skeleton, including the existence of a bone resembling a chicken’s wishbone. The latter fact is described as a prediction of the theory later verified in an observation (of Sue). As Ruse and the exhibit both point out, predictions are important in establishing the viability of a theory. So Sue has been used to obtain an immediately relevant example of what might constitute evidence for a theory.

I was impressed by the seriousness and good sense of this small exhibit, almost up to the end. But then comes what should be the punch line. In the last display board, the museum supplies a sentence, and you are supposed to fill in your own conjectures. The sentence is “One sunny day, 67 million years ago, Sue the T. Rex was [...]. Within minutes, she was dead.”, The bracketed area contains several multiple-choices answers describing the different possible circumstances of her death. We are supposed to pick one of the fanciful or plausible conjectures to fill in the story. But were are not told the status of the rest of the supplied sentence. Does it contain facts, theories, or conjectures? The status of two of the statements is obvious. That Sue died quickly, and on a sunny day must be conjectures. But what of the 67 million years? The status of *that statement* is important; in fact, it is crucial for the would-be believer in a recent creation. The context suggests that the 67 million years is a conjecture. No facts are given in support of this number. The exhibits do quote this age (or the alternative 67-65 million years) several times. But repeated assertions are not “facts”. Someplace earlier on, the careful visitor will see that this number is listed as “theory”, but one requiring a second opinion. The exhibit does seem to permit the viewer to believe that the scientific theories surrounding Sue do not establish her age precisely. Of course that is true. So can one believe in a more recent date for Sue’s death? Say, 6000 years ago? No, the latter is quite inconsistent with available evidence. Making a definite statement about Sue’s age might annoy some visitors, interested in nothing more than

having a pleasant afternoon. But, in trying to be broadly acceptable, the exhibit has ended up muddying a point which is clearly known, simple, and important.

Life Through Time

The little essay about evidence is just a curtain-raiser. From here one can pass into a next-door Field Museum exhibit called “Life through Time”. This is a vastly good-natured display, presenting the history of life on earth with fossils, and videos, games, and a whole variety of amusing devices. Maybe the best part is provided by some of Chicago’s television news people who tell us about the awful and exciting changes occurring to the earth and to its living creatures through billions of years. Their presentation, seen on a TV screen, employs the usual format of the TV news. The news people are clearly having a very good time. As we listen to their various broadcasts, we walk out the eons and observe fossils and toys that tell also tell us about the events of earth-history. Thus we can be entertained as we learn about evolution and the history of the earth.

Asma identifies the ideological centerpiece of this exhibit as the wheels of chance which one can spin to select characteristics that will enable the wheel-spinner (you and me) to survive in a tough universe. Survival is matter of luck, it says here. Another exhibit shows various species of horses racing through the millennia until extinction drags them down, leaving only the modern horse. Asma notices a comment left at the museum by one thoughtful visitor, Alan. Alan objects quite strongly to these gambling exhibits, saying that “seeing the principle cause and government of the universe as a roulette wheel is filled with ... personally subjective views as well as being morally bankrupt”. Alan and some of the other visitors see these exhibits as having led us into a totally immoral or amoral universe. No creator, no greater good, the only goal is to survive. But the exhibits themselves only talk about the evolution of different species. Is Alan’s extrapolation an error? His thinking does not seem to fit into the careful distinctions previously made between fact, theory, and speculation. Maybe Alan is just not being scientific.

To understand the source of Alan’s comment we might look at Ruse’s book. Ruse does tell us that evolutionary science has often been not very scientific. He starts with Erasmus Darwin, whose work may be described as more poetry than truth, and proceeds to look at a temporal series of

evolutionary scientists who become more and more invested in evidence, prediction, and the other tools of objective science. But Ruse argues that in evolutionary thinking, at least, some of the power of the subject resides in its use of metaphors, like the roulette wheel and the horse race. These metaphors carry our thinking beyond the bounds of the scientific evidence and carry our thinking into areas, richly important, but not open to purely scientific thinking. “Is it *all* a horse race?” *Everything?* For better or for worse “Life through Time” has taken us beyond the objective facts about the history of life, beyond theories of evolution, into extra-scientific thoughts about the nature of nature. I find the roulette wheel close to my own view of the universe; Alan finds it repugnant. Our shared mode of thinking is not science. It is not fact, or theory, or speculation. It is the use of metaphor as a tool for extrapolation and generalization.

The Museum in Decline

In different ways, Ruse and Asma and Conn all offer evidence to suggest that the natural history museum might have lost prestige because its subject matter necessarily led to topics which are controversial and “unscientific”. Conn tells the story of this decay in some detail. Its symbolic event occurs when Franz Boas leaves the American Museum of Natural History in 1905, and goes to found the Department of Anthropology at Columbia University. In doing this, he speaks out against the whole ideology of the nineteenth century museum. That museum sees the object as a primary expression of intellectual values. But Boas says that objects are but “incidental expressions” of the “complex mental processes” that are the object of anthropology. The rest of science walks the same road as anthropology, going from object to concept and from the museum display to the laboratory experiment. As this occurs, according to Conn and Ruse, science is becoming more professionalized, less of an activity for the generalist. Universities can be the homes of this more specialized, departmentalized, and professional knowledge. The world of the gentleman collector and the public display is going out of fashion. (Conn in fact, regrets this change. He argues that the university provides knowledge in a much less democratic format than can the museum. Despite admission charges, almost anyone can go to the museum on Sunday. A major investment is required of the university student.)

In 1900, then, the natural history museum is falling away from being in the forefront of intellectual activity. It is becoming a place for nostalgia and for teaching children. And, as a part of the very same change, collections of natural objects are becoming less interesting, because they are less "scientific". But the collection and the museum still exist. The curators must learn how to function in a new way. In the 1920s, the exhibits begin to change. They will no longer draw meaning from objects via systematic arrangement within museum cases. No more butterflies neatly arranged on pins. Instead, "dioramas" are constructed, which put the specimens into lifelike settings and poses. Inhabitants of the same ecology are grouped together in pleasing and often dramatic arrangements. But, in doing this, the museums were mostly not trying to edify or instruct. According to Conn, they were becoming more "concerned with their role as places of entertainment and amusement".

Sue's Places in the Museum

Sue is not a diorama. Her bones and the reconstructions are arranged to stand alone on their armature. The armature in turn stands on an artfully cracked piece of "stone". The painting above might be a still from a somewhat overdone dinosaur movie. Down here, in the great hall, it's a mixture of art and show business. Upstairs, with Sue's real skull, we see the remains of the real science. Near the skull there is a glassed-in place where people in white clothing are cleaning and preparing fossils. The is the McDonald's Fossil Preparation Laboratory.

Along with several other sponsors, McDonald's Corporation and Walt Disney World have supported the Sue project. These sponsors were sorely needed because the acquisition of Sue, in the end, cost eight million dollars. That is almost three times the Field Museum's annual revenue from visitors and memberships. Given the lack of city and state support and the poor potential for big individual donors, the museum needs corporate support to survive. So McDonald's and Walt Disney World provide some of the money for Sue, and in turn they get apparently perfect replicas of Sue to exhibit. They also get the right to use Sue in their publicity and in various different ways sell little Sue's. Of course the Field Museum cannot then emphasize that they have the real thing, the "only true Sue". The corporate collaborators must have their alternative

Sues to project and sell. As a corollary, Sue the artifact must be downgraded and the concept of Sue sold in its place. The concept has the advantage that it is open to infinite replication and exploitation.

McDonald's and Disney World have certainly entered the museum. At the exit to the "Life over Time" exhibit, with all its charming and disturbing features, sits a little store filled with Sue knockoffs that one can buy and take home. The items for sale are all pretty and tasteful and bland, like the products of the corporate sponsors.

Down in the basement there is a real McDonald's. It serves exactly the usual McDonald's product. I generally eat at the hot-dog stand just outside the museum, to the South. It's less corporate. It serves authentic Chicago red-hots.

Addendum

I could end here. But that would not be fair to either the Field Museum or to the books. Conn, Asma, Ruse and Cadbury cover much more territory than I have outlined here. Conn looks at a very wide range of museums, describing how they define and are defined by their artifacts. He tells about how all the different kinds of museum in the U.S., excepting only the collections of art and of technology, have become less central to our thinking and have gone downhill. Asma, on the other hand, reaches beyond the U.S., looking at natural history collections in France, Britain, and Russia. Like Conn he is interested in the connections among artifacts, ideas, and displays. He is more into the nuts and bolts (or rather the gore and mess) of constructing natural history displays. The Cadbury book is about scientific rivalries in Britain during the period in which dinosaurs were discovered and named. She describes collisions between individuals and between religion and science. Throughout she pays particular attention to the class structure that demanded that the successful scientist either have substantial private means or substantial benefactors. Ruse, on the other hand, is interested in the nature of science. When he looks at the scientists who constructed our ideas about evolution and natural history, he asks how closely they hewed to the "scientific" ideal of objective thought and how much they were driven by subjective considerations. His story is about ideas and ideologies and does not directly treat museums at

all. All four books are excellent in their way, with Conn and Ruse being more academic, Asma being more personal and accessible, and Cadbury being the best story-teller. All of these books can entertain and inform a general reader with an interest in natural history, culture, and ideas.

And then there is the Field Museum itself. Sometimes it seems to be empty of ideas, just wanting to collect, display, entertain, ... and survive. It has certainly moved away from science and toward art. Its big exhibit at this moment is about the work of Julie Taymor, theatrical director and designer. The exhibit is particularly concerned with her costumes, including those for the stage production of Disney's *Lion King*. On the scientific side, the Field contains worthwhile objects thoughtfully displayed for a broad audience. Its scientists and display specialists work within a limited budget and produce good science and careful exhibits. More and more the museum's attention is directed to special exhibits to show treasures from afar. Last year, the dead sea scrolls were exhibited to a large and appreciative audience. Before that I saw wonderful photographs from Shackleton's harrowing ordeal in the Antarctic. Exotica, some art, and basic science seem to be the things we, the public, now want from a museum. So that is mostly what the Field delivers.

But, the museum has its moments of being really special. When my grandchildren and I excitedly push the buttons to hear the songs that the stuffed birds once sang, or when I stand quietly among the totem poles deep in the museum, or when I reflect on Sue's many heads, the museum sings to me. Since it has many different kinds of visitors, probably the Field Museum has many songs.

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[1] John Flynn, MacArthur Curator at the Field Museum, kindly took time out in the midst of a trip abroad to describe further the reasons for the substitution. The pose of the skeletal display requires that the head be placed some fifteen feet above the floor of the museum. The museum people did not want to put the fossil skull at risk of a catastrophic fall by placing it that high. Besides, in that position, the visitor could not come in “eyeball to ‘eyeball’ ” contact with the skull. In contrast, the visitor can get really close to the upstairs skull in its plexiglass case. Dr. Flynn also pointed out that modern museum placards must be so short brief that they necessarily provide a most incomplete medium for explanation.

[2] Steven Conn, “Museums and American Intellectual Life, 1876-1926”, University of Chicago Press, Chicago, 1998.

[3] Stephen T. Asma “Stuffed Animals and Pickled Heads”, Oxford University Press, Oxford 2001.

[4] Deborah Cadbury, “The Dinosaur Hunters” Fourth Estate, London, 2000.

[5] Apparently the argumentation got to be quite viscous. Cadbury describes how Richard Owen treated his great scientific rival, Gideon Mantell. After many years of competition in understanding fossils and in building their respective natural history collections, Owen’s reputation far outstripped that of his rival. After Mantell died, from the after-effects of a spinal injury, Owen got control of Mantell’s fossil collection and scattered that to the four winds. Owen’s own collection eventually became Britain’s great Natural History Museum. Eventually, Owen was able to add his rival’s preserved spine to his own natural history collection. In those days, scientific feuds were for keeps!

[6] Michael Ruse, “Mystery of Mysteries: Is Evolution a Social Construction”, Harvard University Press, Cambridge Mass., 1999.

[7] Conn page 43.