



FEATHERS, FAKES, AND FOSSIL DEALERS: HOW THE COMMERCIAL SALE OF FOSSILS ERODES SCIENCE AND EDUCATION

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A false and a true tail

The November 1999 issue of **National Geographic** carried an article by Art Editor Chris Sloan entitled "Feathers on **T. rex**?" It was a follow-up of a successful feature that had appeared in the July 1998 issue about the new feathered dinosaurs from China, and what they tell us about the origin of birds, of feathers, and of flight. The premise of the **T. rex** article was simple enough. True feathers or fine, filamentous integumentary structures (sometimes both) have been found in a variety of coelurosaurian theropod dinosaurs, from the basal compsognathids to the dromaeosaurs (generally regarded as the closest sister-taxon to birds). So it seems conservative to infer that tyrannosaurs, which are now recognized as overgrown coelurosaurs, may have had a similar integumentary covering, at least at some point in their lives. This reasoning is based on cladistic analysis, which infers that a specific feature present in most members of a clade probably evolved in their common ancestor rather than arising independently many times. If this is the case, the feature might at least potentially be present in fossil forms in which preservation is not complete.

The article explained this chain of inference, which is routine. (For example, multituberculates are extinct mammals, but would you like to make the argument that they **didn't** have fur?) It also introduced some interesting new (but then unpublished) fossils that purported to bear on questions involving the origins of some bird features. One was called "Archaeoraptor," and it appeared to be unusual because it had an apparently avian body but a long, stiff, dromaeosaur-like tail. As it turned out months later, the characterization was all too

true. Farmers in the Liaoning Province of China, from where this fossil and many others (including the feathered dinosaurs) come, often put together naturally unassociated body parts, and will carve other features, in order to make the specimens more attractive and potentially more valuable.

"Archaeoraptor" apparently has turned out to be such a chimera. This is based on computer-tomographic (CT) analysis that had evidently been done at the time but was not accepted by all those working on the specimen (results of the analysis are still unpublished). This specimen had been purchased for the small Dinosaur Museum in Blandings, Utah, by a backer of that museum. It came from that legendary fossil site, the Tucson Gem and Mineral Show, where unadulterated specimens from all over the world are sold alongside many that are enhanced, and the action in hotel rooms is said to be as hot as that on the exhibit floor. **Caveat emptor**, of course; but if you represented a small museum with funds available to obtain a specimen that might just turn out to be the Next Big Thing, would you have passed on it?

In the course of time, as doubts about "Archaeoraptor's" legitimacy surfaced, the popular press had a field day with the specimen. The few, but vocal, distinguished colleagues who maintain steadfastly that birds could not have evolved from dinosaurs—but who have yet to provide an alternative hypothesis or an alternative phylogenetic method, even after 25 years—claimed confidently that this specimen shows how pathetic stories of feathered dinosaurs are. According to these pundits, "Archaeoraptor" discredits all the evidence about birds evolving from dinosaurs and about feathers on dinosaurs.

Well, the press and the public should know the real story about "Archaeoraptor." Nothing about it ever had any bearing on ideas regarding the origin of birds or of feathered dinosaurs. The reasons are simple. First, it doesn't have any feathers. At least, none have been reported so far. Second, it was never formally published scientifically. Finally, and most importantly, the origin of birds from dinosaurs rests on a mountain of evidence completely independent of "Archaeoraptor." (Some accounts of the issue can be found in *Nature* 403:689–690; 404:696; 406:930–932 [all 2000]; a letter by Bill Allen, editor of *National Geographic*, in *Nature* 404:541 [2000]; and a report by investigative reporter Lewis M. Simons in *National Geographic*, October 2000:128-132.)

So what went wrong? *National Geographic* was updating its story that birds evolved from dinosaurs, which is generally accepted. As customary, it asked several scientists – including those for and against the dinosaurian origin of birds – to advise them on how to deal with the unpublished specimens. This is a dicey game, because advisors do not always get the chance to study such specimens, and have to rely on whatever information is available. In this case, *National Geographic* received some dissenting views. Some thought the specimen's authenticity questionable. Some were assured that these questions had been addressed and settled (as it now appears, in error). Others withheld judgement pending completion of analysis and peer review. Rather than kill the story at the eleventh hour, *National Geographic* decided to accept the judgement that it was authentic, a new "missing link" in the bird–theropod story. This was not an unreasonable publishing decision. *National Geographic* expected the new specimens to be described scientifically before it printed its story. As it turned out, the "Archaeoraptor" manuscript was ultimately rejected by two major journals. In other words, scientific peer review was taking its normal course. *National Geographic's* premature publicity turned out to be an unfortunate scheduling decision, but it was a journalistic problem, not a scientific problem. This is where the story took a nasty turn, however.

What is most shameful in this entire business is not the editorial gaffe at *National Geographic*, and not even the creativity of the Chinese farmers, but the behavior of some of the dissenters to the theropod hypothesis. In press reports and in widely circulated e-mails, they appeared to accuse *National Geographic* of being party to a hoax. It was not always clear whether the accusations

were limited to the Chinese farmers, or extended to the magazine and even the scientists who accept that birds evolved from theropods. These charges implicated the scientists even as the specimen was being submitted it to CT-scanning to determine its validity.

These critics should have considered their words more carefully. Accusations of fraud, even if implied by mere association, are difficult to document and to retract. Such plays to the grandstand do nothing for science or public information. It is well known that some Chinese farmers commonly alter specimens, though these alterations are usually easy to detect. For example, a pterosaur specimen that I studied with Ji Qiang and Ji Shu'an, my colleagues at the National Geological Museum of China, arrived at the museum with a skull of the fossil bird *Confuciusornis* stuck onto it. This specimen, the holotype of a pterosaur we named *Dendrorhynchoides*, is unquestionably a rhamphorhynchid pterosaur very close to *Rhamphorhynchus* itself – as its short metacarpals, long fifth toes, wing proportions, and long bony tail showed. We published our analysis of this specimen in *Nature* (Ji et al. 1999). But, in February 2000, an article in *USA Today* cited Zhou Zhonghe, of the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing, as claiming that the specimen was forged, and suggesting that our paper should be retracted. A farmer had allegedly said that the tail had been added from another specimen. But no evidence of this claim has been produced. There is no indication that Zhou had seen the specimen or considered the many synapomorphies and morphometric features that we described. The tail was not even included in our morphometric analysis. Although the tail is not complete, there is no doubt from its preserved parts that it was very long, and not that of a short-tailed pterodactyloid. Even if part of the tail had been altered, it would not affect the morphometric analysis or the taxonomic placement of the specimen.

These are some of the dangers of claims of academic fraud. But they are scarcely more than side effects of a larger issue. Why are specimens altered by Chinese villagers in the first place, and why does this result in so much rancor? The answer is that there's a huge international market in the sale of vertebrate fossils. "Archaeoraptor" is such a specimen. It was apparently illegally smuggled from China. In the eyes of the Chinese government, all fossils of scientific value are the property of China; any so-called export papers,

even if signed by local authorities, are regarded as invalid (fossil dealers tell me that they are easy to arrange).

Our Chinese colleagues are extremely upset about the loss of these fossils from China through commercial sale. In April 2000, Storrs Olson, a curator of fossil birds at the Smithsonian's Natural History Museum, refused to allow the "Archaeoraptor" specimen in the door for a press conference until an agreement had been reached to return the specimen to China. Happily, it has now been returned.

The situation in China is unusual in many ways. The local villagers routinely work with Chinese scientists to excavate specimens and to ensure that they will end up in public museums in China. Information on stratigraphy, geographic setting, associated faunal and floral elements, etc., can be recorded as well as in any investigation. The average Chinese villager, however, earns only a meager salary by Western standards. The lure of money from fossil dealers is difficult to resist, just as it is for the Brazilian villagers who excavate and sell in the market stands of Rio and Bahia the valuable fossil-bearing nodules from their Cretaceous Santana deposits. In addition to working with scientists, many Chinese villagers work for private enterprise on the side. And in their shoes, what would you do?

The Society of Vertebrate Paleontology has a clear statement in its by-laws against the commercial collection and sale of valuable vertebrate fossils. The United States does not have laws prohibiting the sale and export of its own fossils, but it should be cooperating more strongly with other countries, such as China, that do. None of this nonsense about "**Archaeoraptor**" would have happened if the specimen hadn't been doctored to make it more attractive to commercial dealers and their customers. This traffic could be cut sharply if countries would observe international laws and cooperation agreements. More importantly, public confusion and deception could be avoided if some of our colleagues would consider cultural and ethical issues before rushing to charge other scientists with fraud.

Two worlds

There are other strange arenas where the problems of commercially collected specimens are played out. The worlds of academic paleontology and commercial fossil dealers met surrealistically at one of the most unusual conferences in recent memory. The Graves Museum of Archaeology and

Natural History, a 30-year-old institution in Dania Beach, Florida, held a conference in April 2000 to publicize a new specimen of a coelurosaurian dinosaur. The name of this specimen was announced well in advance to the popular press as "Bambiraptor feinbergi." The conference was not only about the new specimen; southern Florida welcomed several dozen paleontologists and zoologists interested in the general questions of the origin of birds, their immediate relatives, their locomotion, their flight, and other issues.

It was a strange conference in some ways. Certainly it was better organized and funded than most academic conferences, thanks to the tireless efforts of the convenors. But unlike normal paleontological conferences, there was a strong presence of commercial fossil dealers. In an adjacent exhibit room, they displayed some of their toothsome discoveries, though they exhibited restraint by omitting the price tags. Nonetheless, one commercial entrepreneur was allowed to present in the scientific sessions what amounted to a 20-minute infomercial on two new oviraptorid specimens, probably representing new taxa, but having apparently little to do with the theme of the conference. Again, the price was not displayed, but the figure bandied about offstage left little doubt that most museums could not afford to buy them. It was difficult for scientists to understand the presence of these commercial concerns, if not for the purpose of potential sale, a circumstance that would not exist at most academic conferences.

There was little doubt that the centerpiece of the conference was "Bambiraptor." A barrage of publicity preceded the meeting, and a press conference was held some days in advance to coincide with the publication date of an article that legitimized the find taxonomically (Burnham et al. 2000). Some features of this centerpiece were decidedly unusual, however. For one thing, many of the bones of the holotype were restored, missing pieces were reconstructed, and the skeleton was mounted and placed in a bulletproof display case. Because the specimen was mounted in a restored position, and the restorative material is the same color as the fossil bone, it was difficult to tell what was original and what was restored, and what the specimen had to tell us apart from its description, which was mute on these issues. The specimen was supposed to represent a juvenile, but of what animal? When the specimen was collected, some parts of the skull and other bones of the skeleton were severely damaged. Consequently, it is difficult for other scientists to investigate whether this is a

juvenile specimen of a new taxon or of one that is already known. The precise systematic position of the specimen was not discussed in its description, nor was its relevance to bird origins, the origin of flight, or other larger questions. Conference attendees were puzzled: apparently the specimen's scientific importance was deemed self-evident or to be taken on faith. The oral presentations by two of the describers of the specimen failed to answer any of these larger questions.

These concerns, however, are secondary. They become important only after first things are assessed. What material constitutes a specimen, where does it come from exactly, and what is its precise systematic position? Without this information, how can we assess the importance of "Archaeoraptor" or "Bambiraptor", or any such specimens, to larger issues? This is the problem with most commercially collected specimens.

"Bambiraptor" was found by commercial collectors on private land; they apparently didn't record an accurate map of the specimen before they took out many of the bones. The publication (Burnham et al. 2000) featured a map of the skeleton *in situ* as reconstructed by one of the collectors, and it noted that a lot of information and parts of the specimen were lost. No detailed locality data, no sedimentological data, and no taphonomic information were given, and there was no indication on how to recover what other information might have been present.

Such lapses are common in publications on commercially collected specimens, and so are the extravagant claims about the importance of the specimens. Today's commercial collectors, although they frequently enlist assistance from paleontologists, seldom if ever publish important papers on fossil vertebrates. This is not a criticism, but an observation of an understandable circumstance. In general, commercial collectors don't have scientific information as their first priority. They are of necessity businessmen. The faster they can get the specimen out of the ground, the sooner they can sell it; the longer it takes, the more costly it is. They don't often provide information about the locality, for obvious business reasons. They seldom record details of the environment or the taphonomy of the specimen, because that information doesn't increase its value. Specimens collected in this way are all but useless to science in these respects. Major museums—at least those interested in anything more than headhunting—rarely accept specimens without precise locality information (understandably, the precise locality

data were not given in the "Bambiraptor" publication, but no museum repository for the data was given either).

The circumstances under which "Bambiraptor" and other specimens are collected raise serious ethical questions for many paleontologists. A number of prominent paleontologists refused to attend the Florida conference, even after repeated entreaty, because they had questions about the ethics of celebrating commercially collected specimens of uncertain provenience and ownership. Most of the paleontologists in the audience were members of the Society of Vertebrate Paleontology. More than a few were well aware of the ethical ambiguities, and they came with a mixture of curiosity, concern, apprehension, and open-mindedness. Many seem to have left the meeting satisfied on some counts and confused on others.

Some published reports stated that the specimen of "Bambiraptor" belongs to the Graves Museum. But it does not – at least not yet; its formal description says that it is only "on exhibit" at that museum, even though (perhaps hopefully) it was given a catalogue number. As any curator knows, this is highly irregular. A local businessman in Ft. Lauderdale, a supporter of the Graves Museum and a devotee of paleontology, learned of the specimen and wanted to raise money so that it would find a permanent home that was not in someone's living room. He persuaded another local businessman to purchase the specimen (the price was undisclosed but rumored at \$600,000), with the stipulation that it would eventually be donated to a public museum. (The Graves Museum would presumably be a strong candidate, if its personnel and endowment develop accordingly.)

In this case, hard-working, civic-minded local people with the best intentions are trying to build a center for science and culture in one of the fastest-growing regions of the USA. Local museums should flourish, but professional paleontologists and commercial collectors remain strange bedfellows. **Neither the public nor the national heritage will be served by the publicizing of poorly collected and documented specimens.** When a specimen in a private collection is named and described, there are further difficulties: it could be lost to science, as the Maxberg specimen of **Archaeopteryx** was. **The Journal of Vertebrate Paleontology** and most other paleontological journals will not publish papers on privately owned specimens. These are some of the issues raised in dealing with commercially collected and privately

owned specimens. The best resolution of the "Bambiraptor" problem will be to have the specimen curated in a public museum, for which science will have the specimen's donors to thank.

This won't settle the general problems of commercial collecting and sale of valuable vertebrate fossils, however. The specimen of "Bambiraptor" is said to come from private land, a circumstance that in the USA confers rights of disposition to the landowners. The question is one of differences in the ethics of science and business. It's not to say that one is better or worse, but there are differences. Let's face it: many major museums were built in the 1800s and early 1900s by governments or philanthropists who bought collections from all over the world or who sent people out to make such collections. If all such objects were repatriated, these buildings would be emptier indeed.

But this is a different age. Commercial sales and scientific collections are increasingly incompatible. We are no longer awed by scientific spectacle, no questions asked. We need the scientific information that is so often lost when specimens are commercially collected. It may not be illegal in the USA to dig up and sell dinosaurs and other fossils from private land, but it causes huge problems for the preservation of scientific specimens and information.

Consider the case of the **Tyrannosaurus** named "Sue," bought at auction by Disney and McDonald's for Chicago's Field Museum at a price of more than eight million dollars, after a long court fight and an extended jail term for the commercial collector who thought he had purchased the specimen from the owner of the land. Was it necessary to throw so much money at a skeleton? Of course not. This bidding frenzy was fueled by Sotheby's and the commercial collecting industry. That's their job, and they were very successful at it, ensuring continued interest and growth in the market (**Scientific American**, December 1997:18). Are paleontologists glad that "Sue" is in a public museum and not in someone's private collection? Sure, but the export of this specimen was never in doubt. Commercial collectors knew how much bad press would ensue (no pun intended) if the gavel awarded the tyrannosaur to an overseas concern, and they reputedly persuaded foreign interests to bypass the bidding. Is it worth its sale price? You may have noticed that another **Tyrannosaurus** specimen has since been offered twice on Internet auction at half Sue's bounty, without a legitimate nibble.

Consider the case of my own museum's loss of a **Tyrannosaurus** dentary some years ago. It was stolen from the collections and sold to a commercial fossil dealer. The theft was solved when casts of the specimen were offered for sale on the Internet from an outfit in Europe. The FBI and Interpol got involved, and the specimen was returned to us last year. But many museums are not so lucky. Just ask the Paleontological Institute in Moscow.

Not worlds apart, though

It is absolutely not true that museum curators and professional collectors are always at odds. There are many examples of cooperation between scientists and fossil sellers, who will often donate or sell at a small price (read: finder's fee) specimens that are thought worth preserving for the public good. And let's be careful to draw a distinction between amateur and professional collectors. Amateurs and scientists have always worked well together, to mutual benefit. Some amateurs occasionally sell specimens, either to museums or to private individuals. This is normally not a problem, as long as important specimens are not lost to science and public education. Our colleagues in some European countries and elsewhere may think this is typically a United States problem, and certainly its magnitude is great here; but the problem is also severe in China, Argentina, Brazil, and other countries. And if the prices for fossil specimens continue to grow, problems will arise in countries that have never before faced them. Dan Chure has recently drawn attention on the vertebrate paleontology listserver to two new and important articles on the subject: one in **Geotimes** on the threats to US federal lands, and a second in **Forbes Magazine** on how to invest in valuable fossils. Both are worth perusal.

In some countries and states there are strong laws to prevent the loss of important fossil specimens. Laws vary widely, however. Consider Germany. In Bavaria, a landowner does what he likes with fossils found on his land, and this is why it was such a triumph for the Bavarian State Museum to raise enough money to purchase the most recently discovered **Archaeopteryx**. In Baden-Württemberg, it depends on the value of the specimen; professional evaluation of the find—which is required—may remand it to the state with a finder's fee, or the landowner may be allowed to keep and even sell the fossil if it is not deemed of crucial scientific value. This is an eminently sensible model that the USA would do well to follow.

Most countries do not have quite the volume of the vertebrate paleontological riches of North America, so the problems sometimes seem less intense in other countries. There is a significant overall difference in market value between vertebrate and other kinds of fossils. Granted, beautiful ammonites fetch high prices, but how many belemnites command higher commercial prices than tyrannosaur or sabertooth fangs of the same size? Some years ago the Canadian province of Alberta passed a law against the commercial collection and sale of fossils. Sure enough, those collectors soon migrated south to Montana, Utah, Wyoming, and South Dakota. Offering landowners premium prices for exclusive rights to collect on their lands, these businessmen forced some paleontologists to abandon field projects that they had maintained in some cases for decades. Some research sponsored by the National Science Foundation (NSF) was curtailed, and graduate student theses were halted. Some landowners now have even descended on museums that possess specimens collected freely from their lands years ago, demanding the return of the bones so that they can be sold. It is difficult to imagine that anyone, including commercial collectors, would have wanted this.

Could it happen in Europe? "Claw blimey!" read one British headline when a giant recurved ungual of a theropod dinosaur was found in a clay pit in Surrey nearly two decades ago. As its excavation proceeded, the unusual and scientifically important skeleton that came to be known as **Baryonyx** occupied an increasing share of public attention. Its preparation was long and difficult, but well worth the wait for what it told us about aberrant theropod life habits and geographic distribution. **Baryonyx** was the first even partly complete British dinosaur recovered in over a century. It was the subject of endless newspaper and magazine articles as well as children's books, and it stoked public interest in dinosaurs and natural history museums. Now consider what would have happened if the owners of the clay pit had decided to put the specimen up for sale to the highest bidder. In the past two decades, the public has been fooled into thinking that the discovery of an important fossil is less a scientific event than the winning lottery ticket. What is the incentive to donate any scientific specimens to the public good?

Selling our heritage ...

In the American west, paleontologists have long had excellent relations with ranchers and landowners who allow them access to their lands

for exploration, mapping, and collecting. I was thinking about this as I rode out to the field site last year, listening to crew members reminiscing about the people they were headed to see, the times they had helped each other on the ranch and in the quarry, their children, the parties in the homes and around the campfires, the many intangibles that they all bring to each other's lives. But the skyrocketing value of fossils has changed some of these relationships. American farmers and ranchers live on a bubble, subject to the vagaries of weather, crop yields, and the volatile international market, and they don't get a lot of help from their own government. Museums can offer landowners documentation of assistance and depreciation for tax purposes. This used to be a good incentive and partial compensation for their cooperation. These days, such considerations pale beside the prices paid for fossils, and selling collection rights can be an important hedge against bad times around the corner. To use a familiar analogy, it's easy for citizens of rich nations to deplore the destruction of tropical rainforests, but for those who chop down trees to raise cattle and bananas, it's a question of survival, and conservational considerations are a luxury. We can sympathize with the ranchers, as we can with the rainforest dwellers, but not with those who exploit poverty. **Why should they have the right to dispose of a national heritage for profit?**

... or protecting it?

The SVP and SAFE (Save America's Fossils for Everyone) are working to keep public lands in the USA safe from commercial collectors and to stop the export of our vertebrate fossil heritage to the highest bidder. I'm hearing colleagues say that they're getting tired of being asked to review manuscripts on specimens that have no locality data. These specimens were collected commercially, and their sellers are looking for legitimacy. Many paleontologists are saying that they're not going to review those manuscripts anymore; they're going to recommend their rejection, as they already reject manuscripts on specimens that aren't in public repositories. There's a growing movement to recommend that all scientific journals reject out-of-hand manuscripts based on commercially collected specimens that are in private hands.

Commercial collectors have a lot of money and a strong lobby in the U.S. The American Lands Access Association, for example, lobbies to open federal wildernesses to many uses from recreational vehicles to commercial fossil collecting.

Their office is in the same building in Rapid City, South Dakota, as the Black Hills Institute for Geological Research, a commercial fossil concern. These people talk about the sanctity of free enterprise. They claim that these specimens would not be collected by academic institutions and would simply erode to nothing if they did not rescue them. They claim that scientists just want the fossils for themselves, not for the public. They claim that they're the ones who are putting science in the hands of the people. These and other claims are repeated by Fiffer (2000), who supports them. And without evidence to the contrary, these arguments seem persuasive to many members of the public.

However, there is extensive evidence to the contrary. Commercial collectors seldom publish scientific papers. Their prices restrict access to valuable fossils to the few who can afford them. Scientists don't profit financially from fossils; commercial dealers do. And at current collecting rates, how many years will it be before the available surface area of the American badlands is denuded of the vast majority of good fossil vertebrate specimens? Well, ride through the West sometime and bring some maps of former mining areas. They were once commercially valuable lands, too.

And what about the contribution of commercially sold specimens to public education? Specimens that escape public museums cannot contribute to public education. There is also no peer review of the statements that commercial enterprises make about the specimens they sell. Commercial collectors frequently make claims about the great size and completeness of their specimens, about which is male and which is female, about how revered names such as **Tyrannosaurus rex** will be thrown out because a new discovery suggests that an older name takes priority. Such claims, of course, do not harm the market value of the specimens. Now think back over the years about such claims, and remember how many of these were ever published and accepted. Now think about what this misinformation contributes to public education.

The public is on the side of science. A poll commissioned by the Dinosaur Society in 1995 (**SVP News Bulletin** 166:35-51, February 1996; **The Dinosaur Report**, Fall 1995) found that the American public overwhelmingly supports the conservation of fossil specimens for posterity, and people do not think it is right to sell the natural heritage to the highest bidder. Paleontologists could do a great deal for science by making a point of this at every public venue. Commercial collectors can

contribute a great deal to science, but only by working with scientists and the public to ensure that we are not left scratching our heads a couple of decades hence, wondering where all the vertebrate fossils have gone. Every scientific society with a stake in paleontological resources should see the advantage of clarifying these points to elected officials in every country and municipality. The laws of countries such as the United States need to change to prohibit the export of fossils. Most countries commonly called "Third World," such as Tanzania, Ethiopia, and many others, are more enlightened in these respects than the USA and many European countries. Why should there not be one global policy, enforced by all nations? Why are extinct dinosaur and mammal remains less culturally valued than archaeological artifacts? Who should speak out for this heritage, if not scientists?

Commercial collectors could work from the outset with scientists in collecting fossils from private lands and preserving important data that are so often lost. Museums could preserve specimens for the public trust, and the commercial concerns could retain the rights to sell casts that would increase their profits tremendously, and make a great many local institutions—from provincial museums to shopping malls—able to get a bit of this heritage. Casts like this could be accompanied by accurate scientific information, instead of overblown publicity. Landowners could retain a finder's fee; in some countries, this is funded by the state lotteries. We could all work together in this way, and increase public education as well as scientific knowledge. That would be a much more worthy (and perhaps also profitable) enterprise for commercial collectors than simply selling an irreplaceable scientific heritage to the highest bidder.

So the final point of this essay is hopeful. It would be good to see "Bambiraptor" and other valuable specimens get permanent homes in public museums. It would be good to end the harmful effects of commercial collection, sale, and export of important vertebrate fossils. It would be good to see people who now collect with exclusively commercial interests instead work with scientific institutions to make sure that our paleontological heritage is preserved.

Because, in the end, nobody owns it; everybody owns it.

To achieve these goals, professional paleontologists have to work to ensure that fossil specimens are appropriately valued and conserved. They also have to be realistic about the business

world, and to be willing to compensate landowners and excavators in a reasonable way, provided that their excavations are guided by science. In turn, commercial collectors have to see more than dollar signs in nature. These resources are finite, and they are irreplaceable. Last, but not least, these facts must be conveyed to the public at every opportunity.

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