

## FOSSIL LEGENDS OF THE FIRST AMERICANS

Reviewed by Norman MacLeod

### PALAEONTOLOGISTS AMONG THE FIRST PEOPLES?

Adrienne Mayor

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Tracing the origins of a person's family, ethnic group, business, religion, country, etc. are popular pastimes these days, helped along, no doubt, by the burgeoning pace at which archival information is becoming available on the Internet. There's an irony in this phenomenon. Just as globalization is taking firm hold and borders seem to be vanishing before our eyes, an ever-increasing proportion of the public is becoming interested in who they are and where they came from.

Of course, palaeontologists are no strangers to an obsession with the past. It's our stock and trade. An interest in questions of origin is as natural to us as questions of composition to a chemist or shape to a geometer. The popular obsession with origins could be regarded as the rest of the world catching up with historical sciences like palaeontology. While there is a difference insofar as the oft-stated scientific rationale for studying the past is to better understand the natural processes at work today (e.g., evolution, biogeography, tectonics, physical oceanography), if we're honest I believe we also do what we do simply because, for us, the past holds a fascination all its own. For example, many dinosaur palaeontologists I know are palaeontologists simply because that is, for the most part, what you have to be to make a living studying dinosaurs. Dinosaurs actually have limited biostratigraphical value and few would argue their study has contributed any truly unique and important insights to the functional morphology, ecology,

distribution, cell biology, ontogeny, pharmacology, etc. of any modern organismal group. Nevertheless, a demand exists for information about dinosaurs in the scientific marketplace. The same holds for many other fossil groups. To be sure, we are interested in whatever use the 'real world' can make of our fossils.

We're ever alert for links between the sorts of data we can provide and the information needed by others to solve present-day problems. Arguably those of us who hold professional positions have been selected for those positions as a result of our ability to relate at least some aspects of our science to issues others believe important. But for most of us I think there's also a little voice inside telling us we'd still want to do what we do even if it had no bearing on any contemporary concern.

In this sense I've long regarded fossils as being like art. True art isn't 'for' any practical thing in particular. But that makes it no less important. Rather, art causes a dialogue to spontaneously erupt in us through which we come to know aspects of ourselves, and others, which are difficult to access in any other way. Like art, there's some-



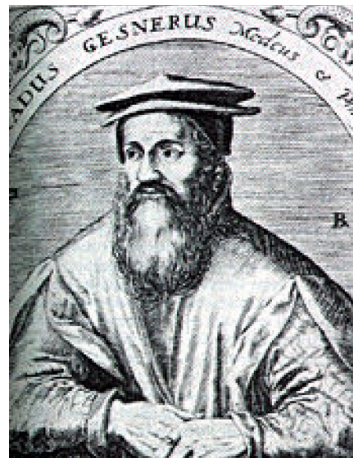
thing about a fossil that speaks to our hearts as well as our heads. Their designs and symmetries are so intriguing, simultaneously familiar and unusual. We're drawn to them irrespective of how much we know about them scientifically. Well-preserved fossils seem so finely wrought. The fact they were created by natural processes, and not by the mind or hands of humans, only adds to their allure. I've always been curious as to why the aesthetic dimension of palaeontology has usually gone unmentioned upon by palaeontologists themselves, as if we're ashamed or embarrassed to have noticed that these objects are also beautiful and aesthetically moving.

Are we unusual in this respect? Did ancient peoples respond to fossils as we do? Did they respond to the beauty of these objects and, if so, how? Or were fossils ignored or treated with indifference, even fear? Given that fossils are, quite literally, just about everywhere, what did ancient cultures make of these objects that were surely as ubiquitous their world as they are in ours?

Most historians trace the science of palaeontology to the first episode of the Renaissance (1450 – 1546, see Adams 1938). The first book on the subject that can reasonably be called scientific was Georg Bauer's *De Natura Fossilium* (1546) published under a latinized form of his name, Georgius Agricola (Fig. 1). Like Niels Stensen (Nicholas Steno) after him, Bauer was trained as a physician, first becoming interested in fossils when he was City Physician of Joachimsthal in the mining region of Bohemian. While primarily a treatise on mineralogy—Bauer is known today as the 'Father of Mineralogy'—true fossils were also considered by Bauer, though his discussion of these is mostly devoted to a debunking of various myths and interpretations published by classical authors (e.g., Aristotle believed fossils grew in the rocks



**Figure 1.** The only known portrait of Georg Bauer (Georgius Agricola, from Adams 1938).



**Figure 2.** Portrait of Conrad Gesner (from Adams 1938).

themselves as a result of the actions of a misplaced organic 'seed') and to fitting them into his 'Classification of Inanimate Subterranean Bodies' (e.g., belemnites, and fossiliferous sedimentary rocks were classified as 'Simple Stones').<sup>1</sup>

Bauer's 1546 treatise set the stage for the modern study of fossils, but it was the Swiss naturalist Conrad Gesner (Fig. 2) who launched the field in its modern form. Gesner's great palaeontological treatise, *A Book on Fossil Objects, Chiefly Stones and Gems, their Shapes and Appearance* (1565) was the fourth (and last) volume of his *History of Animals* series. Like Bauer's *De Natura Fossilium*, this book epitomized everything Gesner had learned from reading classical sources, along with discussing new findings and interpretations being made by his contemporaries, including his own. Written and illustrated in a style that harks back to Medieval bestiaries, *Fossil Objects* set the style for many of the publishing conventions all palaeontologists use today in their systematic writings, including the value of including illustrations along with textual descriptions of taxonomic characteristics.

But what of the time before Bauer and Gesner? Fossils were not unknown or unappreciated in either the Middle Ages (11-1450), the so-called 'Dark Ages' (500-1100) or in classical antiquity (500-BC) as the writings of these (and other) authors take pains to point out. The earliest written discussion of a fossil is usually attributed to Origen's reference to Xenophanes' idea (dating from around 540 B.C.) that the occurrence of fossilized shells of Cenozoic marine molluscs offers proof

1. Interestingly Bauer use the term 'ammonite' to refer to the rock sedimentologists know today as pisolite.



**Figure 3.** Detail of a Greek column-krater (ca. 550 B.C.) showing Herakles and Hesione confronting the monster of Troy, which is depicted as a fossil skull weathering out of a rock outcrop. From Mayor 2000.

that the waters of the sea ‘mingled’ with the Earth in certain places. This seems a perfectly reasonable modern scientific hypothesis, incorporating objective observations and the synthesis of seemingly unrelated observations into a novel and testable hypothesis.

Naturally, the classical literature is also full of stories about the occult origin of fossils, stories that link these objects with a power that arises from their coincidental or metaphorical similarity of form with some other, more familiar, object. The common myth of former ages of the Earth having been populated races of giants or monsters has long been felt by classical scholars to derive from the discovery of large vertebrate bones by ancient people and their (incorrect) analogy of these with large individuals from among their own populations (Fig. 3). This ascientific, metaphorical connection is also manifest in the attribution of curative properties to fossils and unusual modern animals; a view of nature that and comes down to us today in the form of the truly disturbing trade in fossil and endangered species’ ‘parts’ for their supposed medicinal value. The thing that separates this metaphorical view of the status of fossils from those of true proto-scientific writings is the latter’s focus on detailed observation of the forms in question. Few modern anatomists would mistake a giant sloth or glyptodont long bone for that of a human, giant or otherwise, on the basis of detailed point-by-point comparison. After all, the raw materials necessary to make such comparisons were as readily avail-

able in ancient times as during the Renaissance or the Enlightenment.

Let me hasten to add that the fact a difference exists between the supernatural or metaphorical approach to the interpretation of fossils and the scientific approach does not mean the former is unimportant or trivial. Metaphors are concerned with symbolic representation and symbols are important to many aspects of human culture. Indeed, acquisition of the power to use symbols to express ideas is one of the cognitive attributes that make us human. The dialog between the symbolic and scientific interpretation of nature is ever with us and unquestionably enriches its experience for anyone who cares to consider it.

Focault (among others) has noted that fundamental shifts in culture can be described as shifts in episteme, or the unconscious but positive and productive set of relations within which knowledge is produced and defined. Despite its philosophical and analytical sophistication, science is as much a cultural phenomenon as business, art, or, yes, religion, and so cannot avoid all vestiges of influence from prevailing episteme in its own practice (e.g., Kuhn 1970; Mitchell 1998). Problems do arise, however, when the boundaries between science and symbolism become blurred.

In 2000 the classical folklorist Adrienne Mayor attempted a novel tack in the study of proto-palaeontology from the metaphorical perspective. Her thesis was actually quite modest: the discovery of fossils by ancient cultures posed the problem of how to explain these objects and that this problem was resolved by incorporating metaphorical interpretations of fossil discoveries into their cultural myths. On the face of it, this is not only an uncontroversial proposition, but unoriginal, examples having been recognized and discussed by historians for literally centuries. Mayor’s unique and, to my mind, intriguing, contribution, however, lay in her work uncovering the range of possible palaeontological origins for many common myths.

Mayor’s most convincing contribution—for me—remains the griffin (or gryphon) myth. The griffin is a chimera with the head of an eagle, the body of a lion, and a long serpent-like tail (Fig. 4). Both the eagle and the lion are occult sun symbols with a generalized beneficent character. Their combination in the griffin results in a super-positive symbol. Griffins are often portrayed as guardians of roads and bridges (= road to salvation) and positioned beside the Tree of Life. The chimeric nature of the symbol also embodies the concept of ambivalence (e.g., the contraposition between psychic



**Figure 4.** Hammered bronze relief sculpture of a griffin (ca. 630 B.C.). Note baby griffin beneath the adult. From Mayor 2000.

energy and cosmic force, Saviour and Antichrist, earth and sky, King of Heaven and Earth, road to Heaven-road to Hell).

As Mayor (2000) explains, the griffin legend is neither Greek nor Roman, but comes from Scythian nomads who occupied the area of present-day Iran and who, about 675 BC, told the Greek traveler Aristaeus of a vast wilderness to the east where gold deposits were guarded by lion-like creatures with hooked, eagle-like beaks. Aristaeus worked these gryps (= hooked) or griffins into a story (probably also related by the nomads) in which men on horseback battled the griffins for possession of the gold fields or, in later accounts, to protect their nesting areas and young from the gold miners. Soon after this story—and others like it—appeared, the griffin motif began to be incorporated into classical art and architecture alongside such familiar mythical creatures as dragons, naiads, furies, sphinx, and various giant heroes. Mayor's unique contribution to all this was to follow the trail of clues east from the Black Sea to the gold fields of the Hindu Kush, Altari Mountains, and Gobi Desert where she speculated that the archetypal griffin may have been *Protoceratops* fossils noticed by the nomads as they made their way along the Silk Road (Fig. 5).

If Mayor had left her 'analysis' there the association between griffins and *Protoceratops* would have been simple ascientific speculation. But Mayor went further, adopting a science-like search for independent confirmatory evidence. She pointed out that the griffin-*Protoceratops* link not only had geographic evidence on its side, but the form of the entire legend could be plausibly derived



**Figure 5.** Mongolian *Protoceratops* skull weathering out of an outcrop. Photo from the AMNH Chapman-Andrews Expedition

from the character of the fossil deposits. The beak, the 'wings' (which were not part of the earliest depictions of griffins, but may have been a fanciful interpretation of the bony frill at the rear of the skull, see Fig. 6), the claws, the tail, the animal's size, the nests, the eggs, the young, the association with gold deposits; even down to a distinctive color contrast between the fossils (white) and sedimentary matrix (red) that would ensure any alert traveler happening by couldn't help but notice these striking fossils.

Mayor's (2000) book goes on employ this comparative method to the analysis of other, possible palaeontological connections with other ancient myths, including Chinese and Indian dragons (the latter legend originating from the fossiliferous Siwalik region and embodying a distinction between the horned upland dragons and non-horned, but tusked, lowland dragons, that is mirrored by the large vertebrate fossils found in that region), the



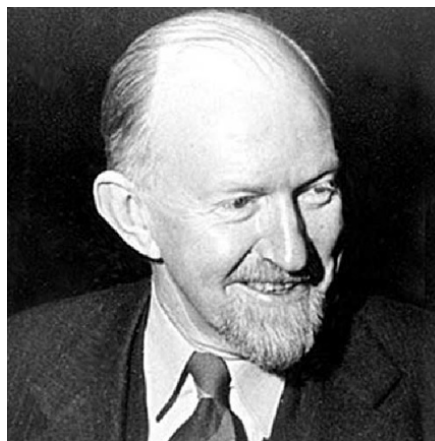
**Figure 6.** Saka-Scythian representation of a griffin (ca. 500 B.C.). Note lack of obvious wings. From Mayor 2000.

Neades of Samos (possibly based on mastodon fossils known to occur on the island), the marine monster of Joppa (possibly based on *Zeuglodon* fossils). Some of these hypothesis tests were more successful than others. Nevertheless, given the ubiquitous nature of these symbols in western art, religious, and political iconography, it is interesting to ponder these links as a way of understanding the effect fossils may have had on our culture from a point-of-view completely different to the scientific ones we usually consider.

Last year Princeton University Press released Mayor's newest book on this topic, entitled *Fossil Legends of the First Americans* (2005). This book has been something of an open secret among the vertebrate palaeontology community for some time. As befits a modern historian, Mayor did an excellent job enlisting the services of her subject community in her project by posting questions about her research to the `vrtpaleo` listserver. As a result, I, no doubt along with many others, eagerly anticipated the book's publication. After reading it through and rereading several long sections for this review, I must say I'm disappointed with the result.

Part of the problem lies in the book's concept. Drawing on the success of *First Fossil Hunters*, Mayor states in the Preface to *Fossil Legends* that her purpose is to determine what fossils meant to Native Americans. While this is a worthy question to ask, it has limited resonance outside those interested in Native American history and so, I believe, misses the point her previous book made so eloquently. In that work, Mayor showed that by trying to fit the occurrence of fossils into their world view classical Greek and Roman scholars not only enriched their world, but also may have had a strong—and continuing—influence on our own.

I do realize, of course, the reason classical views of fossils likely have a significant non-scientific influence on modern times is down to the fact that western societies cultural origins, art, literature, and religion are all strongly based on ancient Greek and Roman symbols. This has no parallel in Native American culture. Not only were Native American legends not as richly developed as those of classical Greece, Native American cultures never developed a tradition of writing or artistic representation to match the sophistication of the European classical age. The fact that Native American cultures were all but exterminated by US westward expansion also had a catastrophic effect on the ability of those cultures to influence the modern world, though this influence remains strong in



**Figure 7.** American vertebrate palaeontologist, evolutionary theorist, and biometrician, George Gaylord Simpson.

terms of North American place names (e.g., Ohio is Iroquosi for 'great river', Minnesota is derived from the Dakota word for 'sky-tinted water', Illinois is Algonquin for 'tribe of great men'). Regardless, in order to make her thesis matter to any but Native American scholars, some reason to care about the Native American view of fossils needs to be explained and developed. Sadly, outside the normal and easy appeals to appreciation of cultural diversity Mayor never attempts to make this connection.

Worse still is the fact that Mayor has chosen to arrange her book as a long rebuttal to George Gaylord Simpson's (Fig. 7) 1942 and 1943 essays on *The Beginnings of Vertebrate Paleontology in North America* and *The Discovery of Fossil Vertebrates in North America*, respectively. In these articles Simpson reviewed the evidence available to him from the published literature and concluded that Native American engagement with fossils constituted 'casual finds without scientific sequel', that Native Americans 'made no real contributions to palaeontological history', and that 'all their ideas about fossils were based on superstition.' (see Mayor 2005, p. xxvi). So far as I can see, virtually all the evidence marshaled by Mayor in her book more-or-less supports Simpson's conclusions, contra her own interpretation of her data.

First a few minor concessions. Mayor is correct—and the Simpson quotes she cites incorrect—that Native Americans did make substantial contributions to early American palaeontology. Trained, early American and European palaeontologists relied upon local tribes' knowledge to show them where the fossil localities were. This is really no different from the situation today where, as

often as not, discoveries of significant fossil material are made by local people (farmers, ranchers, game wardens, hikers) and then brought to the attention of professionals. The contributions of these local collectors are very important and they deserve to be celebrated<sup>2</sup>. But it should also be acknowledged that, in the vast majority of cases—and possibly in all cases involving Native Americans in the 1600s–1800s—the scientific value of the specimens recovered could not be judged by their discoverers, but required examination by competently trained specialists. At the very least a partnership was involved that included a both Native Americans and one or more trained anatomists-morphologists with the latter supplying the expertise required to make the discovery scientifically important. Claiming that the act of object discovery itself constitutes a scientific advance is to mistake the ingredients of a cake for the finished product; on a superficial level they are the same, but the absence of knowing how to combine them correctly makes the probability of achieving a satisfying result vanishingly small.

Mayor is also correct—and the Simpson quotes she cites incorrect—that Native Americans did recognize the organic nature of some fossil types. These tended to be vertebrates and invertebrates whose morphology was reminiscent of familiar local plants and animals (e.g., well preserved trilobites are not all that different in general aspect from many insects and crustaceans). Other fossil groups—especially those of marine invertebrate groups unfamiliar to land-locked tribes—are more abstract in appearance and would be less readily identifiable as organic (e.g., corals, bryozoans, sponges). This is really no different from the history of palaeontological studies in Europe (see Rudwick 1976).

The key to making a scientific contribution—and I suspect this was the real point of Simpson's criticism—is that one must synthesize observational information into general statement of origin and/or development that can be tested empirically via appeal to other available observations. Discovering a fossil bone and then concluding it provides evidence the existence of giant stone humans at some remote time in the past that preyed on Native Americans (see the Iroquois legend of *Ot-ne-yar-*

*heh*, Mayor 2005, pp. 40–42) does not constitute a scientific discovery made by Native Americans. The only evidence for such an interpretation is the fossil bones themselves, none of which really resemble human bones in detail. If such a connection between the discovery of a fossil and the creation of a legend could be made convincingly, a case for the cultural significance of the discovery might be justified, as Mayor herself did repeatedly in her 2000 book; but not a case for its *scientific* importance. Similarly the vision-quest legend of the Monster Bear—which appeared to Seneca brave in a dream, breaking off its own canine tooth and giving it to the brave to symbolize its promise to no longer prey on the Seneca people—is not a scientific discovery, but a metaphorical interpretation of a (possible) fossil find on a par with the interpretation of mastodon crania as the skulls of a race of people-eating, one-eyed giants by the ancient Greeks.

In recounting the bear story Mayor also puts her own scientific credentials into question by identifying the Monster Bear as 'probably belonging to the short-faced bear (*Arctodus simus*) of the Pleistocene' (p. 45). Unlike her previous, Old World investigations (see above), no cultural geographic, or palaeontological evidence is produced in support of this assertion; just a brief sketch of what was arguably one of Pleistocene, North America's most fearsome predators. In fact, North America was host to a diverse bear fauna in the Pleistocene any species of which could have served as the model for the Monster Bear legend. *Arctodus simus* was long limbed and probably a fast runner, but this is insufficient to identify the species as the probable source of a Monster Bear legend (a variant of which describes a brave outrunning of the bear). All Pleistocene bears could undoubtedly run faster than any Pleistocene human (at least in short bursts) and the normal thing to do when encountering any bear species unexpectedly would have been to run the other way. Even more disturbingly, careful reading of Mayor's account reveals a singular lack of any evidence this legend has anything whatsoever to do with any fossil.

Highly suspect examples of similar bald extrapolations litter the text. The basic mode of analysis seems to be one of cataloguing a series of Native American natural history legends from one of five different regions of the US, undertaking a superficial analysis of the local fossil records in the areas where those tribes live today, identifying any particularly exotic, large, ferocious, or otherwise interesting ancient species that might have served

2. The Paleontological Society in the US makes an Annual Award—The Strimple Medal—to amateurs in order to acknowledge and celebrate their contribution to our science and the UK Palaeontological Association awards its Marie Anning prize for the same purpose.

(neglecting to mention any uncertain or complicating factors) and then implying the relation is now proven. To have this sort of thing thrown back at any palaeontologically informed audience, much less use as post-hoc criticism of such an eminence as George Gaylord Simpson, along with thinly veiled accusations of Simpson's supposed racism and indifferent cultural scholarship<sup>3</sup> wears very thin, very quickly.

On the positive side, Mayor has done a great service to Native Americans by collecting together many of their legends, including many that had previously been unrecorded or that had not been available in any but much more obscure publications for some time. While these are not recounted with sufficient background information to make them informative academically in their own right, their collection and brief mention by Mayor should serve as a stimulus to this field for some years to come.

The real story of how Native American culture was touched by fossils—and whether this had any lasting impact beyond those local Native American cultures—would be well worth investigating. The fear is that too much time has passed for cultures based on oral histories to provide sufficient documentation of the connection between fossils and particular legends, especially when the sacred objects themselves either no longer survive or remain inaccessible. In my view Mayor has not managed to make the case for these associations in sufficient detail to convince any audience applying modern scientific evidentiary standards. Whether such a case can be mounted for must be left to others, possibly inspired by Mayor's attempt.

What can be said is that, like their Greek and Roman counterparts and as well as the millions of people worldwide who appreciate them today, fossils spoke to Native Americans in ways that demanded their attention. I can't imagine any sentient human from any historical age not being moved by the discovery of a fossil. I suspect an appreciation of fossils may have predated an appreciation of art and perhaps can even be linked to the development of representational art in some cultures. In (partial) support of this these I would point to a recent study reporting that two marine shells from the Natural History Museum's Palaeontology collections have been identified as beads, and are the world's oldest known items of jewelry

(Vanhaeren et al. 2006). These shells came from two different archeological sites and were dated as 100,000 and 35,000 years old. Possibly they were themselves sub-fossil shells. Certainly many genuine fossil shells look no different.

While both Mayor's books raise intriguing questions about the cultural history and significance of our favorite natural objects, I still see their scientific investigation beginning with Bauer, Gesner and colleagues in the mid-1500s. Although Simpson did not say it, he certainly would have agreed with Zittle (1899) that ancient peoples' 'baseless hypotheses and haphazard observation cannot be considered as the foundation for scientific achievement.', (p. 11). Nonetheless, I certainly do agree with Mayor that these sorts of investigations represent important new attempts to understand and appreciate the holistic significance of fossils.

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3. Simpson was married to psychologist Anne Roe and had a deep interest in cultural subjects (see Laporte, 2000).