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What's all the fuss about dinosaurs?  
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## What's all the fuss about dinosaurs?

by Richard Welsh

Since the first dinosaurs were unearthed in the early 1820s, their scientific study has been entangled with the wildest sorts of popular fiction. Both have served as weapons of cultural warfare, perpetuating the rule of oligarchical elites by attempting to foster popular attitudes of fearful superstition. Leading scientists, with malice aforethought, have dedicated their work to this political agenda, while others succumbed to the same delusions as the manipulated populace.

Though there have been honest researchers, the majority of funding sources both for their work and for the public dissemination of its results—museums, universities, and the huge family funds—have pursued another agenda over this century and a half. The controllers' objective in "dinosaur science" has been to *destroy* science, and in particular, the most fundamental conception at the root of all scientific progress since the European Golden Renaissance: that there is a single evolving universe, governed by a single lawfulness that embraces equally the realms of "physical" nature, social progress, and the process of individual human creativity that links the two.

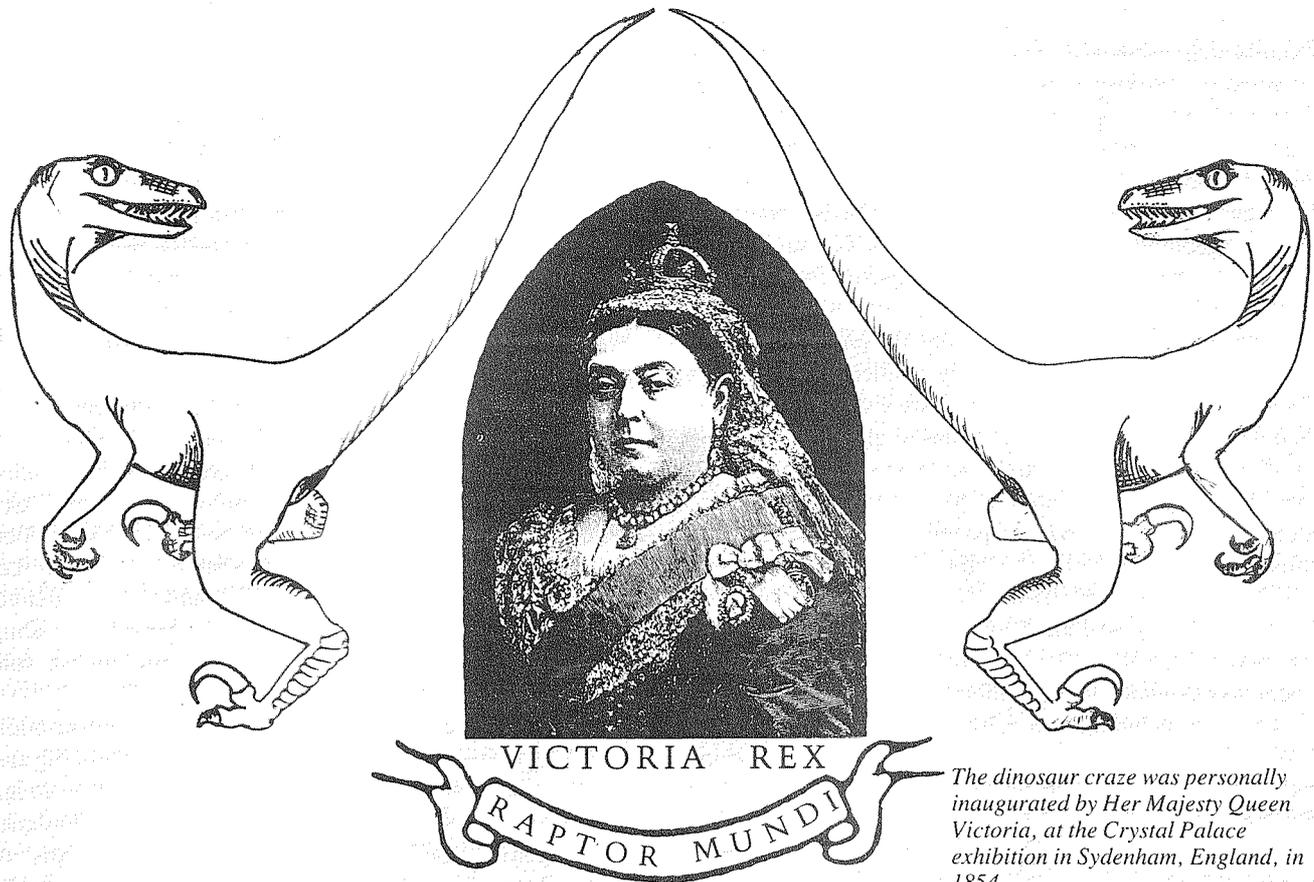
The method of this cultural warfare—brought up to date by the bestselling novel *Jurassic Park* and its "box office blockbuster" movie adaptation—is to induce a generalized antipathy to scientific and related optimistic thinking, by embedding potent psychological images of a world that is fearsome, irrational, and inherently incomprehensible. Michael Crichton, highbrow-pulp author of the novel, is a Harvard M.D. who gave up a potential career healing bodies for the more satisfying and lucrative one of disturbing minds. Asked recently about the "anti-scientific undertone" in his novels, Crichton forthrightly commented, "I'm surprised

more people haven't noticed it more than they have."

The *Jurassic Park* storyline: Billionnaire John Hammond, heedless that his actions might have uncontrollable consequences, populates an island zoological park with living dinosaurs, "cloned" from dino DNA preserved in the gut of blood-sucking insects fossilized in amber. A team of experts visits the remote Costa Rican island, prior to the park's public opening, to evaluate its safety; they are joined on a park tour by Hammond's two grandchildren. As predicted by the story's avant-garde "chaos" mathematician Ian Malcolm, everything that can, does go wrong, initiated by sabotage of the island's security by the computer system designer, resentful of his high-handed treatment by Hammond, and handsomely bribed by a rival bioengineering corporation.

The dinosaurs crash out of their paddocks to eat the senior park personnel, who in the movie are all expendable foreigners and racial minority Americans (plus the renegade programmer, an obese infantile slob who had it coming). The blonde All-American team, led by "Indiana Jones"-type paleontologist Alan Grant and paleobotanist Ellie Sattler (lithe, politically correct cheesecake), help the kids dodge the monsters, and with the aid of the computer hacker child, restore island security. The evil park is destroyed, by firebombing in the novel, merely by implication in the movie (expect a sequel).

Director Steven Spielberg (of *Jaws*, *E.T.*, and *Indiana Jones*), unlike author Crichton, insists that it's not science fiction, it's "science-eventuality." This is the first enterprise of the recently merged MCA (Universal Studios) and Matsushita, Japan's largest electronics firm, costing somewhere between \$60 and \$100 million. The main production cost,



*The dinosaur craze was personally inaugurated by Her Majesty Queen Victoria, at the Crystal Palace exhibition in Sydenham, England, in 1854.*

and the big draw, are the special effects: full-scale and remarkably lifelike moving dinosaur models and animated computer simulations—a different species altogether than old Godzilla.

*Jurassic Park* has broken box office records, grossing \$100 million in the first nine days. Also record-making are the spinoffs, a thousand products pumped out by 100-odd licensed firms led by McDonald's and Kenner Toys. Many are aimed at 4- to 8-year-old children, though Spielberg considers the intense and violent PG-13 movie inappropriate for his own children—which doesn't stop hundreds of thousands of importuned parents from bringing theirs.

This article will show how the movie is but the latest in a 150-year campaign of exploitation of dinosaurs for purposes of cultural warfare. The British aristocracy, in particular, first created the "dinosaur" idea in 1841, elevating it to a cult in 1854, as a weapon against attempts to develop a theory of evolution coherent with the ideas of progress and natural law. Five years later, the *anti*-evolutionary theory of "Darwinism" was propagated for the same purpose.

Dinosaurs have now been big news for over a decade, for several reasons. First, there have been spectacular revisions in our scientific understanding of the animals, starting approximately the late 1960s, becoming increasingly public

knowledge from the early 1980s (see box). Next, promotion of books and other items took off—most of them scientifically worthless abominations—aimed at the traditionally dinosaur-prone children's market. Third, an adult audience for dinosaur literature sprang up, fed by the growing irrationalism of the 1960s "counterculture" generation, eager for fantasies with an imprint of "reality."

### The 'threat' of mass extinctions

The dinosaur craze of the past decade makes sense only if seen alongside an intersecting propaganda campaign: the issue of mass extinctions in Earth history, those half-dozen major and multiple minor events in which up to 90% of then-existing species on the planet have become extinct in relatively brief moments of time. Although the extinction of the last dinosaurs 65 million years ago was not the biggest in history, and the dinosaurs were but one of many groups of organisms that vanished around the same time, dinosaurs continue to dominate the psychological image of these events, including for many scientists.

In 1979 a hot new idea was proffered for mass extinctions: that an asteroid or comet struck the Earth, setting off catastrophic atmospheric and geological effects. This seemingly simple hypothesis created an immediate sensation. It also

required no investigation of complex evolutionary or ecological processes (merely a search for the impact crater and verification of the timing), and has probably inhibited research in those areas. But there was much more at stake than a theory of what happened 65 million years ago: From the beginning, the impact image was controlled by the strategic objectives of the burgeoning environmentalist and pacifist movements, built up by the prestigious *Science* magazine. Massive research funding poured into the theory.

First published by *Science* in 1980, the impact-extinction theory has been even more nakedly political than the "new dinosaurs," aimed specifically to create a stampede into nuclear disarmament by dire predictions of global catastrophes for which no defense or mitigation could ever be physically possible, or even imaginable. In its simplest form, it postulated the generation of an Earth-enveloping dust cloud, which killed all vegetation for lack of light, starving the herbivores, then the carnivores, and so forth. In a January 1983 followup, *Science* explicitly used the dinosaur extinction issue to maximal psychological impact. Finally, in October 1983, the model was extended to an explicit nuclear war scenario, the authors now including pop science-icon Carl Sagan. Mass media followed with such "events" as the widely seen "Morning After" TV drama starring Jason Robards, depicting the aftermath of a nuclear war.

There was scientific opposition to these cut-and-paste theories touted as respectable science, including a sharp critique by Edward Teller, published by *Nature* magazine (the British version of *Science*) in November 1985, establishing that even the most devastating nuclear war could not approach the destructiveness of a major meteorite impact. But these voices were far more sparsely published.

The issues were not academic. Behind the scenes were, first, the intensive exploratory talks between the Reagan administration and the Soviet Union—in which Lyndon LaRouche played a crucial role—on the possibility of joint development of ballistic missile defense based on "new physical principles"; and subsequently, the historic announcement by President Reagan in March 1983, that the United States was going to adopt such a program—the Strategic Defense Initiative. Against this truly scientific hope for an end to nuclear terror, and the associated technological benefits to the economy as a whole, the new catastrophists deployed everything they had in their propaganda arsenal. Steven Spielberg has not forgotten these roots: On the slovenly desk of the repulsive systems designer, we briefly see a picture of atom bomb scientist J. Robert Oppenheimer, headlined "Father of the Baby Boom."

Today, though a vocal majority of scientists from various disciplines apparently favors the impact theory (agreement encourages research grants), the actual causes advanced for the extinctions have become as mutually contradictory as all models dealing with poorly understood atmospheric plane-

tary phenomena: The Earth cooled, no, it warmed; the darkness lasted for months, no, it lasted for days, and maybe only over certain parts of the Earth; it wasn't an asteroid hit but volcanic activity that released the dust cloud; huge fires did much of the killing; no, it was acid rain; and so forth. Though it appears that a major impact did occur at about the time of the dinosaur extinction, and a likely crater has been identified near Yucatán, there is still no proof for any of the specific suggested consequences; and the evidence remains that most of the disappearing organism groups were in significant decline *before* this impact.

The greatest opposition to the new catastrophe theory came from within paleontology, where even normally apolitical rock-hounds were appalled by the crude and ham-handed politics. At a 1985 paleontological conference, for example, there was outrage that those resisting the impact theory stood to lose both funding and career; one scientist revealed that those who queried the theory were branded "militarists"! The editors of *Science* were specifically named as leading "enforcers"—as they are today in the witchhunt against "cold fusion."

In *Jurassic Park*, the threat is not extinction, but the born-again beasts themselves, representing the overwhelming elemental forces that will be unleashed on mankind if we do not suppress the overweening confidence of meddling scientists and their avaricious corporate patrons. So, for nearly 15 years, a campaign has been waged to obliterate the idea of progress in the study of evolution, and by association, in society as well, by the lavishly financed impact-catastrophe theory, associated with a brand-new dinosaur image.

This new image (which is in fact justified by new evidence and reevaluation of the old) is that dinosaurs were much more like modern mammals and birds than like the reptiles of today. They could move briskly, like a running ostrich or galloping rhino; their body temperatures were maintained at a constant high level, enabling them to lead more regularly active lives; and they were overall far more graceful, intelligent, and effective animals than conventionally portrayed (see box). The false deduction that is made from this evidence: The dinosaurs are extinct because of an accident. The moral: Humans and other mammals can just as easily be extinguished by the same kind of violent *random* event that killed the dinosaurs—and *there is nothing you can do about it*.

This faulty conclusion energizes the past decade's extravagant dinosaur popularization, now brought to a boil in *Jurassic Park*. Further, the propaganda purpose not only uses, but attempts to control the always fund-starved science. Among the foremost proponents of the "new image" has been John Horner, an intrepid and creative field paleontologist (and good popularizer), who is the nominal model for Crichton's hero, and technical adviser to the movie, rewarded by one season's worth of funding from Spielberg's company.

Alan Grant, the fictional movie version, got three years' worth.

### The enemy image: scientific optimism

Despite *Jurassic*'s up-to-the-minute animation technologies and claims of scientific accuracy, it is old, old stuff. It began in 1818, when Mary Wollstonecraft Shelley published an attack on the scientific spirit of Benjamin Franklin—"the American Prometheus" as he was known to the admiring European public—under the title of *Frankenstein, or, The Modern Prometheus*. *Jurassic Park* is carbon-copy *Frankenstein*: Mad scientists, intoxicated by powers they undeservedly possess, play God and create life; the life they create turns out monstrous and unnatural; monster kills and terrorizes, then turns on its creator; monster is destroyed and order restored; humility before nature is exalted and audience vows to cut funding for research into electricity (or space exploration or genetic engineering).

It doesn't matter how "accurate" Spielberg's dinosaurs may be; they remain forever "monsters." Indeed, they are even more monstrous than Shelley's actually sympathetic creature, for under the cover of "scientific accuracy," both Crichton and Spielberg have smuggled in a crucial element of satanic evil—something qualitatively different from simply a large carnivorous animal, frighteningly dangerous, but still *comprehensible*, or even a destructive (but impersonal) force of nature. The hell-vector in both book and movie—upon which the plot depends—is one "dinosaur" wildly impossible and capable of feats that no real one could possibly have accomplished. These are the pack-hunting *Velociraptors* (a real name, but for a much smaller and more conventional creature) which, in addition to their terrifying switchblade claw, cat-like athletic prowess, and long toothy muzzles, all real enough, have fraudulently been given a "problem-solving" intelligence in excess of that of chimpanzees.

### Satanic violation of children

In the novel, the satanic sub-theme runs sickeningly throughout, in scenes of savaged children and infants. It opens with a young girl's near-death as a charming, chicken-sized, but venomous dino nips up and down her arm; not long after, a trio of the critters is caught perched on a basinette, slurping down what remains of an infant's face. Startled, they scatter, chirping gaily into the night.

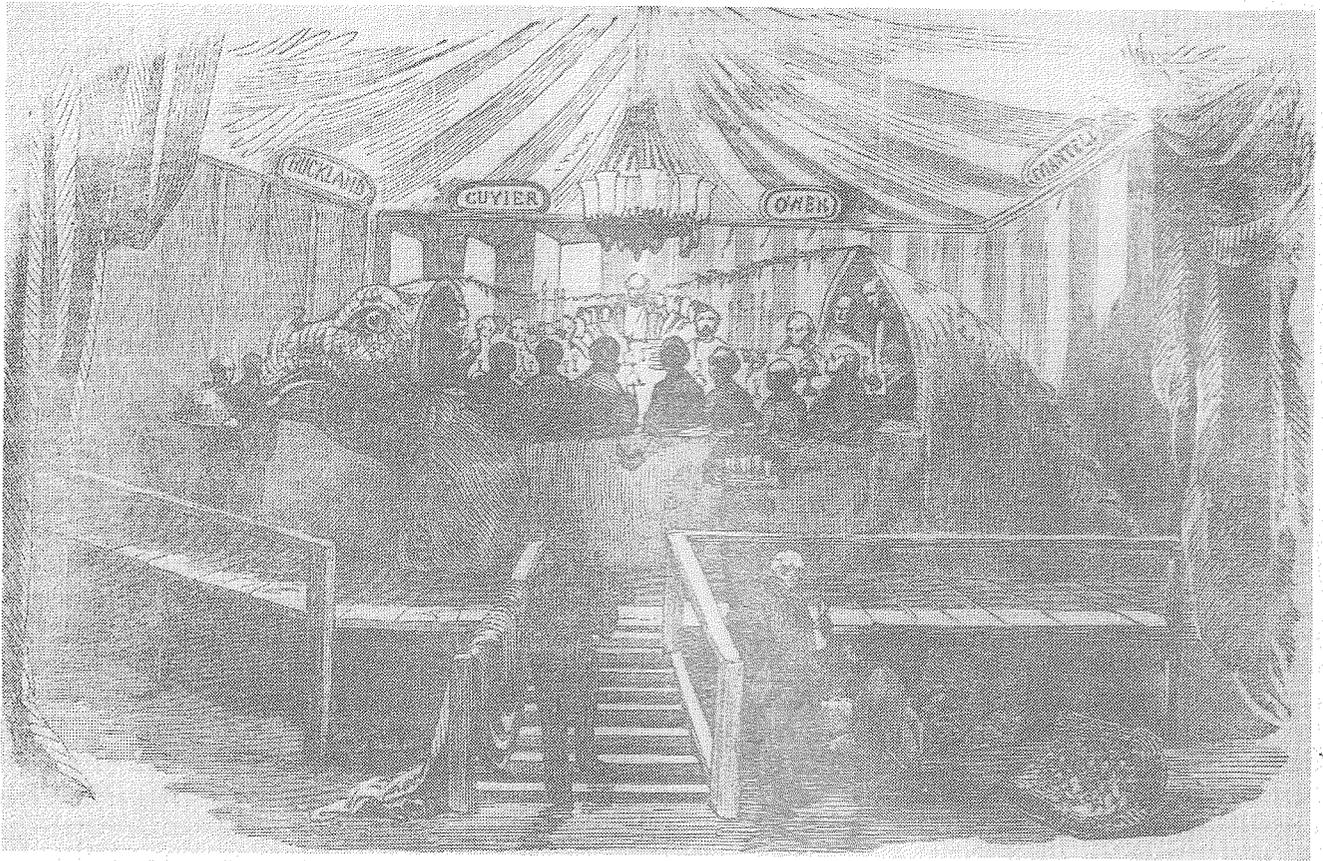
The movie deleted such savagery to herd in the youth audiences and establish the lucrative licensing operation—McDonald's in particular was skittish after its flakking from parents irate with its tie-in to the violence of *Batman*. So we do not *see* the more gut-spilling sort of scenes (but for a severed bloody arm); and we miss most of the novel's exaggerated cruelty to children (other than a symbolic demonstration of how a raptor claw might disembowel or castrate a chubby smart-aleck who was flippant about the dinos).

Spielberg compensates well for the omissions, however, by his unique portrayals of the "raptors." Contrary to the placid, cow-eyed *Triceratops* and *Brachiosaurus*, and even more extreme than the fearsome *Tyrannosaurus*, they are given glinty-yellow, slit-pupilled crocodile-like eyes; unlike all the other, more mammal-appearing dinosaur colorations, their skins gleam an iridescent, eerie metallic silver-gray (shades of *Alien*); and mobile lips give them actual facial expression, leering and grinning in the climactic scene where two fiends quietly and methodically stalk the children through the maze of a cafeteria kitchen.

*Jurassic Park* also possesses an unrelenting, unseen, but horribly *imagined* intensity of violence, from the opening blue-lit nighttime scene of a shrieking park worker pulled slowly into a raptor transport container (the supernatural power of the monster within conveyed by the tense and heavily armed surrounding troops), to the sequence viewed from over the rustling palms of the raptor compound, as a live bull is crane-lowered through the treetops at feeding time—the quietness shattered by the bull's bellows turned to squeals, merging into the unearthly ear-piercing shrieks and howls of the unseen raptors. Cut to lunch. (The fact that most children and adolescents are accustomed to far more "violent" images on the screen speaks not to the "mildness" of *Jurassic Park*, but to the barbarism of the more general culture. Their apparent ability to view such scenes calmly is pure illusion.)

Though the story happens to target genetic engineering as the fearful technology, it is not a literal morality play, but operates on a deeper level, like the anti-nuclear horror films of the 1950s. In emotional images that short-circuit rational thought, the story perpetrates a *manichean* or *gnostic* view (in its milder form termed "romanticism")—in which there are two universes: one of them dark, chaotic, savage, inhabited by fearful monsters, primal and elemental; the other, bright, peaceful, light and airy, beneficent, and safe (also New Age touchy-feely). Into this world, the other may at any time erupt. This is a view, emotional disorder, and cult profoundly hostile to the idea of progress ("evolution") of any form. These dinosaurs are thus not "animals" in any sense of the term, as Moby Dick was not a whale. They are the age-old *monsters*, and in the case of the phony *Velociraptors*, forces of satanic evil.

The danger of *Jurassic Park*, far more than such genre classics as *Frankenstein*, is the targeting of children, not least by the mere starring of dinosaurs. Is there something about dinosaurs that "naturally" fascinates children? One among the many plausible parlor opinions is that dinosaurs are "big, ferocious, and extinct" (that is, *safe*). They can be allies in a world of often unpredictable giants (adults); they provide classic referents for the projection of strong childhood emotions (aggressive ones, in particular), and play-objects for working out the problems of social learning. In a word, *nouveau-dragon*.



*"Dinner in the Iguanodon Model, at the Crystal Palace, Sydenham." The Illustrated London News of 1854 reports on Waterhouse Hawkins's sycophantic tribute to Sir Richard Owen and other scientific luminaries. One hundred and twenty guests attended the New Year's Eve gala, the most illustrious seated inside the body of the largest dinosaur model, as toasts were raised to Queen Victoria and the models' chief promoter, royal consort Prince Albert.*

### **Dinosaur cult was 'Made in England'**

Dinosaurs were first "created," by receiving a name and a description, by the English anatomist and establishment darling Richard Owen (1804-92), in 1841. Owen was unusually clear that these "reptiles" were not giant lizards, but instead combined features seen in crocodiles, birds, and even mammals: unique animals, unlike anything living today. However, he did not create the subject of dinosaurs in a vacuum; though only three species were known at the time of his famous dissertation (and these only from fragmentary remains), other groups of extinct reptiles had come to prominent attention over the preceding 40 years, equally unlike anything now living: the long-necked marine plesiosaurs and dolphin-like ichthyosaurs, and the flying pterosaurs. Fossils of these had emerged as early as 1796, and had already inspired lively imaginings and attempts at artistic reconstruction.

The first such illustration was circulated in England in 1830, showing an assemblage of ichthyosaurs, plesiosaurs, and pterosaurs in a cheerful chomp-and-be-chomped mode. By 1833, copycat scenes were appearing in encyclopedias

and cheap mass-circulation magazines in England and France; and in 1837 the first of countless children's books on prehistoric times came out, this one American. Finally, in 1838, the now familiar "sea dragons" were rendered in explicit "gothic horror" mode, down to the baleful moon starkly illuminating the violent clash of toothy titans in a roiling, ink-black sea.

The "gothic" variant is well captured in an 1834 caption by English amateur-paleontologist Thomas Hawkins (an intimate of Owen): "The globe, sweltering with the intense heat that its primitive revolution in space generated, was a fitting habitation for the cold-blooded reptiles. . . . The ptero-dactyle too, that paradox which, uniting . . . the saurian head with a bird-and-bat-like conformation of body and extremities, has given rise to vagaries of thought as uncertain as the sombre twilight of the ungarnished and desolate world which echoed to the flapping of its leathern wings. They have ceased from off the face of the Earth: inexorable time long since extinguished the last of their race and all that survives of these once-grim and omnipotent aborigines are a few crushed bones as unsightly as they are rare."

Hyper-scientific Crichton still gainfully employs the gothic image: "Behind the foliage, beyond the fence, he saw a thick body with a pebbled, grainy surface like the bark of a tree. But it wasn't a tree. . . . He continued to look higher, sweeping the goggles upward—he saw the huge head of the tyrannosaurus. Just standing there, looking over the fence at the two Land Cruisers. The lightning flashed again, and the big animal rolled its head and bellowed in the glaring light. Then darkness, and silence again, and the pounding rain."

Even those works aiming to be scientific—from the dawn of the literature to today—though avoiding the lightning and hurricanes, routinely cultivated the fantasy of dinosaur "personality types," as typified by the 1837 children's book: "The Ichthyosaurus was a great tyrant, and used to prey on every creature that came within his reach: this is known by the fossil remains found in the inside of his body. He used at times even to act the cannibal, and eat his own relations, for a large one has been dug out of the cliff at Lyme Regis, with part of a small one in his stomach undigested [actually, the unborn young in a female of this live-bearing animal group]; he must have been altogether a very unamiable character."

### Geopolitics and the fight over evolution

Professor Owen thus had a ready audience when he defined the "dinosaurs" in 1841. But he was not primarily catering to a growing romantic taste for the exotic; his purpose was far more serious, and was directed to a more educated audience. Establishing the biological classification "Dinosauria" was but a portion of a two and a half hour speech, a year in the making, dedicated solely to a refutation of—evolution! This was 18 years before the supposedly "revolutionary" Darwin ever published a peep—for, contrary to popular myth, the subject of evolution had been hotly debated in both scientific and popular circles for the entire first half of the 19th century. Owen owed his career to the issue, having dedicated his talents to the British establishment's demand that this idea be demolished.

Contrary to the historical myth, the issues of species extinctions and of the appearance of new species in geological time, of species transformation, and of evolution (or "development" as it was then often termed), were common currency since especially the 1820s. In England, a myriad of theories contended, loosely derived from the ideas of the great French biologist Jean-Baptiste Lamarck (1744-1829). The debate was explicitly both social-political and scientific: The idea of "development" in nature was a rallying cry for a whole range of reformers: socialists, Chartists, anti-malthusians, doctors trained up in new medical schools outside the ambit of the Oxbridge elites, and an up-and-coming middle class, attempting to break into the aristocratic establishment—many of these at each other's throats, but all united in a desire to curb the monarchy and the other established institutions.

"Evolution," allied with "transformism," was understood to be a tool of revolution, forged in the fearful French upheavals, and wielded for the destruction of the English oligarchy. Also, the republican principles of the American Revolution were still fresh, diminished though their European proponents were after the 1815 Treaty of Vienna. As *Frankenstein* made clear, the threat remained real, and any theory, in any science, that justified changes to the ruling order initiated "from below," rather than decreed from the top, was treated seriously. This was particularly true of anything that disseminated scientific literacy too widely among the lower classes, or suggested that the masses of the population might aspire to a higher standard of living.

How was dinosaur ballyhoo *anti*-evolutionary? Owen's rhetorical ploy was to portray the newly defined "dinosaurs" in as *mammalian* a fashion as possible, to be as "*advanced*" a reptile as could be imagined. Lizards and other modern reptiles—self-evidently "primitive" forms—could thus be portrayed as *degenerations* from dinosaurs, and the large extinct types therefore would not represent any kind of Lamarckian or alternative form of *progress*. Otherwise, the argument went, we would find small, sprawling, lethargic, primitive lizards in the oldest geological strata, while the dinosaurs would be alive today. It is no accident that between 1839 and 1842, exactly as Owen was "creating" the dinosaurs, all the European and American "ethnological" societies were created to accomplish the same purpose in the social realm: replacing the idea of coherent universal human *history* with an irrationalist kaleidoscope of hermetically isolated, ahistoric "peoples" or "races."

### The Queen of England pushed dinosaurs

By the middle of the century, the British crown and government themselves had gone into the prehistoric monster business. In 1854, the famous Crystal Palace of the 1851 industrial and imperial exposition was moved from its expo site to the London suburb of Sydenham, where it anchored what became one of the world's first "theme parks." Close by the exhibition building were lifesize reconstructions (the world's first) of all the major prehistoric reptiles then known, fleshed out in tons of concrete, imaginatively colored, and perched on islands in an artificial lake.

The grounds were opened by Queen Victoria personally, addressing a crowd of 40,000 hauled in by special trains, on this "mausoleum to the memory of ruined worlds"; the Royal Consort Prince Albert had first proposed the display. Hundreds of thousands visited the exhibit each year, and for those that could not, the new Department of Science and Art provided for the design and mass-distribution of special posters to schools throughout Britain. Meanwhile, large numbers of miniature models of the originals were produced and sold, anticipating *Jurassic Park's* merchandising racket by 140 years. British mass-circulation periodicals prominent-

ly covered "the story behind the story," taking their readers behind the scenes to witness the construction of the models a year before their debut, and reporting on a visit to the sculptor's studio by the queen and consort.

Owen directly oversaw every detail of the reconstructions, showing sculptor Benjamin Waterhouse Hawkins how to make the beasts look sufficiently mammalian (resembling rhinoceroses and elephants rather than lizards), still intent on undercutting the Lamarckian idea of progress. While the gaping public could not have grasped Owen's fine philosophical point, it certainly absorbed the overpowering image of exotic monstrosity and hulking, primordial power. That served just as well: It reinforced the gnostic conception of a divided universe in which the laws of the one part were different from and incommensurate with those of the other.

### The victory of Darwinism

Just as political was the reason for the rapid success of Darwinism within the decade following the opening of the Crystal Palace exhibition. Owen, who hated it like the plague, was swept away at that time not because he defended any Christian virtues, but simply because he failed to recognize the more sophisticated social control options inherent in Darwin's theory. Like many, he mistook it for just another theory of "evolution." The debates over Darwinism over the 1860s and 1870s were but a tempest in a teapot, as rival establishment factions fought among themselves. Those won, who realized that the evidence for species transformations, or something like it, had become so overwhelming that something was needed to co-opt and undermine the associated idea of "development."

Darwin's contribution to this goal was to wed the idea of transformation with the *malthusian* conception of "struggle for existence" among creatures competing for limited resources. From this he derived a materialistic mechanism that accounted for biological transformations by each species' adaptation to local conditions: the opposite of Lamarckism—which held "adaptations" to be small-scale, local *perturbations* from the grander upward scheme of "evolution" as a whole—and of religious variants that equally viewed evolution as a progressive phenomenon. Thus, Darwin banished utterly the idea that progress was the higher-order or more fundamental causal process. It was simply Adam Smith's "invisible hand" imported into biology: The apparent coherence of the whole is reducible to the maximized selfishness of the component parts.

The resulting Darwin-Huxley victory was thus the triumph of an evolutionary *counter*-theory, or anti-evolutionary theory, which would ensure that never again would the idea of biological species transformation necessitate a sister-concept of "progress"; or if some chose to view the fossil record as a demonstration of progress (amphibians emerging from fish, reptiles from a line of amphibians, mammals and

birds from various lines of reptiles), the theory still reduced the appearance to a mere contingency, from which both self-development, and development of biospheric processes as a whole, had been banished. Darwin himself was scrupulous not to call his idea a theory of "evolution," at least not until sociologist Herbert Spencer supplied the catch-phrase "survival of the fittest," which nicely neutralized the ugly ideas of "progress" and "ordered transformation."

### Judeo-Christian perspectives on evolution

The "evolution" ideas that Darwinism thus coopted were not unique to anti-crown and anti-church English radicals and reformers, however, nor were they universally materialist, reductionist, or even Lamarckian. In the half-century before Darwin, many scientists and others throughout Europe, had embraced the idea in its general form, understanding that "evolution" in the broad sense was completely compatible with Christianity. These ideas may often have been too vague to be termed "theories," but they were not necessarily wrong for that reason.

Creation was seen to take the form of an increasing differentiation, specialization, and progress from lower to higher forms of existence; and human history, the most recent event in the history of creation, was itself characterized by progress in time, with setbacks to be sure, but overall a progress of increasing knowledge of God, and ultimate redemption. Contrary to what the myth of "Darwinism vs. Scripture" (or "science vs. religion") might imply, there was no conflict between the idea of biological evolution and Christianity. There was a conflict between the idea of social progress and the established Church of England.

Austrian scientist Franz Xaver Unger (1800-70), for example, in 1851 published a lavish paleontological tome which embraced not just an advance of life "from the simple to the complex," but species transformations as well, noting of certain older forms, that "they differ from [more recent species] in such a way that we are led to recognize in them only the ancestors of all those forms that were successively developed later." In France, the widely read science popularizer Louis Figuier elaborated with a denunciation of the gnostic view of undifferentiated "primeval time": "There are no monsters in nature," he wrote in 1863. "It is more accordant with the general perfection of creation to see . . . in a structure which differs so notably from that of the animals of our days, the simple augmentation of a type, and sometimes also the beginning and successive perfecting of these beings. . . . Let us look on them, not with disgust; let us learn, on the contrary, to read in the plan traced for their organization, the work of the Creator of all things, as well as the plan of creation."

### English dinosaurs come to America

As in Europe, circumstances in the United States were different from those in England. Here, the idea of progress

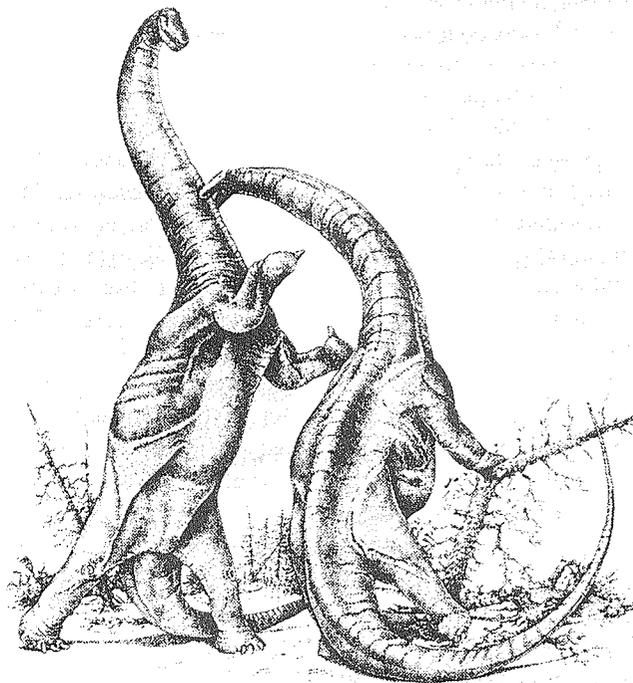
was still so organic a part of the national character that discussion of evolution and transformation (first Lamarckian, later Darwinian) was controversial, but never approached the fever pitch it had in England, where threats to the established rule were taken quite seriously. So, just as the British crown had decreed a public cult of dinosaurs, so here, their affiliated institutions attempted to do the same, but in doing so, were exposed for the unscientific cultists that they were, and at least temporarily derailed.

In 1868, none other than Waterhouse Hawkins, Owen's sculptor, was invited by the authorities of New York City's Central Park, led by Andrew Greene, to create replicas of the English dinosaurs, plus some of the newer American discoveries, for a planned "Paleozoic Museum" to be erected in the park on the model of the Crystal Palace. In their invitation, the park commissioners outlined their plan for a display of the "huge fishes, enormous birds, monstrous reptiles, and ponderous uncouth mammals" that existed prior to man's establishing "a record of his pre-eminence"—in other words, no evolution here, only the primordial monster myth, to be portrayed in modes of carnage and carnivory.

However, New York at that time had come partly under the control of precisely the swarming "lower classes" (mainly Irish, German, and Jewish immigrants) whose challenge had so recently been overcome in England itself. This was the political machine of William Marcy Tweed ("Boss" to his enemies), a machine which has been hypocritically vilified as the epitome of corruption because of its nearly successful challenge to the pro-Confederate New York Democratic Party of August Belmont, his Anglophile banking associates, and their house organ, the *New York Times*.

In 1870, the state legislature transferred control of Central Park to a new municipal body, appointed by Tweed. Funding for the "Paleozoic Museum" was immediately suspended, as, in the words of the new authorities, "too great a sum to expend upon a building devoted wholly to paleontology—a science which, however interesting, is yet so imperfectly known as not to justify so great a public expense for illustrating it." Though Tweed's opponents ridiculed this assertion as hypocrisy in light of the millions of dollars allegedly siphoned off by the "Ring," it happened to be true. Compared to other sciences, paleontology was barely in the running—and the Tweed machine accurately diagnosed its British design. As an opponent mockingly paraphrased this diagnosis: "Professor Hawkins has been studying books and bones; what does he know about the management of Central Park? He was only an Englishman anyway, and the idea of trying to get up a museum in this City without a corresponding scheme for dividing the profits was an absurdity."

Hawkins continued work on the models; but in 1871, vandals entered his Central Park workshop, allegedly under orders of Tweed's men, smashed the models, destroyed the molds and sketches, and carted the pieces off to be buried.



*Two bull Brontosaurus, imaginatively executed by paleontologist Robert T. Bakker in his book The Dinosaur Heresies. Vegetarians, but no "gentle giants"!*

The scandal-mongering against Tweed himself, brewing for some time, took off shortly after this incident, so the victory was short-lived; the banker-installed "Committee of 70" that seized control of the city after Tweed's ouster appointed Andrew Greene (the former park director who had invited Hawkins to create the sculptures) as controller. Still, it was another 30 years before New Yorkers were subjected to the romantic "terrible lizards" at the new American Museum of Natural History, founded and funded by the same Greene and his oligarchic cronies.

Though the American Museum was not in the forefront of dinosaur paleontology when first founded, by the early 20th century its president, Henry Fairfield Osborn, had made it one of the world's foremost displays of the creatures, starting the newly discovered *Tyrannosaurus rex*, the quintessential dragon that Osborn had mounted in its famous towering pose (the more savagely pugilistic display that Osborn first proposed proved impossible for technical reasons). As had become usual in this shadow world of showman-science, the evidence was falsified, by adding extra vertebrae to a tail otherwise too short for the looming stance. In reality, as today's dino-savvy children know, the animal's carriage was horizontal and birdlike, rather than striding upright with a ground-dragging tail.

Osborn's other legacy in the dinosaur domain is the

hyper-romantic artwork of Charles R. Knight, whose career he made (aided by J.P. Morgan financing), and whose dinosaur and other prehistoric paintings became the standard image for some five decades of children and others, both at the museum and reproduced in countless books from the 1920s to the present. Through Knight, and his many imitators, the gnostic "dark world" ideology was also preserved. How many *T. rex* landscapes have you ever seen *without* a belching background volcano—iconic representation of the violent "primeval Earth"? Knight was Osborn's visual myth-propagandist as Hawkins was Owen's; and though Owen denied "transformism" while Osborn embraced it, on the more profound level, they shared an antipathy to the "rabble," and a dedication to preservation of oligarchic rule.

Osborn also made the museum a world center for the eugenics movement and associated "race science," which accompanied the dino-show as twin pillars of the new Darwinian universe: "Progress," for those who still believed in it, was now nothing more than the extinction of the deficient (who deserved it), and their replacement by the superior—dinosaurs by mammals, lesser races by the Anglo-Saxon.

### Science vs. mythology

It is probably as a result of this ideology, that the prevailing 20th-century nonsense about dinosaurs took root: that they were reptilian in every detail, including "cold-bloodedness"; that the sauropods (large *Brontosaurus* types) were too heavy to support their own weight and had to live in swamps; that both these and the so-called duckbills lived on diets of mushy water vegetation; that the dinos wallowed, plodded, and otherwise stupidly and clumsily lurched their way through 160 million years of geological time.

Throughout the entire history of dino-shows, as a part of this myth function, there has been an unbroken continuity of a certain sort of popular drivel, antithetical to scientific thinking, yet embedded in the images projected by the scientific institutions themselves. This is the notion that individual dinosaur species can be characterized as certain "personality types," or by crudely defined human emotional states, as in the "unamiable" ichthyosaur pictured for the children of 1937. Thus, *Tyrannosaurus*, as for Osborn, is "ferocious," "savagely," and of course "tyrannical." *Brontosaurus* is a "gentle giant," or herbivores ("vegetarians") in general are "harmless."

Oh? Try to characterize living mammal species in the same way. If you eat meat, you "rule." If you eat plants, you may be a "gentle giant"—perhaps like a rutting bull elephant or charging hippo or boar? All that really "rules" is the mythic bipolarity of "bad" carnivores and "good" herbivores, merged into the oligarchical form of social pecking order appropriate to a street gang or an English public school. Perhaps those children who have projected a stern father-image onto *Tyrannosaurus* and a "gentle giant" mother-im-

age onto *Brontosaurus*, have merely played back to us what our absurd pictures, museums, and books have fed them?

Filmmaker Spielberg, so publicly attentive to "scientific

## New research fuels interest in dinosaurs

Behind the anti-scientific *Jurassic Park* lies an extraordinary quarter-century overhaul of scientific thinking about dinosaurs, starting especially with John Ostrom's 1964 discovery and evaluation of the small carnivore *Deinonychus*, an agile creature capable of rapid maneuvers beyond those previously associated with dinosaurs. The evidence for its activity levels further suggested a "warm-blooded" metabolism (more precisely, the ability to maintain a constant high body temperature), akin to that of mammals and birds. Its anatomy also strengthened a newly re-argued hypothesis, also due to Ostrom, that birds descended directly from dinosaurs, rather than from an older common ancestor.

Robert Bakker, Ostrom's one-time student, ran with these ideas, putting forth a series of dinosaur "heresies" starting in the late 1960s. He argued that *all* dinosaurs were warm-blooded; that they were quite active; and that their intelligence and complexity of behavior and social organization were comparable to that of most mammals; that their dietary and other physiological characteristics bore little or no resemblance to the traditional "sluggish reptiles." Bakker summarizes his own theories and much of the other new evidence and thinking as of 1985 in his delightful, densely informative, and polemical *The Dinosaur Heresies* (New York: William Morrow & Co., 1986).

Slightly later, John Horner unearthed the first-ever fossils of dinosaur communal nesting, including evidence that distinguished between two species' growth patterns—one in which hatchlings were up and about immediately, the other in which the young hatched at a more immature stage and remained for some time in the nest, fed by "nurturing" parents. Horner's *Digging Dinosaurs* (New York: Workman Publishers, 1988), co-authored with James Gorman, is one of the best general introductions to the field practice of dinosaur paleontology, as well as a report on the author's own work; his more recent, *The Complete T. Rex*, co-authored with Dinosaur Society cofounder Don Lessem (New York: Simon & Schuster, 1993) is a good popular account of the famous title creature, with valuable material on historic delusions.

Work by French paleohistologist Armand de Ricqlès

accuracy," has worked particularly hard to ensure the sanctity of this myth, through such frightful absurdities as cozing up to a megaton *Brachiosaurus*—safe because it is a herbivo-

rous "gentle giant"—and allowing a small child next to an ill *Triceratops*—probably about as safe as a sick rhino of half the size and probably of comparable temperament.

complemented Horner's, by comparing the microscopic internal structure of dinosaur bones with that of living animals (reptile and mammal), to suggest that rates of growth were so rapid as to constitute further evidence for high metabolic rates. Other lines of evidence further filled out the new picture of dinosaurs as rapid-moving, effective animals, including study of dinosaur tracks combined with analysis of the tracks of living large animals and the biodynamics limb structure and musculature. Trackway and other investigations confirmed that many dinosaur species lived in large herds, possibly including such herd-structuring as protecting the young while travelling. Good overviews include Martin Lockley, *Tracking Dinosaurs* (New York: Cambridge University Press, 1991) and R. McNeill Alexander, *Dynamics of Dinosaurs and Other Extinct Giants* (New York: Columbia University Press, 1989).

Meanwhile, new species have come to light at unprecedented rates, both in traditional beds such as the American Badlands and Mongolia, and in previously untapped sites such as in Africa and Argentina. Perhaps some 40% of the 500-plus dinosaur species now known were discovered in the past 25 years.

Finally, a new crop of artists has risen up, who, for the first time since Charles Knight, work intensively with the paleontologists to ensure accuracy in their renditions, while some of the "new" paleontologists—Bakker and Gregory Paul—are themselves proficient illustrators. Unfortunately, many of the paintings, despite respectable anatomical accuracy, perpetuate the romantic images. A good selection, with discussion of the important issue of scientist-artist collaboration, is in *Dinosaurs Past and Present* (Los Angeles County Museum of Natural History and University of Washington Press, 1986).

### Bakker's provocative 'heresies'

While many paleontologists reacted with annoyance or disdain to Bakker's cocky and "unprofessional" assertiveness (he is certainly a media showman), there is no question but that his campaign reoriented the field, as scientists increasingly attempted to pursue or refute his "heresies." What makes this so-called *enfant terrible* interesting, however, is not any of the particular "heresies," but rather his scientific method, a rarity today, which proceeds from an examination of the fundamental premises of the science. If these are proven false, then all the conclusions hanging from them fall as well. Most interest-

ing, though Bakker is first and foremost a dino man, he approaches his subject as embedded in the larger questions of biospheric processes generally: transformations of entire ecologies, relationships among types of organisms, and origins as well as extinctions (he thus rejects the "impact" theory as not merely empirically wrong, but scientifically sterile). In this he is a *rara dino-avis* not only in paleontology, but in biology generally.

Whether Bakker is right or wrong on any particular (for example, regulation of body temperature), his *method* is correct. Unfortunately, many of his colleagues persist in the game of obeisance to "objectivity," even when that means giving "equal respect" to useful hypotheses and received opinion with only the weight of unexamined tradition to support it. Christopher McGowan's *Dinosaurs, Spitfires, and Sea Dragons* (Cambridge, Mass.: Harvard University Press, 1992) is typical, though otherwise useful, particularly for its extended discussion—missing from many narrowly defined "dinosaur" books—of the other Mesozoic reptiles, the ichthyosaurs, plesiosaurs, and pterosaurs.

Science journalist John Noble Wilford, another formally "objective" author, provides a tolerable historic overview of the field, detailed but dino-centric (and keen on catastrophism), *The Riddle of the Dinosaur* (New York: Random House Vintage Books, 1987). For a fascinating history of the complex marriage of paleontology and public policy debate, see Adrian Desmond, *The Politics of Evolution: Morphology, Medicine, and Reform in Radical London* (Chicago: University of Chicago Press, 1989) and Martin J.S. Rudwick, *Scenes From Deep Time: Early Pictorial Representations of the Prehistoric World* (Chicago: University of Chicago Press, 1992). For children, among the best are John Horner and Don Lessem, *Digging Up Tyrannosaurus Rex* (New York: Crown, 1993); Patricia Lauber, *Living With Dinosaurs* (New York: Bradbury Press, 1991) and *The News About Dinosaurs* (Bradbury Press, 1989).

As for an oft-cited "smart" dinosaur, the thin excuse for *Jurassic's* clever "raptors," this is *Troodon*, a small cousin of *Velociraptor* and *Deinonychus*, whose cranial dimensions have captivated Canadian paleontologist Dale Russell. Fine print: Its brain is so large by comparative dino standards, that it equals that of a modern ground-dwelling bird. Okay, I'd respect even a turkey if it were nine feet tall; and as for dinosaur science—well, as the man said, that's just the way it is.—Richard Welsh