

Rise of Lost Worlds

A Cultural History of the Dinosaur Park, Part 1: The Geological Exhibition at the Crystal Palace Park, Sydenham

MIZOI, Yuichi

'But a zoo is not a model for this park.
This park is attempting something far more ambitious than that.
Something much more akin to making a space station on earth'.

Michael Crichton, *Jurassic Park* (1990)

Introduction

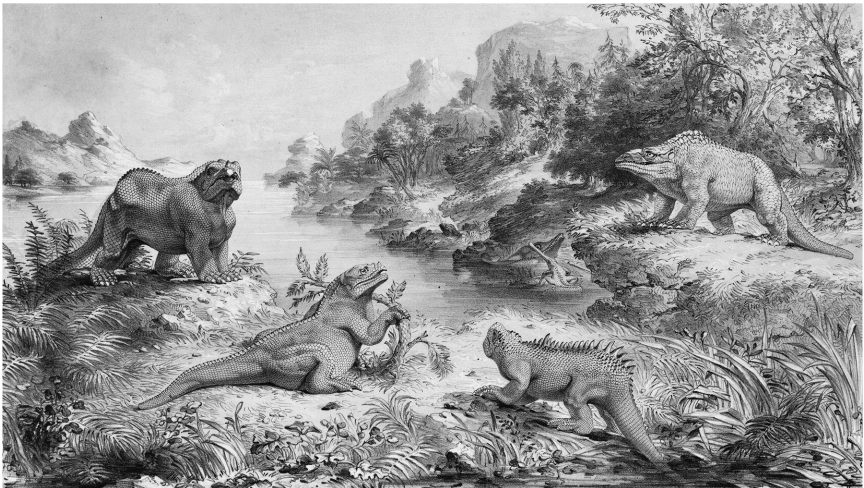


Figure 1. Walter Ray Woods. *The Wealden. The Restorations of the Extinct Animals at the Crystal Palace Park, Sydenham, 1854. As Restored by B. Waterhouse Hawkins, F. C. S. F. L. S.* ©The Trustees of the Natural History Museum, London.

In this essay series,¹⁾ I discuss the exhibition of full-sized models of extinct animals in open (sometimes roofed) areas, which were generally called 'dinosaur parks', in Europe, the United States and Japan. Along with dinosaur parks managed independently, the ancient animal dioramas managed by larger facilities, such as zoological gardens, museums and amusement parks, like the geological section at the Crystal Palace Park in Sydenham (1854), are highlighted in this series. I focus on the process of producing these exhibits and exhibit designs. Furthermore, the cultural backgrounds of these exhibitions are examined because they were intimately related to scientific and religious arguments of the time, technological developments, political movements (e. g. imperialism) and historical events, such as wars. In addition, this series also covers science fiction narratives featuring dinosaur exhibitions, such as the novel *Jurassic Park* (1990) and its film version (1993).

Although dinosaur parks are usually considered attractions for children, I noticed their uniqueness during my previous research on zoological gardens and aquariums. Above all, the Hagenbeck's famous animal park in Hamburg-Stellingen (1907) and the Higashiyama Zoo (1937) in Nagoya—both of which started displaying dinosaur models adjacent to living animal enclosures shortly after their opening—gave me impetus to consider what motivated the producers in those days to host such exhibitions.

Exhibiting models of extinct animals was a serious endeavour, particularly at a time when there was little information on the ancient world. Nevertheless, some dinosaur parks, including the first park at Sydenham, were rather remarkable: they entertained visitors by recreating *lost landscapes* that included animals, vegetation, geological formations and a variety of landforms. Such an undertaking required more imagination than it does to represent the natural world today.

This essay series also discusses the limitations faced by dinosaur park exhibits. Without the ability to resurrect extinct animals from their DNA, it is impossible to exhibit living animals at dinosaur parks. Nevertheless, dinosaur parks can rival other animal attractions by applying both traditional techniques and cutting-edge technologies, such as augmented reality, and by creating a variety of ‘worlds’ that have been lost to the distant past.

The first part of this series focuses on the geological section of the Crystal Palace Park. This section has also been referred to as the ‘Geological Department’, ‘Antediluvian Department’, ‘Geological Islands’, ‘Geological Restorations’ and ‘Geological Illustrations’ and regarded as the predecessor of dinosaur parks. For this section, Sculptor Benjamin Waterhouse Hawkins (1807–1894), with the assistance of the comparative anatomist Richard Owen (1804–1892), produced life-size models of extinct animals, which, at the time, were often termed as ‘antediluvian monsters’. My examination is based on contemporary documents (1853–1855) and extant research. The origin and design of the geological section is outlined in Chapter 1. The reason why they designed the dinosaur models to resemble large mammals, such as elephants or rhinoceroses, is explained in Chapter 2, which references the works of Adrian J. Desmond (1979), James Secord (2004) and Hugh S. Torrens (2012). In Chapter 3, I explore the exhibit design of the geological section in detail. Its cultural contexts and meanings are also examined by drawing on research by Nancy Rose Marshall (2007), Alexis Dworsky (2011) and Alison Laurence (2019).

1. The Geological Section at the Crystal Palace Park

1.1. The New Crystal Palace Reopened at Sydenham

The Crystal Palace, an edifice made of glass and iron, was originally

built by architect Joseph Paxton (1803–1865) for the Great Exhibition (1851) held at Hyde Park, London. After the exhibition, a group of men planned to relocate this ‘first wonderful example of a new style of architecture’²⁾ to Sydenham, which is easily accessible from London, and found the private Crystal Palace Company.

The objective of the relocated palace was to display the marvels of art and science. Architectural works from different time periods and countries were faithfully restored and exhibited alongside casts of sculptures and industrial products. Figures of native people and taxidermised animals from around the world were also placed in the palace. The extensive outdoor park included gardens of Italian and English styles and the geological section with models of ancient animals.

The first column was raised on 5 August 1852 by Samuel Laing, the chairman of the Crystal Palace Company and the Brighton Railway Company. A new rail line between London and Sydenham was constructed to bring visitors directly to the Crystal Palace with the help of powerful engines. The new Crystal Palace was opened on 10 June 1854, and Queen Victoria and 40,000 visitors attended the opening.³⁾

It is unclear who conceived of constructing a geological section. Peter Doyle states that Paxton, who was responsible for constructing the Crystal Palace Park, was most likely the originator of the idea because he had experience in constructing geological illustrations, such as the rockwork representing The Strid (in Yorkshire) at the Birkenhead Park.⁴⁾ All the exhibits at the Crystal Palace, including the geological section, had to be picturesque and in harmony to avoid ‘the monotony that attaches to a mere museum arrangement, in which glass cases are ordinarily the most prominent features.’⁵⁾ Following the theory of Swiss pedagogue Johann Heinrich

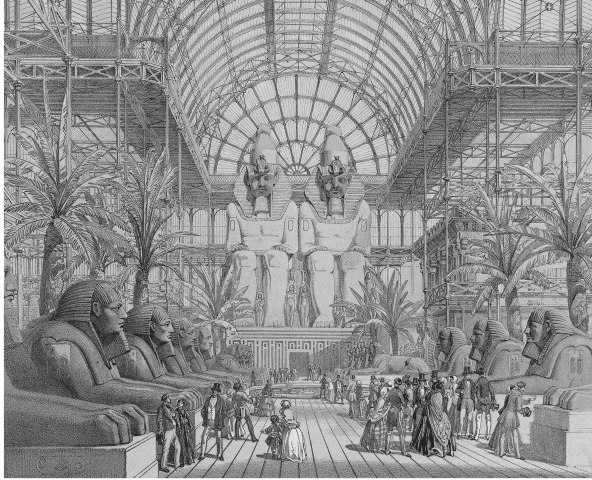


Figure 2. Inside view of the new Crystal Palace at Sydenham (Wyatt, M. Digby. *Views of the Crystal Palace and Park Sydenham: From Drawings by Eminent Artists, and Photographs by P. H. Delamotte*. London: Day and Son, 1854, Plate IV)

Pestalozzi, directors expected visitors to intuitively learn about scientific subjects by *beholding* them.⁶⁾ Hawkins was hired to visualise the ‘antediluvian monsters’ based on his previously recognised work creating animal paintings and sculptures, which he had produced for the Biddulph Grange Garden, Earl of Derby’s menagerie, Zoological Society of London and more.⁷⁾ Furthermore, directors of the Crystal Palace Company asked Gideon Mantell (1790–1852), a palaeontologist and discoverer of the *Iguanodon*, for advice regarding Hawkins’ work. After Mantell’s refusal—he seemed to have regarded that displaying models without real fossils is unscientific—the directors approached Richard Owen, who had famously coined the order ‘*Dinosauria*’.⁸⁾

On 31 August 1853, when the geological section was still under construction, the *Morning Post* claimed that it would be ‘the most astonishing

and the most attractive portion of the Exhibition'.⁹⁾ After the exhibition opened, it was written that '[d]rawings of extinct animals restored to their living forms had thus been made by several geologists, but no attempt to model the figures on the natural scale had been ventured upon until it was undertaken by Mr. Waterhouse Hawkins, for the geological illustrations of the Crystal Palace'.¹⁰⁾

1.2. The 'Antediluvian Monsters' in the Geological Section

The geological section at the Crystal Palace Park consisted of a lake with islands—two large ones and two small ones—and cliffs with exposed strata from a time long ago.¹¹⁾ The lake's water level was changed during the playing of park fountains, and it mimicked the rising and falling of the tide.¹²⁾ These islands and cliffs were intended to represent specific epochs of the ancient world: the Primary, the Secondary and the Tertiary. The Primary Period covers the Palaeozoic Era and older ages, and the Secondary Period corresponds to the Mesozoic Era, whereas the Tertiary Period conforms to the Cenozoic Era.¹³⁾ In this essay, I examine the exhibitions of the geological section by working backwards from the most recent to the earliest epochs in accordance with the collective image of 'time travel' from the Victorian era.

One of the large islands, called the Tertiary Island, was populated with models of extinct mammals belonging to the genera *Palaeotherium*, *Megatherium* and *Megaceros* (Irish Elks) as well as two species of genus *Anoplotherium* (*A. commune* and *A. gracile*).¹⁴⁾ The *Palaeotherium* resembled the present-day tapir. The *Anoplotherium commune* was the herbivorous animal living in the water similar to the otter, and the *Anoplotherium gracile* resembled the gazelle today, whereas the *Megatherium* was the giant sloth found in South America.¹⁵⁾ Originally, there were plans to reconstruct the mammoth, mastodon, *Dinotherium* (large animal resembling elephants),

Dinornis (giant moa) and the other primeval creatures, but these plans were never brought to fruition. Shocked by the £13,729 that had been spent on geological exhibitions by the middle of 1855, the directors of the Crystal Palace Company decided to cease further construction.¹⁶⁾

Another large island, called the Secondary Island, and two small neighbouring islands represented a succession of strata—Chalk, Wealden, Oolite, Lias and New Red Sandstone—from the epoch primarily dominated by reptiles. Each stratum was combined with characteristic animals having flourished when it was formed; the Chalk, representing the period of Upper Cretaceous, was laid at the northern end of the Secondary Island, and there were models of the *Mosasaurus* and *Pterodactylus cuvieri*; the Wealden (Lower Cretaceous) with the *Iguanodon* and *Hylaeosaurus* followed the Chalk; the Oolite (Middle and Upper Jurassic) was combined with the *Megalosaurus* and *Pterodactylus bucklandii*; on the shore of small islands representing Lias (Lower Jurassic), three species of *Ichthyosaurus*, three species of the *Plesiosaurus* and one species of the *Teleosaurus*, which resembles the gaviol of the Ganges, were displayed; and the southern end of islands comprised the New Red Sandstone (Triassic) that was inhabited by two species of the *Labyrinthodon* and one species of the *Dicynodon*.¹⁷⁾

These animal models represented the 'typical' form and behaviour of the original animals; their appearances, however, slightly differed from the images we hold of them today. For example, there was a massive model of *Megalosaurus* standing on four legs; currently, however, it is depicted as a bipedal creature that walks on long hind legs. One of the *Iguanodon* stood in a manner similar to a rhinoceros, and another lay on its belly (Figure 3). While *Iguanodon* was clearly regarded as a herbivore and *Megalosaurus* as a carnivore, the heavily armoured *Hylaeosaurus* was considered to be an

omnivore that 'devoured flesh with his vegetables'.¹⁸⁾ Today, it is regarded as a herbivore similar to an ankylosaur. These three species were newly categorised as dinosaurs by Owen.¹⁹⁾



Figure 3. Iguanodons reconstructed by Waterhouse Hawkins
(Photographed by the author, 2016)

Remarkably, the ancient cycads restored by Hawkins were placed alongside dinosaurs.²⁰⁾ Vegetation is also strongly featured as part of the geological section, suggesting that producers intended to offer several images of the different worlds of the distant past.

Hawkins reconstructed some species from the *Pterodactylus* genus of flying reptiles, which were 'rather a monstrosity, than a monster', while demonstrating their various abilities. An article in *Hogg's Instructor* (Vol. II, January–June, 1854) describes them as follows: 'One is seen as if about to plunge into the water; another running like a bird upon the ground; a third,

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suspending itself by its claws from the face of a rugged cliff; while a fourth is seen crouching with its wings spread, as if about to mount into the air'.²¹⁾ Visitors also could view models of aquatic animals belonging to the *Mosasaurus*, *Ichthyosaurus*, *Plesiosaurus* and *Teleosaurus* genera searching for prey or basking on the shore.²²⁾ The Triassic batrachians, *Dicynodon* and *Labyrinthodon*, were reconstructed based on very limited fossils; the former incorporates 'the properties of the lizard and tortoise, with a large tusk on each side of the mouth', and the latter is 'similar to frogs, giving a countenance to the frog to become as large as a bull'.²³⁾

In addition, the cliffs featuring strata from the Primary Epoch were constructed on the bank of the lake facing the islands. They were planned by geologist David Thomas Ansted and constructed by James Campbell, a mining engineer.²⁴⁾ A part of cliffs demonstrated the Coal Measures and contained layers of coal and ironstone as well as 'faults' that imitated those of Clay Cross, Derbyshire.²⁵⁾ Next to this was an exposed Limestone Formation with veins and 'a reduced model of a lead mine, illustrating the characteristics of the lead mines near Matlock'²⁶⁾ in the same region. '[A] small shaft has been constructed, with a number of miners' implements exhibited, including, at the mouth of the shaft, a windlass, technically called a *stoce*'.²⁷⁾

The Old Red Sandstone at the bottom of the cliffs represents the oldest period of the earth. According to Doyle and Eric Robinson, there were plans to restore older formations, too; however, they were never executed.²⁸⁾ The New Red Sandstone, which was located at the southern end of the Secondary Island, covered the top of cliffs as well so that the connection of the Primary and Secondary periods could be seen.²⁹⁾

As these illustrations demonstrate, the original intention of the geological section was to exhibit the sequence of primeval epochs combining

animals, vegetation and geological formations. As described later, these elements were intentionally placed in close relation to each other to create vivid scenes of primeval epochs.

Clearly, the most impressive part of the geological section was the large dinosaurs. Although the production process of these models has been described several times in previous publications, in this essay I focus on how the designs of dinosaur parks were influenced by the cultural contexts within which they were created.

2. Dinosaurs Produced by the ‘Modern Frankenstein’

2.1. Mammalian-like Dinosaurs

As aforementioned, directors of the Crystal Palace Company requested to seek Owen’s advice for Hawkins’ restoration of antediluvian monsters. Their decision appears natural because Owen possessed abundant knowledge on fossilised animals and had founded the new order of ‘*Dinosauria*’, placing *Iguanodon*, *Megalosaurus* and *Hylaeosaurus* in it.

According to Owen’s ‘Report on British Fossil Reptiles: Part II’ (1842), the term *Dinosauria* is a combination of the Greek words ‘*δεινός*’ (meaning, ‘fearfully great’) and ‘*σαῦρος*’ (meaning, ‘a lizard’).³⁰⁾ The features he originally gave to dinosaurs that were particularly important included ‘a large sacrum composed of five ankylosed vertebræ of unusual construction’ and ‘bones of the extremities’ whose characteristics ‘more or less resemble those of the heavy pachydermal Mammals [like rhinoceros]’.³¹⁾

Owen established the dinosaurian order and emphasised its characteristics; however, in this process, he did not merely describe recent scientific discoveries. As Desmond writes, ‘He did not simply recognize dinosaurs, giving taxonomic expression to the “objective” fact; more properly,

he designed them—invented them, in a sense—paradoxical as this may sound.³²⁾ Owen, who supported the Anglican Church as a natural theologian and believed that all animals were created by God³³⁾, conceived this new category of ‘fearfully great lizards’ to refute the claims of evolutionist Robert Edmond Grant (1793–1874).

Grant was a professor at the University College London, and he was regarded as the British successor of the great French comparative anatomist Georges Cuvier (1769–1832). His theory of evolution differed from that of Charles Darwin, who later asserted that natural selection was the cause of the transmutation of animals. Modifying the theory of a French naturalist Jean-Baptiste Lamarck (1744–1829), Grant insisted that life ‘ascends’ from the simplest form to a more perfect form (i.e. mammals, especially humans), and that this unilinear progress could be seen in the fossil record.³⁴⁾

However, such a theory seemed potentially dangerous in the eyes of Owen because Grant ‘took over not only Lamarck’s approach to evolution and rejection of divine influences on the development of life but also the idea of revolution. [...] The revolution was, for conservatives like Owen, the nightmare which would ruin society’.³⁵⁾

To overturn his rival’s theory and remove him as an obstacle, Owen stressed that extinct dinosaurs possessed sophisticated bone structures like mammals. Therefore, the body shape of dinosaurs as described by Owen resembled rhinoceroses and elephants: they were described as standing upright on their legs, which was unlike reptiles that crouched on bent legs. Owen also wrote that the *Megalosaurus* and *Iguanodon* ‘must have played the most conspicuous parts, in their respective characters as devourers of animals and feeders upon vegetables, that this earth has ever witnessed in oviparous and cold-blooded creatures’.³⁶⁾

Moreover, he suggested that they possessed a four-chambered heart and enjoyed 'the function of such a highly-organized centre of circulation in a degree more nearly approaching that which now characterizes the warm-blooded Vertebrata'.³⁷⁾ This was also Owen's strategy for refuting Lamarckian theory, as Lamarck had argued that warm-blooded mammals were more evolved than cold-blooded reptilians, which have a heart with just one ventricle.³⁸⁾



Figure 4. The Megalosaur at the Crystal Palace Park
(Photographed by the author, 2016)

In his report, Owen emphasised that other ancient animals, such as *Labyrinthodon*, were perfectly structured from the beginning. Moreover, he argued that the structure of *Ichthyosaurus* remained almost unchanged during its existence and did not appear to have evolved into another species.³⁹⁾ While admitting that progressive changes could be discerned within a single class—

such as how the embryo of the present-day crocodile takes the ancient form in its earlier stage—Owen refuted step-by-step ‘ascendance’ from one class to another. Owen asserted that the great lizards were suddenly introduced to the earth by the creator’s hand and did not evolve into ‘higher’ forms. In contrary, they declined. Owen wrote, ‘The Saurian order was anciently represented by Reptiles manifesting the Crocodilian grade of organization under a rich variety of modifications and with great development of bulk and power: it has now subsided into a swarm of small Lacertians.’⁴⁰⁾

According to Torrens, Owen’s dinosaurs also served to attack his other rival: Gideon Mantell. Mantell was the discoverer of *Iguanodon*, and he was also considered to be another potential ‘British Cuvier’.⁴¹⁾ In his report, Owen criticised Mantell’s method for calculating the size of *Iguanodon*, dramatically shortening it from over 70 feet to 28 feet. According to Owen, Mantell and others were misled by ‘the exaggerated resemblances of the *Iguanodon* to the Iguana’.⁴²⁾ It had been common to calculate *Iguanodon*’s size by applying the proportion of an iguana. This ‘mistake’ was made because of the resemblance of the two species’ teeth. However, Owen suggested that the size of a dinosaur should be calculated from the size and number of its vertebrae instead of imagining *Iguanodon* to be some kind of huge iguana.⁴³⁾ Owen demonstrated a sort of *iaidō* in the field of palaeontology; flashing his deadly sword, he cut Grant and Mantell down.

On the advice of British Cuvier the Third, Hawkins restored the dinosaurs to their ‘appropriate’ sizes, giving them four straight legs and emphasising their mammal-like character. Additionally, other primeval reptiles, such as ichthyosaurs, were modelled to showcase their elaborate structure, which was endowed by God.

2.2. Benjamin Waterhouse Hawkins, or the 'Modern Frankenstein'

However, as Secord emphasised, Hawkins did not always follow Owen's advice. Secord wrote, 'The iguanodon, for example, had the overall body shape and short tail described by Owen, but the scales, grasping forearms, and long prehensile tongue were suggested by Mantell. Most notoriously, its nose sported a horn, a feature Owen dismissed but Mantell and most other geologists thought likely'.⁴⁴⁾ In addition, the large hump of the *Megalosaurus* was derived from Hawkins' original interpretation.⁴⁵⁾ It was widely recognised that Hawkins was a talented person who possessed both scientific knowledge and artistic sense. Owen wrote in his guidebook that 'science, art, and manual skill' were 'happily combined' in him.⁴⁶⁾ A newspaper article also praised his talent, writing, '[I]ndeed, the combination of great industry, unwearied thought, extensive knowledge of natural history—not merely from book but of the living creatures themselves—added to a great creative faculty must be awarded to Mr. Waterhouse Hawkins for the resuscitations already completed'.⁴⁷⁾

Hawkins' own expertise should not be underestimated. Except for some genera, such as *Ichthyosaurus* and *Plesiosaurus*, only limited fossils of ancient reptiles had been discovered at that time. Therefore, he strove to gather all available information to help him complete 'a total fabrication'⁴⁸⁾ of these ancient reptiles. Between Owen and Hawkins, there were friendly, but tense relations. A journalist of *Morning Chronicle* noted that Owen served as a 'frame' limiting Hawkins' imagination, writing,

Their [ancient animals'] forms and dimensions, fabulous and unnatural as they appear at first sight, are, nevertheless, upon the authority of Professor Owen, who has given to the progress of the works the benefit of

his criticism and advise, within the strict limits to which Mr. Hawkins would have been authorised to carry his creative and constructive genius.⁴⁹⁾

It is not surprising that Owen tried to keep distance from some of Hawkins' (and Mantell's) interpretations.⁵⁰⁾ He noted in his guidebook that Hawkins took 'upon himself the responsibility of adding the trunk [of the *Labyrinthodon* and *Dicynodon*] to the known characters of the head',⁵¹⁾ and commented that the horn on the iguanodon's nose was 'more than doubtful'.⁵²⁾

Dinosaurs at the Crystal Palace Park were, after all, a patchwork of body parts supplied by several men. And through this patchwork construction, they came to life not unlike Frankenstein's monster—interestingly, contemporary journalists describe the models of ancient animals as 'Frankensteinic productions'⁵³⁾ and Hawkins was referred to as 'our modern Frankenstein'⁵⁴⁾ by them. In addition, his workshop (Figure 5) where he constructed dinosaurs was reminiscent of Frankenstein's laboratory. One reporter wrote, 'In a somewhat lonely corner of the garden is a large wooden house, where the resuscitations of extinct natural history are taking place, under the superintendence of Mr. Waterhouse Hawkins, and certainly will be amongst the most extraordinary of the works included in the entire exhibition'.⁵⁵⁾ The use of the words 'Frankenstein' and 'resuscitation' demonstrate that restoring ancient animals was such a bold undertaking that Victorians were reminded of Mary Shelley's famous novel.

Such characterisations of Hawkins' productions, however, did not reduce the value of his work. These models reflect not only controversies over evolution but also the interpretations of the outstanding academic and artistic men of that period. When viewed from the perspective of cultural history, they



Figure 5. The Workshop of Waterhouse Hawkins (“The Extinct Animals” Model-Room, at the Crystal Palace, Sydenham.’ *Illustrated London News*. 31 December 1853, 600)

are clearly unique individuals.

3. Travelling Through a World Dominated by ‘Infernal Machines’

3.1. The Exhibition of the ‘Lost World’

Although the dinosaur models were an indispensable part of the geological section at the Crystal Palace, other elements must also be discussed to comprehend the overall character of this area. That is, it is necessary to consider how these ancient animals were exhibited, how this lost habitat was

reconstructed, what experiences the visitors enjoyed and what the 'antediluvian monsters' symbolised for Victorians.

I begin by examining the exhibit design of the geological section in detail. After leaving the palace, visitors walked through the Italian and English gardens eastward to the embankment called 'Grand Plateau' from which they could enjoy a panoramic view of the lost world.⁵⁶⁾ Visitors then walked along the Tertiary Island, the Secondary Island and the cliffs, which represented the Primary Epoch. This 'time travel' was described as a descending act in the aforementioned article of *Morning Chronicle*:

A portion of the island will represent the green and living surface which we now inhabit; you descend a step or two, and are landed in a region unconsecrated by the dust of Adam's descendants, and where all traces of human existence disappear—an age when the excavation of valleys in rock marble and the formation of continents was the slow and gradual work of vast and unnumbered ages. The visitor will descend still lower, pass through the vast chalk formations, crowded with shells of the thousands of types no living forms of which now exist. The next step in the downward progress will land the visitor in oolites and realms where the giant saurian and reptiles held undisputed sway.⁵⁷⁾

This descending progress continued until the visitor finally arrived in an incredibly old realm which left no traces of lives and was therefore 'older than death itself'.⁵⁸⁾ This description reflects a geological understanding of time that originates from studies of geognosy (Geognosie in German). According to Dworsky, scholars in this discipline were devoted to describing rock strata for the mining industry, and they found that each stratum was formed over an

incredible duration of time, and that younger strata lie above older strata. Thus, penetrating the earth means visiting older epochs.⁵⁹⁾

Because it was not practical to set up dioramas depicting successive periods within a vertical space, islands and cliffs were constructed to represent three epochs. As Marshall writes, 'In this way, one moved physically through the space of the display in order to comprehend the passage of geological time.'⁶⁰⁾

The water separating these landforms symbolised the uncrossable

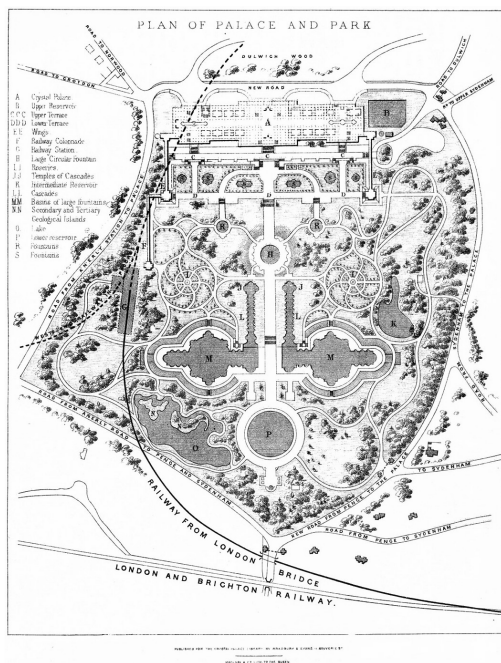


Figure 6. The 1857 map of the Crystal Palace. The lake with 'Geological Islands' lies at the lower left (*Wikipedia: The Free Encyclopedia*. 'The Crystal Palace.' <https://en.wikipedia.org/wiki/The_Crystal_Palace> 31 October 2021)

abyss between epochs. In addition, it implied a catastrophe, the Mosaic Flood, which is related with the impossibility of evolution over a long duration of time.⁶¹⁾ If an evolutionist like Grant, and not Owen, would have supervised the geological exhibit, ancient animals would likely have been placed on the united landform to illustrate a gradual transformation.

In addition, exhibiting extinct animals on islands enabled Hawkins and his co-workers to reconstruct an independent scene for each epoch in an enclosed space. Moreover, as mentioned above, the water level of the lake changed like a tide, giving the exhibit the appearance of a natural landscape. This technique was already announced in papers published in May of 1853: 'An artificial tide of five feet will be produced by pumping the water in and out of its enormous reservoir, so that the amphibious kinds will, at high water, be more or less submerged'.⁶²⁾

The scene also contained vegetation. '[T]o render the illusion more complete', a newspaper article released in October 1853 reported that the models of extinct animals would be 'surrounded by the shrubs, ferns, and brushwood which formed their habitats'.⁶³⁾ Additionally, *Illustrated London News* (31 December 1853) referred to the 'luxuriant vegetation' on the islands.⁶⁴⁾ Aforementioned article of *Hogg's Instructor* vividly illustrates the original plan of the geological section:

The islands will be [...] made to present every necessary variety of surface and aspect for placing each animal in its appropriate haunt. The vegetation of the islands, too, will be all carefully selected. Only such plants will be introduced as are allied to those which flourished during the periods to which the several animals represented belong; and, in cases where any important characteristic forms have no representatives

amongst existing species, or none that can brave our changeable climate in the open air, carefully-prepared restorations of these will also be added. Every detail of the arrangement is thus to be made subservient to the general design; and, when that design has been fully carried out, the observer will have before him the recreated monsters of the primeval world, much as they must have appeared unnumbered ages ago, when they actually lived upon the earth.⁶⁵⁾

Although these articles did not mention what kind of vegetation would be planted or restored, Owen wrote that the models of *Cycas* and *Zamia* were placed in the *Iguanodon* exhibit.⁶⁶⁾ Cycads were, as mentioned above, built by Hawkins by covering a metal frame with concrete before topping it with fronds.⁶⁷⁾

However, the illusion created by the geological landscape seemed imperfect for some viewers. After the opening of the Crystal Palace, a writer noted:

It is intended, we believe, to construct and plant an artificial vegetation, representing the tropical plants that flourished in this portion of the globe at the periods when those creatures lived, but scarcely any progress has been made with the vegetable restorations; nor does it seem practicable to surround the raised ground with water till the works are further advanced.⁶⁸⁾

However, it is the original *intention* that is important. It was not merely the exhibition of extinct animals, but the exhibition of an *ancient world* composed of animals, vegetation, landforms and strata. A lithograph (1854,

Figure 1) produced by Walter Ray Woods may offer the best image of the ideal landscape of the geological section:

The print [...] is intended to give at one view the most striking features of Mr. Waterhouse Hawkins's labours, and at the same time to convey a general idea of the scene by which he intends, when the whole plan is completed, to surround them, so that when the visitor finds himself in this part of the grounds, no object of recent construction shall either meet his eye or distract his attention from the train of thought which a combination of such objects is calculated to engender'.⁶⁹⁾

In the idealised landscape of the geological section, which is filled with plants, stands a *Megalosaurus* 'looking with a hungry and an aldermanic delight upon his less carnivorous neighbours, the Iguanodons and Hyleosaurus [sic], with a savage grin of satisfaction at the anticipation of speedily demolishing them'.⁷⁰⁾

The idea of simulating a lost landscape appears innovative when considering the exhibition style of zoological gardens at that time. The London Zoo, for instance, kept animals in classical or functionalistic buildings that contained almost no signs of their exotic origins.⁷¹⁾ Shortly after studying the Egyptian Court in the Crystal Palace in 1855, Charles Servais built an African animal house that resembled an Egyptian temple for the Antwerp Zoo,⁷²⁾ and the vast animal enclosure, which represented the natural landscape, was exhibited by the German animal dealer Carl Hagenbeck (1844–1913) much later.⁷³⁾ The characteristics of the geological section at Sydenham resembled those of aquariums displayed in the Fish House (1853) at the London Zoo, which featured a variety of aquatic creatures, including sea weeds, 'disporting

themselves in precisely the same manner as if they were still uncaptured and free in the depths whence they were borne'.⁷⁴⁾ This similarity is due to the fact that both facilities purposed to reveal distant, unfamiliar worlds.

It is not surprising that animals and vegetation were displayed together in the geological section when considering the history of geological depictions. As Martin J. S. Rudwick has suggested, geologists had already attempted to depict ancient animals in their natural habitats. For example, Henry Thomas De la Beche vividly drew extinct animals, such as plesiosaurs and flying reptiles, in the ancient landscape of Dorset (1830).⁷⁵⁾ A panoramic broadsheet (1849, Figure 7) engraved by John Emslie and published by James Reynolds illustrated primeval animals and vegetation, relating them with the

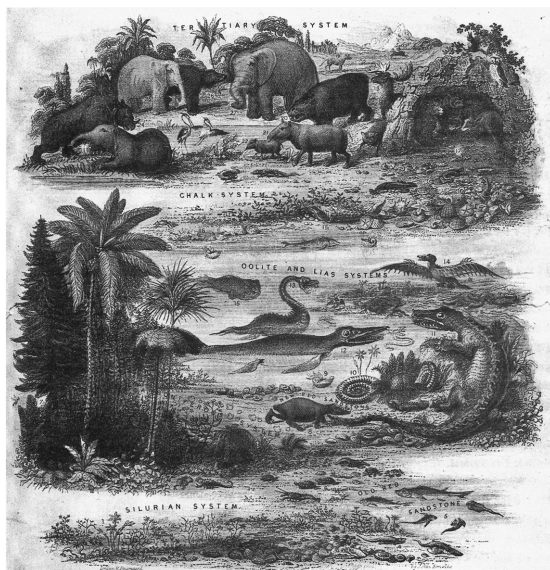


Figure 7. 'The Antediluvian World' (1849) engraved by John Emslie (Rudwick 2009, 95.)

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sequence of epochs from the 'Silurian System' to the 'Tertiary System'.⁷⁶⁾

Meanwhile, the design of the geological section had another connection to the grand concept of the Crystal Palace: its objective was to exhibit the entire history of mankind and nature. In separated 'courts' in the edifice, numerous restored artworks, including architectural works 'from the earliest dawn of the art down to the latest times',⁷⁷⁾ and sculptures were exhibited near modern industrial products. The Egyptian Court, for instance, emphasised the grandeur of Egyptian civilisation by exhibiting a tomb from Beni Hassan, a colonnade from the island of Philae, gigantic figures of the temple of Abu Simbel, the Hall of Columns from the Temple of Karnak and more.⁷⁸⁾

Notably, a section called the Ethnological and Natural Department functioned to link human history with natural history. Figures of Indigenous Peoples from all over the world were placed alongside specimens of animals and vegetation from the same regions to reconstruct their 'habitats'. Humans and animals assumed 'typical' postures: a South American jaguar was challenged by a bigger one over a dead brocket deer; a duikerbok struck back at a leopard by burying one of its horns in the body of the enemy; Indian hunters on a 'howdah' (car) attached on an elephant were depicted being attacked by a tiger getting revenge for a previous attack against another tiger.⁷⁹⁾

In the park, gardens with fountains represented 'tamed nature', while pre-Adamite (and untamed) nature was exhibited in the geological section.⁸⁰⁾ As Dworsky notes, 'The greenhouse-like transparency of the glass wall almost erased the boundary between interior and exterior space' so that 'the history of civilization was extended to the history of the earth in the exterior space'.⁸¹⁾

3.2. Monsters of the British Empire

Moreover, primeval animals were not merely relics of lost worlds. They also symbolised the scientific and industrial success of the British Empire. Alison Laurence suggests that Owen emphasised the provenance of extinct reptiles in his guidebook to the geological section. He states that *Iguanodon*, *Megalosaurus*, *Hylaeosaurus*, *Teleosaurus*, *Pterodactylus*, *Plesiosaurus*, *Ichthyosaurus*, *Mosasaurus* and *Labyrinthodon* were all found in England. Although some fossils belonging to these genera were first discovered in the continent—like that of *Mosasaurus*—they were also unearthed successively in England. The fossil of *Dicynodon* was discovered in the British colony of the Cape of Good Hope. On the other hand, ancient mammals mainly found outside of British territories were not mentioned in his guidebook.⁸²⁾

The ‘British origin’ of the primeval reptiles was mentioned in other documents, too. A reporter at *The Atlas* (20 May 1854) stated that dinosaurs ‘impress us with sentiments of profound respect for the ancient inhabitants of Kent and Sussex, who eat, drank, lived, loved, and hated, and were “shockingly human”’.⁸³⁾ Moreover, their representative, *Iguanodon*, was called ‘a true Briton’, as Edward MacDermott wrote in *Routledge’s Guide to the Crystal Palace and Park at Sydenham* (1854).⁸⁴⁾ Additionally, the Wealden Formations ‘so well known in Kent, Surrey and Sussex’, which were not very far from London, were regarded as ‘the great metropolis of the Dinosaurian orders, or the largest of gigantic lizards’.⁸⁵⁾

As described above, dinosaurs were interpreted as perfect reptiles that dominated the Secondary Epoch, and they were seen as having inhabited the very place where Britons later founded a great empire. As Dowsky writes, ‘It was therefore decided by nature—in the natural theological context at that time, by God—that the Victorian England would dominate the world’.⁸⁶⁾

In addition, the cliffs exposed geological strata, which contained mineral resources, strongly implying that the modern Englishman even has control over the past. Indeed, coal, iron, lead and limestone, which were formed in the distant past, are the materials that were utilised for constructing the infrastructure in British Isles or fuelled the expansion of Empire.⁸⁷⁾

This 'peculiar fusing of the primitive and the modern'⁸⁸⁾ in the geological section made it possible to compare antediluvian monsters with their counterparts of the 'iron age'. For example, MacDermott referred to bridges of 'the most colossal and imposing magnitude', 'the ponderous locomotives' and 'the iron *Great Britain*' (a large steamship) after describing primeval animals.⁸⁹⁾ Locomotives and steamships made using the materials from primeval periods were, figuratively speaking, the modern *Iguanodon* and *Plesiosaurus*.⁹⁰⁾

However, Marshall argues that dinosaurs, that are now extinct despite being superior, also implied the possible fall of the British Empire. Britons consume materials of the past, but the past may also eventually swallow them. Additionally, the thought of the long historical period before the appearance of humans also caused doubts regarding the belief that humans were divinely ordained to rule time and space.⁹¹⁾

3.3. The Deadly War of 'Infernal Machines'

Among extinct animals, *Megalosaurus* simultaneously embodied the sophisticated (war-)machine, unstoppable power and threats to society. It was described by MacDermott as an 'infernal machine' with teeth like 'a double row of sharp and jagged-edged scimitars' that were 'ready to crush, to cut, and to tear any creature' appearing before it.⁹²⁾

He also described an imaginary battle scene between dinosaurs in his book:

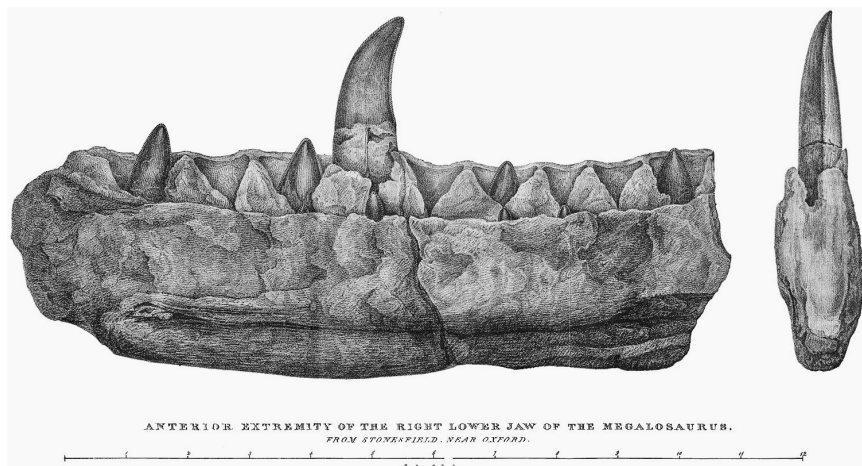


Figure 8. The lower jaw of the *Megalosaurus* from William Buckland's 'Notice on the Megalosaurus or Great Fossil Lizard of Stonesfield' (1824). (Wikimedia Commons. <https://commons.wikimedia.org/wiki/File:Buckland,_Megalosaurus_jaw.jpg> 27 November 2021)

A terrible scene it would have been to have witnessed on the sedgy banks of some old Thames or Medway the megalosaurus hobbling down to the margin of these muddy streams to slake his thirst, and to see this gigantic porcupine [*Hylaeosaurus*] slowly raising himself out of the water, cast his saurian eyes over the livid expanse in search of some object which he might drag down with him to his river den, and hear the ferocious howl and roar with which the two monsters would grapple and struggle with each other, till the dark waters were reddened with their blood, and one or both of the combatants sank beneath their wounds.⁹³⁾

Illustrating an animal fight was not uncommon even before the introduction of Darwin's concept that every life in the natural world is

struggling with each other for existence. Battle scenes of animals had already been depicted in the 18th century, and they were influenced by paintings of historical battles. One such example of an animal fight scene was *Horse attacked by a Lion* (ca. 1762) by Georg Stubbs.⁹⁴⁾ John Martin, a famous painter of disastrous spectacles, applied this approach to extinct animals and produced a mezzotint of a battling *Iguanodon*, *Megalosaurus* and huge crocodile for Mantell's *Wonders of Geology* (1838) and another mezzotint depicting a fight among aquatic reptiles for Thomas Hawkins' *Book of the Great Sea-Dragons* (1840).⁹⁵⁾ As described above, battle scenes were also featured in the Ethnological and Natural Department at the Crystal Palace.

In contrast, Hawkins did not give his models of pre-Adamite animals' aggressive postures. Although the reason is unclear, the educational intention and technical difficulties may have caused this design. It was the first attempt to construct full-sized extinct animals, and battle scenes would have made it difficult for visitors to comprehend their 'accurate' body shapes. The technical difficulty associated with the construction of full-sized monsters could have been more decisive, at least in the case of dinosaurs.⁹⁶⁾ Considering the overwhelming volume of materials used for constructing a monstrous figure, Hawkins clearly had no choice but to support them with four straight legs, particularly because he refused to use any support structures, such as trees, which could spoil their natural appearances.⁹⁷⁾ :

In the instance of the iguanodon, it is not less than building a house upon four columns, as the quantities of material of which the standing Iguanodon is composed, consist of 4 iron columns 9 feet long by 7 inches diameter, 600 bricks, 650 5-inch half-round drain-tiles, 900 plain tiles, 38 casks of cement, 90 casks of broken stone, making a total of 640 bushels of

artificial stone. These, with 100 feet of iron hooping and 20 feet of cube inch bar, constitute the bones, sinews, and muscles of this large model, the largest of which there is any record of a casting being made.⁹⁸⁾

However, he seemed to have considered creating a fight scene during the restoration. Indeed, *Hogg's Instructor* recounted, 'Whether Mr Hawkins really intends to carry out the design he showed us sketched on paper, of having two of these monsters [plesiosaurs] represented as in the heat of a deadly feud, their bodies half raised from the ground, their long necks intertwined, and, with glaring eyes, each burying its teeth in the flesh of the other, we can hardly say.'⁹⁹⁾

In his guidebook, Owen also wrote that 'the Megalosaurus was decidedly carnivorous, and, probably, waged a deadly war against its less destructively endowed congeners and contemporaries.'¹⁰⁰⁾ Did the term 'deadly war' simply refer to the relationship between herbivores and carnivores, or was it a metaphor for the collision of great powers? As described above, the fight between animals was a favoured theme in natural historical depictions, and he might have just followed this convention. However, not to be overlooked is the fact that the early 1850s, the time during which the geological section was constructed, corresponded to the period when Britain 'engaged in a war which threatens to be sanguinary and lasting one.'¹⁰¹⁾

According to Orlando Figes, the news on the Battle of Sinop (30 November 1853), at which the Russian fleet overwhelmingly defeated the Turkish fleet, infuriated the English public, who for decades had felt threatened by the expansion of Russia. In the following year, the British and French navy opened fire on Odessa, which was regarded as the base of the Russian forces, and the Crimean War, which involved new technologies like steamships,

locomotives and telegrams, escalated.¹⁰²⁾ The collision of empires was ominously similar to MacDermott's battle scenes with dinosaurs. Antediluvian monsters sometimes appeared as hostile monarchs, too. As one writer put it, 'Although he [an ichthyosaur in the geological section] could look so quiet, he was quite an Emperor of Russia in devouring his neighbours, of which he has left abundant proof in large beds of coprolites or fossil dung, containing their undigested remains'.¹⁰³⁾

Watching the dinosaurs on the Geological Islands, visitors may have thought not only of the glory of the British Empire, but also the battle of 'infernal machines' beyond the sea.

Conclusion

To represent the geological sequence of epochs and ancient landscapes in three-dimensional space for the first time, Hawkins, Owen, Ansted, Campbell and Paxton cooperated to devise a unique exhibit design that combined animal models, vegetation, islands, artificial tides and cliffs with exposed strata.

The geological section was, like other exhibits inside of the Crystal Palace, designed to enable visitors to experience unfamiliar scenery. Descending from the Grand Plateau and walking past illustrations of the Tertiary, Secondary and Primary epochs, visitors of all ages could 'time travel' through lost worlds. Even though the shapes of the dinosaurs appear somewhat odd to our eyes, the dinosaurs and the reconstructed landscapes felt *real* for Victorians. Considering the original concept of the geological section at the Crystal Palace Park, it is no exaggeration to say that it was not only the predecessor of all dinosaur parks, but also one of the best of its kind.

In the Victorian era, dinosaurs' imposing appearances, which featured

scales, spines, craws, teeth and massive legs, also represented the glory of the British Empire, which dominated international trade and colonies around the world. The exposed strata represented the industrial exploitation of resources from the pre-Adamite period and encouraged visitors to associate ‘antediluvian monsters’ with ponderous iron monsters produced for transport and military purposes. Meanwhile, ancient animals may have symbolised the collision of great powers, especially in the context of the expanding war around the Black Sea.

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Yuichi Mizoi is a professor at Kansai University, Faculty of Letters. His interests are focused on the cultural history of animal exhibitions and folktales. His recent publications include *Suizoku-kan no bunka-shi: Hito, dobutsu, mono ga orinasu majutsuteki-sekai* 水族館の文化史: ひと・動物・モノがおりなす魔術的世界 (*The Exhibition of Oceans: The Cultural History of Public Aquariums in Europe, the United States and Japan*. Tokyo: Bensei-shuppan 勉誠出版, 2018) and *Dobutsu-en: Sono rekisi to boken* 動物園・その歴史と冒険 (*Zoo: A History with Adventurous Tales*. Tokyo: Chuokoron-sinsha 中央公論

新社, 2021).

Notes

- 1) The title of this series 'Rise of Lost Worlds' was inspired by Britt Wray's *Rise of the Necrofauna: The Science, Ethics, and Risks of De-Extinction*. (Greystone Books, 2019) which thematises 'de-extinction' of vanished animals.
- 2) Phillips, Samuel. *Guide to the Crystal Palace and Park*. London: Crystal Palace Library, 1854, 13.
- 3) Phillips 1854, 12–21, 146; McCarthy, Steve and Mick Gilbert. *The Crystal Palace Dinosaurs: The Story of the World's First Prehistoric Sculptures*. n. p.: The Crystal Palace Foundation, 2019, 26–27.
- 4) Doyle, Peter 'A Vision of 'Deep Time': The Geological Illustrations of Crystal Palace Park, London.' *Geological Society London Special Publications*. 2008, 198.
- 5) Phillips 1854, 16.
- 6) Secord, James A. 'Monsters at the Crystal Palace.' Chadarevian, Soraya de and Nick Hopwood, ed. *Models. The Third Dimension of Science*. Stanford: Stanford University Press, 2004, 140–141.
- 7) McCarthy and Gilbert 2019, 13, Secord 2004, 147–148.
- 8) Secord 2004, 154–155, 158.
- 9) 'The New Crystal Palace.' *Morning Post*. 31 August 1853, 6.
- 10) 'The Crystal Palace Catalogues. The Geological Section.' *Daily News* (London). 1 July 1854, 5.
- 11) Doyle, Peter and Eric Robinson. 'The Victorian 'Geological Illustrations' of Crystal Palace Park.' *Proceedings of the Geologists' Association*. 104.3 (1993): 182.
- 12) 'The Crystal Palace at Sydenham.' *Illustrated London News*. 31 December 1853, 599, McCarthy and Gilbert 2019, 13.
- 13) Doyle 2008, 199.
- 14) Doyle and Robinson 1993, 192–193.
- 15) Rudwick, Martin J. S. *Taiko no kokei: Senshi sekai no shoki-kaiga-hyogen* 太古の光景—先史世界の初期絵画表現 (*Scenes from Deep Time: Early Pictorial Representations of the Prehistoric World*). Trans. Satoru Sugaya 菅谷暁. Tokyo: Shinhyoron 新評論, 2009, 30–36.
- 16) McCarthy and Gilbert 2019, 31, Doyle and Robinson 1993, 192, Doyle 2008, 203.
- 17) Doyle and Robinson 1993, 187–192.
- 18) 'Crystal Palace, Sydenham: Dinner to Professor Owen in the Iguanodon.' *Morning*

Chronicle. 2 January 1854, 3.

- 19) Owen, Richard. 'Report on British Fossil Reptiles: Part II.' *Report of the Eleventh Meeting of the British Association for the Advancement of Science; Held at Plymouth in July 1841*. London: John Murray, 1842, 102–103.
- 20) Doyle and Robinson 1993, 191.
- 21) 'The Geology of the Crystal Palace.' *Hogg's Instructor*. Vol. 2. January–June, 1854. n. p.: Reprinted by Pranava Books, 284.
- 22) MacDermott, Edward. *Routledge's Guide to the Crystal Palace and Park at Sydenham*. London: George Routledge & Co., 1854, 193, 197–199.
- 23) 'Crystal Palace: The Ancient World and its Denizens.' *Kentish Mercury*. 12 May 1855, 6.
- 24) Doyle and Robinson 1993, 184.
- 25) Doyle and Robinson 1993, 185–186.
- 26) Phillips 1854, 158, MacDermott 1854, 202.
- 27) Phillips 1854, 158. Entering the lead mine, visitors could enjoy a fantastic scene. 'Suddenly you will perceive an opening among the rocks, and entering therein will find a cavern, drear chill at entrance, with light shut out excepting from crannies in the rocks, whilst groping your way, the sun's rays gleam through the open space, reflecting its warm yet silvery light to all around. You then behold it lit up with glittering pendants [sic] and petrified waters, transformed by the luminaries bright beams into a garnished dwelling meet for a fairy's revel, so studded is it with ten thousand dazzling gems.' *Kentish Mercury*. 12 May 1855, 6.
- 28) Doyle and Robinson 1993, 184–185.
- 29) Doyle and Robinson 1993, 188.
- 30) Owen 1842, 103.
- 31) Owen 1842, 103.
- 32) Desmond, Adrian J. 'Designing the Dinosaur. Richard Owen's Response to Robert Edmond Grant.' *Isis*. 70.2 (1979): 224.
- 33) Dworsky, Alexis. *Dinosaurier! Die Kulturgeschichte*. München: Wilhelm Fink, 2011, 63–64.
- 34) Desmond 1979, 224–225.
- 35) Dworsky 2011, 63.
- 36) Owen 1842, 200.
- 37) Owen 1842, 204.
- 38) Desmond 1979, 226–230.
- 39) Owen 1842, 197–199.

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- 40) Owen 1842, 201.
- 41) Torrens 2012, 27–29.
- 42) Owen 1842, 142.
- 43) Owen 1842, 143–144, Torrens, Hugh S. 'Politics and Paleontology: Richard Owen and the Invention of Dinosaurs.' Brett-Surman, M. K., Thomas R. Holtz, Jr. and James O. Farlow, ed. *The Complete Dinosaur*. Bloomington: Indiana University Press, 2012, 37.
- 44) Secord 2004, 155.
- 45) Secord 2004, 155–157.
- 46) Owen, Richard. *Geology and Inhabitants of the Ancient World*. London: Crystal Palace Library, 1854, 7.
- 47) *Kentish Mercury*. 12 May 1855, 6.
- 48) Mitchell, W. J. T. *The Last Dinosaur Book*. Chicago: The University of Chicago Press, 1998, 126.
- 49) *Morning Chronicle*. 2 January 1854, 3.
- 50) Secord 2004, 157.
- 51) Owen 1854, 6.
- 52) Owen 1854, 17.
- 53) *Morning Chronicle*. 2 January 1854, 3.
- 54) 'The Crystal Palace at Sydenham.' *Northern Whig*. 4 May 1854, 1. The 'modern Frankenstein' was not, of course, the only title given to Hawkins; he was also compared with Pygmalion for whom the goddess Aphrodite breathed new life into his beautiful woman figure. Secord 2004, 148.
- 55) 'The Crystal Palace at Sydenham.' *Southern Times and Dorset County Herald*. 15 October 1853, 3.
- 56) MacDermott 1854, 189, Phillips 1854, 157.
- 57) *Morning Chronicle*. 2 January 1854, 3.
- 58) *Morning Chronicle*. 2 January 1854, 3.
- 59) Dworsky 2011, 25.
- 60) Marshall, Nancy Rose. "A Dim World, Where Monsters Dwell": The Spatial Time of the Sydenham Crystal Palace Dinosaur Park.' *Victorian Studies*. 49.2 (2007) : 293–294.
- 61) Marshall 2007, 295.
- 62) 'The Crystal Palace.' *Oxford Chronicle and Reading Gazette*. 28 May 1853, 2. This text was extracted from *Literary Gazette* issued a week before.
- 63) 'The Crystal Palace at Sydenham.' *Saunders's News-Letter*. 19 October 1853, 1.
- 64) *Illustrated London News*. 31 December 1853, 599.

- 65) *Hogg's Instructor*. 1854, 279-280.
- 66) Owen 1854, 17.
- 67) Doyle and Robinson 1993, 191.
- 68) *Daily News* (London). 1, July 1854, 5. The botanist John Lindley also criticised that placing ancient animals with modern vegetation is anachronistic. *Secord* 2004, 158.
- 69) 'The Wealdon' *Morning Post*. 26 September 1854, 5.
- 70) *Morning Post*. 26 September 1854, 5.
- 71) Guillery, Peter. *The Buildings of London Zoo*. London: Royal Commission on the Historical Monuments of England, 1993, 4-8.
- 72) Baetens, Roland. *The Chant of Paradise: The Antwerp Zoo: 150 Years of History*. Tielt: Uitgeverij Lannoo, 1993, 144-145.
- 73) Dittrich, Lothar and Annelore Rieke-Müller. *Carl Hagenbeck (1844-1913): Tierhandel und Schaustellungen im Deutschen Kaiserreich*. Frankfurt am Main: Peter Lang, 1998, 178-200.
- 74) 'The Aquatic Vivarium at the Zoological Gardens, Regent's Park.' *Illustrated London News*. 28 May 1853, 420, Mizoi, Yuichi. *Suizokukan no bunka-shi: Hito, dobutsu, mono ga orinasu majutsuteki-sekai* 水族館の文化史：ひと・動物・モノがおりなす魔術的世界. Tokyo, Bensei Shuppan, 71-73.
- 75) Rudwick 2009, 42-47.
- 76) Rudwick 2009, 91-95.
- 77) Phillips 1854, 15.
- 78) Phillips 1854, 39-45.
- 79) Phillips 1854, 106-112.
- 80) Laurence, Alison. 'A Discourse with Deep Time: The Extinct Animals of Crystal Palace Parks as Heritage Artefacts.' 2019, *Science Museum Group Journal*. 11. 10 August 2021 <<http://journal.sciencemuseum.ac.uk/browse/issue-11/a-discourse-with-deep-time/>>.
- 81) Dworsky 2011, 70.
- 82) Laurence 2019, 10 August 2021 <<http://journal.sciencemuseum.ac.uk/browse/issue-11/a-discourse-with-deep-time/>>, Owen 1854, 10-39, Doyle 2008, 201-202.
- 83) 'The Crystal Palace.' *The Atlas*. 20 May 1854, 397.
- 84) Macdermott 1854, 194.
- 85) Phillips 1854, 158-159.
- 86) Dworsky 2011, 82. Mitchell W. J. T. also suggests that dinosaurs symbolised the ruling power of British Empire: 'If the [American] mastodon was the product of individual industry in the service of a breakaway settler colony aiming to invent a past for itself,

the dinosaur was the monstrous monument of the world's largest empire at the peak of its glory and self-confidence. The great age when reptiles ruled the earth was a fitting epitome of the naturalness of the historic mission of the British empire in the modern age.' Mitchell 1998, 128.

- 87) Laurence 2019, 10 August 2021 (<http://journal.sciencemuseum.ac.uk/browse/issue-11/a-discourse-with-deep-time/>), MacDermott 1854, 200-204.
- 88) Marshall 2007, 299.
- 89) MacDermott 1854, 203.
- 90) Michael Freeman points out that Alfred Tennyson also got an image of the ancient monster, such as ichthyosaur, by watching the locomotives panting through the nightscape. Freeman, Michael. *Victorians and the Prehistoric: Tracks to a Lost World*. New Haven: Yale University Press, 2004, 141.
- 91) Marshall 2007, 295-296.
- 92) MacDermott 1854, 195-196.
- 93) MacDermott 1854, 195.
- 94) Debus, Allen A. *Dinosaurs in Fantastic Fiction: A Thematic Survey*. Jefferson: McFarland & Company, 2006, 61, Dworsky 2011, 53-59.
- 95) Rudwick 2009, 78-83, Freeman 2004, 140-141.
- 96) Dworsky 2011, 79-80.
- 97) Hawkins, Waterhouse B. 'On Visual Education as Applied to Geology, Illustrated by Diagrams and Models of the Geological Restorations at the Crystal Place.' McCarthy and Gilbert 2019, 92.
- 98) Hawkins 2019, 92.
- 99) *Hogg's Instructor*. 1854, 283.
- 100) Owen 1854, 20. Dworsky also finds that Owen's description cited here is noticeable, because employing 'war-analogy' was uncommon in scientific writings than those by popularisers. Dworsky 2011, 53.
- 101) 'An Account of the New Crystal Palace, Sydenham.' *Alnwick Mercury*. 1 June 1854, 12.
- 102) Figes, Orlando. *Kurimia-senso クリミア戦争 (Crimea: The Last Crusade)*. Trans. Toru Someya 染谷徹. Tokyo: Hakusuisha 白水社, 2017, 21-23, 225-267.
- 103) *The Atlas*. 20 May 1854, 397.