



and Nipam Patel continue with this arthropod theme in a clear and concise review of arthropod appendages in modern organisms and how evolution and development have interacted to produce such an amazing diversity of appendages in these fascinating animals. Andrew Smith contributes a detailed analysis of echinoid plate development and growth and how variation and innovation in this system shaped Palaeozoic and post-Palaeozoic echinoids very differently. In a later paper Richard Prum provides an overarching discussion on the origin and evolution of feathers using a developmental approach, with data from modern and fossil feathers.

Evolutionary analyses of morphological and functional trends form another major thrust of this volume. In a novel presentation Geerat Vermeij synthesizes the very common phenomenon in molluscs of internalization of the shell – shell envelopment – and how this phenomenon evolved repeatedly in this clade. Jenny Clack provides a critical analysis of the evidence that is available on how tetrapods emerged onto land, the understanding of which has been further enhanced by the recent discovery of *Tiktaalik* from the Canadian Arctic (Daeschler *et al.*, 2006). Providing a fitting conclusion to this volume, Dolf Seilacher renders a marvellous synthesis of the phenomenon of secondary soft-bottom dwellers.

This truly outstanding volume not only honours the work of Dolf Seilacher but very much points the way to the future for studies of form and development as a way to answer a variety of the most significant problems of evolution. In many ways it may prove as inspirational to the nascent evo-devo field as the landmark “Models in Paleobiology” (Schopf, 1972) was to the then young field of palaeobiology, or the timeless “Biotic Interactions in Recent and Fossil Benthic Communities” (Tevesz and McCall, 1983) was to the first generation of evolutionary palaeoecologists.

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Starring T. Rex – Dinosaur Mythology and Popular Culture

José Luis Sanz (2002). Indiana University Press, Bloomington and Indianapolis. 153pp. ISBN: 0253341531 \$17.95, currently on special offer: \$4.00 (paperback).

My enthusiasm for dinosaurs as a child and teenager (and adult) is evidenced today by a collection of scale models and posters, a worn out VHS cassette of Jurassic Park, and an ongoing Ph.D. in vertebrate palaeontology. So, as a self-confessed dinosaur fan, I was looking forward to reading *Starring T. Rex – Dinosaur Mythology and Popular Culture*. The book is easy to read (it was translated by Philip Mason) and well illustrated throughout with many black and white photos, movie posters,



and illustrations. Unfortunately, for a topic with so much apparent potential, it came as a bit of a disappointment in the end.

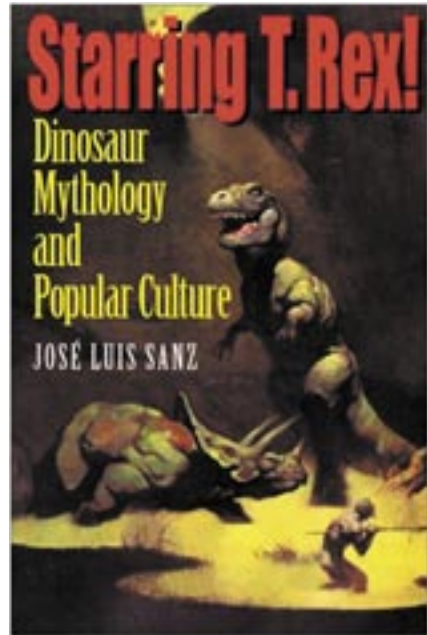
Starring T. Rex is structured in two parts (totalling 26 short chapters). The first part describes the process by which dinosaurs came to be cultural icons. This is achieved through a review of the history of dinosaur palaeontology, beginning with the first discoveries of dinosaurs in the 1800s, and ending with an overview of the current phenomenon known as ‘dinomania’. The second part of the book establishes the nature of dinosaur mythology. In general, this second section takes restorations of dinosaurs from movies, TV and literature, assessing and discussing their scientific accuracy.

Chapters 1–8 review the history of the discovery of dinosaurs and their first appearances in popular culture. Chapters 9–15 are enjoyable – they outline the various ways in which dinosaurs and humans are brought into contact in the fictional realm. This is achieved by a number of explanations (some obvious, others fantastical) involving the misportrayal of the prehistoric world (caveman living alongside dinosaurs), discovery of lost worlds, thawing out of frozen dinosaurs, time travelling, the reappearance of dinosaurs through evolution in the future or on different planets, and finally via genetic recreation. This section boils down to a list of fictional works – essentially movies, books, and television series, with a brief outline of the various dinosaur related action.

Chapter 16, ‘The extinction of the dinosaurs’, is a mishmash – the first third is pure popular science – how did dinosaurs become extinct? This is followed by some (not-so) popular culture concerning dinosaur extinction, (1) denial that they went extinct at all, and (2) fictional explanations that aliens were responsible, or at least interacted with dinosaurs. Point one brings us nicely to the next chapter...

As a plesiosaur researcher, I was particularly interested in chapter 17 – ‘Nessie and friends’. Throughout the book, a general theme is presented – that of popular culture mirroring science. This struck me as a way of dispelling cryptozoological myths. After all, if an early 20th century description of, say, a living sauropod in the Congo matches the erroneous early 20th century vision of sauropods as sluggish sea-weed munching aquatic monsters, surely the sceptic emerges victorious? The scope of this topic, and its relationship with certain religious beliefs (fundamentalist belief in recent living dinosaurs), seemed to me very worthy of deeper investigation.

Chapter 18, ‘Intelligent dinosaurs’, looks at the myth of brainy (and not so brainy) dinosaurs. Dale Russell’s infamous dinosauroid (if dinosaurs had continued to evolve to the present day, this is what they would supposedly look like – more or less a human) makes an inevitable cameo appearance,





alongside a few reviews of cartoon and TV series. Chapter 19 returns to the issue of coexistence between humans and dinosaurs. Chapters 9–15 investigated *how* the co-existence was reached; now their happy co-existence is reviewed. Following on this theme, chapter 20 investigates the nature of conflicts between humans and dinosaurs in movies. Chapter 21, 'Dinosaurs and Terror', explores the iconic scary dinosaur (in five paragraphs). We are reminded that dinosaurs are usually portrayed as monsters, but while this is, of course, a myth, this is not made clear or clarified – another under-explored chapter.

In Chapter 22, Sanz analyses the mechanical processes traditionally and currently used by movie-makers to re-create dinosaurs. The resulting dino-creations are classified into two groups – real dinosaurs and dinosauroids. The latter is subdivided into paradinosaurs (half sauropods, half theropods), sauriodynaminosaurs (living lizards decorated in plastic spines and sails), and dragodinosaurs (*e.g.* Godzilla). A clever approach to circumventing the subtleties of scientific accuracy in movie restorations is to make up fictional dinosaurs, as executed in the newest version of the movie *King Kong* (2005). The 'Venatosaurus', a slightly modified theropod, and the 'Ferrucutus', a modification on a ceratopsid dinosaur, provide examples. However, slightly modified real dinosaurs, such as these, do not fit happily into Sanz's classification of movie dinosaurs (of course, this version of the movie was released after the publication of the book). I suppose these dinosaurs fit under 'paradinosaurs', although strictly this is restricted to half-sauropod, half-theropod creatures, such as the 'Rhedosaurus' from *The Beast from 20,000 Fathoms* (1953). Appeasing the myth of the 'ferocious giant dinosaur', filmmakers combined the giant body of a sauropod with the toothy maw and vicious habits of a theropod. This is one of a frequent number of interesting tidbits throughout the book. Going back to *King Kong* these two chapters also seemed a suitable place to discuss the influence of the false myth of gorillas as ferocious monsters (not strictly dinosaur culture, I know).

Finally, Chapters 23–26 give us a peek at Godzilla and the like, explore the true myth of dragons and their possible relationship to dinosaur fossils (good stuff), and the behaviour of dinosaurs in movies (they all live in caves).

In addition to movies, which are well covered in this book, documentaries also (often inadvertently) contribute to myths surrounding dinosaurs. A most notable recent example omitted by Sanz is the BBC series *Walking with dinosaurs*. And so much other dinosaur culture seems to be missing from the book. There is no mention of dinosaurs in comic strips. Gary Larson's *The Far Side* and Bill Watterson's *Calvin and Hobbes* (there are many others), often take dinosaur myths and run with them; although one cartoon is figured, this is another missed opportunity for discussion. There is no discussion of toys or action figures. For example, I remember being appalled as a child when each dinosaur toy, carnivore and herbivore alike, possessed a mouth full of sharp bloodied fangs – such blatant (and probably intentional?) dinosaur myths result from existing ones, but also serve as a catalyst, exasperating and spreading the myth. Yet toys remain completely overlooked by Sanz. There is even no mention of *The Flintstones* or 'dino' the pet dinosaur, either in the analysis of synchrony between humans and dinosaurs in prehistoric times (chapter 9), or in the discussion of the co-existence of dinosaurs and humans (chapter 19, where pets are mentioned specifically).

One interesting point raised by Sanz is the relationship between science and 'dinomania' (chapter 8). For palaeontologists this is important because public interest fuels funding (p. 48). But, again, the surface is only scraped, leaving a number of unasked questions regarding the nature of 'dinomania'.



For example, why did dinosaur-mania blossom and not, for instance, plesiosaur-mania, mammoth-mania, or *Hallucigenia*-mania? Or does dino-mania include all these prehistoric organisms too? Or just the big ones? Or just the 'unusual' ones? Or just the Mesozoic ones? Alternatively dinomania may simply be a recurring fad as suggested by Gould (1996) – purely the result of commercialism? I don't know, and I was hoping *Starring T. Rex* would explore the subject.

At the risk of appearing pedantic, I have a few niggling points too. The figures are not linked specifically to the text, and are sometimes inexplicably cryptic. There is no distinction between the term 'reconstruction' (which applies to skeletons only) and 'restoration' (the presentation of animals as living organisms). There is an over-frequent use of wording such as 'without a doubt', 'it is clear that', 'of course', and 'obviously' throughout the book, often in cases when it doesn't (to me at least) seem quite as certain as implied. For example, on the topic of hunting for mythical monsters: "without a doubt, the search for fame has been one of the *most obvious* driving forces behind the huge amount of research carried out in Loch Ness, although, *of course*, we must also include those of human curiosity for the marvellous" [my italics]. I wonder if some of this may stem from the translation from Spanish to English. Also, a separate index or list of movies *etc.* would have been nice, maybe even with a review?

In conclusion, determining to whom this book would appeal is difficult. It raises some interesting points and discusses intriguing issues, but all too often cuts itself short. Anyone with a genuine interest in dinosaur mythology and culture (myself included) may be disappointed by the fleeting movie synopses and cultural analyses. Dinophiles may in all probability just be confirmed of what they already know. If you are looking for a review of dinosaur movies, you could preferably consult a more dedicated volume; Steven Jones' (1993) *The Illustrated Dinosaur Movie Guide* comes to mind. Plus, history of palaeontology is covered in more detail elsewhere. I'm ashamed to say I probably judged this book by its cover so my disappointment may come from my expectations. Nevertheless, I may still flick through *Starring T. Rex* on a rainy day, after I reorganise my collection of dinosaur stamps.

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The Carnivorous Dinosaurs

Kenneth Carpenter (2005). Indiana University Press, Bloomington and Indianapolis, 371pp. ISBN 0-253-34539-1, \$49.95 (hardback).

Given their popularity, both within our field and among the public, it seems surprising that this special volume on theropods was not the first Indiana University Press dinosaur book to be published. Hot on the heels of Tidwell and Carpenter's *Thunder-Lizards: the Sauropodomorph*