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TEN ESSENTIALS TO UNDERSTAND DINOSAURS.

REVIEW OF "DINOSAURS: 10 THINGS YOU SHOULD KNOW"

Dean Lomax. 2021. 120 pp. Seven Dials (Orion Publishing Group Ltd.). ISBN (Hardback) 978 1 8418 8494 3 and ISBN (eBook) 978 1 8418 8495 0.

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REVISITING *RINGOSAURUS CAUDAMIRUS* FROM THE UPPER CRETACEOUS OF PATAGONIA

Detailed description of the axial skeleton and a revised diagnosis for this taxon establishes firmly its validity.

MACROEVOLUTIONARY HISTORY OF BODY SIZE IN ARCHOSAUROMORPHS

Analysis of more than 400 species indicate increasing size after the Permian/Triassic boundary.

STEM PLATYRRHINE FROM THE MIOCENE OF PATAGONIA

A well-preserved humerus of *Homunculus patagonicus* from the Santa Cruz Formation points to a robustly built arboreal quadruped that weighed between 2.2 and 2.6 kg.

TEN ESSENTIALS TO UNDERSTAND DINOSAURS

REVIEW OF “DINOSAURS: 10 THINGS YOU SHOULD KNOW”. *Dean Lomax*. 2021. 120 pp. Seven Dials (Orion Publishing Group Ltd.). ISBN (Hardback) 978 1 8418 8494 3 and ISBN (eBook) 978 1 8418 8495 0.

Somebody might say: “ok, another dinosaur book; what’s new?”. However, Dr. Dean Lomax condensed ten of the most interesting topics about dinosaurs in a very easy-to-read contribution. “Dinosaurs: 10 things you should know” is a 120-page book focused, in my opinion, on people from curious school kids who want to go beyond movies and cartoons, to adults entering the fascinating world of the Mesozoic Era. The author himself precisely defines this contribution as “Combining the rich history of dinosaur discovery with the latest research, in this book I have carefully pieced together ten chapters which provide you with the basic essentials of everything you need to know about dinosaurs”.

But, of course, after reading this book, I have my own opinion of it, which I summarize here. The book begins by highlighting the concept of time. To do so, the author condensed the history of Earth in a timeframe of a year. This way, the reader can easily be aware of the scale of time, pinpointing that dinosaurs’ appearance on Earth took place on December 13 and the *Homo sapiens* records about 10 minutes before midnight on New Year’s Eve. A very accurate comparison the author made to understand the scale of time and the magnitude of geological time is the fact that not all dinosaurs lived at the same time; for example, the genus *Stegosaurus* is separated from *Tyrannosaurus* by 80 million years, and the latter is separated from humans by 66 million years, meaning that *Tyrannosaurus* is closer to the modern humans in time than it was to its relative *Stegosaurus*.

The second chapter is focused on the concept of space and how dinosaurs did deal with it. The author compared the present configuration of continents with the ancient supercontinent configuration during the dinosaurs’ era, giving evidence that supports the idea of Pangea in the Triassic period, followed by the split into Laurasia and Gondwana since the Jurassic Period, and successive breaks after that.

In doing so, crucial evolutionary terms are introduced, either in an explicitly or implicitly way, such as niche partitioning, adaptation and speciation. This information is presented as evidence for the question of how dinosaurs conquered the world.

The third chapter is one of my favourites because it addressed a question that is always made to paleontologists: “What makes a dinosaur a dinosaur?” several traits are listed and described as present in all dinosaurs (including living birds), which are easily recognizable in the skeleton, like the skull fenestrae and the morphology of the hips. However, maybe more important, the author specified features that palaeontologists unambiguously agree in what is not a dinosaur, such as the flying (pterosaurs) and swimming (plesiosaurs, ichthyosaurs) reptiles or even the synapsid reptile *Dimetrodon*.

The next chapter continues demystifying popular beliefs, but in this case, regarding the size of the dinosaurs. For example, contrary to what was presented in the film Jurassic Park, *Velociraptor* was not as tall as an adult human, but as big as a turkey. Not all dinosaurs were enormous, as is commonly believed. Also, this chapter mentioned dinosaurs with unusual preservation of structures, such as feathers, keratinous horns and even tiny colour pigments trapped inside fossilised skin.

Chapter five deals with the dinosaur diet. How these animals fed is one of the most exciting topics, in my view, because understanding what things they fed on, allows us to amplify our research to behavioural patterns (such as predation or scavenger) or paleoenvironmental scenarios (by studying the plants that served as food). In this regard, this chapter highlights the repertoires of studies that can be done to elucidate how dinosaurs used their feeding apparatus, such as bite force studies on *Tyrannosaurus*, or the use of three-dimensional models to recreate the masticatory movements of the jaws.

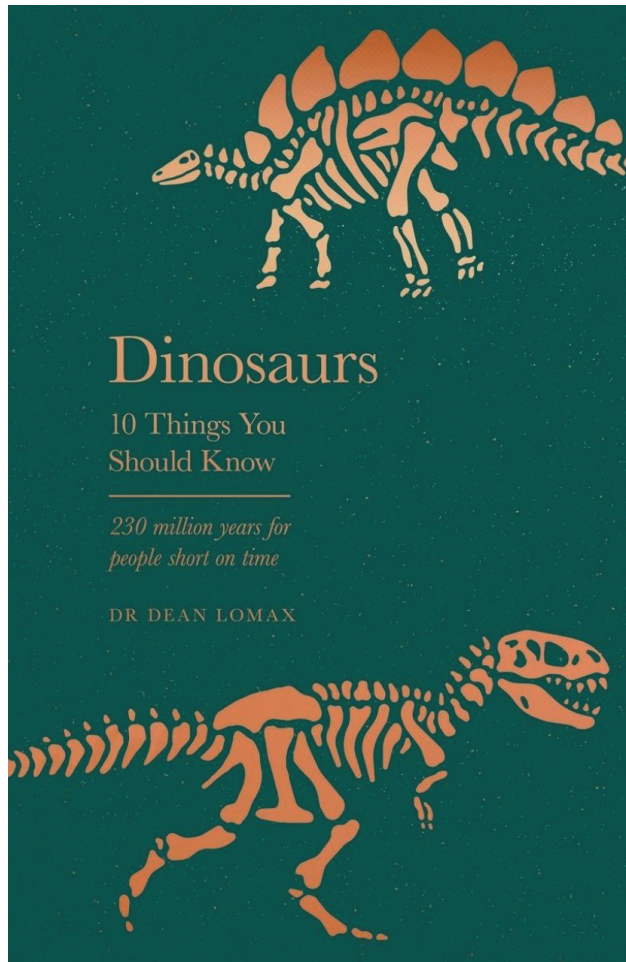


Figura 1. Cover of the book "Dinosaurs: 10 things you should know" - Orion Publishing Group Ltd.

Chapter six is about sex and mating, being, perhaps, the chapter dealing with the most speculative topic of the book since there is no direct way to know the behaviour behind mating in dinosaurs (except for the improbable preservation of a couple of dinosaurs having sex). However, the author put the finger on a critical and crucial topic related to evolution: sexual dimorphism, highlighting the importance of horns, crests and frills, as probable structures related to that. The author also compared dinosaurs with living crocodylians and birds (their closest living relatives) to infer the possible reproductive apparatus of the formers. Although a conclusive answer is not possible given, of course, Lomax speculates with the hypothesis that some reproductive features present in living archosaurs could be inferred to have existed in dinosaurs, introducing the concept of phylogenetic inference, which is a commonly used methodological approach in paleobiology.

The following chapter also speculates with dinosaur behaviour: parental care, herding and related social interactions. As with the other chapters of the book, the author focused on evidence, either direct or indirect, to arrive at his conclusions. For this purpose, Lomax introduces the concept of trackways, standing out their importance to infer specific attributes of the individual, such as how fast the trackmaker was moving, how tall it was, its walking gait and what type of dinosaur left the track behind. But trackways importance is highlighted in terms of their utility as good indicators of social interactions, since some dinosaur multi-track sites have shown that groups were either mixed age, comprising older and younger individuals, or age-segregated, implying that juveniles or young adults may have lived in exclusive groups. Finally, the author gives additional evidence for social aggregations among dinosaurs, such as bonebeds and nesting sites, giving examples for each of them.

The concept of extinction is developed in chapter eight. Starting with a brief historical background on the matter, the author highlights the common nature of extinctions throughout the life history on Earth before diving into the theory of dinosaur extinction. As an introduction to the latter topic, some weird (and funny) suggestions about it are presented, like the dinosaurs went extinct due to a lack of sex drive, mass blindness from cataracts, general stupidity, constipation, disease-carrying biting insects, or because mammals ate all of their eggs. After that, the theory of the asteroid impact on Earth is described, and its main lines of evidence presented.

Chapter nine presents evidence of birds as dinosaurs. But it is more than that. Lomax developed this chapter not only in terms of the anatomical features that link a modern bird with a Mesozoic dinosaur, but also in an evolutionary fashion. From Darwin, Huxley and Wallace, to Dobzhansky and Ostrom, the author used the iconic *Archaeopteryx* to present evidence of the linkage between modern and ancient dinosaurs, introducing the concepts of phylogeny and common ancestry.

As a conclusion, the last chapter presents the magnitude of the dinosaurian fossil record, considering the number of species already described (about 1.500) and the lots of species that were lost long before the humans appeared on Earth, not to mention the bunch of them lost in the

course of fossilisation. Finally, the author highlights some significant topics of study on dinosaurs, such as the early evolution and the not-so-probable “back to life *a la* Jurassic Park”.

In my opinion, the following editions of this book will be significantly improved with the inclusion of some non-traditional dinosaur examples, since many new discoveries have been released during the last years in regions like South America, Europe and Africa.

When talking about dinosaurs, I think this kind of book is never old fashioned. Dinosaur research is going fast, particularly during the last twenty years, in which lots of discoveries have been published, with the synergy that technology (*e.g.*, CT scans, three-dimensional modelling) and

non-traditional approaches (*e.g.*, paleohistology) provide. When I was a kid, the main discussion regarding dinosaurs was whether they walked with the tail down or lifted from the ground. We already got over that. The advancement of science challenges us with new questions, and I think this book addressed many of them in a simple language.

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