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Dance of the Cave Bear: Honouring the Scientific Legacy of Björn Kurtén

Bringing the past to life in writing — a look into Björn Kurtén's popular science literature

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Introduction to Kurtén

Björn Kurtén (1924–1988), a prominent figure in the fields of palaeomammalogy and evolutionary biology, left behind a vast body of work in writing. Besides his numerous scientific studies and research papers, he became prolific as a writer of popular science, a feature of his work that tends to be discussed in the various memorials and articles on the late professor's life and career: rightfully so, for it made his name famous across the world, with works translated into at least 14 languages (Anderson 1992). Popularising science even won him several awards in his country of birth, Finland.

"*Björn always loved writing. He was an author before he became a scientist, published his first novel when he was seventeen. When he became a palaeontologist his passion for writing never ended*", recalled Mikael Fortelius, when we met in Helsinki in late November 2023 to discuss palaeontology, and Kurtén in particular. The recently retired professor of palaeontology first met Kurtén in the early 1970s as a student attending lectures at the University of Helsinki, and later knew him for over 13 years as both a colleague and a friend. In addition to following in his mentor's footsteps as an expert on fossil mammals (although he specialised in prehistoric herbivores as opposed to carnivorans like Kurtén), Fortelius discussed Kurtén's importance as both a scientific mind and a literary wordsmith in various publications over the years (e.g. Fortelius 1997, 2014, Fortelius & Werdelin 2024).

My journey with Kurtén's visions about the prehistoric past began about six years ago, when I was studying for a master's degree with history as my major at the University of Tampere. Palaeontology and prehistoric life have always held a special place in my heart, and so I ended up choosing Björn Kurtén as the subject of my master's thesis. Prior to this I had missed Kurtén's works beyond a few passing mentions of him here and there, but the more I learned about this expert of ancient life the more fascinated I became.

Kurtén's literature played an instrumental part in this, as I read through a majority of his books with the aid of the university's interlibrary loaning, and even collected several of them for my personal bookshelf through both antiquarian and online book shops during the long road to my thesis, *Elämän lämpöä kuolleissa luissa: Näkökulmia suomalaiseen paleontologiaan ja sen kirjallisiin esityksiin Björn Kurténin kautta* (Toivonen 2022). One of the main themes I explored was Kurtén's role as a populariser of science. It was his literature that also initiated the meeting between Fortelius and myself, as I had asked for his help and requested to borrow

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a couple of Kurtén's works from his collection, as I had not been able to read them during my thesis period (afterwards I tracked down one more book with the help of Ilari Pätilä, a master's student of palaeontology at the University of Helsinki).

In this article, I go over a majority of his published books on palaeontology, in particular focusing on his popular science literature and essay collections by exploring their content and presentation. His famous palaeofictional novels are also discussed briefly from the viewpoint of popular science and as extensions of Kurtén's other works. For the original release dates, as well as title names in three languages represented by the editions I have personally encountered (Swedish, Kurtén's mother tongue and main writing language; English, his second primary writing language; and Finnish, my own first language, into which five of his books were translated), I consulted a bibliography of Kurtén's publications from the 1992 Björn Kurtén memorial volume of this journal (Werdelin 1992).

The world of the Ice Age

Of all the prehistoric periods Kurtén's research covered, the Ice Ages of the Pleistocene epoch can be well regarded as his specialty. Many of his studies focused on the mammalian fauna of this period, so it should be no surprise that he also covered the topic in many of his popular science writings. In addition to various articles and essays about the Ice Age, he wrote multiple books exploring this lost world, starting in 1964 with *Istidens djurvärld* (Kurtén 1964). In this relatively small, Swedish-only title published by Aldus, Kurtén introduces the mammalian life of Pleistocene Europe to the readers. Written in a casual yet professional manner (a trademark of Kurtén's style), the book starts by introducing the causes and chronology of the European Ice Age in a way accessible to non-experts. After this basic education, Kurtén goes through the featured fossil mammals one order and species at a time. The focus is on the groups featuring fossil humans and charismatic megafauna (Primates, Carnivora, Proboscidea, Perissodactyla and Artiodactyla), followed by an overview of the mammalian evolution and migrations during the Ice Age, as well a brief reflection about the interaction between extinct animals and early humans.

One easily overlooked element in *Istidens djurvärld* that became a recurring feature in many of Kurtén's popular works is the use of common names for the Ice Age animals. Laypeople were, of course, familiar with names for some of the more famous primeval beasts like the woolly mammoth (*Mammuthus primigenius*), the cave bear (*Ursus spelaeus*) and the "Irish" elk (*Megaloceros* [*Megaceros*] *giganteus*), but many other, more obscure species only had difficult-sounding scientific names. Starting with *Istidens djurvärld*, Kurtén not only discussed the pros and cons in the use of scientific names across his various books, he also used and established common names for many of the Pleistocene mammals for the benefit of his non-expert readers. For example, in one of his later works (Kurtén 1988d) Kurtén takes credit for coining the terms "dirk-toothed cat" and "scimitar cat" in reference to different groups of sabretooth cats. In *Istidens djurvärld* and other titles, these two are also used as common names for the genera *Machairodus* and *Homotherium*, respectively.

Also notable in *Istidens djurvärld* is the role of reconstructions. These artistic depictions of prehistoric life, also called life pictures or palaeoart, are sometimes taken for granted by readers and authors alike, which can lead to fanciful and inaccurate results (especially in popular works). Kurtén knew well how important a well-crafted, carefully considered picture was for presenting a believable extinct animal, its habitat and life style. In addition to several maps and detailed illustrations of skeletal remains, *Istidens djurvärld* features hand drawn restorations of several megafaunal species, drawn by Kurtén himself. While the drawings are somewhat crude in comparison to many of the more lavish restorations featured in later works, they are very detailed and present the animals with lifelike appearances, keeping any speculative features within the realm of plausibility. For example, the dirk-toothed cats are presented with spots in their coats, a plausible reconstruction with extant felids in mind.

Originally released in 1968, four years after *Istidens djurvärld*, *Pleistocene Mammals of Europe* (Kurtén 1968a) is one of Kurtén's major literary works that, while not a popular science book *per se*, is described in the author's foreword as being a revised edition of the earlier Ice Age title. This becomes apparent when comparing the two side by side: their content follows the same sequence of events, and *Pleistocene Mammals* even features most of the same artwork as *Istidens djurvärld*, although there are also new pictures added in. The main differences come in the *Pleistocene Mammals of Europe* featuring both an extended analysis to cover all land mammal orders (including the ones omitted from *Istidens djurvärld*) and by updating and fine-tuning a lot of the details as required for a semi-technical work. Even so, the lines between scientific technicality and informal presentation are blurred for the benefit of non-academic people, as the overall writing style contains a fair share of the informal musings familiar to long-time readers of Kurtén.

The next of Kurtén's Ice Age-centric books is the appropriately titled *The Ice Age* (Kurtén 1972c), originally released in 1969 as *Istiden* and later translated into Finnish as *Jääkausi* (Kurtén 1972a). The volume takes readers on an illustrated journey into the Pleistocene epoch. The focus is once again mostly kept on the European stage, although other regions also receive attention in the later chapters. Starting with an overview of geological time, as well as the theories and natural processes that lay the foundation for the cyclical appearance of the Ice Ages, Kurtén weaves a narrative that explores the world of advancing and retreating glaciers, traveling across various ancient habitats inhabited by a fauna of both extinct and extant species. Along the way he discusses mammalian evolution, migrations, and the life of Ice Age humans, while filling out details on key discoveries, research methods and scientific hypotheses with some subtle humour sprinkled in (notable, for example, in the caption discussing a specific cave painting of a woolly rhinoceros (*Coelodonta antiquitatis*)). The narration is supported by a plethora of colourful artwork (a rarity, for in most of Kurtén's other works the illustrations are in black-and-white), which dominates *The Ice Age* in the form of various drawings, paintings, photos and maps. The most impressive pieces, created by Kurtén's regular collaborator Margaret Lambert (alias Newman or Lambert Newman in later works), depict various scenes of Ice Age animals in their natural habitats, like a wandering cave bear in search of a wintering den in the mountains, a herd of muskox gathering together in a blizzard-swept tundra, a view of the rich megafauna along the river in Eemian Devon, UK, or a dirk-toothed cat retreating from a kill due to the arrival of a formidable short-faced hyena (*Pachycrocuta* [*Hyena*] *brevirostris*).

The Finnish edition of *The Ice Age*, *Jääkausi*, also marks the first time when one of Kurtén's books was translated into and published in Finnish (the first of his books to be published in Finland was the Swedish essay collection *Urmänniskor och sabeltigrar* (Kurtén 1961), discussed later), although it came out three years after the original release in 1972. According to Leikola (1992) this was due to economic reasons, as it took a while to find relatively cheap printing for the new edition in Hong Kong. Despite the positive reception it was also the only one of Kurtén's larger volumes to be printed in Finnish, as the only titles to follow suit were two novels and two essay collections, which were smaller, had few or no pictures in black and white, and were thus far less expensive to publish.

Of all Ice Age creatures, the one most associated with Björn Kurtén's career is the Eurasian cave bear. Besides the well-known and discussed irony of a man named "bear" making a career by studying fossil bears, there was also a practical reason for Kurtén's focus on the species. The University of Helsinki possessed a large collection of cave bear remains, collected by Alexander von Nordmann in Odessa nearly a hundred years before Kurtén's career begun, that was comprehensive enough to be subjected to a quantitative population study. During my trip to Helsinki, Fortelius took me on a visit to Kumpula Manor, a small museum near the university's Kumpula Campus that houses an exhibit displaying some of the bear fossils Kurtén researched in publications like *Life and death of the Pleistocene cave bear* (Kurtén 1958). Showcased in display cases are fossilised bones and teeth of Odesan

cave bears that died during their hibernation. The teeth, in particular, tell a story of death in the Pleistocene. As shown by Kurtén's study, the cave bear population had a high rate of infant mortality, as evidenced by the vast number of milk-teeth from cubs that perished during their first winter. This, and other information told by the fossils of Odesa (as well as other cave bear sites across Europe), formed a fascinating tale of the cave bear's lifecycle, which Kurtén eventually decided to present in a way accessible to experts and laypeople alike: enter *Björnen från Drakhålan*, a 1975 title released a year later in English as *The Cave Bear Story. Life and Death of a Vanished Animal* (Kurtén 1976).

The Cave Bear Story is, in terms of writing, one of the most engaging of Kurtén's non-fictional works. Starting with a look into the history of the bear caves and their explorers, the author speculates on the poetic awe felt by past people who entered the dark caves, and the mysteries presented by the vast number of fossilised bones they encountered. Soon afterwards, after explaining how knowledge from various scientific fields is brought together to complete a vision of prehistory, Kurtén transports the readers into the ancient past: "*And so, in a way, the past comes to life again. Reindeer course through central Europe. Mammoths trumpet. The Irish elk spreads his immense antler shovels. The wild laughter of the cave hyena is heard once more. And the bear, deep in his dark cave, is awake now. It is time to make his acquaintance.*" Following these evocative words, the book explores the cave bear in an extensive manner that combines research data with educated speculation derived from both the fossils and the behaviour of modern bears to recreate the vanished life of an extinct animal.

After discussing the appearance and features of the species, such as what the skull and dentition tell us about its senses and diet, Kurtén contextualises the cave bear by tracing its evolutionary history across the Pleistocene and presenting the world it lived in, aided by detailed drawings of the fossils, as well as Lambert's artwork of Ice Age fauna (including the cave bear reconstruction previously featured in *The Ice Age*). In the following chapters of *The Cave Bear Story,* information assembled from the caves is discussed through several different themes. For example, an analysis of the intraspecific variation and sexual dimorphism also observes the history of cave bear research and the challenges historical collections present to potential population studies. A look into the possible interaction between the extinct bears and prehistoric humans, meanwhile, studies the extent of scientific imagination with a critical review of the cave bear cult hypothesis. Following a detailed analysis about the animal's lifecycle as revealed by the fossils, as well as a survey of several interesting "substitute cave bears" (such as a British population of brown bears with cave bear-like features and the Florida cave bear (*Tremarctos floridanus*)), the story ends with a reflection of the mystery of the Pleistocene megafaunal extinction, including a deconstruction of several outdated suggestions about the end of the cave bear specifically.

In 1980 Kurtén published, with co-author Elaine Anderson, a sequel of sorts to *Pleistocene Mammals of Europe* titled *Pleistocene Mammals of North America* (Kurtén & Anderson 1980). This comprehensive major technical volume was more formal in its approach in comparison to the previous monograph, and ultimately Kurtén decided to present the tale of the Ice Age on the continent in a more accessible popular form as well. *Before the Indians* (Kurtén 1988a), the last of Kurtén's books to be released before his passing, did just that. In content, the volume follows in the footsteps of *The Ice Age* by first illuminating the chronology and theories behind the Pleistocene before moving into an anecdote-enriched expedition across the prehistoric land with its environments and wildlife, although this volume takes place solely on North American soil. Both Hubert Pepper and Lambert provided illustrations for *Before the Indians*, once again providing a visual companion for the readers stepping thousands of years into the past. Particularly impressive pieces are featured in a set of plates showcasing the diversity of Pleistocene life, from a white-tailed deer passing by a feeding American mastodon (*Mammut americanum*) in the Appalachians to two short-faced bears (*Arctodus simus*) facing off against one another in the Great Plains. In addition to the impressive array of megafauna, there is a constant presence

(in both the art and narration) of various smaller animals like rodents, mustelids, birds and reptiles that were just as much a part of the prehistoric scene as their extinct neighbours, despite being often neglected in the public eye in favour of the larger and more "impressive" creatures. The importance of palaeoart is highlighted by a section written by Lambert, describing in detail the process and research that goes into bringing the past to life on canvas.

In terms of current scientific understanding, Kurtén's popular publications about the Pleistocene world and its animal life have generally remained rather accurate when compared with depictions found in recent literature. In the year 2000, the *Tiede* magazine published an article (Kurtén & Riikonen 2000; re-released online in 2004) about Ice Age megafauna that Kurtén originally wrote and published in the early 1980s. The article also included a brief interview with Fortelius, who stated that the old text was still mostly accurate without any major errors. According to Fortelius, the big picture about the Pleistocene was already well known in Kurtén's time, and most of modern research on the subject is about ironing out specific details and using new research to test and confirm old ideas. Changing details usually have to do with classification and restoration of certain species. For example, the short-faced hyena has since been reclassified from *Hyaena* to *Pachycrocuta*, and in modern reconstructions it is depicted as resembling a spotted hyena as opposed to the brown hyena-like restorations in *Istidens djurvärld* and *The Ice Age* (e.g. Liu *et al*. 2021). However, a recent new study (Pérez-Claros 2024) instead suggested that the brown hyena should be reclassified as a member of the *Pachycrocuta*-lineage after all. Likewise, the short-faced bear was, in the past decade, reassessed in terms of appearance and habits, with the consensus being it was more generalised and "bear-like" than Kurtén's interpretation of a specialised hypercarnivore with extreme body proportions (e.g. Figueirido *et al*. 2010).

Another intriguing example of changing visions is the giant rhinoceros *Elasmotherium sibiricum*. Palaeontologists have long debated whether this huge Eurasian herbivore had a horn on its head. Kurtén, who discussed the animal in both *Istidens djurvärld* and *Pleistocene Mammals of Europe*, as well as other works, supported the traditional restoration of the rhino with a 2-meter-long horn and even referred to the species as the "giant unicorn". The matter remains unsettled, as while the unicorn-esque restoration of *Elasmotherium* is still favoured by some experts and remains prevalent in popular culture, others challenge this reconstruction. The reduction of the horn of *Elasmotherium* was supported by Titov *et al.* (2021) based on the relatively thin bone forming the dome on the frontal bones. Moreover, when I brought it up with Fortelius during a discussion about the changing views in reconstructions of prehistoric animals, he told me that in his opinion "*it did not have a horn.*"

A recurring theme in Kurtén's Pleistocene works is a feeling of loss over the prehistoric past. In his various books, the world of the Ice Age appears as a kind of a lost paradise, a rich land of amazing biodiversity that is now gone forever. Modern nature is a successor to this legacy, however, and many Ice Age animals are still with us today across the world, although the survivors are often in danger of following the likes of mammoths and cave bears into extinction. To Kurtén, modern nature was just as precious as the prehistoric past, and humans (who in Kurtén's opinion, as expressed in several of his works, were a likely key factor in the mass extinction of Pleistocene megafauna, if not the main culprits) have a responsibility to take care of our planet and preserve what remains of its diminished yet wonderful biodiversity.

At the end of *Istidens djurvärld*, Kurtén ponders whether or not the remaining Nordic megafauna will survive to thrive in the future, or if they will join their extinct relatives as "Siegfried's prey" (in reference to an early 1800s theory that the Irish elk was the identity of the "Shelk" or "Schelch" (e.g. Manias 2023) mentioned alongside the likes of European bison and aurochs (*Bos primigenius*) in the Germanic epic *Nibelungenlied*). *Before the Indians* finishes by noting that "*the mammoths and ground sloths, the saber-tooths and glyptotheres will remain shadows in the past*", and, instead of toying around with the idea of using genetic research to revive the long-dead species of the Pleistocene, humans should focus their conservation efforts

on the remaining extant wildlife. The final words of *The Ice Age* in particular feel just as poignant in the present day as they were when Kurtén wrote them decades ago: "*Where man moves in with his fires, his cattle and goats, mice and rats, disruption moves in with him. He enjoys an episode of predatory exploitation, at the end of which he is punished by diminution of his food supply and decline in his numbers. The process is now culminating on a global scale and there can be nothing more urgent than finding the way back to a sane interaction between man and his surroundings. And this, I think, is the chief moral to be gained from the study of the Ice Age*."

Across eras long past

In addition to often exploring the world of the Pleistocene, Kurtén's literature would also venture even further back in geological time to visit our planet during other periods. Two particular books in his bibliography take the approach of a journey across a long geological era, with one book exploring the Mesozoic "age of reptiles" and the other the Cenozoic "age of mammals". The Palaeozoic era has been discussed in several of Kurtén's works, usually to present a background for what would follow, but he never wrote a dedicated volume about it. The 1968 Mesozoic book called *Dinosaurernas värld*, or *The Age of the Dinosaurs* (Kurtén 1968b), was in its time one of Kurtén's most widespread works as, through international co-operation, it was published in the same year in several languages across seven European countries, including the United Kingdom, France, Spain and Italy (Leikola 1992; in Toivonen (2022) I erroneously claimed that the English edition was published in 1969). Its success was tied to the mainstream popularity of its main subject, the dinosaurs, which had by the 1960s become the most popular and recognisable of all prehistoric life in the public eye across the globe. Kurtén himself owed at least part of his passion for fossils to popular dinosaur books he read in his youth (Donner 2014), and although he ultimately specialised in Cenozoic fossil mammals in his personal palaeontological career, he would nevertheless occasionally visit the realms of Mesozoic archosaurs in his writings.

The story of *The Age of the Dinosaurs* begins, once again, through contextualising the main topic. The history of dinosaur research and the definition of dinosaur (as well as the real-life unlikelihood of finding living ones in a pulp fiction style "lost world") are explored in a pleasantly written, slightly cheerful manner, followed by an overview of the Palaeozoic era as the predecessor to the Mesozoic in terms of geology, geography and evolution of life. Afterwards, Kurtén introduces the various dinosaur families, highlighting example species from each group, while discussing their general appearance and likely living habits. Dinosaur contemporaries (including pterosaurs, crocodilians, marine reptiles, mammals, fish, invertebrates and flora) are also given an examination to provide a general picture about the Mesozoic biosphere as a whole. Distribution and migration of animals, two themes Kurtén often touched upon in his mammalian research, are explored in a survey of the changes in Mesozoic geography over the Jurassic and Cretaceous periods. *The Age of the Dinosaurs* also includes a variety of pictures, such as impressive photographs of fossil specimens, maps of the Mesozoic earth, and detailed illustrations drawn by Tamsyn Trenaman.

The Age of the Dinosaurs had been released just before the "dinosaur renaissance" of the 1960s and 1970s begun in full, and as such it leaned on many traditional views about the age of reptiles. Indeed, with modern eyes the book appears in many ways very outdated when it comes to the portrayal of Mesozoic life: the sauropods are depicted as aquatic creatures unable to remain on land for extended periods, crested hadrosaurs are claimed to have used their head ornaments for breathing underwater after fleeing from a predator, the "ostrich dinosaurs" are speculated to have become specialised egg-eaters by noting the discovery of an individual "caught red-handed" in Mongolia (likely a reference to *Oviraptor*, a dinosaur that was famously described as an egg-eater due to an association with their bones and fossilised eggs), familial care among all dinosaurs is described as virtually non-existent (ironic as later studies concluded that the "nest-robbing" *Oviraptor* was a parent protecting its nest; *see* e.g. Dong & Currie 1996), birds are classified as a separate group of archosaurs only

distantly related to dinosaurs, and the list of discussed creatures includes several names that have since been determined to be either synonyms to other genera or dubious in nature, such as *Monoclonius*, *Antrodemus* and *Phobosuchus*.

It should be remembered, however, that these views were within plausible limits for scientists at the time, as according to Leikola (1992), contemporary dinosaur experts did not have major grievances with *The Age of the Dinosaurs* upon its release. Indeed, Kurtén himself would reflect on and wholeheartedly support the radical changes in post-1960s dinosaur depictions in his later works. Furthermore, in *The Age of the Dinosaurs* he contested a prominent popular culture stereotype by claiming that the portrayal of dinosaurs as sluggish "evolutionary failures" was incorrect, as not only were there features in their physiology that suggested an active lifestyle, no animal group that survived for over 100 million years could reasonably be considered a failure.

At the end of *The Age of the Dinosaurs* Kurtén ponders the at-the-time mysterious end Cretaceous extinction, weighing different options among the various contemporary theories while also debunking some of the more outlandish suggestions. He also gives a brief overview of what came after the Mesozoic as mammalian evolution flourished to fill the ecological space left open by the disappearance of great reptiles. This very era became the main focus of Kurtén's second "era book", the 1971 title *Däggdjurens tidsålder* or *The Age of Mammals* (Kurtén 1971), a longer, more comprehensive volume that takes a slightly more formal writing style without becoming overtly technical or losing accessibility to non-expert readers. Intended as a sequel to Edwin H. Colbert's 1965 Mesozoic volume *The Age of Reptiles*, the narrative surveys the Cenozoic world one epoch at the time, starting from the Palaeocene aftermath of the Cretaceous extinction and ending the tale at the dawn of the Holocene, or as Kurtén called it, "the age of man".

The beginning of *The Age of Mammals* follows Kurtén's usual sequence by educating the reader about the basics in palaeontological work, including an explanation on the then-new methodology of using strontium values in fossils to study animal diets, an overview of the work that goes into making reconstructions, and reasoning the logic behind the creation and use of scientific names. As mentioned, the main narrative in *The Age of Mammals* follows the Cenozoic chronology while studying the changes in geography due to continental drift, the climate conditions and the resulting changes in biomes and flora, and the evolution of animals during each epoch. The focus is, as the title suggests, on mammalian radiation and diversity, showcasing a variety of families and genera ranging from iconic to obscure. As in *The Age of the Dinosaurs*, other animal groups are also covered on the side to complete the picture of what the past eras were like. South America and Australia, two continents that remained isolated for most of the Cenozoic and developed unique endemic faunas as a result, are explored in separate chapters specifically dedicated to their natural history.

As more research has taken place, the very broad major ideas regarding the Cenozoic have mostly remained since the release of *The Age of Mammals*. There have been many changes in the details, however, ranging from new knowledge about individual creatures to several wider themes, although in many cases, as with the earlier *Dinosaurs* book, many of these "errors" were common during the original release year. The dating of Cenozoic epochs has changed since the 1970s due to revisions to geological timescale, for example. As far as differences in animal depictions are concerned, Kurtén, for example, describes the giant flightless bird *Gastornis* as "*an imperious effigy of the roc-bird*" terrorising the mammals of Eocene, as was the traditional portrayal of the species for over a century. After years of debate about the validity of this restoration, an isotope study only relatively recently settled the matter by revealing the avian as an imposing herbivore (Angst *et al.* 2014). Another case in the text is *Afrochoerus*, described in *The Age of Mammals* as a giant pig from Pleistocene Africa with elephant-like tusks. This imaginative-looking creature is unlikely to be encountered in current works, for it was ultimately revealed as a chimera consisting of a mix-up of fossil suid and proboscidean remains (M. Fortelius pers. comm.).

Lambert's artwork is on full display in *The Age of Mammals*, consisting of both detailed

drawings of a variety of selected species along the main text, as well as plates featuring beautiful paintings of animals in reconstructed palaeoenvironments across various landscapes and eras. From a lush valley in Palaeocene Rockies of North America to the Ice Age tundra in Pleistocene Europe, the illustrations present a variety of mammalian life from a wallowing *Arsinoitherium* in the Fayum delta, Egypt, to a hunting *Borhyaena* against the volcanic backdrop of Santa Cruz, Argentina. A particular highlight, chosen also as the book's cover art, features a *Desmostylus* (a bizarre aquatic herbivore from an extinct order) retreating from a territorial display of an elephant seal-like *Allodesmus* bull on the Pacific coast during the Miocene.

Interestingly, in a foreword written to *On Evolution and Fossil Mammals* (Kurtén 1988b), a collection of several of Kurtén's notable research papers, George Gaylord Simpson (Kurtén's personal hero and inspiration in evolutionary biology who also became his friend) noted in a short review of *The Age of Mammals* that the reconstructions were "*attractive but a few with perhaps a bit too much artistic license*" (Kurtén 1988b). Although Simpson did not elaborate on which illustrations he was specifically referring to, a modern student of palaeomammalogy would probably agree with the notion in several cases, especially for species that fall outside Kurtén's usual Pleistocene comfort zone.

Along with, for example, an appearance by the previously discussed unicorn-style *Elasmotherium* and a rather sea lion-esque *Desmostylus*, two curiosities caught my eye among the restorations presented in *The Age of Mammals*. In the chapter dedicated to Cenozoic Australia, Kurtén discusses the debate among his contemporaries surrounding the diet and lifestyle of the marsupial lion (*Thylacoleo carnifex*). In an interesting choice the artwork depicts two different options as the animal is pictured eating plants in one portrait and meat in the other (since then, *T. carnifex* has been confirmed as a carnivore; *see* e.g. Figueirido *et al*. 2016). Another example is the restoration of a trunkless *Macrauchenia*. This enigmatic South American ungulate has traditionally been restored with an either elephant-like or tapir-like proboscis, but in *The Age of Mammals,* this view is challenged, as the animal is portrayed lacking a trunk and with nostrils on the top of its skull. In contemporary context this was a rare exception to a norm, but in recent years new studies have cast doubt on the popular proboscis reconstruction (e.g. Moyano & Giannini 2018). However, it should be noted that featured in Pleistocene rock paintings discovered in Colombia is a possible depiction of a trunk-nosed macraucheniid (probably *Xenorhinotherium*) (Morcote-Rios *et al*. 2020), so the appearance of these creatures remains a topic of debate. Some palaeoartists have reconstructed a trunkless *Macrauchenia*: Lambert's illustration of *Macrauchenia* in Kurtén's 1971 book bears a surprising resemblance to the one created by Velizar Simeonovski for Darin Croft's (2016) book about the fossil mammals of South America.

Environmental perspective and lessons to be learned from the deep time past (familiar themes from the Ice Age-focused titles) are also present in both era books. Kurtén ends *The Age of the Dinosaurs* by noting that unravelling the true nature of the Cretaceous mass extinction may "*perhaps*" be of interest to humankind, for we have only been on this planet for a fraction of the time the dinosaurs existed, and unlike the great archosaurs, we can take note of the alarming signs in the environment we live in and act on them. Meanwhile, the biodiversity of the Cenozoic appears awesome to Kurtén's eye, as the mammalian diversity of the Neogene was, in his opinion, without peer in terms of evolutionary beauty. Human activity is once again presented as a likely cause for the megafaunal extinction in the late Pleistocene while our future, despite perhaps being full of evolutionary potential according to some researchers, is uncertain: "*Perhaps, in future, man will populate other worlds besides the earth that bore him; perhaps he will reach out towards the ends of the universe. That we cannot say now. But looking back on the long panorama of Cenozoic life, I think we ought to sense the richness and beauty of life that is possible on this earth of ours, and realise that equal splendour may again be attained in the future, in new guises, under the aegis of wise and benevolent men. And we should also realise that man, who is now planning for his own or the next generation, must begin to plan also for the geo-*

logical time that is ahead of him. It may stretch as far into the future as time behind us extends into the past."

In search of human origins

In a profile of Kurtén written in *History of Physical Anthropology*, Fortelius (1997) noted that, after some early papers on the age and biogeography of fossil hominids in the 1950s and 1960s, Kurtén became increasingly entwined in the discussion surrounding our origins and the nature of humanity, despite not being a first-hand specialist in the field. The theme of human evolution and the scientific debate about our ancient past was covered by Kurtén in three dedicated popular titles released in three separate decades between the 1960s and 1980s, starting in 1963 with a Swedish-only title *Människans utveckling* (Kurtén 1963). In the foreword, Kurtén takes note of the rapidly changing landscape of palaeoanthropology, as new discoveries and studies were emerging at such an accelerated pace that most popular overviews on the matter, including his own book, were facing a risk of becoming outdated by the time of publication. This was a sentiment he also repeated in both of his later titles on the subject, which is very telling of the contemporary scientific interest towards human prehistory.

After detailing the basics and the origins of palaeoanthropological research, *Människans utveckling* takes the reader through the origins and evolution of hominids, from their mysterious and uncertain beginnings through various extinct members of the family tree leading to modern *Homo sapiens*, highlighting the ways extant human populations have been shaped by our evolutionary history. Once again fossil illustrations and jovial anecdotes are used effectively to illustrate the main points to layman readers. As noted by Fortelius (1997), Kurtén's works on fossil hominids would test the boundaries of expert consensus and challenge the status quo based on his own interpretations of the fossil material. Kurtén was well aware of this fact. In *Människans utveckling*, for example, he presents an evolutionary tree on human evolution, while noting that such a model often varies from one researcher to another, and his own will likely soon become obsolete due to new discoveries. He then proceeds to explain his personal choices for the evolutionary tree, detailing justifications for his controversial choices (mostly concerning the placement of different species and intraspecific groups in the sequence).

Nearly a decade after *Människans utveckling* in 1971 came *Inte från aporna*, known in English as *Not From the Apes* (Kurtén 1972b). Much like how *Istidens djurvärld* became the basis for *Pleistocene Mammals of Europe*, *Not From the Apes* feels like an expanded remake of its thematic predecessor (although in this case the "sequel" too remained firmly in the realm of popular science). The story begins with a list of statements concerning human evolution, such as the claim that (as expressed in the book's title in a humorous appropriation of a popular misconception about human origins) humans did not evolve from apes, but rather a shared common ancestor. This, and other claims concerning the details in human evolution and the nature of prehistoric hominids are each explored throughout *Not From the Apes*. Kurtén himself noted in the foreword that he did not set out to prove any of the claims; rather they formed during his research for the book, and many even contradicted his own previous assumptions on the subject.

The overall chronology of *Not From the Apes* follows *Människans utveckling*, divided here into four sections. The first one explores the long scientific search for "the missing link" and how it was seemingly discovered in the form of the australopithecines, as well as an updated tale on the origins and evolution of early hominids. The second takes a deeper look into the life of australopithecines by examining their native environment, evidence of early stone tools, and the physical and behavioural effects of transitioning from an arboreal lifestyle to living on the ground and walking upright. The third section studies human evolution during the Pleistocene Ice Ages, from the earliest members of *Homo* to Neanderthals and modern humans. The final part of *Not From the Apes* analyses contemporary times from an evolutionary biologist's perspective, detailing how natural selection works in modern society, such as the effects urban life, violence and drug use have on our ongoing

evolution. Kurtén's familiar wordplay is in full effect through the pages, supported by several fossil and palaeoenvironment reconstructions.

While *Not From the Apes* was in most part warmly received in its day, it did draw some criticism from anthropological experts due to certain unorthodox claims by the author (*see* Pihlström 2024). An example noted by Fortelius (1997) is Kurtén's championing (also present in *Människans utveckling*) a view that the evolutionary divergence between human ancestors and apes from a common ancestor had taken place as early as the Oligocene epoch, contending that the proposed common ancestor could be found among the primates of Fayum, and, as a result, the evolutionary line of humans had been independent for a period of tens of millions of years. According to Fortelius (1997), this theory was already on the wane when *Not From the Apes* came out and had been completely abandoned long before his Kurtén profile in *History of Physical Anthropology* came out in the late 1990s.

An important thing to note about Kurtén's palaeoanthropological popular writing is societal and historical context. Modern scientific consensus, backed up by genetic research, is that there is no basis to classify *Homo sapiens* into separate biological "races" based on alleged physical differences in skeletal and fossil remains. In Kurtén's time, however, such theories were still in use by many scientists and thus were common in available anthropological and palaeoanthropological literature. Kurtén himself discussed this topic in all his anthropological books, using now outdated ideas and terminology on human classification. Furthermore, several of his books published in the 1960s and early 1970s (including *Människans utveckling*) contain words that are rightfully condemned as racial slurs in modern discourse. These were, regrettably, at the time in common use in Finland in both academic circles and society at large. As such, a modern reader, especially one versed in the uncomfortable side of the shared history between palaeontology and anthropology (as detailed, for example, by Manias 2023), may find themselves bemused, even appalled, when going over Kurtén's older works, for in present day some of his phrasing comes across as politically incorrect at best and racially offensive at worst.

Context matters, however, and while the negative historical context of offensive language cannot be ignored, reading through Kurtén's writing it becomes very apparent that, these offensive words and phrases aside, he despised racism and in particular opposed pseudoscientific attempts at justifying racist theories and ideologies. For example, in both *Människans utveckling* and *Not From the Apes*, Kurtén deconstructs the concepts of "racial supremacy" and "racial purity" as fallacies that, besides the moral and ethical counterpoints, have no scientific ground to stand on, as he found no evidence to suggest that any "race" of humans is inherently superior to one another as far as cognitive capabilities are concerned. He further noted that any and all physical differences between human populations were simply a result of natural selection favouring certain features based on the environmental conditions (for example, skin colour being related to exposure to ultraviolet radiation), while subjects like language, culture, religion and nationality have nothing to do with our biology. Finally, he pointed out that genetic diversity through mixed heritage is healthier and more beneficial for both a single individual and the species as a whole than any imagined notion of "purity".

In addition to discussing and debunking racial prejudice in relation to modern humans, Kurtén extended humanisation to our extinct relatives as well. A particular focus on this is given to Neanderthals (*Homo neanderthalensis* or *Homo sapiens neanderthalensis* depending on classification), whom Kurtén covered in all of his anthropological books as well as many of his previously discussed Ice Age-themed titles. In the 1960s and 1970s the scientific vision of the Neanderthal had changed radically from earlier reconstructions of a savage "caveman", but the outdated image continued to live on in popular culture, much to Kurtén's chagrin. By presenting a detailed picture of these extinct people, including uncovered evidence of their cultural and possible spiritual life, he sought to challenge the fictional stereotypes seen in contemporary popular works. A more subtle example of giving fossil hominids dignity is Kurtén's attempt in *Not From the Apes* to refer to the australopithecines as "Dartians" (in honor of Raymond A. Dart),

suggesting this to be a more preferable and appropriate name for them than the one meaning "southern ape" (it did not catch on, and Kurtén himself had abandoned the term by the time of *Our Earliest Ancestors*).

The last of Kurtén's popular works centred specifically around human origins came out in 1986, originally titled *Våra äldsta förfäder* and later translated as *Our Earliest Ancestors* (Kurtén 1993). The overall sequence of events in terms of a narrative order is repeated from the previous works, although many of the details have changed due to new discoveries and research. The humour in Kurtén's narration is on this occasion punctuated further by Viking Nyström's artwork, featuring cartoonish illustrations that simultaneously evoke amusement and illuminate the discussed topics. In *Our Earliest Ancestors*, the updated review of the controversies surrounding palaeoanthropological research follows along familiar topics, discussing past research history while highlighting new discoveries and outdated assumptions (including ones Kurtén himself had previously presented in *Människans utveckling* and *Not From the Apes*, but had since come to other conclusions about in light of new evidence) on the evolutionary history of ancestral hominids. As noted by Fortelius (1997), Kurtén once again challenged established authority in *Our Earliest Ancestors* with some his views on human origins. For example, he did not classify humans within the line of African apes, although he noted their close evolutionary relationship, and the discussion on early hominids includes a serious exploration of the controversial and mostly rejected aquatic ape hypothesis.

In terms of speculation, Kurtén's views on prehistoric humans tended to evoke more backlash from colleagues in comparison to his other works, but even most of his critics would still admit the books were generally well-written. Furthermore, as always, Kurtén maintained a level of self-reflection by admitting and correcting previous mistakes on his part as new research changed the field, while simultaneously using the same rational approach to discuss and examine even his most controversial arguments. An overarching theme of Kurtén's works about palaeoanthropology is the uncertainty of our future, pondered in a slightly different guise from the environmental perspective of his other popular books. Kurtén was open in his criticism of human follies, but he also saw potential for us to learn from past mistakes and live prosperously. In various works he would reinforce his criticism of racism by making general, uncited references to fellow scientists with similar thoughts, such as agreeing with Stephen Jay Gould's view of all of humankind being equal brothers and sisters with one another (e.g. Kurtén 1972b & Kurtén 1988d): Kurtén also often referenced a similar thought by Andor Thoma, paraphrased in the final words of *Not From the Apes*, "*... not a single leaf of the great tree of mankind should be lost, for there may be a role for all of us in the future.*"

In *Our Earliest Ancestors*, after noting various potential crises looming in our future (overpopulation, environmental destruction, nuclear war) and speculating briefly on natural selection's possible effect on humans settling on other planets, he concludes, "*One thing is certain: we and our world are in a state of constant change, in the present as in the past millions of years. There is no brake and there is no turning back. The arrow of time hastens on. We have been amoeba, fish, salamander, reptile, ape, and human being; thus far everything has proceeded without human interference. Now our future lies in our hands.*"

Hominids and megafauna and dinosaurs, oh my

Many scientists have used essays as means of both exploring ideas in a less restricting manner and presenting scientific information to the public in an easily accessible manner. For example, Kurtén's friend Stephen Jay Gould published multiple essay collections across his long career (e.g. Gould 2001) and the same applied to Kurtén himself. Over the course of his career, he wrote a vast number of essays published in various magazines, newspapers and other publications in multiple languages, primarily in Swedish and English. Some of these texts were eventually compiled and re-released in compilation books. In total, three essay col-

lections were published, the latter two of them also translated into Finnish: these editions came out during the 1980s when Kurtén was finally starting to become a visible figure in his home country, and they remain the most recognisable of his non-fiction works among his Finnish readership. Each collection features essays covering various topics, often overlapping with subjects explored in his other works. The general writing style of these texts shows Kurtén free from the constraints present in the more serious technical publications, allowed to express palaeontology in a playful manner without ever losing his grasp on the matter at hand.

The first collection came out in as early as 1961, titled *Urmänniskor och sabeltigrar* (Kurtén 1961). It begins with an essay doubling as a foreword, detailing Kurtén's life on a typical "palaeontologist's workday" in 1961 going over the fossil remains of Pleistocene foxes (and other mammals mistakenly labelled as foxes) sent from Devon by a colleague (the future result of this work being one study among hundreds that together build up the faunal chronology of the Ice Age). The two following essays are loosely connected by the theme of palaeontological literature, though both take vastly different approaches. The first recounts John C. Merriam's account of his search for "the cave of the magic spring" in Tanner Creek as both an example of a thrillingly written (if romanticised) account of a palaeontological adventure, but also a demonstration of the value indigenous lore may hold for scientific discoveries, as a human skeleton found during the cave exploration matched an old folk story by the local Wintun of a lost girl falling in. The second essay takes a critical look at a recently released American popular title about human evolution, criticising several misconceptions about geology and history of geological study presented in popular works, as well as briefly commenting on the role and portrayal of science and scientists in contemporary pulp fiction.

The rest of *Urmänniskor och sabeltigrar* covers topics on palaeontological and palaeoanthropological discoveries, highlighting interesting tales surrounding the science as well as possibilities offered by new research. Most of these essays include at least one illustration, usually depicting either the fossils or a live restoration of the subject at hand. While not clearly divided in the table of contents, the remaining essays in this volume fall roughly into three groups. The first and the largest one deals with megafaunal mammals. An overview of sabretooth cats muses about the life and death of these iconic predators, while a tale of a then-recent chemical study on a preserved fur and skin of a *Mylodon* ground sloth by Martti Salmi offers potential new viewpoints for examining the Pleistocene extinctions. The Biblical tale of Jonah and the whale is humorously alluded in both the title and story of an essay about the discovery of a *Diceratherium* rhinoceros buried and preserved in lava. Also included are a history of mastodon discoveries, and the sometimes-peculiar ways they were reconstructed during the early days of North American palaeontology (such as the turtle-like "*Missourium*"), as well as highlights of research covering the Spanish *Hipparion* fauna by two of Kurtén's colleagues and friends, Miguel Crusafont Pairó and José F. De Villalta Comella.

The next and shortest section of *Urmänniskor och sabeltigrar* deals with two Mesozoic subjects, rarities in an otherwise Cenozoic-heavy collection. The first of these recounts the discovery and scientific importance of the third *Archaeopteryx* specimen while also discussing the clashes between palaeontological parties in acquiring these prized "urvogels". The other one offers a brief look into Mesozoic mammals, which at the time of publication were few in number and variety compared to current knowledge. The remaining essays are dedicated to prehistoric humans and human ancestors, taking the readers into the world of the australopithecines, showcasing the shadier side of scientific ambitions and desire for glory by examining the infamous Piltdown man hoax, offering a look into possible evidence of Neanderthal rituals, once again supporting the notion that their lives were far more complex than commonly thought; speculating about the first hominid to use fire as a tool, dubbed "Prometheus" in reference of the Greek myth about a Titan who delivered fire to humanity, and studying the Ice Age cave paintings, pondering over their original purpose and meaning, while also noting information prehistoric artists have provided to modern researchers

about what the extinct megafauna looked like in life.

The second essay collection was first released two decades later in 1981, originally titled *Hur man fryser in en mammut* (Kurtén 1981) and published soon afterwards as *How to Deep-Freeze a Mammoth* and *Kuinka mammutti pakastetaan* (Kurtén 1982a). The foreword notes that nearly all the texts within have been previously published in other publications (including the 1961 collection) and were rewritten specifically for the new volume. The foreword also touches upon a palaeontologist's imagination: where most people only see petrified and lifeless bones, Kurtén sees the warmth and spirit of bygone life. The featured essays are divided into small chapters of two or three texts, covering various topics from several themes. Some of them contain illustrations, including a couple made by Lambert and Pepper.

Theories, the backbone of science, are the main topic of the first three essays in *How to Deep-Freeze a Mammoth*. The first one explains the basics of forming a scientific theory. The second looks at the theory on plate tectonics as a case study of how the work of several researchers provided a remarkable result after a long period, while the third discusses and criticises "wrong" theories, namely those founded in pseudoscientific methods and championed in dubious manner by self-proclaimed scientific masterminds. The following two texts, in turn, provide a deep time perspective on environmental issues by examining the evidence of the flooding of the Mediterranean, and prehistoric oil-spills, both a result of continental drift. After this the next chapter moves on to the dinosaurs and the re-imagined 1980s views about them. The *Archaeopteryx* text from the previous collection makes a return, containing several new paragraphs about the growing evidence about the connection between birds and dinosaurs. In the following essay, centred around the discovery and speculated habits of the famous dromaeosaurid *Deinonychus*, Kurtén fully embraces the dinosaur renaissance by suggesting that *Deinonychus* and other similar theropods may have been feathered: a notion that was radical in the contemporary context and was confirmed years later (e.g. Xu *et al*. 2003, Turner *et al*. 2007). The third Mesozoic tale discusses the Cretaceous extinction event in a manner reminiscent of the ending of *The Age of the Dinosaurs*. In this case, Kurtén claimed that the most likely explanation for the extinction was a gradual faunal turnover due to climate change, a view he later maintained in a presentation about dinosaur reconstructions held in the last year of his life (Kurtén 1988c). The hypothesis of a meteorite impact is ultimately dismissed on the grounds of scepticism. It would take years of research and emerging evidence before the Cretaceous impact hypothesis became widely accepted in the scientific community (*see* e.g. Alvarez & Zimmer 2015).

Moving on to a chapter about fossil mammals, the next essay (curiously absent from the Swedish edition; Kurtén 1981) begins with an account of one of Kurtén's personal research trips as he recalls fieldwork in Bled Douarah, Tunisia, in the late 1960s. What follows is one of the most endearing tales in all Kurtén's tales, as he recalls the trials and tribulations faced by the crew and their local aid in their search for Miocene fossils in the North African desert. Next is a redux of the *Diceratherium* story, followed in turn by the titular account on "deep-freezing" a mammoth by detailing the natural processes necessary for the preservation of a frozen mammoth carcass in permafrost. Also discussed is scientific information provided by these frozen specimens, including Kurtén's personal belief (based on a suggestion on pigment degeneration by Kenneth Oakley) that woolly mammoths would have had blackish fur in life.

Like in *Urmänniskor and sabetigrar*, the final chapter in *How to Deep-Freeze a Mammoth* deals with palaeoanthropology. The Piltdown tale (kept in its original unedited form, according to the foreword) is followed by a look into a recent discovery in Petralona of possible evidence of the "first Europeans". The following essay about the Neanderthals details evidence about their life and culture, providing a compelling and humanising view of these Ice Age people. Kurtén was enchanted by the discovery of what appeared to be evidence of Neanderthal flower burial in Shanidar Cave, Iraq (although years later this site has been re-examined and it has been concluded that flower pollen amongst the human remains was

more likely caused by rodent activity rather than ancient burial rites; *see* e.g. Papagianni & Morse 2022). The book concludes with an extended exploration of the cave paintings, which (according to the foreword) is not a rewrite of the discussion from *Urmänniskor och sabeltigrar*, despite covering the same topic.

The third and final essay collection came out originally in 1987 as *De skuldlösa mördarna*, later released as *Innocent Assassins* and *Viattomat tappajat* (Kurtén 1988d). Featuring more illustrations than the other two collections, Nyström makes a return as the primary artist with a mix of both "serious" scientific illustrations and comical cartoons akin to the ones he created for *Our Earliest Ancestors*. Kurtén begins the volume with a poignant comparison between Dalton's atomic theory and the theory of evolution in terms of contemporary public acceptance: in Kurtén's eyes both theories are equally proven true by a solid foundation of factual empirical evidence, yet while no one has seriously challenged the validity of the atomic theory, the idea of evolution has faced (and faces) constant criticism and pseudoscientific debunking attempts. Biology and evolution are the central themes of the volume as Kurtén, in his own words, seeks not to defend the theory of evolution, but rather introduce and explore a biological view of the world around us.

Innocent Assassins is split into two sections in terms of content. The first part of the book deals with the basics of what Kurtén calls "biological thinking", while the latter explores the theme through cases chosen from the field of palaeontology. The first essays touch on the use of science in works of fiction, as the first one discusses the presentation of biology in science fiction and criticises, for example, the often monsterised and severely outdated portrayal of prehistoric life. The second section explores the biological limits of changes in size, deconstructing fictional depictions of shrunken people and giant monsters (although Kurtén notes that even scientifically implausible works of fiction can still be appealing in other ways). The remaining essays in the first half of the volume ponder the world's beauty through the eyes of a scientist, define the basics of biological thinking and evolution while clearing up common misconceptions on the topic, and illuminate the vast scale of geological time as seen in the layers of rock beneath the ground we walk upon.

The rest of the collection moves into the realm of palaeontology with an essay about the "two-dimensional" fossils of the Ediacaran fauna, a rare pre-Palaeozoic inclusion in these volumes. In a text about fossilised footprints Kurtén reaffirms his support for the reshaped view of dinosaurs, noting how trackway discoveries held a key role in debunking many of the previous assumptions (like the ones presented two decades earlier in *The Age of the Dinosaurs*) about the lifestyle of sauropods and dinosaur social life, for example. The namesake essay of *Innocent Assassins*, a spiritual expansion of a text from *Urmänniskor and sabeltigrar*, delves into the realm of the sabretooths with a look into their history, hunting style and extinction. The next tale explores the biological size limits of flying birds by highlighting the then-recent discovery of a new "champion", the South American teratorn *Argentavis magnificens*, while also noting that it too could one day be outsized in terms of wingspan by another fossil avian (which has since happened; Ksepka 2014). The possibilities of DNA-research, a field that presented palaeontology with various new opportunities, are presented in an account about the study to find the identity of the biological foremother of modern *Homo sapiens* or "Eve".

Following a rewritten and expanded version of the tale on Tunisian fossil hunting, the book concludes with a thematic callback to the deep-frozen mammoth by recounting the story of "Blue Babe", a famous mummified steppe bison (*Bison priscus*) found in Alaska. The story ends with a remembrance of a special event where a group of contemporary palaeontologists (including Kurtén himself) attended a dinner serving cooked meat from the Ice Age bison, as the author muses in jest if, by consuming the flesh of the prehistoric bovid, they had somehow briefly crossed a bridge into the past.

Thematically, the essay collections serve as a microcosm of the various subjects and themes that Kurtén covered across his other literary works, ranging from fossil mammals and prehistoric humans to dinosaurs and principles of scientific research. The connecting tissue between

all of the featured texts is Kurtén's championing of a view of the world, past and present alike, through the lens of natural sciences. Not only does the history of life provide tales and characters that rival the most fantastic of beasts created by human imagination, but knowledge gained by the study of prehistory can provide a plethora of interesting and valuable perspectives for understanding our world as it is today. Additionally, the jovial yet informative style of Kurtén's essays offers a great example of how popular publications can be used to break down the metaphorical barrier between academic researchers and the public, by educating them about the basics and applications of science in an accessible manner without either going over their heads or talking down on them.

Novels of the Ice Age

Possibly the most famous of Kurtén's literary works are two novels set in the Pleistocene Ice Age: *Den svarta tigern* (Kurtén 1978) — later translated as *Dance of the Tiger* (Kurtén 1980b) and *Musta tiikeri* (Kurtén 1982c) — and its sequel *Mammutens rådare* (Kurtén 1982c), also known as *Mammutin suojelija* (Kurtén 1984) and *Singletusk* (Kurtén 1986). These stories, centred around a fictional encounter and subsequent interactions between Neanderthals and early modern humans in the interstadial region of the modern Archipelago Sea, have been discussed and analysed in various publications from several viewpoints. In terms of popularising palaeontology, the novels were an extension of Kurtén's scientific studies and popular works, presented here in a completely new medium. As noted by Gould in the foreword of *Tiger*, a novel set in prehistory offers a new forum to introduce and experiment with ideas and scenarios in a way that would not work in a technical publication.

Likewise, Kurtén himself noted in *Dance of the Tiger* that during his career he had developed concepts about the Ice Age world that could not be presented in traditional scientific literature, hence why he chose to explore them in the form of a novel. An additional goal was related to the depiction of prehistoric humans (Neanderthals in particular) as Kurtén sought to further challenge the common popular culture depictions of savage cavemen (Kurtén 1984).

Kurtén has been credited for coining the term "palaeofiction" to describe his novels, although, as he himself was aware of and acknowledged, he was by no means the first author of this genre. As shown by Ruddick (2009), prehistoric fiction was born in the 1800s following the discovery and conceptual acceptance of fossil humans. Depending on one's interpretation (Toivonen 2022), palaeofiction can be identified as either a synonym for prehistoric fiction, encompassing every type of storytelling involving prehistory or prehistoric people and creatures; or it could alternatively, as defined by Kangasvuo (2020) whose description of palaeofiction matches what Ruddick defines as the subgenre of "pure prehistoric fiction", be used to specifically refer to works about prehistoric life set within a prehistoric period (or rather the author's interpretation of said prehistoric period).

In the afterword to *Singletusk*, Kurtén stated that to recreate the prehistoric past in writing, an author has to rely on "*facts, speculation based on the facts, and imagination.*" The same principles essentially apply to palaeontological research and reconstructions in general, and as such Kurtén extended his familiar approach to his novels as well. For the depiction of extinct megafauna, he derived inspiration from the fossil record; the most notable examples being the scene of the first novel's namesake "tiger", the scimitar cat, hunting a baby mammoth in *Dance of the Tiger* (based on the discoveries in Friesenhahn Cave, Texas), and the climactic duel between two mammoths in *Singletusk* (inspired by the famous "duelling mammoths" discovered in Nebraska (Lister & Bahn 2000), that were yet to be officially publicised when the novel came out).

A reader familiar with Kurtén's works will also recognise other familiar details in the presentation of the animals. The Irish elk is identified in the story as the "Shelk" (in the Finnish edition this has been translated as "isohirvi", literally meaning "great elk"), which is also the name used by the twin antagonists of *Dance of the Tiger*, while the woolly mammoth is once again described as being black. The colouration of the mammoth, in turn, inspired the depiction of the scimitar cat, a predator of mammoths, with

black fur as well. In addition to Pepper recreating the hunting scene from *Dance of the Tiger* in a plate in *Before the Indians* (although relocated to the northern edge of the Great Plains), in 1985 a reconstruction of *Homotherium* created under Kurtén's guidance for a museum exhibit was also coloured black, likely another nod to the novel. This black tiger continues to lurk on the premises of the Finnish Museum of Natural History in Helsinki to this day. Besides being featured in key scenes in the novels, the megafaunal beasts also provide symbolism for their human namesakes and their struggles. Tiger, the main protagonist of the first novel, envisions himself using the subtlety and feigned innocence of his namesake sabretooth in order to defeat his elk-themed nemesis, while in *Singletusk* the mutual killing of two mammoth bulls represents a permanent rift between both Tiger's children (namely the sequel's main protagonist Whitespear and his half-sister Avens) and the Neanderthals and modern humans as a whole in the aftermath of the story's tragic events.

The union of science and speculation is also present in the portrayal of Ice Age humans themselves, in particular the sympathetic depiction of the Neanderthals. While many aspects of prehistoric culture in the novels are guesswork (and there are also elements that, according to Kurtén himself, were anachronistic additions in the name of dramatic licence), the factual foundation is never forgotten and most of the speculative details are presented with a scientific basis in the foreword and afterword of both novels. For example, the chosen skin colour of both human types is explained with their geographical histories (boreal Neanderthals are depicted as white-skinned, while the dark-skinned modern humans are relatively recent arrivals from the south) and Kurtén's speculation on possible intimidation display purposes of the Neanderthal's heightened brow ridge (explored in his 1979 essay "In the Shadow of the Brow", reprinted in Kurtén 1988b) is expanded, with this feature having a prominent role in their daily social interactions.

The previously mentioned method of using a fictional narrative for exploring hypothetical scenarios is primarily represented in the subject of interbreeding between Neanderthals and modern humans: a major element in both novels is a hypothesis that not only did this interbreeding occur, but also the resulting hybrids are sterile, which (along with ethnological elements in the interactions between the two human types) is presented as a possible model to explain the extinction of the Neanderthals. While the topic of Ice Age romance has been explored in various works of fiction, Kurtén's novels take a very nuanced approach by exploring the ramifications of his chosen model, such as the societal status of the children born from intermarriage, prehistoric forms of prejudice and coexistence, as well as the idea that in the long run a Neanderthal population would have been supplanted by infertile hybrids — a notion that, in a way, feels as if the genetic benefits of mixed heritage presented in *Not From the Apes* have been twisted on their head in the ultimate form of biological tragedy.

Kurtén stated in both novels that the ideas presented in his stories, from prehistoric societies to the interbreeding model and its consequences, were ultimately speculative concepts and they did not necessarily represent his beliefs on what the interactions between Ice Age humans were like in the actual prehistoric times. As observed by Fortelius (2014), within 30 years of the release of *Dance of the Tiger* scientists were able to test the hypothesis with genetic research. Studies have found that Neanderthals did interbreed with modern humans, but only a small percentage of their genome remains within us, resulting in various contrasting views on how common this interbreeding was in practice (e.g. Papagianni & Morse 2022), one interpretation being that Kurtén's idea of sterile hybrids may ultimately hold some truth to it, pending further research (Fortelius 2014).

Conclusions

Björn Kurtén's popular works encompass a variety of topics and themes, from the cave bears and scimitar cats prowling during the Pleistocene to the age of the dinosaurs, from the mysterious origins of humanity to megafaunal biodiversity and environmental changes over the course of deep time's turning cycle and beyond. The books vary in style from technical scientific presentations to layman-friendly illustrated journeys into the

past, upbeat compendiums collecting a variety of topics from the perspective of an evolutionary biologist, and even palaeontologically constructed works of fiction set in a world thousands of years apart from us. Whatever the subject or forum, Kurtén took a professional approach grounded in scientific facts, which he maintained even in his more speculative works and suggestions. In addition to presenting scientific knowledge on the prehistoric past, he knew well how to approach his non-expert readers through a deliberate use of well-placed anecdotes and informative illustrations, often blurring the line between different genres in his presentation of prehistory.

Popular works about palaeontology may bring their author fame among the public, but they rarely offer a path to financial wealth. Fortelius told me that Finland was, and still is, a very limited market for palaeontological literature, which can be seen in the lack of larger technical and semi-technical volumes and popular books printed in Finnish, with the exception of the various dinosaur-related titles aimed at children. As an example, he brought up *Mammutin aika — elämää jääkaudella* (Björklund & Vuokko 2009), a popular work released in Finnish 15 years ago: this beautifully illustrated book, in content a spiritual successor to Kurtén's *Jääkausi*, was a commercial failure that subsequently discouraged Finnish palaeontologists from working on similar popular publications. In Kurtén's time this was in full effect, as evidenced by the economic difficulties delaying the publication of *Jääkausi*, as well as the fact that afterwards only the two 1980s essay collections and the two palaeofictional novels were published in Finnish, which in turn likely explains in part why Kurtén long remained in relative obscurity amongst the Finnish readership and only begun to make a bigger impact on them during the last decade or so of his career.

Conversely, all his books were published in his mother tongue (Swedish) from the start (including a couple of popular works that exist only in that language), which made Kurtén a well-known and familiar figure in both Sweden and among Finland's Swedish-speaking minority. This does not account for the reach of the English editions, let alone those published in German, French, Spanish, Chinese, Russian or other languages. Indeed, it is very likely that Kurtén's works, in part, inspired many later popular palaeontology works across the world, although assessing this claim would require a separate dedicated study. Likewise, future investigations could, for example, compare and contrast Kurtén's popular writings with those of his contemporaries like Stephen Jay Gould, or explore his more obscure fictional works: including his early adventure novels from the 1940s and their spiritual successor, the 1980 story *63 förstenade hjärtan* (Kurtén 1980a; in fact, *63 förstenade hjärtan* was originally an unpublished manuscript that Kurtén wrote decades earlier; Leikola 1992). I briefly mentioned in my thesis (Toivonen 2022) that an archived listing of Kurtén's early short stories (published in *Aftenposten* in 1944) contains a couple of titles related to palaeontological topics, like *Sabeltänder* ("Sabretooth") and *Neanderthalmordet* ("Neanderthal murder"), although COVID-19-related difficulties prevented a further investigation at the time.

Due to the nature of sciences and palaeontology in particular, scientific knowledge, hypotheses and theories can change extensively over time. This difference becomes apparent when, for example, comparing a dinosaur book published in the 1960s to a similar title released more recently. Many inaccuracies in Kurtén's works can seem quite amusing in hindsight with modern eyes, but one should always keep in mind their contemporary context. After all, it often takes years of research, new fossil discoveries, evolving methodology and previously unconsidered insights to bring about these changes. Conversely, several well-established theories and depictions in Kurtén's books have remained largely unaltered despite recent research, perhaps even gained stronger support because of new discoveries. Overall, Kurtén himself was very open-minded to information presented by new research and discoveries, as shown when comparing his writings across the decades. During this overview of his literature I have used examples from Kurtén's works to illustrate changes and longevity in scientific depictions of prehistory, both in comparison to each other and to modern ideas. Furthermore, while some of Kurtén's views are now

scientifically outdated and obsolete, many of the points he made, especially in relation to humanity's relationship with nature and the perspective offered by the study of geological past, are just as much relevant in the 2020s as they were at the time of writing, as the chosen quotes from his works illustrate. Additionally, in my opinion (shared by Fortelius and others I have discussed this topic with), Kurtén's books are, simply put, well-written and are pleasant to read even today.

Those interested in reading Kurtén's works or even acquiring any of the books for themselves may face a challenge in terms of availability. As far as I know, none of the Finnish editions have been reprinted following the author's death and can currently only be found in library collections or antiquaries. The Swedish editions of several publications, including most of the popular science books, all three essay collections and both novels, were reprinted in the late 2010s and were even released in ebook form, which speaks volumes of Kurtén's popularity among the Swedish readership. English editions are, in some cases, still available online, and some have been reprinted. For example, my personal copies of *The Cave Bear Story* and *Pleistocene Mammals of Europe* are reprints from 1995 and 2009, respectively. Many of Kurtén's English works are increasingly rare, however, and can have substantial pricetags attached to them. This is ironic given my earlier point about palaeontological literature not being the way to make a fortune. The irony was certainly not lost on Fortelius, who, when told about some of the current prices for Kurtén's books, smirked and gave a chuckle, "*Björn would have been amused by that.*"

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