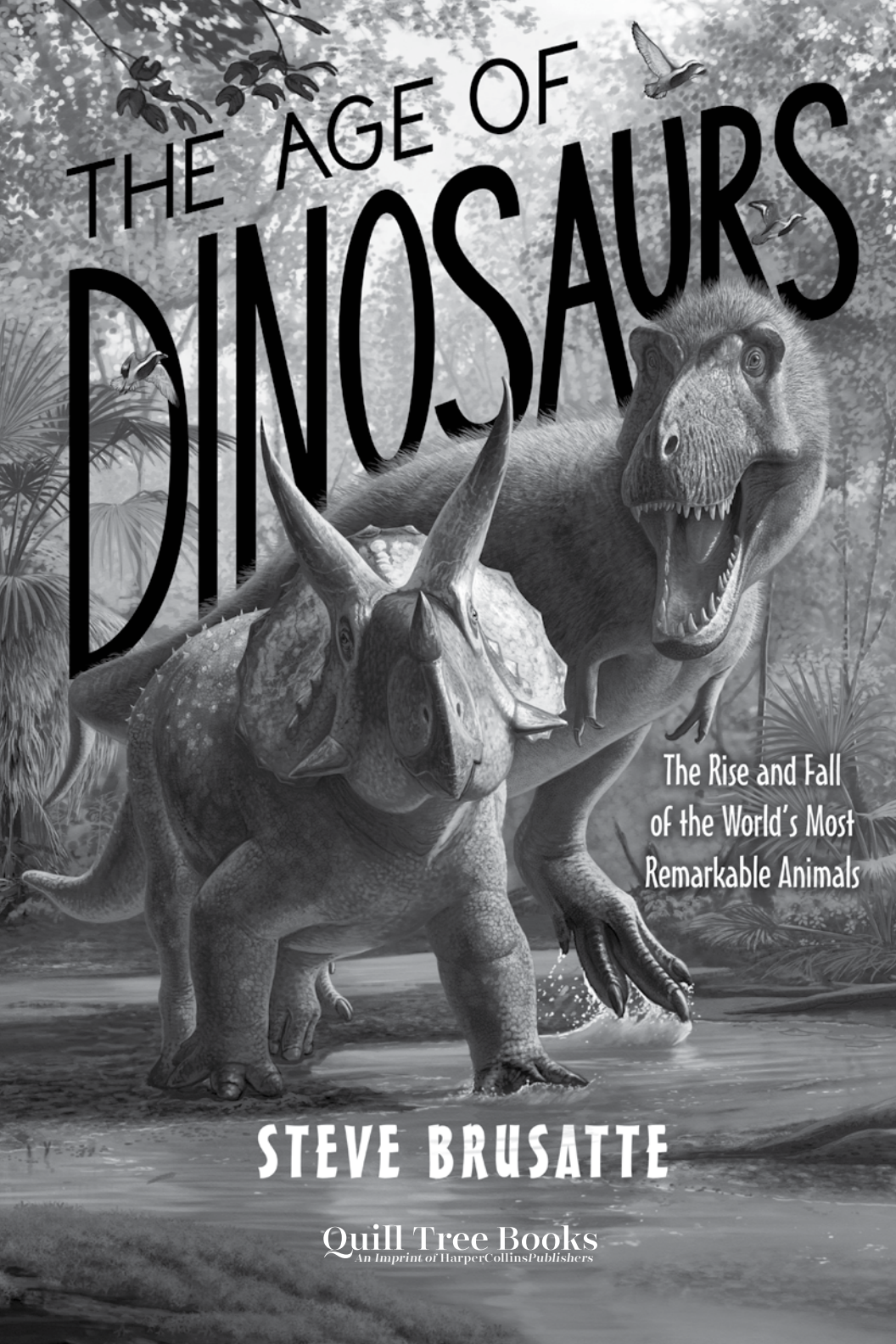
THE AGE OF
DINOSAURS
The Rise and Fall of the World's Most Remarkable Animals
STEVE BRUSATTE
Quill Tree Books
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Library of Congress Control Number: 2020945262
ISBN 978-0-06-293017-0

Typography by Laura Mock
20 21 22 23 24 PC/LSCH 10 9 8 7 6 5 4 3 2 1
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First Edition

TIME LINE

Era	Period	Epoch	Age (millions of years ago)
Paleozoic	Permian		
Mesozoic	Triassic	Early	252-247
		Middle	247-237
		Late	237-201
	Jurassic	Early	201-174
		Middle	174-164
		Late	164-145
	Cretaceous	Early	145-100
		Late	100-66
Cenozoic	Paleogene		

Permian Period

299–252 million years ago: before the dinosaurs, when mammal ancestors and other reptiles and amphibians ruled the world

Triassic Period

252 million years ago: End-Permian mass extinction

250 million years ago: First fossils of the dinosaur lineage: *Prorotodactylus* tracks from Poland

230 million years ago: Oldest true dinosaurs: *Herrerasaurus*, *Eoraptor*, *Eodromaeus*, and other species from Ischigualasto, Argentina

215 million years ago: The first giant dinosaur: *Ingentia* from Argentina

212 million years ago: Dinosaurs remain rare and less successful than the pseudosuchians and giant salamanders, as shown by the Hayden Quarry fossils.

201 million years ago: Pangea begins to split and the end-Triassic mass extinction occurs

Jurassic Period

200–170 million years ago: Dinosaurs become larger, spread around the world, and become dominant

170 million years ago: Giant long-necked sauropods roam the lagoons of Skye, Scotland

170 million years ago: Tyrannosaurs originate as small, second-tier predators

156–146 million years ago: Sauropods and *Allosaurus* dominate the Morrison Formation ecosystems

145 million years ago: The Jurassic Period ends as the climate and sea levels change

Cretaceous Period

145–94 million years ago: Sauropods begin to decline and are replaced by smaller plant-eating dinosaurs, and carcharodontosaurs are the top predators around the world

125 million years ago: Feathered dinosaurs thriving in China

100–95 million years ago: *Carcharodontosaurus* rules Africa

92–90 million years ago: Tyrannosaurs like *Timurlengia* evolve big brains and keen senses while still no larger than horses

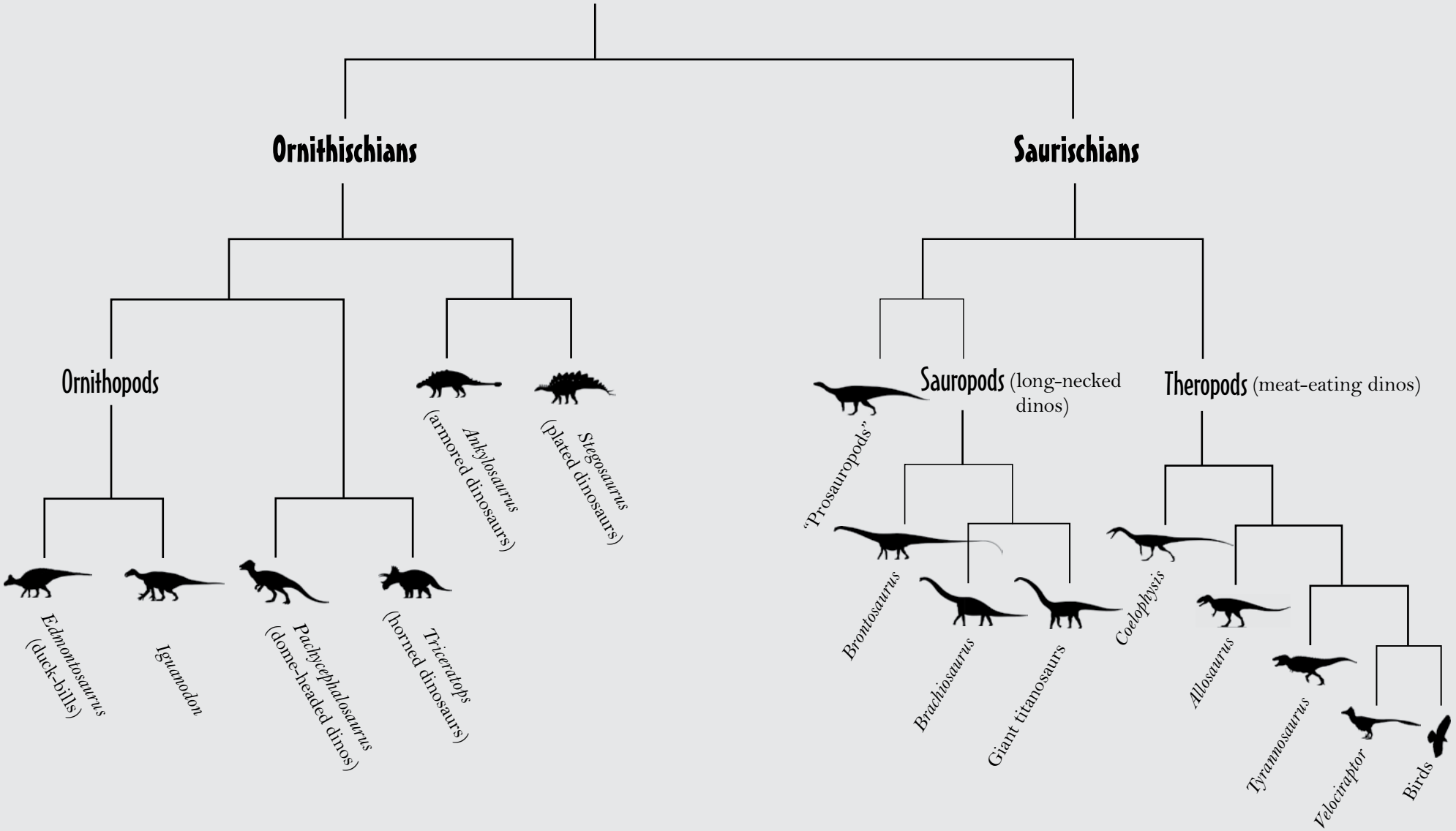
84 million years ago: Tyrannosaurs evolve giant body sizes

68–66 million years ago: *T. rex* and *Triceratops* rule North America, tyrannosaurs and hadrosaurs live in Asia, giant titanosaurs and abelisaurids thrive in the southern continents, and dwarf dinosaurs live in Europe

Paleogene Period

66–23 million years ago: Mammals and birds prosper after the non-bird dinosaurs go extinct

DINO SAURS


Ornithischians
Saurischians
Ornithopods
Ankylosaurus (armored dinosaurs)
Stegosaurus (plated dinosaurs)
Edmontosaurus (duck-bills)
Iguanodon
Pachycephalosaurus (dome-headed dinos)
Triceratops (horned dinosaurs)
"Prosauropods"
Sauropods (long-necked dinos)
Theropods (meat-eating dinos)
Brontosaurus
Brachiosaurus
Giant titanosaurs
Coelophysis
Allosaurus
Tyrannosaurus
Velociraptor
Birds

Further Reading

This book is inspired by my adult pop science book, *The Rise and Fall of the Dinosaurs* (William Morrow, 2018). A detailed list of sources for the specific dinosaurs and theories I write about can be found in that book. But there are so many dinosaur books for younger readers. Here are some additional resources that will provide more information on dinosaurs.

Dinosaurs, by Steve Brusatte (Quercus Publishing, 2008): This is a very large coffee table book that has profiles of around 100 dinosaur species, each one illustrated with colorful computer-generated artwork. Some of the dinosaurs—like *Microraptor*—are even illustrated at life size!

Day of the Dinosaurs, by Steve Brusatte (Wide Eyed Editions, 2016): This book was a collaboration with the creative artist Daniel Chester. We take the reader on a time-traveling adventure back to the Age of Dinosaurs, providing facts on the dinosaurs and their environments.

National Geographic Absolute Expert: Dinosaurs (National Geographic Kids, 2018): I served as the consultant for this book, which was written by Lela Nargi. The book tells the story of dinosaur evolution and how scientists dig up dinosaurs, and answers some of the big questions that people often have about dinosaurs.

Dinosaurs: The Most Complete, Up-to-Date Encyclopedia for Dinosaur Lovers of All Ages, by Thomas R. Holtz, Jr. (Random House, 2007): This is the ultimate dinosaur encyclopedia, written by my colleague Thomas Holtz, a paleontologist who studies tyrannosaurs. It is expertly illustrated by Luis Rey, one of the most creative dinosaur artists in the world.

She Found Fossils, by Maria Eugenia Leone Gold and Abagael Rosemary West (CreateSpace Independent Publishing Platform, 2017): This book, written by two paleontologists who recently finished their PhD degrees, highlights the discoveries of female fossil hunters around the world, including many inspiring young scientists.

Dinosaur Atlas, by Anne Rooney (Lonely Planet Kids, 2017): This lively, well-illustrated book has up-to-date

facts and information on the latest dinosaur discoveries in a very readable style. The young paleontologist David Button consulted on the book, ensuring the information is accurate.

Glossary

air sacs: balloon-like structures connected to the lungs that store oxygen to extend air supply

angiosperms: flowering plants

ambush predator: a carnivore that captures its prey by hiding or camouflaging itself before attacking

amphibians: a group of cold-blooded vertebrates such as frogs, toads, or salamanders

barbs: the extensions that project sideways from the central shaft of a feather

body fossil: an actual part of a plant or an animal that turns into stone

body plan: the distinctive features of a given species

carnivore: an animal that feeds on animal matter or meat

CAT scanner: a machine that uses X-rays to create a three-dimensional image of an internal object or body part

conglomerate: rock made up of pebbles and boulders glued together

coprolites: fossilized excrement

denticles: a bump or serration on a tooth

dinosaurs: a group of extinct herbivore or carnivore reptiles that roamed the Earth during the Mesozoic Era

dominant: residing at the top of an ecological community

ecosystems: a community of species living together and interacting with their environment

evolution: the process in which animals and other species slowly change over time to adapt to the world around them

extinct: no longer living

extinction line: a change in the type or quantity of fossils in a given sample of rock, which suggest that an extinction even took place

finite element analysis: the process of using computer models to predict what will happen to something when force is applied to it.

fossils: the remains of ancient living things, such as plants and animals

geologist: a scientist who studies rocks

herbivore: an animal that feeds on plants

lava: hot liquid rock that has reached Earth's surface

link fossils: fossils that capture the evolution of one type of animal into another

magma: hot liquid rock under the Earth's crust

mammals: a group of warm-blooded vertebrates that can produce milk to feed their young

megavolcanoes: big cracks in the Earth, often miles long, which continuously release lava

melanosomes: the capsules that hold pigment, which gives animals their colors

natural selection: a natural process in which the survival and reproductive success of individuals, or groups, best suited to their environment allows them to pass along their genes to the next generation

paleontologist: a scientist who studies fossils to understand what Earth was like in the distant past

Pangea: the name of the "supercontinent" that once included the major landmasses of Earth before continental drift moved them to their modern locations

Panthalassa: the name of the single ocean that surrounded Pangea

plate tectonics: the process by which Earth's surface divided into plates and moved over millions of years

radioisotopic dating: a method used to determine the age of rocks by measuring the types of chemicals the rocks are made of

reptiles: a group of vertebrates including lizards, snakes, alligators, and dinosaurs

shale: rock hardened from ancient mud

sprawling: the limb posture of salamanders, frogs, and lizards in which their limbs stick out sideways from the body

trace fossil: a fossilized object that records the behavior

of an animal or something that an animal produced

trackways: the sequence of handprints and footprints left by an animal

vertebrates: animals that have an internal skeleton made of bone