

Book Review

August 13, 1989

NONFICTION

- 2 A CHORUS LINE: And the Musicals of Michael Bennett. By Ken Mandelbaum.
- WHAT THEY DID FOR LOVE: The Untold Story Behind the Making of "A Chorus Line." By Denny Martin Flinn.
- 6 NO BELLS TO TOLL: Destruction and Creation in the Andes. By Barbara Bode.
- 8 DYNAMICS OF DINOSAURS AND OTHER EXTINCT GIANTS. By R. McNeill Alexander.
- 10 WOMEN TOGETHER, WOMEN ALONE: The Legacy of the Consciousness-Raising Movement. By Anita Shreve.
- 11 THE NOOSE OF LAURELS: Robert E. Peary and the Race to the North Pole. By Wally Herbert.
- A BLACK EXPLORER AT THE NORTH POLE. By Matthew A. Henson.
- 15 TWO TO FOUR FROM 9 TO 5: The Adventures of a Daycare Provider. By Joan Roemer as told to Barbara Austin.
- 18 RUSSIAN FOLK BELIEF. By Linda J. Ivanits.
- 19 KAFFIR BOY IN AMERICA: An Encounter With Apartheid. By Mark Mathabane.
- 24 AMERICA'S ROME. Volume One: Classical Rome. Volume Two: Catholic and Contemporary Rome. By William L. Vance.
- 25 PERESTROIKA IN PERSPECTIVE: The Design and Dilemmas of Soviet Reform. By Padma Desai.
- GORBACHEV'S STRUGGLE FOR ECONOMIC REFORM: The Soviet Reform Process, 1985-88. By Anders Aslund.

FICTION

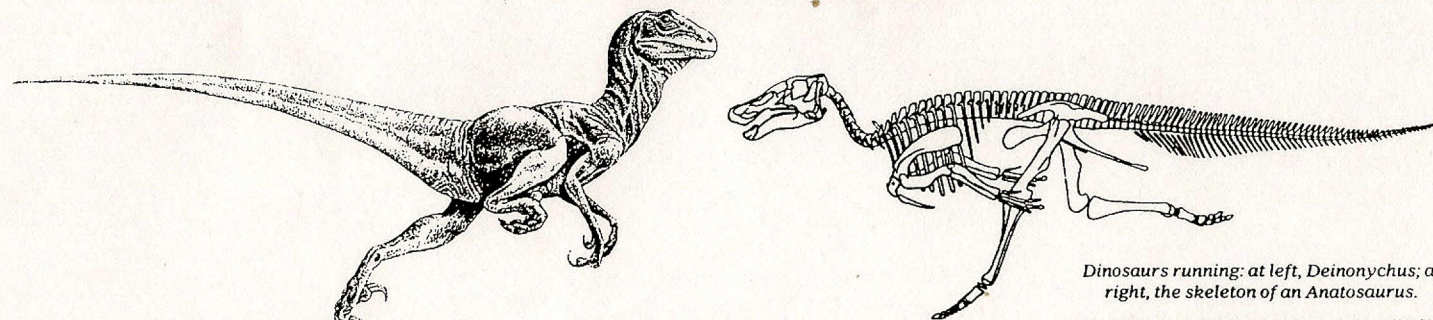
- 1 OLDEST LIVING CONFEDERATE WIDOW TELLS ALL. By Allan Gurganus.
- 3 FORTY-SEVENTEEN. By Frank Moorhouse.
- 6 THE RAINBOW STORIES. By William T. Vollmann.
- 7 THE PILGRIM'S RULES OF ETIQUETTE. By Taghi Modarressi.
- 8 VOICES FROM HOME. By Neil Caudle.
- 9 CLEAR AND PRESENT DANGER. By Tom Clancy.



- 10 THE HANGMAN'S CHILDREN. By Donald Hays.
- 12 STARS OF THE NEW CURFEW. By Ben Okri.
- 13 SEMINAR ON YOUTH. By Aldo Busi.
- 21 A SEASON IN THE WEST. By Piers Paul Read.

FEATURES AND DEPARTMENTS

Reptile, Run



Dinosaurs running: at left, *Deinonychus*; at right, the skeleton of an *Anatosaurus*.

FROM "THE RIDDLE OF THE DINOSAUR" (DEINONYCHUS) AND "DYNAMICS OF DINOSAURS"

DYNAMICS OF DINOSAURS AND OTHER EXTINCT GIANTS

By R. McNeill Alexander.

Illustrated. 167 pp. New York: Columbia University Press. \$30.

By Gregory S. Paul

FOR many years scientists paid little attention to dinosaurs. What could be learned from obsolete reptilian giants that waded through archaic swamps to their inevitable dead end? Things have changed. Mile-long beds of bones are revealing that enormous herds of dinosaurs wandered in search of food across dusty parklands, and birds have been unmasked as the direct descendants of small flesh-eating dinosaurs. Now that they are a focus of serious research, many people are asking just what made dinosaurs work so well for 170 million years.

R. McNeill Alexander is a British zoologist interested in how animals work. He has driven after antelope across the African plains to find out how fast they really run, and is urging that modern running shoes be given bouncier soles for better performance. "Dynamics of Dinosaurs and Other Extinct Giants" is his brief and entertaining look at dinosaurs and other big beasts from the viewpoint of physics, engineering and mathematics. This marks a departure from more usual paleontology, which tends to concentrate on the form and proportional aspects of extinct animals.

Mr. Alexander opens his book with an overview of dinosaur history and biology that is succinct; yet it does not quite get across just how wonderful and explosive is the revolution sweeping the field. He then asks the basic question of how big dinosaurs were, and there he makes the most egregious mistake in the book. Mr. Alexander uses the British Museum of Natural History's toy models

Gregory S. Paul, a freelance dinosaur paleontologist and artist, is the author of "Predatory Dinosaurs of the World."

to estimate the weight and mass distribution of such famous dinosaurs as *Diplodocus*, *Tyrannosaurus* and *Brachiosaurus*. These playthings are simply not accurate enough to belong in this serious work of science.

Mr. Alexander then turns to the aspect of dinosaur locomotion with which he first started in the 1970's: footprints. He has come up with a simple and sound formula for calculating the speed at which a series of prints was made. Most dinosaur trackways show walking dinosaurs, and Mr. Alexander once implied that this suggested they were not terribly fast. He now explains that new trackways have shown fairly large dinosaurs at a full run, although he appears unaware of one trackway that may show a small dinosaur running at some 40 miles an hour.

In the most interesting chapter of this book, Mr. Alexander estimates the "athletic" performance of big dinosaurs by calculating and comparing the stresses their limb bones underwent. No one will fault his conclusion that the elephantlike legs of the great brontosaurs were not strong enough to gallop on. What has been controversial is the opinion of some "dinosaur radicals" that the rhinolike limbs of elephant-sized Triceratops were built for fast running. Traditionalists may be brought up short by Mr. Alexander's biomechanical calculation that Triceratops really was strong-limbed enough to charge in a full gallop. On the other hand, his computation that *Tyrannosaurus* was less athletic than a human being is not so satisfactory. After all, this giant killer had legs just like those of its smaller relatives, the ones that made the high-speed trackways. Following the basic engineering principle that machines that are built the same way will work the same way, the great tyrannosaurs should have been good runners too.

The mathematical approach is less successful than the biomechanical. Mr. Alexander admits that he cannot tell whether dinosaurs were warm-blooded like mammals or cold-blooded like reptiles just by looking at possible heat-flow patterns. He details the dreadful physical conditions that supposedly follow the impact of giant meteorites and enormous volcanic eruptions, conditions that some people believe killed off the dinosaurs about 65 million years ago. What is not noted is that such catastrophes occurred throughout the dinosaurs'

existence without causing them much harm.

Other things Mr. Alexander has a go at include singing duck-billed dinosaurs, sonic booms produced by the cracking of the whiplike tail of the *Diplodocus*, and blood pressure in the 40-foot-tall *Brachiosaurus*. Various activities of other giants of the past are also considered, including the flight of the giant pterosaur *Pteranodon* and the hard time the recently extinct elephant birds of Madagascar had in hatching out of their two-and-a-half-gallon eggs. The chapter on such titanic mammals as the 18-foot-tall rhino *Indricotherium* is too short.

Mr. Alexander does about as good a job as one can in weaving formulas and physical principles into a popular text, and this book should be readily understandable to those who are not fortunate enough to spend their days studying extinct monsters. The illustrations do a good job of explaining the book's concepts and conclusions, but their execution is uninspired — especially the restorations of dinosaurs, which are no more accurate, or interesting, than the British Museum models they are based on. It is good to see the diagram of the galloping Triceratops.

THE greatest value of this book, and its greatest weakness, derive from the fact that Mr. Alexander is an outsider to professional paleontology. The weakness is that he often seems unaware of the latest work in the field. This may explain some of his errors. It also leads him to dismiss the physiological implications of dinosaur bone microstructure, just when there is an emerging consensus that their type of bone is the kind found only in fast-growing warm-blooded creatures.

But the strength of this volume — that it introduces an outsider's way of examining dinosaur biology that is both fresh and needed — cannot be dismissed. It is becoming increasingly apparent that dinosaurs did things no living mammal does, such as eating the crowns of trees four stories high and engaging in high-speed combat. Mr. Alexander's effort is a good start at using sophisticated biomechanics to figure just what things dinosaurs did and did not do, and from this will come a better understanding of how they fit into the greater scheme of things. □