B. Smith Institute of Grahamstown, South Africa, at $105. In this superbly illustrated book, the faunal accounts are written by a variety of specialists in each family.)

These books deal with interesting and important topics in an important and captivating part of our planet. For people who love fishes, biology, the polar regions, and books—there are some—they provide rich food for thought.

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Eocene Revelations

Messel. An Insight into the History of Life and of the Earth. STEPHAN SCHAAL and WILLI ZIEGLER, Eds. Clarendon (Oxford University Press), New York, 1993. vi, 322 pp., illus. $75 or £50. Translated from the German edition (Frankfurt am Main, 1988) by Monika Shaffer-Fehre.

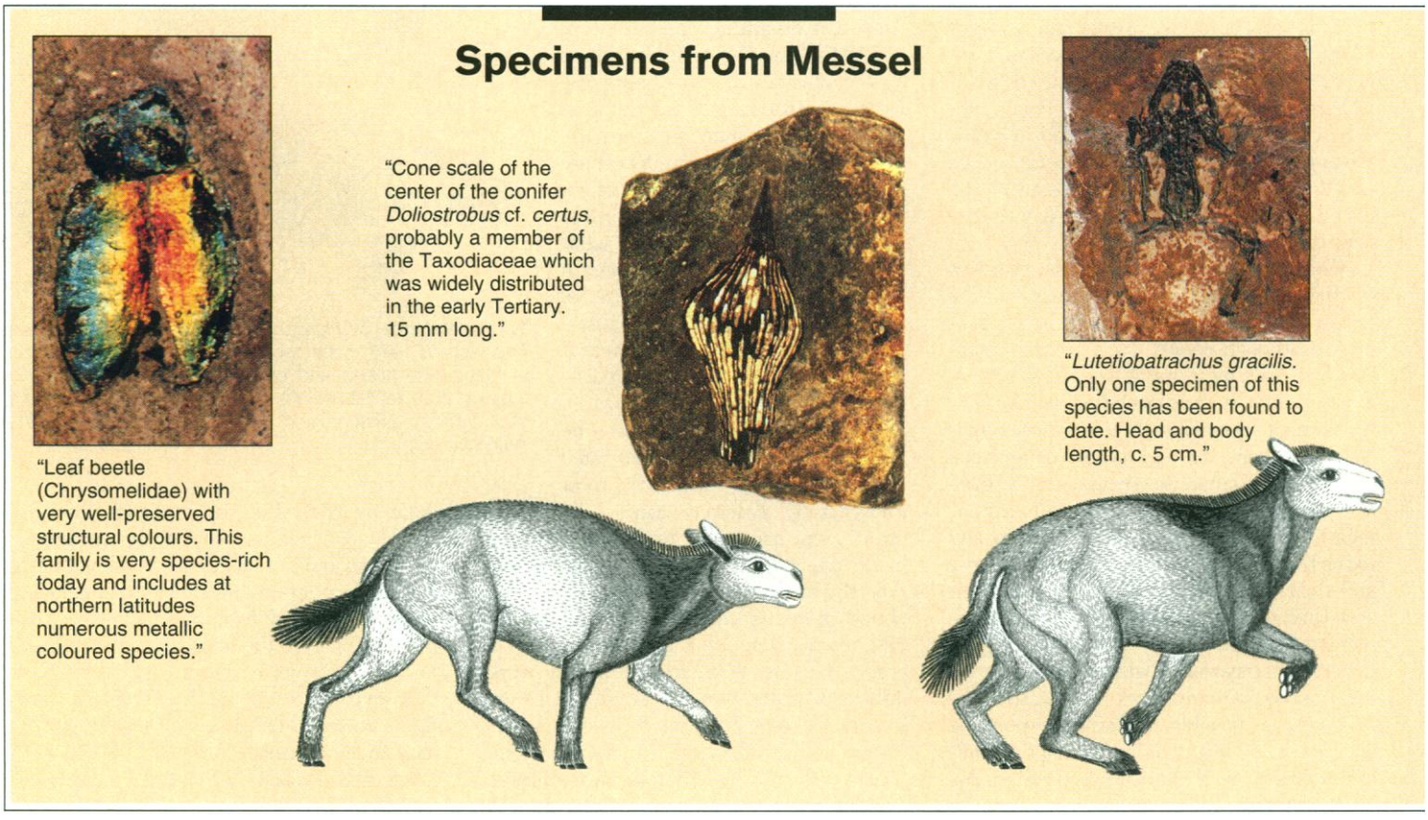
Early in the Middle Eocene, roughly 50 million years ago, a persistent lake developed in what is now west central Europe, on a large isolated island that was surrounded by arms of shallow seas. Anoxic bottom waters preserved, in exquisite detail, all manner of life forms that sank after death onto the central lake's muddy substrate. The resulting deposits show just how good a fossil record can be.

This lavishly illustrated book is an excellent English translation of the 1988 German summary of the flora and fauna of the "Messel pit," near Darmstadt. The book transports readers into the warm forests and volcanically bordered rift valleys of the European Eocene. The wealth of detail presented, including discussion of an astonishing diversity of plants, arthropods, and vertebrates, allows us to experience the stench from this ancient lake and to hear the night-calls of countless animals in the adjacent multistoried forests.

The format is a series of 27 short chapters that successfully bridge the interests of paleobiologists and lay readers. Most of the illustrations are in color, and the photography of specimens is outstanding. Diverse, well-chosen drawings, including scientifically conservative life reconstructions, fill the pages of this handsomely designed volume. The chapters include illustrations of many undescribed species, and the text conveys the excitement of work yet to be done and of discoveries yet to be made at Messel. A species index includes references to pertinent illustrations.

In contrast to most paleontological sites, Messel preserves plants and animals side by side. The ancient bottom waters apparently were hostile to benthic life, and with the exception of predatory fishes and certain of the crocodilians and turtles, most of the fauna exemplified life on the surrounding dry land and in the paratropical forests. Most species are represented by body parts that had floated post mortem by way of streams, apparently from considerable distances, into the lake. The preserved fossils therefore provide insight into a broad geographic area of environmental settings. Lake-bottom sediments remained unburrowed.

The organic-rich bottom setting also provided a natural laboratory for the comparative study of fossilization of differing biological materials (lignin of wood; siliceous spicules of freshwater sponges; calcium carbonate of molluscan shells and fish otoliths; chitin of insects; keratin, bones, and teeth of vertebrates). Plant and animal soft parts abound. A water-lily flower preserves caddis-fly larval cases. Oil droplets can be seen in leaf mesophyll of ancient relatives of laurels. Original structural colors shimmer in beetle elytra. Frog spawn and tadpoles exist. Gut contents from invertebrate and vertebrate animals provide direct evidence for their dietary abilities, sometimes with surprises. Tiny dawn-horses probably staggered drunkenly after feasting on fermented grapes. Traces of body shapes, internal organs, and even hair patterns are represented by clear outlines, usually formed by the cell walls of



decay bacteria encapsulated by iron carbonate. Such discoveries provide unique evidence for the chemistries of the bottom waters themselves. Also directly evidenced are advanced states of parasitism and other forms of symbiosis.

Equally fascinating are biogeographical surprises from Messel. Diverse as the biota was, very few European endemics have been recognized. Most elements of the flora and fauna seem characteristic of other continents, especially North and South America and southeastern Asia. The composition of the pre-passerine avifauna is particularly eye-opening paleogeographically. Messel eloquently shows how primitive our understanding of Eocene intercontinental dispersal pathways really is.

Until 1990, the Messel pit was threatened as a scientific resource by local municipal plans to use the site as a refuse pit. Every town in the world has its garbage dump, but there is only one Messel. This book is dedicated in part "to the politicians who, in the conflict between science and refuse disposal decided in favour of science, as a testament for others." I suggest that all of us in the sciences should tip our hats in respect for their wisdom.

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Big Cats in Situ

The African Leopard. Ecology and Behavior of a Solitary Felid. THEODORE N. BAILEY. Columbia University Press, New York, 1994. xviii, 429 pp., illus. $65 or £45. Biology and Resource Management in the Tropics Series.

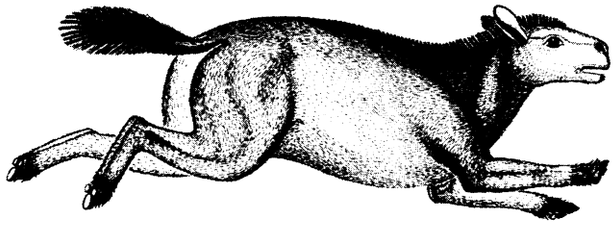
Theodore N. Bailey has previously produced important works on the bobcat (*Lynx rufus*) and Canadian lynx (*Lynx canadensis*). With the present work, he has provided the most detailed account of the ecology, behavior, and conservation of the African leopard (*Panthera pardus*) yet published.

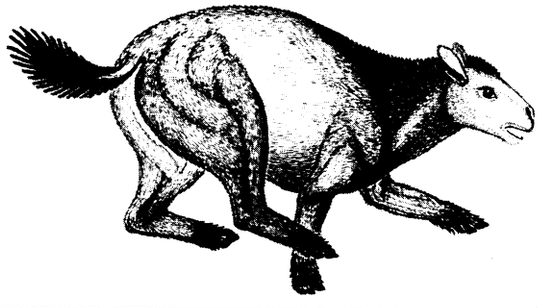
The setting for Bailey's study was two contrasting study sites within South Africa's 19,485-square-kilometer Kruger National Park, one of Africa's oldest and largest national parks. Adjacent to the border with Mozambique, Kruger is a "boundary park" that buffers the international boundary from agricultural, developed, and native-trust lands. Despite its great size, Kruger was never an ecological unit, and the "balance of nature" as a park management concept has been challenged here. The international boundary was fenced three decades ago, interrupting traditional east-west "game" migrations; the park is now completely fenced. With fire suppression over the last century, much of the park's vegetation has shifted from open grassland to savanna to woodland-savanna to woodlands and thickets. The vegetation shifts have been accompanied by a decline in grazing ungulates and an increase in browsing species. There have been culling programs and waves of mortality in Kruger's "game" from epizootics, such as rinderpest, hoof-and-mouth disease, and anthrax, and from periodic droughts. To protect the ungulates, there have been rather vigorous carnivore control programs in the past. Poaching in Kruger was not thought by the park management staff to be a significant problem. After a prolonged drought, populations of the leopards' prey were rebounding during Bailey's study period, 1973–1975, with the rains and the increased vegetation growth that resulted. Bailey's study population had not been subject to control since 1960.

Bailey used direct and indirect observation, capture-mark(n = 30)-recapture, and radiotelemetry to follow most of the leopards living on and around his study sites. Using direct-observational census methods, he quantified the dynamics and the behavior of the leopard's larger prey species. Following such a large and dynamic predator-prey system nearly single-handed was challenging, and Bailey must have put in 18- to 24-hour days for the nearly three years he was in the field. His great effort is our gain, as detailed a picture as has yet

"This skeleton, related to the 'true' lizards, is one of the smallest Messel reptiles recorded. Entire length, *c.* 11cm."

"Pinna of *Romohra recentior*, a polypod fern, without a sporangia. Each leaflet is 6 cm long."





"The smaller primitive horse from Messel, *Propalaeotherium parvulum*, at different stages of locomotion."