

of the World

by *KARL P. SCHMIDT*

Curator of Zoology Emeritus, Chicago Natural History Museum

and *ROBERT F. INGER*

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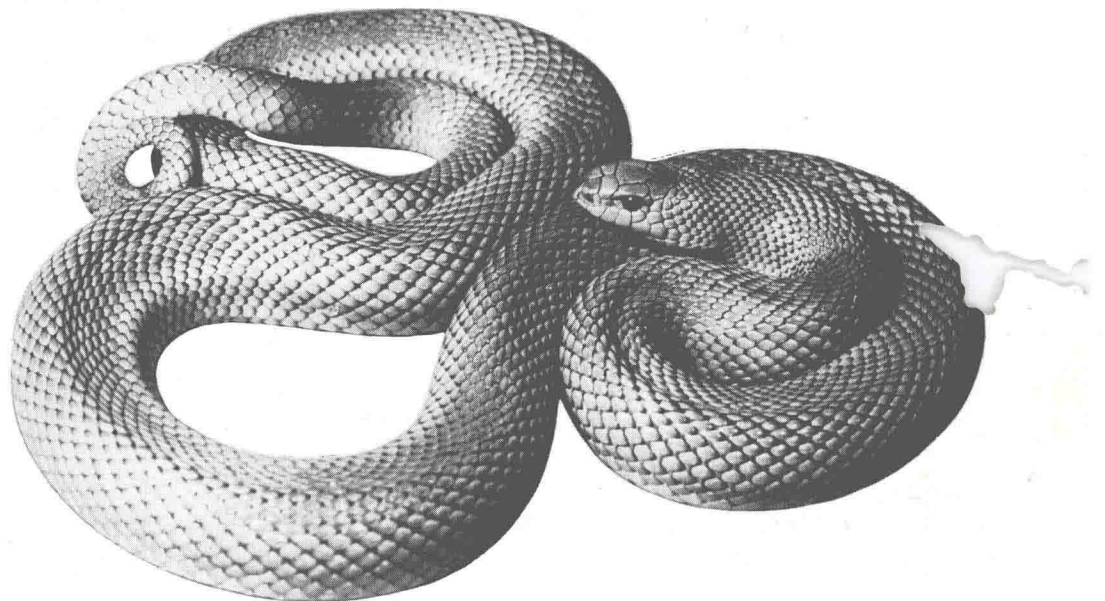
JOHN MARKHAM

HAL H. HARRISON

CY LA TOUR

ERICH SOCHUREK

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Living Reptiles of the World

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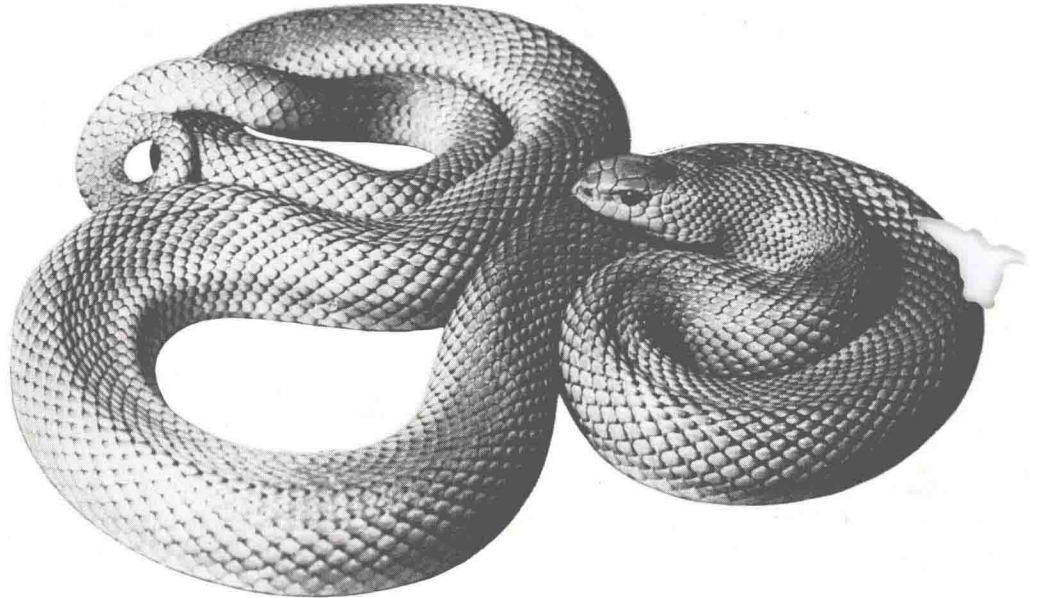
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Preface

BOOKS about reptiles intended for the general public begin with Aristotle, who put all that was known to him about the crocodile of the Nile, the various turtles of Greece, and lizards and snakes into his *Historia Animalium*. Since Aristotle's time, there has been a flow of books and other publications about salamanders and frogs, lizards and snakes, and turtles and crocodiles, many directed strictly to professional zoologists, but always some with the object of popular instruction or entertainment—or both. No period has seen such an upsurge of interest in reptiles and such a volume of publications about them as the first part of the present century. This has furthermore been especially a feature of North American natural history and has been fostered by American zoological gardens and museums.

The American books were at first mainly descriptive works, beginning with the many volumes by Raymond Lee Ditmars. With the growth of a large group of professionally trained herpetologists, a greater range of interests has come to be emphasized even in the most popular works. The younger generation of American naturalists is fortunate to have such introductory works as Clifford Pope's *Snakes Alive and How They Live*, and at another level, James A. Oliver's *The Natural History of North American Amphibians and Reptiles*. The present volume is one of a series in which the colored illustration now made available by photography affords an essential supplement to the existing works.

Information concerning any animal group or, indeed, any aspect of nature, is accumulated slowly through the careful and serious work of literally thousands of scientists, most of whom will never be known to the public at large. Like the authors of previous books on reptiles, we are indebted to a host of colleagues, both those long dead and those who are still very much alive, for the fund of knowledge on which we have drawn.

We have seized the occasion for a new review, at the descriptive level, of the reptiles, which are the great central stock, ancestral to both mammals and birds and themselves derived from the amphibians. Some knowledge of the reptiles is important to everyone who wishes to understand something of "man's place in nature."

April, 1957

KARL P. SCHMIDT
ROBERT F. INGER

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Living Reptiles of the World

Introduction

The Place of Reptiles in the Animal Kingdom

IN THESE days, when "dinosaur" has become almost a household word, most people realize that there was a great Age of Reptiles, long ago, when gigantic four-footed creatures with long tails and necks splashed and fed in the swamps, and great flesh-eaters stalked the land, walking erect on their hind legs, to prey upon the lesser types. The vast array of other kinds of reptiles that lived in that age—the Mesozoic—is still mostly unfamiliar except to students and to those children and parents who are confirmed museum-goers. There were long-necked plesiosaurs, short-necked ichthyosaurs, slender mosasaurs, incredible placodonts, and gigantic paddle-limbed turtles in the seas; and on land multitudes of smaller reptiles lived beside the dinosaurs.

It was from the more ancient types, long preceding the dinosaurs, that mammals (and thus we ourselves) took their origin. Birds evolved from some small dinosaur stock that had taken to life in the trees, quite as many modern lizards do. Fishes maintained their dominance of the sea, but as the birds and mammals underwent their great evolution into varied types in the Tertiary Era, the reptiles declined. The living reptiles are a mere remnant of the innumerable ancient kinds, an unknown number of which remain undiscovered, locked as fossils in the rocks or lost by erosion into later seas.

Only the turtle group is really ancient, as ancient indeed as the earliest reptiles, surviving as a cohort

of about two hundred kinds. The crocodylians, with only twenty species or so, give us a good idea of what some dinosaurs must have been like, but they are a uniform lot, without anything of the vast diversity of the dinosaurs. Still more obviously a remnant held over from the Mesozoic is the tuatara, the lizardlike creature of New Zealand that stands alone as a single species of beak-headed reptiles, whose ancestors flourished at the beginning of the Age of Reptiles. Lizards and snakes we have in modern times in great numbers, some two thousand kinds of each, and in sufficient variety of habitat and habits to give us a picture of the deployment of their groups into terrestrial, subterranean, arboreal, and aquatic types, evolving in the past into close adjustment to every niche in the environment where food was available and where a cold-blooded creature could live.

If there is a theme in our book, it lies in the contrast between the modern and still-evolving snakes and lizards and the relict types that are plainly survivors from a time long past. And this theme finds fulfillment in the account of the evolving adjustment of individual forms, not only to the major habitats, but also to very specific roles in the economy of nature, often illustrated by species that exhibit in their shapes and colors the stamp both of their special environment and of their evolutionary history.

Snapping Turtle (*Chelydra serpentina*)

LEE JENKINS: NATIONAL AUDUBON



The Turtles

Order Chelonia

IN CONTRAST with their attitude toward most of the major groups of reptiles and amphibians, few people look with aversion on turtles or think of being afraid of them. It does not excite surprise to find these creatures kept as children's pets, and the larger ones are favorites in zoological gardens. Almost all turtles are eaten by primitive peoples, and a good number of different species are highly regarded as food among civilized nations. Even English-speaking peoples, who are inclined to disdain many sea foods enjoyed in the countries bordering the Mediterranean (and in more remote regions) eat the marine green turtle; and in North America the snapping turtle has been added to the list of regularly eaten forms. The diamondback turtles of the brackish-water marshes along the Atlantic and Gulf Coasts are regarded as a special delicacy, and a very costly one.

On account of our great familiarity with them, we are inclined to forget that turtles are really the oldest type of living reptiles, vastly more ancient in lineage than the fossil dinosaurs and most of the other extinct forms. The turtles really deserve the name of "living fossils" much more than do some of the creatures to which it is commonly applied. There are only twelve families among the existing turtles, and a few more than two hundred species. It is fortunate for those who study them that these existing forms include almost all of the types of turtles, extinct as well as living.

The earliest turtles, at the very beginning of the Age of Reptiles, were already characterized by the bony, boxlike shell that encloses the shoulder and hip girdles and all of the internal organs, and serves as a very effective protection against more active predators. From this "box" the head and neck and forelimbs project through an opening at the front, and the hind limbs and tail at the rear. Swift locomotion and agility on land are quite impossible with such a structure. The shell is made up of an inner layer of regularly arranged bony elements and an outer layer of horny shields that overlap the bony plates. The possession of so effective a protective shell is accordingly directly correlated with the turtles' proverbial sluggishness of movement and in-

offensiveness of disposition. Metaphorically, peace has been the keynote of their evolution through some hundreds of millions of years, and their reliance, in a world filled with predacious enemies, has been on passive defense. It is all the more clear that the main theme has been defense when we find that, in the less sluggish types, more active habits have been correlated with reduction of the shell, and that this has gone hand in hand with enlargement of the limbs, or of the head and limbs together.

The importance of the protective shell in evolution is shown by the development of all sorts of devices for its more complete closure; they are variations on the theme of defense. For this effect, either the front or rear lobe of the lower shell (the plastron), or both, may be hinged so as to close the front and rear openings of the box. An irregular but effective hinge is developed even in the upper shell (the carapace) of an African land turtle, so that its posterior part can be drawn down over the opening for hind feet and tail. The typical land turtles both large and small (to which the term "tortoises" is now restricted in the American language) close the openings neatly with the armored surfaces of their limbs. Such complete closure of the shell by secondary modification has been attained at least a dozen times in quite different and unrelated types of turtles. We shall return to this subject again and again in describing the living turtles family by family.

Four great lines of evolution are immediately recognizable among living turtles. There is the gigantic leatherback of the sea, one of the largest of modern reptiles, with a most extraordinary type of shell; then all the rest of the sea turtles, quite unrelated to the leatherback but quite closely related among themselves; then the curious side-necked turtles of the southern continents, all extinct in the Northern Hemisphere; and lastly the hidden-necked turtles, in which the head is completely withdrawn into the shell by a vertical flexure of the neck. All of the familiar land and fresh-water turtles of the northern continents belong to this last-named type.

The words "turtle" and "tortoise" are a source of confusion in the English language, for originally