

TURTLES *of* BORNEO AND PENINSULAR MALAYSIA

Lim Boo Liat and Indraneil Das

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About the Book

The Turtles of Borneo and Peninsular Malaysia provides an account of the turtles, tortoises and terrapins of a tropical region known for its rich biodiversity. In all, 25 species are described and illustrated with one or more colour photographs of each species, including two exotics that are now established. All marine, terrestrial and freshwater species have been covered. The introductory chapters include a general introduction to these reptiles and an identification key to the turtles of the region. For each species, there is a section on identification, including descriptions of males, females and juveniles, the meaning of the current scientific name, its global and local distribution, notes on natural history (including behaviour, habitats used, diet and reproduction), and conservation status. A glossary of technical terms is appended at the back, in order to make the work accessible to the layperson, and for those who wish to find more information on the turtles of the region, there is a list of references. *The Turtles of Borneo and Peninsular Malaysia* will be of interest to tourists, biologists, park managers, conservationists, or even those simply curious about the wildlife and wilderness areas of south-east Asia.

Front cover: *Manouria emys* from Sepilok, Sabah, Malaysian Borneo. (Photo: Indraneil Das)



The Authors

Lim Boo Liat (right) began his zoological career in the Institute of Medical Research in 1947. He was awarded a Medical Research Council Fellowship in 1969 to pursue an MSc. at the University of Aberdeen, U.K. He obtained his PhD in 1977 at University Sains Malaysia, and in the same year, was seconded to WHO, where he remained until his retirement in 1987. Lim is a founder member of the Malayan Nature Society, the friends of Templar Park and the Malayan Zoological Society. In addition to numerous scientific papers and popular articles, he is author of two books, *The Poisonous Snakes of Peninsula Malaysia* and *Orang Asli Tales*.

Indraneil Das (left) received his D. Phil. from the University of Oxford, and was a Postdoctoral Fellow at Universiti Brunei Darussalam, a Fulbright Fellow at Harvard University, and Scientific Officer at the Centre for Herpetology, Madras; he is at present Associate Professor, Universiti Malaysia Sarawak. His research interest includes systematics (including palaeontology), ecology, biogeography and ethnozoology of amphibians and reptiles, and his previous books are on south Asian turtles, lizards, as well as biogeography and ethnoherpetology. Das is currently the Chairman of the IUCN/SSC South Asian Reptile and Amphibian Specialist Group and is Editor of the herpetological journal, *Hamadryad*.

Back cover: *Manouria emys* from Sarawak, Malaysian Borneo. (Photo: Indraneil Das)

TURTLES
of BORNEO
AND PENINSULAR MALAYSIA



Map of Borneo.

TURTLES *of* BORNEO

AND PENINSULAR MALAYSIA

Lim Boo Liat and Indraneil Das

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Turtles of Borneo and Peninsular Malaysia

Lim Boo Liat and Indraneil Das

Contents page: River Terrapin (*Batagur baska*). (Photo: Indraneil Das)

Facing Foreword: Shuk Mun with Asian Brown Tortoise (*Manouria emys*).

(Photo: C.L. Chan)

Facing Preface: Asian Brown Tortoise (*Manouria emys*). (Photo: Indraneil Das)

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Foreword

by

Y.B. Datuk Chong Kah Kiat, J.P.

*Minister of Tourism Development, Environment,
Science and Technology, Sabah*

Turtles have always managed to capture the imagination and interest of people and cultures. Sadly, though, not enough has been documented of these magnificent creatures in the Malay archipelago. While we hear of the wonders of Giant Leatherbacks congregating upon tropical shores and the plight of turtles dragged up together with fish catches, there is altogether too little available that presents to us the fascination of these animals as a group—few people have the opportunity to appreciate the overall diversity of a group of animals that has transcended the barriers between sea and land, represented by marvellous forms in Borneo and Peninsular Malaysia, swimming the oceans endlessly and roaming the great forests.

To say that this account helps the popular understanding and is another step forward in conservation is only a part of the achievement of the present book. It is written by two specialists who love turtles and whose combined efforts have brought out this overview of diversity, beauty and natural history of turtles.

From stories of the tortoise and the hare, to expressions such as turning turtle, and a universal amazement at how some turtles quite circumnavigate our planet, these animals have always held substantial human interest.

Now read on.

Chong Kah Kiat, J.P.





Preface

by

Joseph Pounis Guntavid

Director, Sabah Museum

The presentation of an account of turtles in the present format is a pleasant task. The Sabah Museum has been able to maintain its interest in documenting various aspects of Sabah's natural history and this has inevitably led to interaction with various specialists, including Dr Lim Boo Liat and Dr Indraneil Das. It is therefore a great delight that our holdings of specimens have been of use to them and one of the products of their research should be the present book.

Our interest in documentation is not restricted to the specialist research papers put out on specific aspects, but very much includes well-illustrated accounts such as here, which greatly help in popular understanding. Here must be mentioned specially the fortuitous presence of *both* biologists and a fine publisher who is truly interested in the natural history of our area.

Of turtles, this book reveals, in the simplest way, the many forms that not everyone gets to see or to read about in popular channels. One can only wish that—as is the case with turtles, so finely demonstrated—more of this region's natural history will be made available with the interest of specialists. Malaysia's natural heritage is a vast and priceless one, and making information more accessible is a vital step in the difficult process of management and conservation.

Joseph Pounis Guntavid



F. Seow-Choen

Chapter 1

INTRODUCTION

Turtles, tortoises and terrapins belong to the Order Chelonii (formerly Testudines) which include the terrestrial, freshwater, brackish water and marine forms. The Order is divided into two Suborders: Cryptodira and Pleurodira. Members of Cryptodira have short necks, that are generally retractile inside the shells (exceptions include the marine turtles). Turtles belonging to Pleurodira have long, non-retractable necks that are instead withdrawn and folded to one side. In the region covered by this work (Borneo and Peninsular Malaysia), all turtles are cryptodirans. There are 12 living families and over 260 living species in the world, of which 25 species (including two exotics) have been recorded as occurring on Borneo and Peninsular Malaysia.

Turtles, along with lizards, snakes, crocodilians and a bizarre reptile from some of the islands off New Zealand, called the tuatara, constitute the group reptiles. There is evidence that these groups are not particularly closely related, some, such as the crocodiles and alligators being closer to birds than they are to other reptiles. Turtles are surely the most distinctive among the living reptiles, with a shell that incorporates the ribs, vertebrae, pectoral girdle and skin, giving protection to the body. No living turtle species possesses teeth (some of the extinct forms that we know from fossils did) and their skulls are without opening on the sides. The shell is composed of two major

(Opposite). The Aldabra Tortoise (*Dipsoschelys gigantea*) from the Seychelles is one of the largest turtles in the world.

parts, the carapace (or upper shell), and the plastron (or lower shell), the two joined laterally by a narrow part laterally, called the bridge. Most turtles (except softshell turtles and the Leatherback Sea Turtle, *Dermochelys coriacea*) have horny (the same material as nails and horns) scales covering the shell, giving them additional protection. These scales are usually of great importance in identification of individual species, and, on the carapace, include a single row of a central series (the vertebrals) that follow the single nuchal scale behind the neck region, an intermediate series (the costals), and a peripheral series (the marginals). On the plastron, shell scales are paired, and include the gular, humeral, pectoral, abdominal, femoral and anal. The shape and texture of the carapace varies according to the ecological habits of the species, the land-dwelling forms showing a relatively more domed, often rugose shell, while aquatic species have a more flattened, smooth and streamlined shell. The carapace, and particularly the plastron, may not always be rigidly fixed, and in some species, are capable of movement (as might be needed for delivering large eggs, or wedging in narrow crevices).

The earliest turtles appeared during the Late Triassic, 230 million years before present, and the origin of the group remains largely unresolved. These early turtles are imperfectly known from partially preserved shells, skulls and other skeletal remains, from fossiliferous rocks of Germany. They had teeth on the bones of the palate, and distinct shells, little different in basic structure from the types to be seen in living turtles. The two major groups in which living turtles are divided are the Pleurodirans (the side-necked turtles, which bend their necks sideways under the front of the carapace) and the Cryptodirans (the vertical-necked turtles, which bend their necks into a vertical sigmoid curve; this group, however includes sea turtles that have a reduced ability to withdraw their head). All turtles from Borneo and Peninsular Malaysia belong to the latter group, which is thought to have evolved more recently. Pleurodirans have a distribution in the southern continents (South America, Africa south of the Sahara and Australasia), while Cryptodirans are more typically found in northern latitudes, although many species have invaded south Africa and South America, coexisting with the Pleurodirans. Fossil records reveal that Pleurodirans were once very widespread,

Fossil records reveal that Pleurodirans were once very widespread, and have probably been outcompeted by the more recently evolved Cryptodirans.

Turtles are among the most long-lived of the vertebrates, some of the largest species (such as those from the oceanic islands of Galapagos and Aldabra) attaining over a century, especially in captivity. Wild turtles, however, are likely to have shorter life spans, and freshwater turtles probably live for only a few decades. Turtles have an extensive behavioural repertoire, virtually unmatched by other reptiles. Many are social, basking or feeding in groups. Some (such as the Ridley Sea Turtles of the genus *Lepidochelys*) form dense nesting aggregations that cover virtually every square meter of sea beach during the nesting season. Several turtles are known to produce sounds, especially during courtship, including grunts, gasps, bellows and even chicken-like clucks. When threatened, some species are known to utter a deep hiss, others growl or croak. Sea turtles are highly aquatic, some species, such as the Leatherback making impressive migrations from their tropical nesting beaches to the polar



Indraneil Das

Close-up of scute from the shell of a Black Marsh Turtle (*Siebenrockiella crassicollis*), showing the growth rings.

characterised by flippers, which are forelimbs modified to look like the wings of birds, through the fusion of digits. Tortoises are poor swimmers, sometimes colonising islands by floating for short distances between islands. Their gait on land is slow, but the powerful, club-shaped hind legs and columnar forelegs can raise their bodies well off the ground. Freshwater turtles of some species are fast swimmers; others are known to bottom-walk, being inhabitants of stagnant or slow-moving waterways. The more aquatic ones show extensive webbing on their feet, while the terrestrial turtles lack webs.

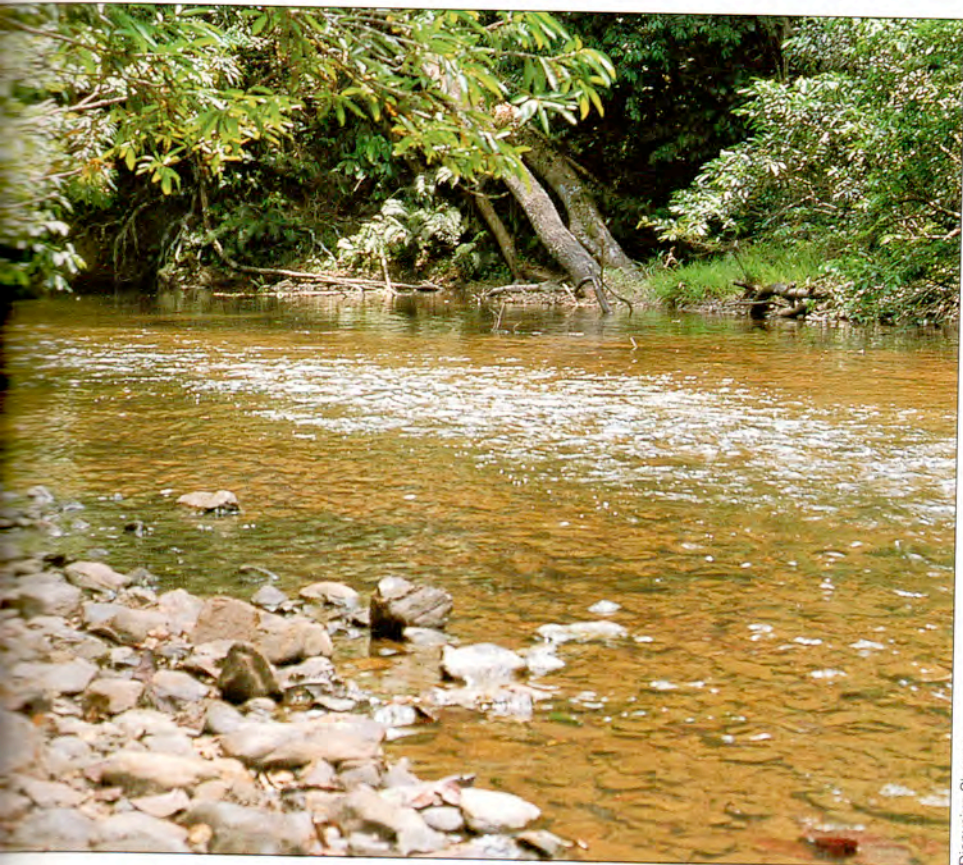
All turtles whose nesting habits are known produce eggs, and with one exception (the Northern Long-necked Turtle, *Chelodina rugosa*, from Australia, whose eggs are laid underwater), are laid on land. Some of the land tortoises produce a single egg; others, such as the sea turtles, can lay over 200 at a time, and several times during a single nesting season. Eggs are generally laid in holes excavated underground with the help of the hindlimbs, the Asian Brown Tortoise (*Manouria emys*) differing in making a leaf-mound nest in which its large clutch of eggs is laid. For most species, sex is determined by the temperature of incubation of eggs. Softshell turtles (Family: Trionychidae), on the other hand, probably have the genotypic sex determination mechanism. Incubation period (or the time taken for the young turtles to emerge from the egg), is, to some extent dependent on the temperature at which the eggs develop, and may range from a few weeks to as long as a year and a half, as in some giant tortoises. In general, emergence of baby turtles is synchronized with the season of plenty (such as the wet months), when food in



(Opposite). A clear forest stream, home for many freshwater turtles, in Peninsular Malaysia.

the form of plant and animal life (such as insects) is abundant. There is no parental care once the eggs are deposited (the exception being the Asian Brown Tortoise, the females of which may stay a few days after completing nesting, pushing away potential intruders from their nests). Hatchlings of sea turtles and most other water turtles scramble towards water immediately upon emergence, in the case of sea turtles, returning to dry land only years later. Even then, it is only the females which will ascend the beach, while males linger in the shallow coastal waters.

Although turtles don't seem to have the public relations problem with people that crocodiles, snakes and large lizards seem to suffer from (presumably for lacking fangs or venom, they are as a whole



Dionysius Sharma

considered "safe"), many species of turtles are in danger of extinction caused by humans. Almost throughout the world, turtles are eaten as either a proteinaceous food or for the purported therapeutic value of their body parts, such as meat, gall bladder, fat, unshelled eggs, cartilage, and bones that are used for the manufacture of drugs. The incredibly large number of freshwater turtles and tortoises from all over south-east Asia that land up in the markets of China is a particular cause for concern, as several species found in these markets are unknown to science, and therefore, nothing is known of their biology and conservation status. Large numbers of turtles are also collected from the wild for supply to a growing pet trade industry in the West. Even in many cultures that do not eat turtle meat, the harvesting of turtle eggs may be an acceptable activity, and on some sea turtle nesting beaches, virtually every egg laid are collected for consumption or sale. Other threats to the survival of wild turtles include the modification of their natural habitats. For instance, dams built on a river has the potential to change a running water ecosystem into a standing one, which, over time, will affect the ecology of the waterway, causing the extinction of species that are adapted to living in flowing waters. Pesticide and herbicide spill-offs from agricultural fields into ponds and rivers is another human induced threat to turtles and other aquatic organisms. Some pesticides are known to cause thinning of egg-shells in birds, leading to breakage during development. More specific conservation issues have been discussed in Chapter 9.

Turtles play a number of useful functions in the ecosystem. Many are feeders of carrion, often scavenging far from their typical haunts, and thereby help in the release of locked-up nutrients. Other turtles feed on organisms that cause diseases in humans, such as schistosomiasis, which is spread by a snail, and malaria and filaria, that are transmitted by mosquitoes; several aquatic turtles are specialised snail eaters (complete with enlarged jaw muscles for breaking the hard shells of snails) or feeders of mosquito larvae. By eating water weeds, such as the introduced water hyacinth (*Eichhornia crassipes*), water turtles help maintain open waters, and thereby in the control of insects (such as mosquitoes) that breed in stagnant waters. In turn, turtles are food for other animals, from large



Ulrich Menthey

A juvenile Asian Softshell Turtle (*Amyda cartilaginea*), showing a skin-clad shell and nostrils set on a proboscis.

fishes to waterbirds, monitor lizards, otters and crocodiles, not to mention many aboriginal people throughout the world.

Finally, turtles are important to many local cultures, and several tribes consider the turtle as a totem, eating of the totemic animal being taboo (forbidden) for the tribe members. For others, bringing a turtle to a temple is considered a good deed, that brings not only good luck, but also a better after life.

This work described all species of native and introduced turtles and tortoises recorded from Borneo (including the Malaysian states of Sabah, Sarawak, as well as Brunei Darussalam and Indonesia's Kalimantan Province), besides Peninsular (West) Malaysia. A few of these spill over to Singapore, for which reason we have covered this island state as well. The primary aim of this work is to enable the lay public to identify species encountered in the field, and more generally, to create an interest in these animals. We use the word 'turtle' for the whole group, although in general English usage, turtle is the marine animal, tortoise the terrestrial animal, and terrapin, the

freshwater one. Contrary to traditional usage, several terrapins have relatives that spend their entire life on dry land and are unable to swim, and a few tortoises prefer wet areas. The River Terrapin (*Batagur baska*) typically inhabits brackish, even coastal, waters, and generally avoids freshwaters.

We have tried to use external characteristics (such as size, colour and morphological characters), whenever possible as identification characters to define species, although for familial or generic identification, internal characters need to be studied. Each species account contains the English, the current scientific and vernacular names, the primary citation, besides data on morphological characteristics (including size, colour and sexual dimorphism), distribution, biology (including habitats preferred, diet, behaviour and reproduction) and conservation status. A glossary of technical terms used can be found at the back of the book.

CHECKLIST OF TURTLES OF BORNEO AND PENINSULAR MALAYSIA

(species marked with an asterisk are exotics that are established in the region)

DERMOCHELYIDAE

1. Leatherback Sea Turtle *Dermochelys coriacea* (Vandelli, 1761)

CHELONIIDAE

2. Loggerhead Sea Turtle *Caretta caretta* (Linnaeus, 1758)
3. Green Turtle *Chelonia mydas* (Linnaeus, 1758)
4. Hawksbill Sea Turtle *Eretmochelys imbricata* (Linnaeus, 1766)
5. Olive Ridley Sea Turtle *Lepidochelys olivacea* (Eschscholtz, 1829)

TRIONYCHIDAE

6. Asian Softshell Turtle *Amyda cartilaginea* (Boddaert, 1770)
7. Narrow-headed Softshell Turtle *Chitra indica* (Gray in: Griffith & Pidgeon, 1831) species-complex

8. Malayan Softshell Turtle *Dogania subplana* (Geoffroy-Saint Hillaire, 1809)
9. Asian Giant Softshell Turtle *Pelochelys cantorii* Gray, 1864
10. Chinese Softshell Turtle *Pelodiscus sinensis* (Wiegmann, 1835)*

BATAGURIDAE

11. River Terrapin *Batagur baska* (Gray in: Gray & Hardwicke, 1830)
12. Painted Terrapin *Callagur borneoensis* (Schlegel & Müller, 1844)
13. Malayan Box Turtle *Cuora amboinensis* (Daudin, 1801)
14. Asian Leaf Turtle *Cyclemys dentata* (Gray, 1831)
15. Orange-headed Temple Turtle *Heosemys grandis* (Gray, 1860)
16. Spiny Hill Turtle *Heosemys spinosa* (Gray, 1831)
17. Yellow-headed Temple Turtle *Hieremys annandalei* (Boulenger, 1903)
18. Malayan Snail-eating Turtle *Malayemys subtrijuga* (Schlegel & Müller, 1844)
19. Malayan Flat-shelled Turtle *Notochelys platynota* (Gray, 1834)
20. Asian Giant Turtle *Orlitia borneensis* Gray, 1873
21. Black Pond Turtle *Siebenrockiella crassicollis* (Gray, 1831)

EMYDIDAE

22. Red-eared Slider *Trachemys scripta* (Schoepff, 1792)*

TESTUDINIDAE

23. Elongated Tortoise *Indotestudo elongata* (Blyth, 1853)
24. Asian Brown Tortoise *Manouria emys* (Schlegel & Müller in: Temminck, 1844)
25. Impressed Tortoise *Manouria impressa* (Günther, 1882)

Note: The record of *Geoemyda spengleri* from Borneo is in error.