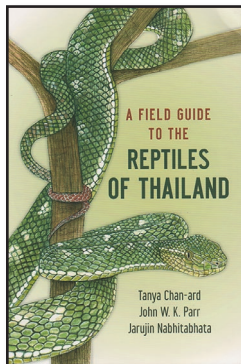


BOOK REVIEWS

Herpetological Review, 2015, 46(3), 456–459.
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A Field Guide to the Reptiles of Thailand

Tanya Chan-ard, John W. K. Parr, and Jarujin Nabhitabhata. 2015.
Oxford University Press, New York (<http://global.oup.com>). xxix + 314 pp. Softcover, US \$39.95. ISBN 978-0-19-973650-8. Hardcover, US \$125.00. ISBN 978-0-19-973649-2.



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During the last two decades the known Thai herpetofauna has much increased due to new species descriptions and to additions of species recorded from neighboring countries, and species are still regularly added today (Kunya et al. 2015; Pauwels et al. 2015; Sumontha et al. 2015). The Thai reptile list is also still going through important taxonomic changes (see the most recent change by David et al. 2015). Under these circumstances, one might wonder if this was the best time to produce a field guide. On the other hand, existing guides on the Thai herpetofauna are really outdated or incomplete (David et al. 2004; Pauwels and David 2005, 2011), and an easily accessible update on the current status of knowledge on the reptiles of Thailand would certainly be good support for further research and conservation management.

This courageous task of compilation has been jointly attempted by three authors. Tanya Chan-ard has dedicated his whole career to the study of the reptiles and amphibians of Thailand, and his field knowledge on these faunas is unrivalled. John Parr is a conservationist with experience in Southeast Asia but is not a herpetologist, hence his participation in such a challenging enterprise is a surprise. Jarujin Nabhitabhata was one of the leaders in herpetological research in Thailand, but he tragically died during minor surgery in 2008 (Chan-ard et al. 2009), i.e., seven years before the guide under discussion here was published.

The guide's size makes it easy to bring in the field, with good quality binding and paper. It is divided into six main parts: an unnamed section (pp. i–xxix) including a glossary and a key to the major groups of Thai reptiles; an introduction (pp. 1–17) containing a history of herpetology in Thailand; a half-page section

on physiography; very general sections on habitats (without figures), zoogeography, and conservation; species accounts (pp. 18–298); a selected bibliography (pp. 299–306); an index of scientific names and an index of common names. The authors included keys to genera for most families, and keys to species within each multiple-species genus.

The glossary does not include a number of terms that are used in the identification keys (alveolar rim, amphicoelian, cornified, entoplastron, pentadactyl, pores, precentral scute, pterygoideum, etc.). Some of the glossary's definitions are erroneous or misleading (for example “anal plate” is defined as the “terminal ventral scale or scute” while the drawing on page xxix mentions that the last ventral precedes the anal; “scansorial” is defined as “both arboreal and terrestrial;” “superciliary” is defined as “small scale bordering orbit”). No methodology is provided to explain how to count supralabials, infralabials, lizard midbody scales, etc. There is no distinction made between snake preventrals and ventrals (see drawing p. xxviii). The way shown to measure the plastron length (p. xxv) is erroneous.

The section on the history of herpetology in Thailand is a major disappointment. The guide being co-authored by two Thai herpetologists, one would have hoped to find much information on the contributions by their compatriots. However, after long paragraphs dedicated to the biography of foreign herpetologists, including only information already available in the literature, the single thing said about Thai herpetologists is “currently, there are about 20 Thai nationals with a keen interest in herpetology supported by a network of more than 100 experts in particular field of herpetological [sic] taxonomy”! Not a single word about pioneers such as the late Wirot Nutphand who wrote the first Thai reptile guides and described several taxa including the iconic *Chitra chitra*, Kumthorn Thirakhupt who trained a large part of the current generation of Thai herpetologists, Lawan Chanhome who made significant progress in the study of Thai snake venoms and husbandry, Piboon Jintakune who initiated an important snake reference collection at the Thai Red Cross, Yodchaiy Chuaynkern or Montri Sumontha, to mention a few. There is not even a mention of the fact that Jarujin died in 2008!

The habitats and zoogeography sections of the introduction are very general and make a single reference to reptiles (“turtle”) but refer five times to mammals; it seems like these sections have been just copied and pasted from a general guide on Thai mammals. The map showing the Thai provinces is outdated, and Bueng Kan Province, cited in the guide, won't be found on the map.

Within the families, the order of genera seems more or less random, as does the order of species within genera, making it very impractical to find a given taxon. The text for the family Typhlopidae has been placed by mistake in the Sauria section. The introduction to Agamidae tells us that this family includes the genus *Takydromus*!

The key to the major groups of Thai reptiles states that in lizards “the tail is equal to or longer than snout-vent length (unless regenerated);” this obviously does not always apply, for example, to *Dibamus* and some *Isopachys*. The keys to trionychid and skink genera are largely based on osteological characters, inappropriate for a field guide. The key to genera of the Geoemydidae lacks an entry to couplet 4, and the key is partly based on osteological characters. The key to the genus *Malayemys* erroneously states that the front of the upper jaw of *M. subtrijuga* has three vertical lines, while it actually has three pairs of vertical lines. The key to the lizard families erroneously states that all legless skinks have an ear-opening and implies that Anguillidae do not. The keys to trionychid genera, agamid genera (*Acanthosaura*, *Calotes*, *Draco*, *Pseudocalotes*), gekkonid genera (*Cnemaspis*, *Cyrtodactylus*, *Dixonius*, *Ptychozoon*), skink genera (*Eutropis*, *Isopachys*, *Scincella*, *Sphenomorphus*), *Dibamus*, *Boiga*, *Oligodon*, *Crotalidae*, *Disteira*, homalopsid genera, *Asthenodipsas*, etc., contain numerous mistakes regarding character variation, with considerable discrepancies between variation given in the species accounts, variation given in the keys, and characters visible on the drawings. One of many examples is that the character “no gular fold or pouch” leads to *Aphanotis* in the key to agamid genera, but the species account for *A. fuscus* mentions “the gular pouch is black.” The first choice in the agamid genera key is between “body depressed” and “body compressed”—the first leads, after some additional steps, to *Leiolepis*, while the account for that genus states “members of this genus have a compressed body,” in complete contradiction with the key. The last point of the key for *Bronchocela* leads to *B. cristellata*, the last point of the key to *Xenochrophis* leads to *X. flavolineatus*, while these two species don't exist. There is no key to snake families nor to colubrid genera. There is no drawing nor definition to explain the peculiar head scales of the scolecophidians, rendering the use of their key very difficult. The key to Hydrophiidae lacks an entry to couplet 11, and does not include the genus *Praescutata*, which is, however, recognized by the authors. The key to *Dendrelaphis* does not include *D. subocularis*, which is, however, included in the guide. These very numerous mistakes and missing keys will make the identification of sea turtles, terrapins, softshell turtles, skinks, and of all snakes particularly challenging. It should be noted that the body lengths of *Laticauda colubrina* and *Trimeresurus sumatranus* are erroneously indicated at 360 cm and 256 cm, respectively.

Relative species' sizes within genera are often inconsistent. For example *Lycodon fasciatus* is said to have a body length of 89.5 cm and be a medium-sized snake, while *L. cardamomensis* is said to have a body length of 89.6 cm and be a small snake. *Oligodon catenatus* is said to have a body length of up to 60.7 cm and to be “one of the larger Kukri snakes,” while *O. fasciolatus* is said to have a body length of up to 80.7 cm and to be a “small Kukri snake.”

A number of important references cited in the text are not included in the literature section. The literature section includes 156 references (one is listed twice), i.e., only a small part of the existing literature on Thai reptiles. The arrangement of references is not consistent: it is sometimes purely by alphabetical order, sometimes by chronological order within a series of references with the same first author, thus not following strict alphabetical order. The selection of references is mysterious, as many major revisions and herpetofaunal inventories are missing, while many obsolete and insignificant contributions were included, even several publications that deal exclusively with Thai amphibians. The

introduction of the guide explains that it “includes species accounts for all of the 352 reptile species currently with confirmed records in Thailand as of December 31, 2010.” However, there is only one reference for 2010—the revision of the Thai *Cnemaspis* by Grismer et al., in which seven new species were described, of which only one, *C. narathiwatensis*, was included in the guide! For 2009 there is also only a single reference listed, the description by Bauer et al. of *Cyrtodactylus erythropis*, a species that was, however, not included in the guide! For 2008, the authors listed only five references (not repeated in the literature cited below), including Bauer et al. (2008) who described *Gekko nutaphandi* from Kanchanaburi Province, David et al. (2008) who described *Oligodon pseudotaeniatus* from central Thailand, and Grismer et al. (2008) who described *Cnemaspis biocellata*—but none of these species was included in the guide! The authors also listed Murphy et al. (2008) who rediscovered and redescribed *Paratapinophis praemaxillaris* giving a maximal known snout-vent length of 770 mm, while in the guide it is stated “a very small snake ...body length: up to 22.7 cm”! With only two references for 2009 and 2010 combined, and five references for 2008 that have not been integrated in the text, it would thus have been more honest to write that the literature was included until the end of 2007, even if many important references are also missing for that year. The authors gave the number of Thai protected areas “as of December 2008.” Thus, there is a gap of about seven years between the finalization of the guide contents and its publication.

The guide is totally outdated regarding snake and lizard classification, having not benefitted from the numerous phylogenies and revisions published in the 2010s. For example, snake genera like *Aplopeltura*, *Pseudoxenodon*, *Sinonatrix* and even *Xenodermus* are still included in the Colubridae in the guide and the anguid *Dopasia gracilis* is still under *Ophisaurus*. The classification used in the guide thus gives an outdated picture of the currently recognized taxonomic diversity of Thai reptiles.

Among the 352 species presented, 22 (ca. 6%) were not illustrated (*Draco haematopogon*, *Sphenomorphus grandisonae*, *S. helena*, *S. lineopunctulatus* and *S. mimicus*, *Argyrophis roxanae*, *Indotyphlops ozakiae*, *Lycodon butleri*, *Oligodon jintakunei*, *Acalyptophis peronii*, *Chitulia bituberculata*, *C. inornata* and *C. lamberti*, *Disteira nigrocincta*, *Hydrophis obscurus*, *Microcephalophis cantoris*, *Polyodontognathus caerulescens*, *Thalassophis anomalus*, *Enhydryis chanardi*, *Opisthotropis spenceri*, *Xenochrophis punctulatus*, and *Plagiopholis blakewayi*). Drawings vary greatly in quality from one species to another, probably because they were executed by three different artists (there is no indication as to which artist made what drawings). Sometimes several specimens are illustrated for a single species, differing from each other, but as there are no figure captions, one does not know if the differences correspond to age, sexual dimorphism, breeding condition, subspecific or individual variation. The drawings of pitvipers, *Boiga* spp. and cobras are superb and deserve special mention. The drawing for *Cyrtodactylus sumonthai* definitely does not illustrate that species. *Gonyosoma floweri*, a brown morph of *G. oxycephalum* (David et al. 2004), is however recognized as a distinct species in the guide, but illustrated with a drawing of *Orthriophis taeniurus ridleyi*. The drawings of *Gonyosoma longicauda* and *Liopeltis tricolor* have been mixed up, as well as the drawings of *Oligodon joysoni* and *O. taeniatus*. These are obvious, but there may be others, as there are very numerous discrepancies between the color descriptions in the species accounts and the drawings. In the era of digital photography, drawings should be used only if they offer something more than

photographs, such as accurate scalation outlines or color variations that are not available on photographs.

Species missing in the guide include at least the agamids *Acanthosaura cardamomensis*, *Pseudocalotes kakhienensis*, and *P. khaonanensis*, the gekkonids *Cnemaspis biocellata*, *C. channardi*, *C. huaseesom*, *C. kamolnorrnanathi*, *C. niyomwanae*, *C. omari*, *C. punctatouuchalis*, and *C. vandeventeri*, *Cyrtodactylus astrum*, *C. auribalteatus*, *C. doisuthep*, *C. dumnuui*, *C. erythropros*, *C. inthanon*, *C. khelangensis*, *C. kunyai*, *C. lekaguli*, *C. macrotuberculatus*, *C. phuketensis*, *C. ranongensis*, *C. saiyok*, *C. samroiyyot*, *C. sanook*, *C. surin*, and *C. wangkulangkulae*, *Gekko lauhachindai* and *G. nutaphandi*, *Hemiphyllodactylus chiangmaiensis*, and *Ptychozoon kaengkrachanense* (see, for example, Grismer et al. 2010, 2012, 2014), the skinks *Jarujinia bipedalis*, *Larutia nubisilvicola*, *Lygosoma angeli*, and *L. frontoparietale* (this last species is in the identification key for the genus, but its species account has been omitted), the colubrids *Dendrelaphis nigroserratus*, *Lycodon ophiophagus*, *Oligodon pseudotaeniatus*, and *Ptyas nigromarginata*, the homalopsids *Cerberus schneiderii* and *Homalopsis mereljcoxi*, the natricids *Amphiesma boulengeri*, *A. leucomystax*, and *Sinonatrix yunnanensis*, and the viperids *Trimeresurus cardamomensis* and *T. phuketensis*. There is no mention of the emydid *Trachemys scripta elegans* and the trionychid *Pelodiscus sinensis*, although both have been abundantly released in the wild in Thailand, and are possibly locally reproducing (Vidthayanon 2005).

Leiolepis ocellata, regarded as a subspecies of *L. belliana* in the guide, was raised to species level by Pauwels and Chim-suncharat (2007). Without any justification, a number of subspecies are not recognized in the guide, such as those of *Oreocryptophis porphyraceus*. *Dryocalamus davisonii tungsongensis* is recognized in the guide as a subspecies of *D. subannulatus*, while these taxa had been synonymized in a work coauthored by Tanya Chan-ard (Pauwels et al. 2006). There are many more taxonomic comments that could be made, but this would go far beyond the scope and the space allowed for a book review.

The section "Identification of Reptiles" states that the "international conservation status is provided at the end of each species account," while this section appears in only 44 (12.5%) of the species accounts. For these species this section only mentions the IUCN and/or the CITES category, without any comment, thus not explaining what threatens the species face. In some cases the IUCN conservation status attributed has been made up ("Insufficiently Known" p. 23 [presumably "Data Deficient"]). The guide, thus, does not provide any new information on the conservation status of Thai reptiles and does not even present the data already available on the subject, with the exception of the CITES and IUCN listings as they were in 2007.

Based on the available published literature, it is obvious from the first look that more than a fourth of the maps presented in the guide are grossly incomplete or erroneous. There are numerous contradictions between the text and the maps; one among many examples is found in *Batagur borneoensis*, where the text says it inhabits in Peninsular Thailand as far north as Bangkok while the map shows a distribution in Thailand limited to Yala Province.

There are serious mistakes in the behavior and habitat sections within some species accounts. For example *Cyrtodactylus tigroides* is indicated as a cave-dweller (this mistake is also in the identification key for the genus); its common name is even given as "Tiger Cave Gecko." Regarding *Draco blanfordii*, the authors stated "prefers hilly habitats, although young are found at lower

elevations." *Leiolepis* are presented as insect-eaters, there is no mention of the fact that their diet also includes plants.

The index to common names is extremely impractical. For example, the Selangor Striped Skink can be found only under "Skink, Striped, Selangor"; there is no entry under Striped or Selangor. In the conservation section of the introduction, the common names for seven species differ from the ones used in their respective species accounts; only the latter names are in the index. In the index to common names, a number of common names differ from the names appearing in the species account, among others the Slender Blind Snake name found in the species account is replaced by the Doi Pui Blind Snake in the index. The common name Malayan Snail-eating Turtle is applied to *Malayemys subtrijuga* in the introduction, and to *M. macrocephala* in its species account; in the latter case it is definitely an inappropriate common name given the species' distribution. Other inappropriate common names include "Tailed Skinks" for *Plestiodon*, "Western Legless Skink" for *Isopachys borealis*, or "Clouded Pit Viper" for *Trimeresurus nebularis*, the two latter being based on misunderstandings of the species' scientific epithets. The common name "Common Softshell Turtle" is given for the genus *Amyda* which contains a single species, but that species receives the name "Asiatic Softshell Turtle," none of these names appear in the index. Throughout the guide there is a disturbing lack of consistency regarding the common names when they are used without the corresponding scientific name, making it often impossible to deduce what species the authors were writing about. The index to scientific names is badly designed, with entries to genera then species within genera, not entries to species, which makes it more difficult for readers who do not know to which genus a species they are looking for currently belongs.

Oxford University Press is to be held responsible as much as the authors for the numerous shortcomings of the guide. Even a very superficial review of the manuscript by a non-specialist would have revealed that the data are seven years old and thus mostly outdated, that mistypings, not limited to scientific names, are numerous (more than 280), that all figure captions are missing, that many of the references cited in the text are not in the bibliography, that 79% of the references in the bibliography are not mentioned in the main text, that some numberings within identification keys are wrong, etc. A slightly more careful review would have shown that even the 2008 status of knowledge on Thai reptiles is not properly reflected in the guide. Because about 50 species from at least seven families are missing, many identification keys are erroneous or obsolete, the taxonomy and the conservation data are outdated and many maps are incomplete or erroneous, and in spite of the obvious efforts the authors have put into the making of this good-looking book, we definitely cannot recommend the use of this guide. We hope that a new, completely revised version will soon be produced.

Acknowledgments.—We thank Tanya Chan-ard, Michael Cota, M. Jack Cox, Patrick David, and Mike Dloogatch for useful discussions.

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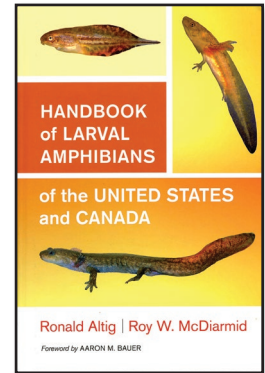
Herpetological Review, 2015, 46(3), 459–461.
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Handbook of Larval Amphibians of the United States and Canada

Ronald Altig and Roy W. McDiarmid. 2015. Comstock Publishing Associates, Cornell University Press, Ithaca, New York (www.cornellpress.cornell.edu). xvi + 345 pp., 130 illustrations. Hardcover. US \$75.00. ISBN 978-0-8014-3943-8.

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One can't help but marvel at a scholar who can stick with a challenging project for close to half a century. In 1970, Ronald Altig published "A key to the tadpoles of the continental United States and Canada" in the journal *Herpetologica*. The key was neither perfect nor complete. Altig was determined to make it better. Now, after 45 years of commitment, his original 27-page paper has expanded into a 368-page book. This volume culminates a productive career and is a profoundly comprehensive work.

Altig's co-author on the book, Roy McDiarmid, has not spent his career so singly focused on amphibian larvae, but has spent much of the last 20 years studying tadpoles. The collective devotion of Altig and McDiarmid was first demonstrated by their important reference book, *Tadpoles: The Biology of Anuran Larvae*, published 16 years ago (McDiarmid and Altig 1999).

Many more species are included in this new book than in Altig's 1970 key. Most of those result from legitimate revisions or discovery of cryptic species. Other species are exotics that now make their home not only in the continental United States, but also in Hawaii.

The title of this book does not do justice to its depth and breadth. For example, it doesn't mention the 40 pages dedicated to a key to the eggs and embryos of amphibians. The book also includes a detailed glossary and a huge literature cited section. Species accounts for all amphibian taxa currently recognized in North America are included, organized by family. Each species account includes information under the headings: Identification, Natural History, Range, and Citations. Within the Citations for each species the references are clustered under the subheadings: General, Development/Morphology, Reproductive Biology, and Ecobehavior. For well-studied species, the accounts fill a page or so largely because of the extensive list of references. For lesser-known species, the accounts run a third to half a page in length.

Illustrations are included for every species that can be visually distinguished from other species. Not only are there photos of the larvae in lateral view, but also photos (and some line drawings) of key body parts, most notably the oral disc of tadpoles. Some accounts include images of the eggs and labial teeth. Habitat shots are included for a few species. All those illustrations are black-and-white, but the book also contains 12 colored plates, each showing 12 species.

Two working principles were used in developing the key to the larvae in this *Handbook*: 1) the keys are not necessarily dichotomous; and 2) to identify the taxa one has to know where