

# Three new species of archerfishes from the freshwaters of Southeast Asia (Teleostei: Toxotidae) and notes on Henri Mouhot's fish collections

Maurice Kottelat<sup>\*,\*\*</sup> and Tan Heok Hui<sup>\*\*</sup>

Examination of strictly freshwater archerfishes earlier identified as *Toxotes microlepis* and *T. chatareus* shows that they represent four species. Inland records of *T. chatareus* in mainland Southeast Asia are misidentifications. *Toxotes microlepis* is reliably known only from the lectotype, from an unknown locality in Thailand, possibly not in freshwater. *Toxotes siamensis*, new species, is described from the Chao Phraya drainage in Thailand and is distinguished by an irregular colour pattern and especially by the presence of a conspicuous black blotch above the anal-fin base. *Toxotes mekongensis*, new species, from the Mekong drainage in Cambodia, Laos and Thailand, has an elongated black blotch extending from below dorsal-fin origin to between origins of pelvic and anal fins. *Toxotes sundaicus*, new species, from Borneo, Sumatra and possibly the Malay Peninsula, has a longitudinal row of four blotches in the upper half of the body, a deeper body and a shorter snout. The history of the fish collections obtained by Henri Mouhot in Thailand, Cambodia and Laos (1858–1861) is reviewed.

## Introduction

The family Toxotidae includes the single genus *Toxotes* and seven valid species (Allen, 1978, 2004). They are well known as archerfishes for the ability of at least some species to shoot down terrestrial insects from the shore vegetation by a squirt of water from their mouth. This behaviour is known with certainty for *T. jaculatrix* and *T. chatareus* but apparently has not been confirmed for the other species in the wild; it has been observed for *T. blythii* in captivity (THH, pers. obs.). They are distributed from India to northern Australia, Vanuatu and Ryukyu Islands. Over most of this

range, species of *Toxotes* inhabit mangroves and estuaries but most species have a smaller range and occur in part or exclusively in freshwater. *Toxotes lorentzi* is known from inland waters in New Guinea and northern Australia, *T. kimberleyensis* from a few rivers in western Australia and Papua, *T. blythii* from freshwater in Myanmar, and *T. microlepis* in the Sundaic and Indochinese areas. There is no data on the habitat of *T. oligolepis*, which apparently is still known from a single specimen, apparently from Batjan Island [not Buru Island; explicitly stated by Bleeker, 1876a: 164].

*Toxotes microlepis* was originally described on the basis of three syntypes from “Siam”,

\* Rue des Rauragues 6, 2800 Delémont, Switzerland (address for correspondence). E-mail: [mkottelat@dplanet.ch](mailto:mkottelat@dplanet.ch)

\*\* Lee Kong Chian Natural History Museum, National University of Singapore, 2 Conservatory Drive, Singapore 117377, Republic of Singapore. E-mail: [nhmth@nus.edu.sg](mailto:nhmth@nus.edu.sg)

## Literature cited

- Allen, G. R. 1978. A review of the archerfishes (family Toxotidae). Records of the Western Australian Museum, 6: 355–378.
- Allen, G. R. 2004. *Toxotes kimberleyensis*, a new species of archerfish (Pisces: Toxotidae) from fresh waters of Western Australia. Records of the Australian Museum, 56: 225–230.
- Baird, I. G., V. Inthaphaisy, P. Kisouvannalath, B. Phylavanh & B. Mounsouphom. 1999. [The fishes of southern Lao]. Lao Community Fisheries and Dolphin Protection Project, Pakse, 161 pp. [In Lao].
- Bleeker, P. 1876a. Sur la pluralité des espèces insulindiennes de *Toxotes*. Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen, Afdeling Natuurkunde, Ser. 2, 9: 155–167.
- Bleeker, P. 1876b–1878a. Atlas ichthyologique des Indes Orientales Néerlandaises. Tome IX. Percoides III. Müller, Amsterdam, 1876b: pls. 355–360, 363–380, 1877: pp. 1–40, pls. 381–410, 1878a: pp. 41–80, pls. 411–420.
- Bleeker, P. 1878b. Levensbericht van Pieter Bleeker, door hemzelve. Jaarboek van de Koninklijke Akademie voor Wetenschappen gevestigd te Amsterdam, 1877 [1878]: 5–55.
- Blyth, E. 1860. Report on some fishes received chiefly from the Sitang river and its tributary streams, Tenasserim Provinces. Journal of the Asiatic Society of Bengal, 29: 138–174.
- Boulenger, G. A. 1892. Note on *Toxotes microlepis* Günther and *Toxotes microlepis* Blyth. Annals and Magazine of Natural History, Ser. 6, 9(50): 143–144.
- Gray, J. E. 1859a. Description of a new species of squirrel (*Sciurus siamensis*) from Siam, in the collection of the British Museum. Proceedings of the Zoological Society of London, 1859: 478.
- Gray, J. E. 1859b. Description of a new species of freshwater tortoise from Siam. Proceedings of the Zoological Society of London, 1859: 478–479, pl. Reptilia 21.
- Gray, J. E. 1861a. Description of a soft tortoise from Camboja. Proceedings of the Scientific Meetings of the Zoological Society of London, 1861: 41–42, pl. 5.
- Gray, J. E. 1861b. List of mammalia, tortoises and crocodiles collected by M. Mouhot in Camboja. Proceedings of the Scientific Meetings of the Zoological Society of London, 1861: 135–140, pl. 21.
- Guérin, M. 2003. Des casques blancs sur le Plateau des Herbes. La pacification des aborigènes des hautes terres du Sud-Indochinois, 1859–1940. Thèse, Université Paris 7, Paris, 332 pp.
- Günther, A. 1860. Catalogue of the Acanthopterygian fishes in the collection of the British Museum. Vol. 2. Squamipinnes, Cirrhitidae, Triglidae, Trachinidae, Sciaenidae, Polynemidae, Sphyrænidæ, Trichiuridae, Scombridae, Carangidae, Xiphiidae. British Museum, London, xxi + 548 pp.
- Günther, A. 1864. List of the new species of fresh-water fishes discovered by the late M. Mouhot in Siam and Cambodia. Pp. Appendix 174–180 in: H. Mouhot, Travel in the central parts of Indo-China (Siam), Cambodia, and Laos, during the years 1858, 1859, and 1860. Murray, London, 1: 303 pp., 2: 301 pp.
- Kaw-anantakul, K., C. Vidthayanon, A. Termvidchakorn & C. Sirikul. 2000. [Fishes of the Bueng Borapet swamp (lower Chao Phraya basin)]. Department of Fisheries, Bangkok, 83 pp., pls. [In Thai].
- Kaw-anantakul, K., C. Vidthayanon, A. Termvidchakorn, C. Sirikul & N. Junprathad. 2003. [Fishes of the Bueng Borapet swamp (lower Chao Phraya basin). Second edition]. Department of Fisheries, Bangkok, 82 pp, 22 pls. [In Thai].
- Kottelat, M. 1998. Fishes of the Nam Theun and Xe Bangfai basins, Laos, with diagnoses of twenty-two new species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coiidae and Odontobutidae). Ichthyological Exploration of Freshwaters, 9: 1–128.
- Kottelat, M. 2001. Fishes of Laos. Wildlife Heritage Trust, Colombo, 198 pp.
- Kottelat, M. 2011. Pieter Bleeker in the Netherlands East Indies (10 March 1842 – ca. 21 September 1860): new biographical data and a chronology of his zoological publications. Ichthyological Exploration of Freshwaters, 22: 11–94.
- Kottelat, M. 2013. The fishes of inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. Raffles Bulletin of Zoology, Supplement 27: 1–663.
- Kottelat, M., A. J. Whitten, S. N. Kartikasari & S. Wirjoatmodjo. 1993. Freshwater fishes of Western Indonesia and Sulawesi. Periplus, Hong Kong, 259 pp., 84 pls.
- Kottelat, M. & E. Widjanarti. 2005. The fishes of Danau Sentarum National Park and the Kapuas Lakes area, Kalimantan Barat, Indonesia. Raffles Bulletin of Zoology, Supplement 13: 139–173.
- Mouhot, H. 1864a–b. Travel in the central parts of Indo-China (Siam), Cambodia, and Laos, during the years 1858, 1859, and 1860. Murray, London, 1 (1864a): 303 pp., 2 (1864b): 301 pp.
- Pavie, A. 1903. Mission Pavie Indo-Chine – Atlas – Notices et cartes. Challamel, Paris, 54 pp., 10 pls.
- Rainboth, W. J. 1996. Fishes of the Cambodian Mekong. FAO, Rome, 265 pp., 27 pls.
- Rainboth, W. J., C. Vidthayanon & D. Y. Mai. 2012. Fishes of the Greater Mekong ecosystem with species list and photographic atlas. Miscellaneous Publications, Museum of Zoology, University of Michigan, 201: i–vi, 1–173, 121 pls.
- Roberts, T. R. 1989. The freshwater fishes of western Borneo (Kalimantan Barat, Indonesia). Memoirs of the California Academy of Sciences, 14: 1–210.
- Sirimontaporn, P. 1984. Fishes in Songkhla Lake. Volume 1. Fishes collected in the years 1981–83. National Institute of Coastal Aquaculture, Bangkok & Japan International Cooperation Agency, Tokyo, 91 pp.

- Smith, H. M. 1945. The fresh-water fishes of Siam, or Thailand. *Bulletin of the United States National Museum*, 188: i-xi, 1-622, 9 pls.
- Stuart, B. L., K. Sok & T. Neang. 2006. A collection of amphibians and reptiles from hilly eastern Cambodia. *Raffles Bulletin of Zoology*, 54: 129-155.
- Taki, Y. 1968. Notes on a collection of fishes from lowland Laos. United States Agency for International Development, Mission to Laos, Agriculture Division, Vientiane, 47 pp.
- Taki, Y. 1974. Fishes of the Lao Mekong basin. United States Agency for International Development, Mission to Laos, Agriculture Division, Vientiane, 232 pp.
- Vidthayanon, C. 2004. [Freshwater fishes handbook]. Sarakadee, Bangkok, 227 pp. [In Thai].
- Vidthayanon, C. 2008. Field guide to fishes of the Mekong delta. Mekong River Commission, Vientiane, 288 pp.
- Weber, M. & L. F. de Beaufort. 1936. The fishes of the Indo-Australian archipelago. VII. Perciformes (continued) Families: Chaetodontidae, Toxotidae, Monodactylidae, Pempheridae, Kyphosidae, Lutjanidae, Lobotidae, Sparidae, Nandidae, Sciaenidae, Malacanthidae, Cepolidae. Brill, Leiden, xvi+607 pp.

Received 22 April 2014  
Revised 15 January 2018  
Accepted 25 January 2018

## The whole contribution can be purchased as PDF file.

### Availability

Generally all our publications are available as PDF files; full publications as a general rule after the printed version is out of print. If you have questions concerning particular contributions please contact us by e-mail:

pdf@pfeil-verlag.de.

### The PDF files are protected by copyright.

The PDF file may be printed for personal use.

The reproduction and dissemination of the content or part of it is permitted.

It is not allowed to transfer the digital personal certificate or the password to other persons.

### Prices

Books: Prices are to be found in the catalog.

Articles in journals and single contributions or chapters in books:

10 EURO basic price per order (including the first 10 pages),  
and

0.50 EURO per page, beginning with the 11<sup>th</sup> page.

Page numbers are found in the contents of the publications.

### Orders

Orders can be sent to us via the online shop, by using the PDF order form, or informally by e-mail (pdf@pfeil-verlag.de). All we need is your name and address for invoicing. You will then receive an order confirmation incl. price and link for the payment processing. For orders via the online shop and immediate payment, the file can be provided without detours.

### Completion

As soon as possible, but depending on our office hours and the desired order, we will send you the order confirmation. After payment you will receive the PDF file(s) together with your personal certificate and the corresponding password by e-mail. Larger files are available for downloading. You will receive the invoice for your order by e-mail.

In order to be able to open the encrypted PDF files, the password-protected personal certificate must be installed at the first order, which then remains on the computer. All files encrypted with this certificate can then be opened on this computer.

## Dieser Beitrag kann als PDF-Datei erworben werden.

### Verfügbarkeit von PDF-Dateien

Prinzipiell sind von allen unseren Publikationen PDF-Dateien erhältlich. Komplette Publikationen in der Regel erst nachdem die gedruckte Version vergriffen ist. Anfragen bezüglich bestimmter Beiträge richten Sie bitte per E-Mail an pdf@pfeil-verlag.de.

### Die PDF-Dateien sind urheberrechtlich geschützt.

Ein Ausdruck der PDF-Dateien ist nur für den persönlichen Gebrauch erlaubt.

Die Vervielfältigung von Ausdrucken, erneutes Digitalisieren sowie die Weitergabe von Texten und Abbildungen sind nicht gestattet.

Das persönliche Zertifikat und das Passwort dürfen nicht an Dritte weitergegeben werden.

### Preise

Bücher: Die Preise sind dem Katalog zu entnehmen. Zeitschriftenbeiträge und einzelne Kapitel aus Sammelbänden bzw. Büchern:

10 EURO Grundbetrag pro Bestellung (einschließlich der ersten 10 Seiten),  
und

0,50 EURO pro Seite ab der 11. Seite.

Den Umfang der Beiträge entnehmen Sie bitte den Inhaltsverzeichnissen.

### Bestellungen

Bestellungen können über den online-Shop, das Formular, oder formlos per E-Mail (pdf@pfeil-verlag.de) an uns gerichtet werden. Wir benötigen nur Ihren Namen und Ihre Anschrift für die Rechnungserstellung. Sie erhalten anschließend eine Bestellbestätigung incl. Preis und Link zur Zahlungsabwicklung. Bei Bestellungen über den online-Shop und sofortiger Zahlung kann die E-Book-Datei ohne Umwege bereitgestellt werden.

### Abwicklung

So bald wie möglich, aber abhängig von unseren Bürozeiten und der gewünschten Bestellung, schicken wir Ihnen die Bestellbestätigung. Nach Zahlungseingang erhalten Sie die PDF-Datei(en) zusammen mit Ihrem persönlichen Zertifikat und dem zugehörigem Passwort per E-Mail. Größere Dateien bieten wir Ihnen gegebenenfalls zum Herunterladen an. Die Rechnung für Ihre Bestellung erhalten Sie per E-Mail.

Um die verschlüsselten PDF-Dateien öffnen zu können, muss bei der ersten Bestellung das passwortgeschützte persönliche Zertifikat installiert werden, welches anschließend auf dem Rechner verbleibt. Alle mit diesem Zertifikat verschlüsselten Dateien können dann auf diesem Rechner geöffnet werden.