

Short Communication

Records of freshwater fish species from Phnom Kulen National Park, northwestern Cambodia

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Cambodia's fish fauna remains only partially explored, with most of the ichthyological literature dating back to the early 20th century when Cambodia was under French jurisdiction (e.g. Leclère, 1901; Durand, 1915; Chabanaud, 1926; Chevey, 1932). In the 1960s, François d'Aubenton undertook the first extensive scientific collection of fishes from all over Cambodia, which were later identified and revised by Kottelat (1985). The following years of civil unrest in Cambodia hampered further research. Besides a field guide on the *Fishes of the Cambodian Mekong* (Rainboth, 1996) and an atlas on the *Fishes of the Greater Mekong Ecosystem* (Rainboth *et al.*, 2012), recent work has focused mainly on the Tonle Sap lake and river system (Lim *et al.*, 1999; Motomura *et al.*, 2002).

Phnom Kulen National Park is a 37,375-hectare protected area in Banteay Srei, Svay Leu and Varin Districts, Siem Reap Province, northwestern Cambodia (Fig. 1). Hills dominate the park's topography, with most areas above 200 m elevation, but with few peaks above 450 m. Most of the park is covered by disturbed semi-evergreen forest that suffers from ongoing forest clearance and selective logging. The national park contains numerous small, often seasonal streams, which are not mapped.

Here we present recent records of freshwater fishes from three sites in the Phnom Kulen National Park: Site A—Phnom Kbal Spean, Banteay Srei District (13°40'45.5"N, 104°01'25.0"E); Site B—Phnom Kbal Spean, Banteay Srei District (13°41'13.0"N, 104°00'56.0"E); Site C—Phnom Kulen, Svay Leu District (13°31'40.3"N, 104°07'10.8"E). These records were a by-product of a wider herpetological survey. Sites A and B are upland tributaries of the Kbal Spean River in the Northwest of the national park. During the early rainy season, in May and June 2011, Site A was a shallow stream meandering between rocks, with a moderate to slow current and a sandy bottom (Fig. 2). Site B also had a sandy bottom and was up to one metre deep, with a moderate current (Fig. 3). Site C is a small tributary of the Phnom Kulen River, up to one metre deep, with a very slow current and rocky to sandy bottom (Fig. 4). At each site we captured fish opportunistically in all accessible micro-habitats.

Fish were caught using a dip net (50 cm x 70 cm; mesh size 3.2 mm). After capture, life pictures were taken, and then the fishes were anaesthetized with clove oil, following the methods of Oetinger (2003), and subsequently fixed in 95% ethanol. Specimens were deposited at the Zoologisches Forschungsmuseum

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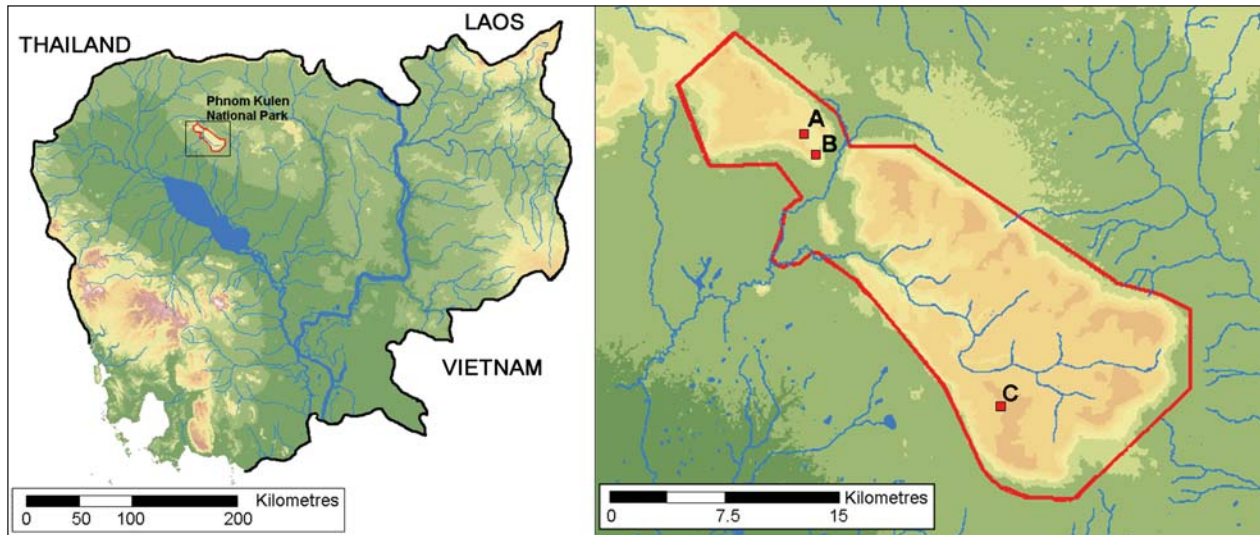


Fig. 1 Left: The Kingdom of Cambodia, showing the Phnom Kulen National Park, Siem Reap Province. Right: Phnom Kulen National Park, showing sampling localities and main water bodies. Maps designed using ArcGIS 9.3.



Fig. 2 Site A—Phnom Kbal Spean, Bantey Srei District, at 100 m a.s.l. (© T. Hartmann).



Fig. 3 Site B—Phnom Kbal Spean, Bantey Srei District, at 198 m a.s.l. (© P. Geissler).

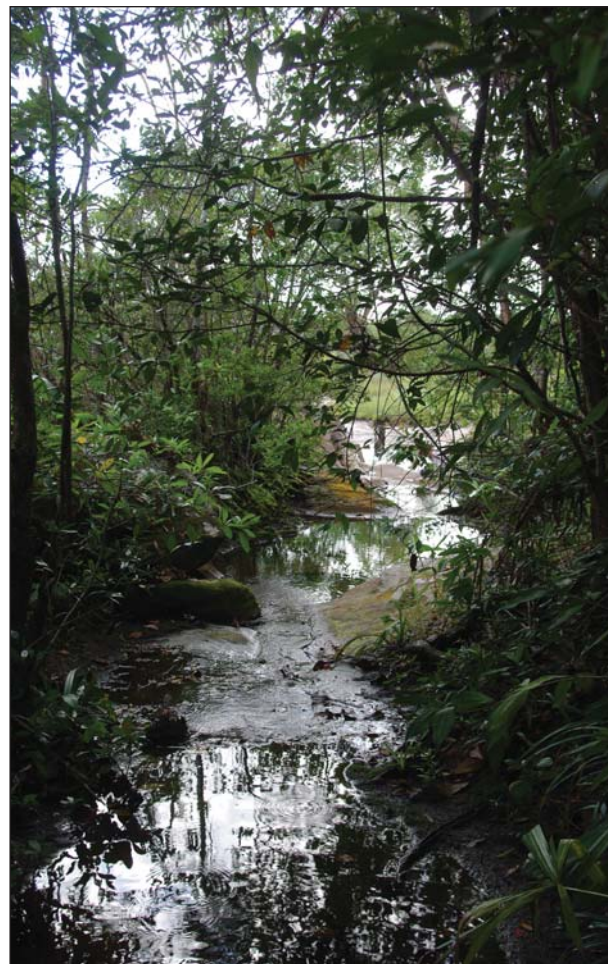


Fig. 4 Site C—Phnom Kulen, Svay Leu District, at 315 m a.s.l. (© P. Geissler).



Fig. 5 Variation in *Puntius aurotaeniatus* (© P. Geissler).



Fig. 6 *Danio albolineatus* (© P. Geissler).



Fig. 7 *Rasbora paviana* (© P. Geissler).



Fig. 8 *Lepidocephalichthys hasselti* (© P. Geissler).



Fig. 9 *Nemacheilus pallidus* (© P. Geissler).



Fig. 10 *Dermogenys siamensis* (© P. Geissler).



Fig. 11 *Betta prima* (© P. Geissler).

Alexander Koenig (ZFMK), Bonn, Germany, and the Institute of Animal Physiology and Genetics (IAPG), Liběchov, Czech Republic. Each collection number refers to a single specimen.

Our collection contains 13 species, as listed below. We also give the known distribution in Cambodia for each of these species, assigning old locality names from literature to currently used names where possible, and provide further clarifying remarks on species where necessary.

Compared to the immense species richness found during ichthyological surveys elsewhere in Indochina (e.g. Freyhof *et al.*, 2000; Motomura *et al.*, 2006), our opportunistic and very short-term approach certainly cannot determine the full diversity of the freshwater fishes in Phnom Kulen National Park. An in-depth survey of the park's ichthyofauna would certainly lead to the finding of numerous additional species. By presenting this list of freshwater fish species, we hope to encourage future Cambodian ichthyologists to undertake further work on this understudied taxonomic group in the Phnom Kulen National Park and elsewhere in Cambodia.

Cyprinidae: Barbinae

***Puntius rhombeus* Kottelat, 2000**

Site A: ZFMK 44887–44888; Site B: ZFMK 44795–44807; 44869.

Mekong Basin (Kottelat, 2000).

***Puntius aurotaeniatus* (Tirant, 1885)**

Site A: ZFMK 44892–44894.

Mekong Basin and in coastal drainages of the Gulf of Thailand (Rainboth, 1996). Specimens vary remarkably in the pattern and distinctiveness of their vertical bars (Fig. 5 A, B).

Cyprinidae: Danioninae

***Danio albolineatus* (Blyth, 1860)**

Site A: ZFMK 44899–44901; Site B: ZFMK 44845–44862; Site C: ZFMK 44866–44868 (Fig. 6).

Mekong Basin (Rainboth, 1996; Kottelat, 2001); O Po Kampon, Boum Long (= probably Banlung), Snoc Trou, Toek Sap, Kirikum (= Kirirom), Sihanoukville, Bokéo (= Bokor) and Sré Umbel (= Sre Ambel) (Kottelat, 1985).

Remarks: Our specimens are in accordance to Fang &

Kottelat's (2000) observations on *Danio albolineatus* in having a lateral line and 13 to 14 soft anal fin rays.

Cyprinidae: Rasborinae

***Rasbora paviana* Tirant, 1885**

Site A: ZFMK 44906–44916; Site B: ZFMK 44809–44826; 44836–44844 (Fig. 7).

Mekong Basin (Rainboth, 1996, Kottelat, 1998), including Tonle Sap River and Tonle Sap Lake (Lim *et al.*, 1999, Motomura *et al.*, 2002).

Cobitidae

***Acanthopsoides hapalias* Siebert, 1991**

Site A: IAPG A5451, ZFMK 45232.

Lower Mekong (Rainboth, 1996; Doi, 1997; Kottelat, 1998; Kottelat, 2001).

***Lepidocephalichthys hasselti* (Valenciennes, 1846)**

Site A: IAPG A5449, ZFMK 45233 (Fig. 8).

Mekong Basin (Kottelat *et al.*, 1993; Rainboth, 1996; Kottelat, 2001).

Balitoridae

***Nemacheilus pallidus* Kottelat, 1990**

Site A: IAPG A5450, ZFMK 45234–45235 (Fig. 9).

Mekong Basin (Kottelat, 1990; Rainboth, 1996). Tonle Sap Lake (Motomura *et al.*, 2002).

Clariidae

***Clarias spec. aff. batrachus* 'Indochina' Linnaeus, 1758**

***Clarias aff. batrachus* 'Indochina' (Ng & Kottelat, 2008)**

Site B: ZFMK 44794.

Ng & Kottelat (2008) designated a neotype for *Clarias batrachus* (Linnaeus, 1758), a species previously thought to be widely distributed throughout South-east Asia. It is now understood *Clarias batrachus* is restricted to Java and the Indochinese form represents a distinct species, *Clarias aff. batrachus* 'Indochina', but the whole complex requires further taxonomic research. ZFMK 44794 has 77 soft dorsal fin rays and 53 soft anal fin rays; the first pectoral spine is thickened and the inner edge is serrated. The dorsolateral colouration of the preserved specimen is brown,



Fig. 12 Juvenile of *Trichopsis vittata* (© P. Geissler).

without white dots. The ventral side is whitish to brown in colour; fins and head are darker.

Zenarchopteridae

Dermogenys siamensis Fowler, 1934

Site A: ZFMK 44918–44922; Site C: ZFMK 44886 (Fig. 10).

Mekong Basin (Kottelat, 2001; Meisner, 2001).

Channidae

Channa gachua (Hamilton, 1822)

Site A: ZFMK 44917; Site B: ZFMK 44827–44835; 44863–44865.

Mekong Basin (Kottelat, 1998; Kottelat, 2001).

Channa striata (Bloch, 1793)

Site A: ZFMK 44897–44905; Site C: ZFMK 44870–44873.

Mekong Basin (Kottelat, 1998), including Tonle Sap River and Lake (Nao & Sina, 1998; Lim *et al.*, 1999; Motomura *et al.*, 2002), Ratanakiri, Boum Long (= probably Banlung), Kampong Chnang, Ream, Boeng Kbal Damrey, Sihanoukville and Angkor (= Siem Reap) (Kottelat, 1985).

Osphronemidae

Betta prima Kottelat, 1994

Site C: ZFMK 44874–44885 (Fig. 11).

Mekong Basin (Kottelat, 1994, 2001) and coastal drainages in Cambodia and Vietnam (Allen, 2012).

Trichopsis vittata (Cuvier, 1831)

Site A: ZFMK 44895–44896 (both juveniles) (Fig. 12).

Mekong Basin (Rainboth, 1996); Kirirom, Toek Sap, Boeng Kbal Damrey, Stung Sen and O Po Kampon (Kottelat, 1985).

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References

- Allen, D. (2012) *Betta prima*. In *IUCN Red List of Threatened Species. Version 2012.1*. <http://www.iucnredlist.org/details/181251/0> [accessed 9 October 2012].
- Chabanaud, P. (1926) Inventaire de la faune ichthyologique de l'Indochine: première liste. *Bulletin économique de l'Indochine*, **169**, 561–581.
- Chevey, P. (1932) Inventaire de la fauna ichthyologique de l'Indochine. *Notes de l'Institut Océanographique de l'Indochine*, **19**, 1–31.
- Doi, A. (1997) A review of taxonomic studies of cypriniform fishes in Southeast Asia. *Japanese Journal of Ichthyology*, **44**, 1–33.
- Durand, P. (1915) *Industrie de la Pêche Dans la Région des Lacs au Cambodge*. Saigon (Ho Chi Minh City), Vietnam.
- Fang, F. & Kottelat, M. (2000) *Danio roseus*, a new species from the Mekong basin in northeastern Thailand and northwestern Laos (Teleostei: Cyprinidae). *Ichthyological Exploration of Freshwaters*, **11**, 149–154.

- Freyhof, J., Serov, D.V. & Nguyen T.N. (2000) A preliminary checklist of the freshwater fishes of the River Dong Nai, South Vietnam. *Bonner zoologische Beiträge*, **49**, 93–99.
- Kottelat, M. (1985) Fresh-water fishes of Kampuchea. *Hydrobiologia*, **121**, 249–279.
- Kottelat, M. (1990) *Indochinese Nemacheilines: A Revision of Nemacheiline Loaches (Pisces: Cypriniformes) of Thailand, Burma, Laos, Cambodia and Southern Viet Nam*. Pfeil-Verlag, Munich, Germany.
- Kottelat, M. (1994) Diagnoses of two new species of fighting fishes from Thailand and Cambodia (Teleostei: Belontiidae). *Ichthyological Exploration of Freshwaters*, **5**, 297–304.
- Kottelat, M. (1998) Fishes of the Nam Theun and Xe Bangfai basins, Laos, with diagnoses of twenty-two new species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coidae and Odontobutidae). *Ichthyological Exploration of Freshwaters*, **9**, 1–128.
- Kottelat M. (2000) Diagnoses of a new genus and 64 new species of fishes from Laos (Teleostei: Cyprinidae, Balitoridae, Bagridae, Syngnathidae, Chaudhuriidae and Tetraodontidae). *Journal of South Asian Natural History*, **5**, 37–82.
- Kottelat, M. (2001) *Fishes of Laos*. WHT Publications Ltd., Colombo, Sri Lanka.
- Kottelat, M., Whitten, A.J., Kartikasari, S.N. & Wirjoatmodjo, S. (1993) *Freshwater Fishes of Western Indonesia and Sulawesi / Ikan Air Tawar Indonesia Bagian Barat dan Sulawesi*. Periplus Editions, Hong Kong, China.
- Leclère, A. (1901) La pêche dans le Grand Lac au Cambodge. *Bulletin Économique de l'Indochine*, **38**, 675–679.
- Lim, P., Lek S., Touch S.T., Mao S.-O. & Chhouk B. (1999) Diversity and spatial distribution of freshwater fish in Great Lake and Tonle Sap River (Cambodia, Southeast Asia). *Aquatic Living Resources*, **12**, 379–386.
- Meisner, A.D. (2001) Phylogenetic systematics of the viviparous halfbeak genera *Dermogenys* and *Nomorhamphus* (Teleostei: Hemiramphidae: Zenarchopterinae). *Zoological Journal of the Linnean Society*, **133**, 199–283.
- Motomura, H., Tsukawaki, S. & Kamiya, T. (2002) A preliminary survey of the fishes of Lake Tonle Sap near Siem Reap, Cambodia. *Bulletin of the National Museum of Nature and Science*, **28**, 233–246.
- Nao T. & Sina, L. (1998) Review of the fisheries and aquaculture sector in Cambodia. In *Natural Resources-based Development Strategy for the Tonle Sap Area, Cambodia. Final Report, Volume 2*. (ed. Cambodian National Mekong Committee/ Nedeco), pp. 35–36. Mekong River Commission and United Nations Development Programme, Phnom Penh, Cambodia.
- Ng H.H. & Kottelat, M. (2008) The identity of *Clarias batrachus* (Linnaeus, 1758), with the designation of a neotype (Teleostei: Clariidae). *Zoological Journal of the Linnean Society*, **153**, 725–732.
- Oetinger, F.C. (2003) *Betäubung von Regenbogenforellen (Oncorhynchus mykiss) mit Nelkenöl und BHA – Stressbelastung und Produktqualität*. LMU München – Tierärztliche Fakultät, Munich, Germany.
- Rainboth, W.J. (1996) *Fishes of the Cambodian Mekong: FAO Species Identification Field Guide for Fishery Purposes*. Food and Agriculture Organisation, Rome, Italy.
- Rainboth, W.J., Vidthayanon, C. & Mai D.Y. (2012) *Fishes of the Greater Mekong Ecosystem with Species List and Photographic Atlas*. Miscellaneous Publications, Museum of Zoology, University of Michigan. Ann Arbor, USA.