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Fishes of the Xe Kong drainage in Laos, especially from the Xe Kaman

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Summary

The fishes of the Xe Kaman drainage in Laos have been surveyed between 15 and 24 May 2011. Forty-five fish species were observed, bringing to 175 the number of species recorded from the Xe Kong drainage in Laos, 9 of them new records for the drainage. Twenty-five species (14 %) have been observed from no other drainage and are potentially endemic to the Xe Kong drainage.

Five species observed during the survey are new to science (unnamed); they belong to the genera *Scaphiodonichthys*, *Annamia*, *Sewellia* and *Schistura* (2 species). Three of them have been discovered during the survey, the others although still unnamed were already known for some time, under an erroneous name. In the Xekong drainage, a total of 19 (11 %) fish species are still unnamed or their identity is not yet cleared and they are potentially also new to science.

The survey focused on Dakchung district. Eleven species were collected on Dakchung plateau and 3 are apparently new to science (and thus 27 % of the fish fauna of the plateau is endemic there).

Most of the endemic species (and all the new species discovered by the survey) are from rapids and other high gradient habitats. This reflects the limited distribution range of rheophilic species, but may also partly result from a sampling bias.

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Introduction

The Xe Kong is the southernmost drainage in Laos. It is faunistically different from the rest of the Mekong drainage in Laos. This results from it being the only drainage in Laos entering the Mekong south of the Khone Falls, which constitutes the boundary between two distinct lower Mekong and central Mekong fish fauna.

Little has been published on the fish fauna of the Xe Kong drainage. There has been no ichthyological work conducted in the drainage until recently. Baird et al. (1999) described the fish fauna of southern Laos, including the Xe Kong, but for language reasons, it is difficult (for me) to make full use of their work. Also quite a number of species are misidentified. Some species from the Xe Kong new to science have been described in various papers (Roberts, 1995, 1997, 1998a-b).

I did some short survey work in the Xe Kong in 1999 when preparing my book *Fishes of Laos* (Kottelat, 2001). This yielded 17 species new to sciences described in various papers (Kottelat, 2000a-b; Ng & Kottelat, 2000a-b). The material obtained during this 1999 survey was used in the 2001 book, but it has not been the object of a specific study and publication. Some of the data obtained in 1999 is included in the present report. A short survey was conducted in 2009 (Kottelat, 2009).

The data on the fishes of the Vietnamese part of the Xe Kong are too fragmentary to include them in this report. A few species of Balitoridae and Nemacheilidae are recorded by Freyhof & Serov (2000, 2001), Freyhof & Herder (2002) and a species of Sisoridae by Ng & Freyhof (2008; *Glyptothorax filicatus*), which was later also found in Laos (Kottelat, 2009).

The Xe Kaman is one of the main tributaries of the Xe Kong, which it enters in Attapeu (see map). There is no information about the fish fauna of the Xe Kaman in the scientific literature, except that some of the new species described by Kottelat (2000a) and Roberts (1995, 1997, 1998a-b) have their type locality in that drainage.

Methods

Fishes were obtained by push-net, castnet, seine and electric fish-shocker, and by inspecting fishermen's catches. Ichthyocides were used to obtain samples from habitats that could not be sampled by other means (crevices, rapids, waterfalls, etc.); they were used only where their effects could be entirely controlled and where the river topography allowed an immediate dilution below toxicity level immediately downstream of the sampled area. Fishermen's catches were mostly identified in the field; where needed sub-samples of each species were preserved to confirm identifications.

Beside observations made during the survey, much of this report is based on published and unpublished material and information that I gathered over the last 29 years in Southeast Asia. This report also includes informations obtained during a survey conducted in 1999 and which have not been published before. Identifications and nomenclature follow Kottelat (2001), except where noted.

Species are recorded only under their scientific names; these are made of two words, written in italics, and follow the International Code of Zoological Nomenclature. For species that present identification problems, I add the term 'cf.' (for 'confere': referred to) between the generic name (the 'first name' written with a capitalised initial) and the specific name ('second name') to indicate populations that are likely to belong to the species referred to but whose identification is not yet certain because of unresolved taxonomic problems. For example what is referred to as *Parambassis* cf. *siamensis* has similarities with *P. siamensis* but until a revision (a critical comparison of all species of the genus) can be done, one cannot be absolutely sure. I use 'aff.' (for 'affinis', related to) to denote populations that cannot be identified with any species known to me or that probably are new species (that is unnamed, without scientific name). The use of 'aff.' is to ally this possibly new species with what is possibly its closest species. For example, *Pangio* aff. *fusca* indicates that the species is distinct but close to *P. fusca*.

I use 'sp.' to indicate fishes that can only be identify to genus level but not to species level, for various reasons, most frequently because they are too small juveniles. For example, *Schistura* sp.; these are juveniles unambiguously identified as belonging to the genus *Schistura* but too small to exhibit the characters diagnostic of the various species. I use 'sp. n.' for species new to science, that is, species which have not yet received a formal name; for temporary use, these have been given English names (e.g. *Laocypris* sp. n. 'Xe Kong') or 'aff.' has been used to indicates their possible affinities (e.g. *Rasbora* sp. n. aff. *atridorsalis*).

Toponymy (spelling) follows the 1985 1:100,000 Lao P.D.R. topographic maps, when names are similar to those recorded in the field. Many names, however, do not agree with those on the maps. These cases are mentioned in the list of sampling sites. Co-ordinates were obtained with a Garmin GPS 76CSx.

All fish lengths are standard length (SL), measured from the tip of the snout to the base of the caudal fin (the 'tail fin').

'Endemic', used as either a noun or an adjective, means: whose distribution is restricted to a geographically limited area. For example, a species endemic to the Xe Kong is a species that has been observed only in the Xe Kong drainage.

Observations

List of sampling sites and species

The present list (below) includes only the species observed during the survey. Species mentioned by fishermen but not observed have been omitted as they are not readily identifiable. The compilation of lists of vernacular names is not an acceptable method to analyse fish distributions as very often a single name may be applied to more than one species or the same name may be used for different species in different places; often too, the same species is given different names depending of sex, age, size, etc. Species are listed in alphabetic sequence.

11-029 Attapu Prov.: Houay Park Par (tributary of Nam Thuei) at km-stone 27 on road from Attapu to Chalernxai, 31 km from Xaisetha; 221 masl; 15°00'23"N 107°05'08"E [15.00644°N 107.0855°E]; 15 May 2011.

Remark: Nam Thuei is Nam Vong on 1:100'000 map.

<i>Channa gachua</i>	<i>Puntius aurotaeniatus</i>
<i>Devario gibber</i>	<i>Rasbora paviana</i>
<i>Mastacembelus armatus</i>	<i>Rhinogobius taenigena</i>
<i>Monopterus albus</i>	<i>Schistura</i> sp.

11-030 Attapu Prov.: Nam Pa, km-stone 23 on road from Attapu to Chalernxai, 37 km from Attapu; 14°58'53"N 107°3'40"E [14.98139°N 107.0611°E]; 15 May 2011.

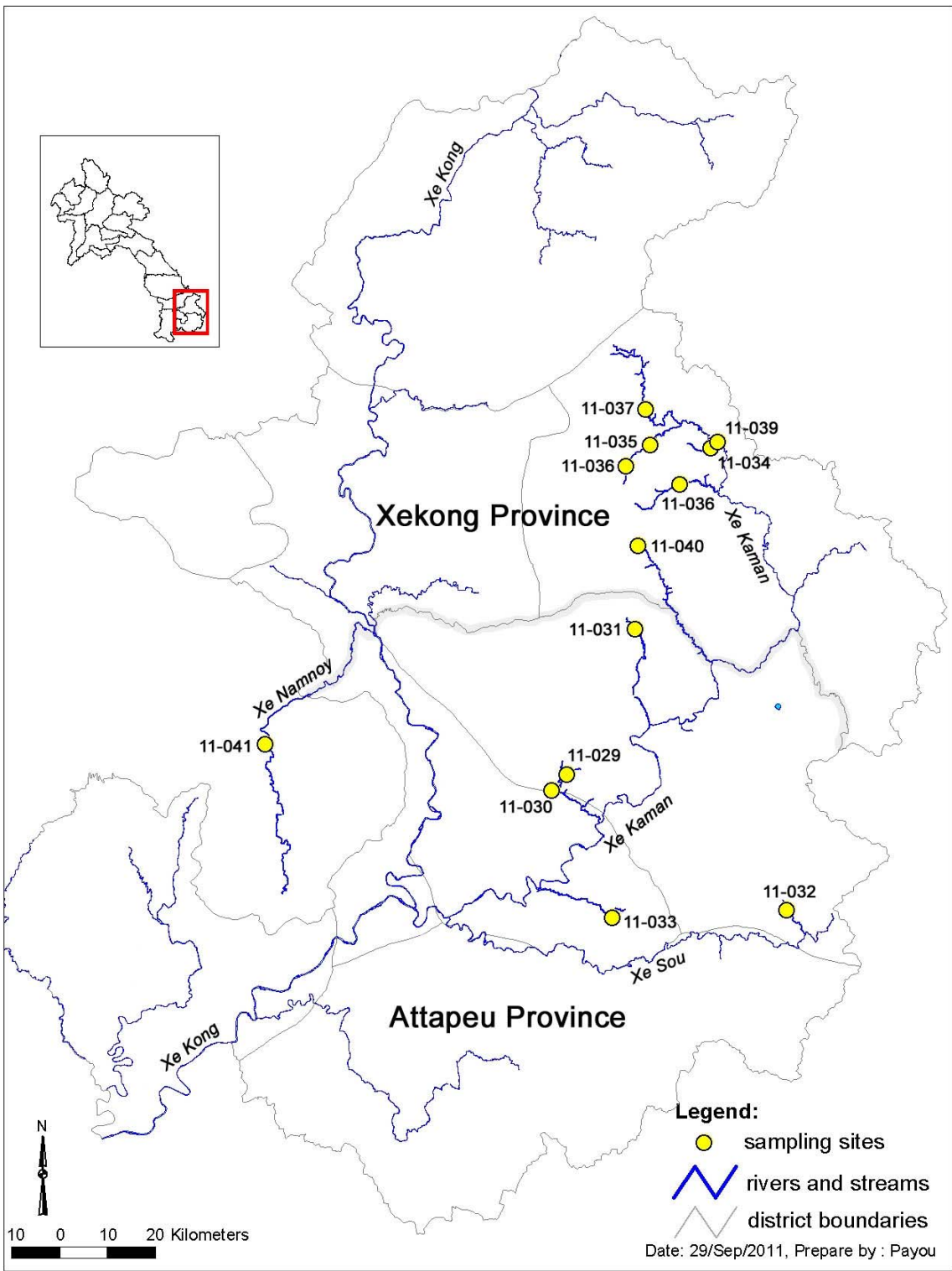
<i>Annamia normani</i>	<i>Puntius rhombeus</i>
<i>Channa striata</i>	<i>Rasbora amplistriga</i>
<i>Homaloptera smithi</i>	<i>Rhinogobius taenigena</i>
<i>Mastacembelus armatus</i>	<i>Schistura clatrata</i>
<i>Poropuntius normani</i>	<i>Schistura fusinotata</i>
<i>Pseudomystus siamensis</i>	<i>Sewellia speciosa</i>

11-031 Attapu Prov.: Nam Chun (Nam Tabeng on 1:100'000 map), a tributary of Xe Kaman, at about km 20 on road from Chalernxai to Dakchung; 846 masl; 15°13'48"N 107°11'49"E [15.22996°N 107.1968°E]; 16 May 2011 (Fig. 1).

<i>Annamia normani</i>	<i>Rasbora paviana</i>
<i>Neolissochilus blanci</i>	<i>Rhinogobius taenigena</i>
<i>Opsarius pulchellus</i>	<i>Scaphiodonichthys acanthopterus</i>
<i>Poropuntius normani</i>	<i>Schistura</i> sp.
<i>Puntius rhombeus</i>	<i>Sewellia diardi</i>

11-032 Attapu Prov.: Houay Pik (tributary of Xe Xou) at bridge on road from Attapu to border with Vietnam. 78 km from Xaisetha, 23 km from border, 9 km from Xe Xou bridge; 369 masl; 14°47'33"N 107°26'06"E [14.79245°N 107.435°E]; 17 May 2011.

<i>Garra cambodgiensis</i>	<i>Onychostoma meridionale</i>
<i>Garra cyrano</i>	<i>Opsarius pulchellus</i>
<i>Glyptothorax filicatus</i>	<i>Poropuntius normani</i>
<i>Glyptothorax laosensis</i>	<i>Pseudomystus siamensis</i>
<i>Glyptothorax aff. zanaensis</i>	<i>Raiamas guttatus</i>
<i>Henicorhynchus lineatus</i>	<i>Scaphiodonichthys acanthopterus</i>
<i>Homaloptera confuzona</i>	<i>Schistura</i> sp.
<i>Lobocheilos rhabdoura</i>	<i>Sewellia diardi</i>
<i>Mastacembelus armatus</i>	<i>Tor aff. tambra</i>
<i>Mystacoleucus atridorsalis</i>	<i>Tor aff. tambroides</i>



Sampling sites of the 2011 fish survey.

- 11-033** Attapu Prov.: Houay Wang Po, on road from Attapu to border with Vietnam; about 25 km from Xaisetha; 163 masl; 14°46'57"N 107°9'21"E [14.78248°N 107.1558°E]; 18 May 2011.

Rasbora aff. *daniconius*

- 11-034** Sekong Prov.: unnamed stream, 1.5 km on road from Dak Ta Oc Noy to Dakchung (about 10 km from Dakchung); 1090 masl; 15°30'43"N 107°19'17"E [15.51208°N 107.3215°E]; 20 May 2011.

Annamia normani

Channa gachua

Devario gibber

Poropuntius cf. *carinatus*

Scaphiodonichthys sp. n. 'Dakchung'

Schistura clatrata

Sewellia sp. n. 'Dakchung'

- 11-035** Sekong Prov.: Houay Oy [Xe Nam-Oy on 1:100'000 map], large stream, on road from Dakchung to Dak Noi, 5 km from Dakchung, 5 km from Dak Noi; 1164 masl; 15°31'04"N 107°13'27"E [15.51769°N 107.2242°E]; 21 May 2011 (Fig. 2).

Annamia normani

Neolissochilus blanci

Onychostoma meridionale

Poropuntius cf. *carinatus*

Scaphiodonichthys sp. n. 'Dakchung'

Schistura clatrata

Sewellia diardi

Sewellia sp. n. 'Dakchung'

- 11-036** Sekong Prov.: Houay Oy [Xe Nam-Oy on 1:100'000 map], 13 km from Dakchung, on road to Ban Tong Siang, 4 km after Ban Tongxiang; 1226 masl; 15°29'05"N 107°11'07"E [15.48482°N 107.1852°E]; 21 May 2011 (Fig. 3).

Annamia normani

Neolissochilus blanci

Onychostoma meridionale

Poropuntius cf. *carinatus*

Scaphiodonichthys sp. n. 'Dakchung'

Schistura clatrata

Sewellia diardi

Sewellia sp. n. 'Dakchung'

- 11-037** Sekong Prov.: Houay Champong, in Ban Dak, immediately upstream of confluence with Houay Xe Kaman, 15 km from Dakchung, 4 km after Dak Noi and 4.4 km before Ban Sang Mai; 1161 masl; 15°34'24"N 107°13'03"E [15.57347°N 107.2174°E]; 22 May 2011.

Remarks: Ban Dak is Ban Lak Tai on 1:100'000 map, Dak Long on Google Earth. Houay Xe Kaman is Houay Poyo on map. Map shows Houay Poyo as tributary of Nam Poay-O which is a tributary of Xe Kaman. Houay Xe Kaman is not same as Xe Kaman. But Nam Poay-O is locally called Xe Kaman.

Annamia normani

Devario gibber

Onychostoma meridionale

Poropuntius cf. *carinatus*

Scaphiodonichthys sp. n. 'Dakchung'

Schistura clatrata

Schistura sp. n. 'Dakchung'

Sewellia diardi

Sewellia sp. n. 'Dakchung'

- 11-038** Sekong Prov.: Houay Phouang, in Dak Bon, 2 km South of Dakchung; 1187 masl; 15°27'19"N 107°16'14"E [15.45534°N 107.2704°E]; 22 May 2011 (Fig. 4).

Annamia normani

Devario gibber

Poropuntius cf. *carinatus*

Sewellia sp. n. 'Dakchung'

11-039 Sekong Prov.: Xe Kaman in Dak Ta Oc Noy; 967 masl; 15°31'15"N 107°19'58"E [15.52085°N 107.3328°E]; 23 May 2011.

Poropuntius cf. carinatus

11-040 Sekong Prov.: small stream [possibly Nam Voun, near Dak Do on 1:100'000 map] about 15 km on road from Dakchung to Sekong; 1130 masl; 15°21'39"N 107°12'11"E [15.36094°N 107.203°E]; 23 May 2011 (Fig. 5).

Annamia normani

Channa gachua

Devario gibber

Schistura clatrata

Schistura sp. n. 'Dakchung'

Sewellia diardi

11-041 Attapu Prov.: Bolaven Plateau: Xe Namnoy at Xe Namnoy-Xe Pian proposed dam site, near Ban Latsasin; 728 masl; 15°03'28"N 106°36'10"E [15.05777°N 106.6028°E]; 24 May 2011 (Fig. 6).

Annamia sp. n. 'Bolaven'

Schistura bolavenensis

Schistura sp. n. 'Bolaven'

Schistura tizardi

Sewellia elongata

Devario gibber

Poropuntius bolovenensis

Poropuntius lobocheiloides

Scaphiodonichthys acanthopterus

Fish diversity

Forty-five fish species have been obtained during the survey (Table 1). Nine of them are recorded for the first time in the Xe Kong drainage. The total number of fish species recorded from the Xe Kong drainage in Laos is now 175, but this number is definitely below the reality; a number of additional species in Baird et al. (1999) probably are based on records from the Xe Kong. Also, several families of catfishes (Siluriformes) are under-represented in my samples. They are mainly nocturnal, live in deeper waters and are rarely collected with the gears used. They are better collected by inspecting the catches of local fishermen, which implies staying several days at a single site.

Five new species (unnamed species) have been discovered during the survey, called here *Scaphiodonichthys* sp. n. 'Dakchung', *Annamia* sp. n. 'Bolaven', *Sewellia* sp. n. 'Dakchung', *Schistura* sp. n. 'Dakchung', *Schistura* sp. n. 'Bolaven'. One other observed species is still unnamed but was known from earlier records, from the Xe Kong and other drainages in Laos: *Glyptothorax* aff. *zanaensis*.

The identity of four additional species is not yet cleared and they are potentially also unnamed: *Poropuntius* cf. *carinatus*, *Rasbora* aff. *daniconius*, *Tor* aff. *tambra*, *Tor* aff. *tambroides*. In the Xekong drainage, 10 additional fish species are still unnamed, or their identity is not yet cleared and they are potentially also new to science (discussed in Kottelat, 2009).

Twenty-five species (14 %) of the fish fauna of the Xekong drainage in Laos are known from no other drainage. They are indicated in Table 2. These species are possibly endemic to the Xe Kong drainage, but too few data are available from the adjacent drainages in Laos and Cambodia to be definitive on this point. The formal description of one of them (*Akysis bilustris*), discovered during the 2009 survey, has just been published (Ng, 2011). Descriptions of several others are in preparation.

Most of the endemic species are from rapids and other high gradient habitats. This reflects the limited distribution range of rheophilic species, but may also partly result from a sampling bias to favor habitats most likely to yield uncommon or new species, or most efficiently sampled by the available gears. Also, the 2011 survey targeted an hilly area.

Most of the work of the 2011 survey was in the Xe Kaman drainage, and especially on the Dakchung plateau. The 45 species collected in the Xe Kaman by the 1999, 2009 and 2011 surveys are listed in Table 3. The inventory of the lower Xe Kaman is far from complete because our work was restricted by the rains and increasing water level. Further, it was not possible to follow the river by road upstream of the Xe Kaman 1 dam site and boats were not available for travelling upstream. There is no reason to believe that the fauna of the lower Xe Kaman would be different from that of the Xe Kong near and immediately upstream of Attapu.

In sharp contrast, the fish fauna of the upper Xe Kaman on Dakchung plateau was made of very few species. Only 11 species were collected (Table 3) and information obtained from villagers are that there is no additional species (which may be true or not). Our stay in Dakchung was quite short but we sampled in all accessible streams and in all available habitats, except the main Xe Kaman, whose level was too high because of recent rains. Still, local people could fish a single species during the night (*Poropuntius* cf. *carinatus*). Families present elsewhere in the Mekong drainage in similar habitats are said to be totally missing on Dakchung plateau (Cobitidae, Botiidae, Sisoridae, Mastacembelidae, Channidae, Gobiidae). Genera of Cyprinidae found elsewhere in most headwaters in the Mekong basin were also missing [e.g. *Garra*, *Mystacoleucus*, *Lobocheilos*]. The situation is similar to that existing on the Bolaven plateau where only 17 species have been collected (Roberts, 1998b: 285; Kottelat, 2000a-b, 2001 and present report) and where Cobitidae, Botiidae, Mastacembelidae and Gobiidae are also missing.

It is not clear why all these families and genera are missing on Dakchung plateau. In the case of the Bolaven plateau, the absence of these families is obviously explained by the numerous waterfalls at the edges of the plateau which make it impossible for fish to reach upstream. I could not find information on the possible presence of significant waterfalls on the Xe Kaman, but there must be some obstacle. It is also not known until which altitude the lowland faunal elements are present in the Xe Kaman. Several of them have been observed in the Nam Chun (sample MK 11-031) and this

indicates that they extend upstream along the Xe Kaman at least to the confluence of the Nam Chun and Xe Kaman.

Three of the 11 species observed on Dakchung plateau are apparently endemic and new to science (*Scaphiodonichthys*, *Sewellia*, *Schistura*). This, however, still requires confirmation, which is difficult at the moment. A number of new species have recently been named from nearby areas in Vietnam; apparently, none is identical with the new species discovered by the survey. The descriptions of these Vietnamese species is unfortunately in a quality that makes it hard or impossible to evaluate their validity or for comparison with the fauna of adjacent areas. In most cases identification of these Vietnamese species will be possible only after they are properly re-described or if material becomes available for direct comparison.

On Dakchung plateau, the fish populations seemed reasonably healthy, with no sign of poisoning or electric-fishing. The samples included individuals of all sizes including numerous adults. But in the Nam Pa (samples MK 11-0329, 11-030) the fish density was very low and the community made almost exclusively of small juveniles, which is a common sign of overfishing or major accident. Villagers confirmed that these areas were frequently fished with electricity. On Dakchung plateau, stream morphology was still little impacted, except for site MK 11-037 where the bottom was completely covered by sediments. But the construction work for the road from Xekong to Dakchung has had devastating effects on the streams along which it is built because all the soil and rocks are simply pushed downhill and completely cover the streams. Reportedly there is little fishing activity on Dakchung plateau, including in the Xe Kaman itself; this is possibly related with the reported absence of large species.

Table 1. Fish species observed during 2011 survey in the Xekong drainage. In alphabetic sequence. Asterisks (*) indicate new records for the drainage.

<i>Annamia normani</i>	<i>Pseudomystus siamensis</i>
* <i>Annamia</i> sp. n. 'Bolaven'	<i>Puntius aurotaeniatus</i>
<i>Channa gachua</i>	<i>Puntius rhombeus</i>
<i>Devario gibber</i>	<i>Raiamas guttatus</i>
<i>Garra cambodgiensis</i>	<i>Rasbora</i> aff. <i>daniconius</i>
* <i>Garra cyrano</i>	<i>Rasbora amplistriga</i>
<i>Glyptothorax filicatus</i>	<i>Rasbora paviana</i>
<i>Glyptothorax laosensis</i>	<i>Rhinogobius taenigena</i>
<i>Glyptothorax</i> aff. <i>zanaensis</i>	<i>Scaphiodonichthys acanthopterus</i>
<i>Henicorhynchus lineatus</i>	* <i>Scaphiodonichthys</i> sp. n. 'Dakchung'
<i>Homaloptera confuzona</i>	<i>Schistura bolavenensis</i>
<i>Homaloptera smithi</i>	<i>Schistura clatrata</i>
<i>Lobocheilos rhabdoura</i>	<i>Schistura fusinotata</i>
<i>Mastacembelus armatus</i>	<i>Schistura tizardi</i>
<i>Monopterus albus</i>	* <i>Schistura</i> sp. n. 'Bolaven'
<i>Mystacoleucus atridorsalis</i>	* <i>Schistura</i> sp. n. 'Dakchung'
* <i>Neolissochilus blanci</i>	<i>Sewellia diardi</i>
<i>Onychostoma meridionale</i>	<i>Sewellia elongata</i>
<i>Opsarius pulchellus</i>	<i>Sewellia speciosa</i>
<i>Poropuntius bolovenensis</i>	* <i>Sewellia</i> sp. n. 'Dakchung'
<i>Poropuntius lobocheiloides</i>	* <i>Tor</i> aff. <i>tambra</i>
<i>Poropuntius normani</i>	<i>Tor</i> aff. <i>tambroides</i>
* <i>Poropuntius</i> cf. <i>carinatus</i>	

Table 2. Fish species known from the Xe Kong drainage in Laos, in systematic sequence. When different from the present name, the name used in Kottelat (2001) is indicated. Asterisks (*) indicate species apparently endemic to Xe Kong drainage

current name	name in Kottelat (2001) if different
Family Notopteridae	
<i>Chitala blanci</i>	
<i>Notopterus notopterus</i>	
Family Sundasalangidae	
<i>Sundasalanx mekongensis</i>	
Family Clupeidae	
<i>Clupeichthys aesarnensis</i>	
Family Cyprinidae	
<i>Bangana behri</i>	
<i>Barbonymus altus</i>	
<i>Cirrhinus molitorella</i>	
<i>Cosmochilus harmandi</i>	
<i>Crossocheilus atrilimes</i>	
<i>Crossocheilus oblongus</i>	
<i>Crossocheilus reticulatus</i>	
<i>Cyclocheilichthys repasson</i>	
<i>Devario gibber</i>	<i>Danio gibber</i>
* <i>Devario salmonatus</i>	<i>Danio salmonata</i>
<i>Discherodontus ashmeadi</i>	
<i>Esomus metallicus</i>	
<i>Garra cambodgiensis</i>	
<i>Garra cyrano</i>	
<i>Garra fasciacauda</i>	
<i>Hampala dispar</i>	
<i>Hampala macrolepidota</i>	
<i>Henicorhynchus lineatus</i>	
<i>Henicorhynchus lobatus</i>	
<i>Henicorhynchus siamensis</i>	
<i>Hypsibarbus lagleri</i>	
<i>Hypsibarbus vernayi</i>	
<i>Labeo barbatulus</i>	
<i>Labeo pierrei</i>	
<i>Labiobarbus leptocheila</i>	
* <i>Laocypris</i> sp. n. 'Xe Kong'	
<i>Lobocheilos melanotaenia</i>	
<i>Lobocheilos rhabdoura</i>	
<i>Luciocyprinus striolatus</i>	
<i>Luciosoma bleekeri</i>	
<i>Luciosoma setigerum</i>	
<i>Macrochirichthys macrochirus</i>	
<i>Mystacoleucus atridorsalis</i>	
<i>Mystacoleucus greenwayi</i>	
<i>Mystacoleucus marginatus</i>	
<i>Neolissochilus blanci</i>	<i>Neolissochilus stracheyi</i>
<i>Onychostoma meridionale</i>	
<i>Opsarius koratensis</i>	
<i>Opsarius pulchellus</i>	
<i>Osteochilus hasselti</i>	
<i>Osteochilus lini</i>	
<i>Osteochilus microcephalus</i>	
<i>Parachela maculicauda</i>	

Table 2. Continued.

current name name in Kottelat (2001) if different

Family Cyprinidae (continued)*Paralaubuca barroni**Paralaubuca riveroi**Paralaubuca typus***Poropuntius bolovenensis**Poropuntius* cf. *carinatus***Poropuntius lobocheiloides***Poropuntius molestus**Poropuntius normani***Poropuntius solitus**Probarbus jullieni**Puntioplites falcifer**Puntioplites proctozysron**Puntius aurotaeniatus**Puntius brevis**Puntius jacobusboehlkei**Puntius rhombeus**Raiamas guttatus**Rasbora amplistriga***Rasbora* aff. *atridorsalis**Rasbora borapetensis**Rasbora* aff. *daniconius**Rasbora daniconius**Rasbora myersi**Rasbora dusonensis**Rasbora paviana**Rasbora rubrodorsalis**Rasbora trilineata**Scaphiodonichthys acanthopterus***Scaphiodonichthys* sp. n. 'Dakchung'*Scaphognathops bandanensis**Scaphognathops stejneri**Sikukia gudgeri**Tor laterivittatus**Tor* aff. *tambra**Tor tambra**Tor* aff. *tambroides**Tor tambroides***Family Gyrinocheilidae***Gyrinocheilus aymonieri***Family Cobitidae***Acanthopsoides gracilentus**Acanthopsoides hapalias**Acantopsis* sp.*Lepidocephalichthys hasselti**Pangio* aff. *anguillaris**Pangio anguillaris**Pangio* aff. *fusca**Pangio fusca***Family Botiidae***Syncrossus beauforti*

included in Cobitidae

*Botia beauforti**Syncrossus helodes**Botia helodes**Yasuhikotakia modesta**Botia modesta**Yasuhikotakia nigrolineata**Botia nigrolineata***Yasuhikotakia splendida**Botia splendida***Family Balitoridae***Annamia normani***Annamia* sp. n. 'Bolaven'

Table 2. Continued.

current name name in Kottelat (2001) if different

Family Balitoridae (continued)

Balitora annamitica
Hemimyzon khonensis
Hemimyzon papilio
Homaloptera confuzona
Homaloptera smithi
Homaloptera tweediei
Homaloptera yunnanensis
Homaloptera zollingeri
 **Serpenticobitis octozona*
Sewellia diardi
 **Sewellia elongata*
 **Sewellia speciosa*
 **Sewellia* sp. n. 'Dakchung'

Family Nemacheilidae

included in Balitoridae

Acanthocobitis sp. n. 'Xe Kong'
Nemacheilus longistriatus
Nemacheilus platiceps
Schistura bolavenensis
 **Schistura clatrata*
Schistura dorsizona
 **Schistura fusinotata*
 **Schistura imitator*
Schistura isostigma
 **Schistura khamtanhi*
Schistura kongphengi
Schistura nicholsi
 **Schistura nomi*
 **Schistura rikiki*
 **Schistura tizardi*
 **Schistura* sp. n. 'Bolaven'
 **Schistura* sp. n. 'Dakchung'

Family Bagridae

Bagrichthys macracanthus
Bagrichthys obscurus
Hemibagrus nemurus
Hemibagrus wyckioides
Mystus atrifasciatus
Pseudomystus siamensis

Family Siluridae

Kryptopterus bicirrhis
Kryptopterus kryptopterus
Micronema micronemus
Wallago leeri

Family Schilbeidae

Laides longibarbis

Family Pangadiidae

Pangasius krempfi
Pangasius larnaudii
Pseudolais pleurotaenia

Pangasius pleurotaenia

Table 2. Continued.

current name	name in Kottelat (2001) if different
Family Akysidae	
<i>*Akysis bilustris</i>	<i>Akysis ephippifer</i>
<i>Akysis inermis</i>	
<i>Akysis varius</i>	
Family Amblycipitidae	
<i>Amblyceps serratum</i>	
Family Sisoridae	
<i>Bagarius bagarius</i>	
<i>Bagarius yarrelli</i>	
<i>*Glyptothorax filicatus</i>	
<i>Glyptothorax lampris</i>	
<i>Glyptothorax laosensis</i>	
<i>Glyptothorax aff. zanaensis</i>	
Family Belonidae	
<i>Xenentodon cancilooides</i>	
Family Syngnathidae	
<i>Doryichthys contiguus</i>	
Family Synbranchidae	
<i>Monopterus albus</i>	
Family Mastacembelidae	
<i>Macrognathus semiocellatus</i>	
<i>Macrognathus siamensis</i>	
<i>Macrognathus</i> sp. long snout	
<i>Mastacembelus armatus</i>	
Family Ambassidae	
<i>Parambassis</i> cf. <i>siamensis</i>	
Family Pristolepididae	
<i>Pristolepis fasciata</i>	
Family Datnioididae	
<i>Datnioides undecimradiatus</i>	
Family Gobiidae	
<i>Papuligobius ocellatus</i>	
<i>Rhinogobius taenigena</i>	
Family Osphronemidae	
<i>Osphronemus exodon</i>	
<i>Trichogaster trichopterus</i>	
<i>Trichopsis schalleri</i>	
<i>Trichopsis vittata</i>	
Family Channidae	
<i>Channa</i> aff. <i>marulius</i>	
<i>Channa gachua</i>	
<i>Channa micropeltes</i>	
<i>Channa striata</i>	

Table 2. Continued.

current name

name in Kottelat (2001) if different

Family Soleidae*Brachirus harmandi***Family Tetraodontidae***Auriglobus nefastus**Monotrete baileyi**Monotrete cambodgiensis**Monotrete cochinchinensis**Monotrete suvattii**Monotrete turgidus*

Table 3. Fish species observed in the Xe Kaman drainage during the 1999, 2009 and 2011 survey. In alphabetic sequence. Asterisks (*) indicate species observed on Dakchung plateau.

species	Xe Kaman downstream of Dakchung	Dakchung
<i>Akysis inermis</i>	*	
<i>Annamia normani</i>	*	*
<i>Channa gachua</i>	*	*
<i>Channa striata</i>	*	
<i>Chitala blanci</i>	*	
<i>Crossocheilus reticulatus</i>	*	
<i>Devario gibber</i>	*	*
<i>Doryichthys contiguus</i>	*	
<i>Garra cambodgiensis</i>	*	
<i>Glyptothorax lampris</i>	*	
<i>Glyptothorax laosensis</i>	*	
<i>Gyrinocheilus aymonieri</i>	*	
<i>Hampala macrolepidota</i>	*	
<i>Hemimyzon papilio</i>	*	
<i>Hemibagrus nemurus</i>	*	
<i>Henicorhynchus lineatus</i>	*	
<i>Henicorhynchus lobatus</i>	*	
<i>Homaloptera smithi</i>	*	
<i>Homaloptera zollingeri</i>	*	
<i>Laocypris</i> sp. n. 'Xe Kong'	*	
<i>Lobocheilos rhabdoura</i>	*	
<i>Mastacembelus armatus</i>	*	
<i>Monopterus albus</i>	*	
<i>Monotrete cambodgiensis</i>	*	
<i>Monotrete cochinchinensis</i>	*	
<i>Monotrete turgidus</i>	*	
<i>Monotrete suvattii</i>	*	
<i>Mystacoleucus atridorsalis</i>	*	
<i>Mystacoleucus greenwayi</i>	*	
<i>Mystacoleucus marginatus</i>	*	
<i>Nemacheilus longistriatus</i>	*	
<i>Neolissochilus blanci</i>	*	*
<i>Onychostoma meridionale</i>	*	*
<i>Opsarius pulchellus</i>	*	
<i>Opsarius koratensis</i>	*	
<i>Papuligobius ocellatus</i>	*	
<i>Parambassis</i> cf. <i>siamensis</i>	*	
<i>Poropuntius</i> cf. <i>carinatus</i>		*
<i>Poropuntius normani</i>	*	
<i>Pristolepis fasciata</i>	*	
<i>Pseudomystus siamensis</i>	*	
<i>Puntius aurotaeniatus</i>	*	
<i>Puntius rhombeus</i>	*	
<i>Raiamas guttatus</i>	*	
<i>Rasbora amplistriga</i>	*	
<i>Rasbora paviana</i>	*	
<i>Rhinogobius taenigena</i>	*	
<i>Scaphiodonichthys acanthopterus</i>	*	
<i>Scaphiodonichthys</i> sp. 'Dakchung'		*
<i>Scaphognathops stejnegeri</i>	*	
<i>Schistura clatrata</i>	*	*
<i>Schistura fusinotata</i>	*	
<i>Schistura imitator</i>	*	

Table 2. Continued.

species	Xe Kaman downstream of Dakchung	Dakchung
<i>Schistura isostigma</i>	*	
<i>Schistura khamtanhi</i>	*	
<i>Schistura nomi</i>	*	
<i>Schistura rikiki</i>	*	
<i>Schistura tizardi</i>	*	
<i>Schistura</i> sp. 'Dakchung'		*
<i>Serpenticobitis octozona</i>	*	
<i>Sewellia diardi</i>	*	*
<i>Sewellia speciosa</i>	*	
<i>Sewellia</i> sp. 'Dakchung'		*
<i>Syncrossus beauforti</i>	*	
<i>Tor</i> aff. <i>tambra</i>	*	
<i>Tor</i> aff. <i>tambroides</i>	*	
<i>Trichopsis vittata</i>	*	
<i>Xenentodon canceloides</i>	*	

Comments on selected species

Family Cyprinidae

Garra cyrano

(Fig. 7)

Remarks. This species is a new record for the Xe Kong drainage. It was originally described from the Nam Leuk and later recorded from the Nam Theun and Khone falls (Kottelat, 2000a, 2001, unpubl. obs.).

Laocypris sp. n. 'Xe Kong'

(Fig. 8)

Remarks. This is an unnamed species, distinguished from *Laocypris hispida*, the only other named species of the genus (Kottelat, 2000a, 2001), by a more slender body, fewer and thinner bars on body, restricted to the anterior half of the body, with a median stripe on the posterior half of body ending in a spot at caudal-fin base, and by the absence of black marks along the lateral line canals. It was collected during the 2009 survey.

Neolissochilus blanci

Remarks. This species is a new record for the Xe Kong drainage. It has been recorded in streams in most hilly areas of the Mekong basin in Thailand and Laos. It was earlier identified as *N. stracheyi*, a species originally described from Myanmar (Kottelat, 2001).

Poropuntius cf. *carinatus*

(Fig. 9)

Remarks. This species has great similarity with *P. carinatus* (Fig. 10), whose range extends in the Mekong drainage from southern Yunnan southwards to Nam Theun drainage.

The taxonomy of the genus *Poropuntius* is still very confused, despite a recent revision (Roberts, 1998a). Several species are known from the Xe Kong drainage in Laos: *P. normani* (Fig. 11) in the lowlands, *P. laoensis* (Fig. 12) in faster waters, and *P. bolovenensis* (Fig. 13), *P. lobocheiloides* (Fig. 14), *P. molestus* and *P. solitus* on Bolaven plateau.

An additional species of *Poropuntius* occurs in the Xekong drainage in Vietnam.

Poropuntius aluoiensis was described from the A Sap in Vietnam, which becomes the Xe Sap in Laos, a tributary of the uppermost Xe Kong. The Dakchung species differs from *P. aluoiensis* in having a longer and more pointed snout, a more forward position of the dorsal fin (its origin almost above pelvic-fin origin, vs. clearly backwards), and more and finer serrae along the posterior edge of the last simple dorsal rays (17-26 [increasing with fish size] vs. 15-17).

The Dakchung material should also be compared with *P. kontumensis* and *P. yalyensis*, two species described from the area of Kontum, in the upper Sesan drainage in Vietnam, of which no material is available for comparison..

Rasbora aff. *atridorsalis*

(Fig. 15)

Remarks. This is an unnamed species. A single specimen was observed during the survey and two were observed in the Xe Kong in the 1999 survey. It had earlier been mis-identified as *R. atridorsalis*, a species known only from northern Laos and Xishuangbanna (Kottelat & Chu, 1988).

Rasbora aff. *daniconius*

(Fig. 16)

Remarks. This species was earlier identified as *R. daniconius* (e.g., in Kottelat, 1998, 2001). This name has been used for a species extending from Pakistan and Sri Lanka to the Mekong drainage and the Malay Peninsula (see, e.g., Kottelat & Pethiyagoda, 1991; Silva et al., 2010). It now appears that several species have been confused under this name. The identity of the Mekong populations is not yet fully cleared but it seems it is an unnamed species.

Scaphiodonichthys sp. n. 'Dakchung'

(Fig. 17)

Remarks. A new species discovered during the 2011 survey. Collected only in the upper Xe Kaman and possibly endemic. Distinguished from *S. acanthopterus* (Fig. 18) from the lower part of the drainage by its more slender body, more slender caudal peduncle, more protruding snout, more

slender and weaker last simple dorsal ray, and less concave edge of dorsal fin. There are indications that several species are confused under the name *S. acanthopterus*. The type locality of *S. acanthopterus* is the Nam Luang, in Sop Lao, Southern Shan States, Myanmar (Fowler, 1934: 119) and the original description and figure refer to a deep-bodied species.

Tor aff. tambra

(Fig. 19)

Remarks. The taxonomy of the genus *Tor* in Southeast Asia is still confused. A number of studies have tried to clarify the identity of some of the species or populations present in the Mekong drainage, but with partly disagreeing conclusions (Zhou & Cui, 1996; Roberts, 1999; Kottelat, 2001). A molecular study (Nguyen et al., 2008) is of limited use as it provides no information on the morphology of the specimens on which it is based, and therefore their identity remains uncertain. Three species have been collected in the Xe Kong drainage, *T. laterivittatus*, *T. aff. tambra* and *T. aff. tambroides*.

Nguyen et al.'s (2008) molecular study included a species that they identified as *T. douronensis* made of three distinct lineages. One of the lineages is from the Mekong drainage. Unfortunately, because of technical limitations, no taxonomic conclusions can be made from this study. It seems possible, however, that their material from the Mekong drainage belongs to the species identified as *T. douronensis* by Zhou & Cui (1996: 134) or *T. tambra* by Kottelat (2001c: 83). It does not seem to be conspecific with the 'real' *T. tambra* or *T. douronensis* from Sumatra and Java; however, it is premature to reach taxonomic conclusions.

Tor aff. tambroides

(Fig. 20)

Remarks. This species is apparently unnamed and was collected by the 2009 and 2011 surveys. It has similarity with the species identified as *T. tambroides* in Kottelat (2001: 84), but with a more pointed snout. Baird et al (1999: 29) figured a "*Tor* sp. 1" with a very elongated snout and this is possibly a large adult of the same species. It does not seem to be conspecific with the 'real' *T. tambroides* that I have examined from Sumatra and Borneo; however, it is premature to reach taxonomic conclusions.

Family Cobitidae

***Acantopsis* sp. 'small spots'**

Remarks. The taxonomy of the genus *Acantopsis* is still confused. Field observations indicate that several species exist in Laos, but their identity is not yet settled. Several of them are probably new to science. The present species was called *Acantopsis* sp. 'small spots' in Kottelat (2001: 86).

Pangio aff. anguillaris

(Fig. 21)

Remarks. This species was identified as *Pangio anguillaris* in Kottelat (2001: 90). Recent studies have shown that *P. anguillaris* is a species restricted to Sumatra, Borneo and the southern Malay Peninsula (Tan & Kottelat, 2009; Hadiaty & Kottelat, 2009). The present species is still unnamed. A similar fish occurs in the Chao Phraya drainage; it has not yet been checked whether they are conspecific.

Pangio aff. fusca

(Fig. 22)

Remarks. This species was identified as *Pangio fusca* in Kottelat (2001: 90). Recent studies have shown that *P. fusca* is a species restricted to Myanmar and the north of the western slope of peninsular Thailand (Britz & Maclaine, 2007). The Lao "*P. fusca*" of Kottelat (1998: 100; 2001: 90) includes three species, two of them still unnamed (Britz & Kottelat, 2010). It has not yet been checked whether the present species is conspecific with one of them.

Family Balitoridae

***Annamia* sp. n. 'Bolaven'**

(Fig. 23)

Remarks. This is an unnamed species, apparently endemic to the Bolaven plateau, where it had already been observed in 1999, but then confused with *A. normani*. The genus *Annamia* has long been considered to include only *A. normani*, a species known from rapids in headwaters of the tributaries of the Mekong, from the upper Xe San northwards to the upper Xe Bangfai. The Bolaven

species is distinguished from *A. normani* (Fig. 24) by a more pointed head and details of the colour pattern.

An additional species (*A. thuathienensis*) has recently been described from Bo River, a small coastal drainage in Thua Thien Hue Province in Vietnam (Nguyen, 2005: 579). The original description and illustration do not allow to decide whether it is distinct from *A. normani*. It is likely that detailed analysis of *A. normani* from throughout its range could reveal that several species have been confused under this name.

***Sewellia* sp. n. 'Dakchung'**

(Fig. 25)

Remarks. A new species discovered during the 2011 survey. Observed only in Dakchung, where it was present at most stations. *Sewellia diardi*, *S. elongata* and *S. speciosa* have been described from the Xe Kong in Laos (Roberts, 1998b). In adjacent areas in Vietnam, Freyhof & Serov (2000) described *S. breviventralis* and *S. patella* from the Sesan drainage about 30-50 km north of Kontum. Nguyen (2005) described *S. analis* and *S. media* from the upper Xe Kong (Xe Sap) in Vietnam, which have a broad and compact body similar to that of *S. speciosa*, and *S. songboensis*, from same area, which has a colour pattern apparently similar to that of *S. lineolata*. The new species from Dakchung is distinguished from all of the above species by its plain fins, poorly contrasted pattern on body and a much larger fleshy flap at the base of the pelvic fin.

Family Nemacheilidae

This family was earlier included in Balitoridae (see Slechtova et al., 2007; Kottelat & Freyhof, 2007).

***Acanthocobitis* sp. n. 'Xe Kong'**

(Fig. 26)

Remarks. An unnamed species already recorded from the Xe Kong (Baird et al., 1999) and Se San in Cambodia (Rainboth, 1996; MK, pers. obs.). Interestingly, the genus *Acanthocobitis* is known from Sri Lanka to the Salween drainage, the Mae Khlong and the Malay Peninsula, but is unknown from the Chao Phraya and the rest of the Mekong drainage (Kottelat, 1990).

***Schistura* sp. n. 'Bolaven'**

(Fig. 27)

Remarks. A new species discovered during the 2011 survey. Observed only on Bolaven Plateau. Already collected in the 1999 survey, but confused with *S. bolavenensis* (Fig. 28).

***Schistura* sp. n. 'Dakchung'**

(Fig. 29)

Remarks. A new species discovered during the 2011 survey. Observed only in Dakchung. Besides the species of *Schistura* known from the Xe Kong drainage in Laos (Kottelat, 2000a, 2001), the following have been recorded from adjacent drainages in Vietnam: *S. kontumensis*, *S. namboensis*, *S. sokolovi* in Sesan and *S. namboensis*, *S. sokolovi*, *S. yersini* in Srepok (Freyhof & Serov, 2001). The new species possibly has affinities with *S. sokolovi*.

Family Sisoridae

Glyptothorax* aff. *zanaensis

(Fig. 30)

Remarks. This is the species identified as *G. zanaensis* by Kottelat (1998, 2001). This is apparently an unnamed species, observed in all large tributaries of the Mekong, in rapids and stretches with strong current. The real *G. zanaensis* is apparently restricted to the middle Salween drainage.

Family Akysidae

Akysis bilustris

(Fig. 31)

Remarks. A single specimen of this species was collected during the 1999 survey and identified as *A. ehippifer* (Kottelat, 2001). It was collected again by the 2009 survey and this additional material showed that it was an unnamed species whose formal description has just appeared (Ng, 2011).

Family Mastacembelidae

Macrogathus sp. long snout

Remarks. An apparently unnamed species reported by Baird et al. (1999: 129). The species was not obtained during the 2009 and 2011 survey.

Family Ambassidae

Parambassis cf. *siamensis*

(Fig. 32)

Remarks. *Parambassis siamensis* is a species recorded from throughout mainland Southeast Asia. One record from Java (Kottelat et al., 1993) is attributed to introduction, but this requires confirmation. There is a great morphological variability among the populations of this species, and a revision is needed to clarify the taxonomic status of the different forms.

Family Channidae

Channa aff. *marulius*

Remarks. An unnamed species, see Kottelat (2001: 162).

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Figures



Fig. 1. Nam Chun, between Chalernxai and Dakchung; 846 masl; site MK 11-031.



Fig. 5. Small stream about 15 km from Dakchung on road to Sekong; site MK 11-040.



Fig. 2. Houay Oy, 5 km from Dakchung on road to Dak Noi; site MK 11-035.



Fig. 3. Houay Oy, 13 km from Dakchung on road to Ban Tong Siang; site MK 11-036.



Fig. 6. Bolaven Plateau: Xe Namnoy at proposed dam site, near Ban Latsasin; site MK 11-041.

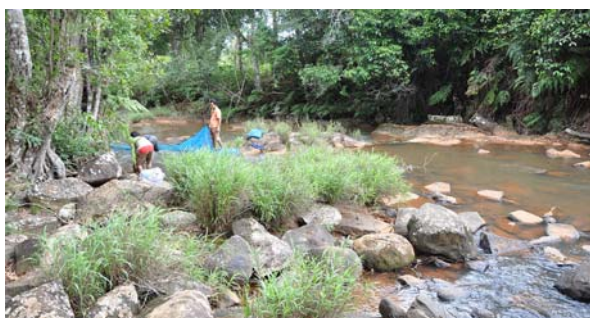


Fig. 4. Houay Phouang, 2 km South of Dakchung; site MK 11-038.



Fig. 7. *Garra cyrano*, MK 11-032, 95.7 mm SL.



Fig. 8. *Laocypris* sp. n. 'Xe Kong', MK 09-050, 58.8 mm SL.



Fig. 9. *Poropuntius* cf. *carinatus*, MK 11-037, 155 mm SL.



Fig. 10. *Poropuntius carinatus*, from Nam Theun, 158 mm SL.



Fig. 11. *Poropuntius normani*, MK 11-032, 87.1 mm SL.



Fig. 12. *Poropuntius laoensis*, from Nam Leuk, 115 mm SL.



Fig. 13. *Poropuntius bolovenensis*, MK 11-041, 92.2 mm SL.



Fig. 14. *Poropuntius lobocheiloides*, MK 11-041, 65.3 mm SL.



Fig. 15. *Rasbora* aff. *atridorsalis*, MK 09-063, 75.9 mm SL.



Fig. 16. *Rasbora* aff. *daniconius*, MK 09-050, 58.8 mm SL.



Fig. 17. *Scaphiodonichthys* sp. n. 'Dakchung', MK 11-037, 112 mm SL.



Fig. 18. *Scaphiodonichthys acanthopterus*, MK 11-032, 116 mm SL.



Fig. 19. *Tor* aff. *tambra*, MK 11-032, 121 mm SL.



Fig. 20. *Tor* aff. *tambroides*, MK 09-063, 73.1 mm SL (top), MK 09-066, 86 mm SL, MK 09-070, 195 mm SL (bottom)



Fig. 21. *Pangio* aff. *anguillaris*, MK 09-053, 53.7 mm SL.



Fig. 22. *Pangio* aff. *fusca*, MK 09-058, 29.1 mm SL.

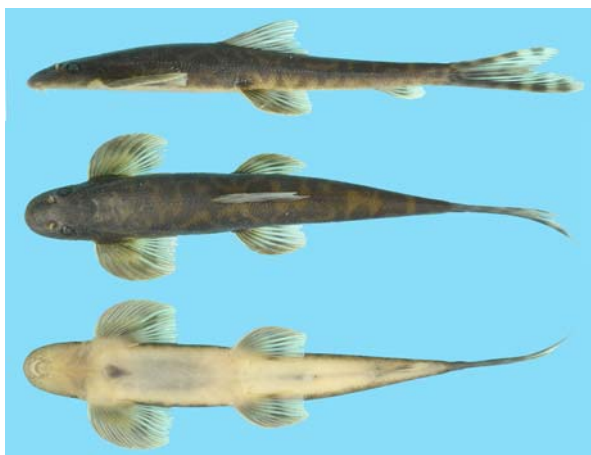


Fig. 23. *Annamia* sp. n. 'Bolaven', MK 11-041, 68.4 mm SL.



Fig. 24. *Annamia normani*, MK 11-031 79.1 mm SL.



Fig. 25. *Sewellia* sp. n. 'Dakchung', MK 11-038, 49.3 mm SL.



Fig. 26. *Acanthocobitis* sp. n. 'Xe Kong', MK 09-058, 50.0 mm SL.



Fig. 27. *Schistura* sp. n. 'Bolaven', MK 11-041, 51.6 mm SL.



Fig. 28. *Schistura bolavenensis*, MK 11-041, 52.2 mm SL.



Fig. 29. *Schistura* sp. n. 'Dakchung', MK 11-037, 76.8 mm SL.



Fig. 30. *Glyptothorax* aff. *zanaensis*, MK 11-032, 66.3 mm SL.



Fig. 31. *Akysis bilustris*, MK 09-050, 25.7 mm SL.



Fig. 32. *Parambassis* cf. *siamensis*, a specimen collected during the 1999 survey (Attapu Prov.: Nam Pa), 44.0 mm SL.