# A new blind loach, Oreonectes elongatus sp. nov. (Cypriniformes: Balitoridae) from Guangxi, China 

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#### Abstract

A new loach, Oreonectes elongatus sp. nov. is described based on collections from Mulun Township, Huanjiang County, Guangxi in China. It is distinguished from its congeners by the combination of the following characters: most elongate body (body depth/SL 8.62-10.68\%), blind, a forked caudal fin, obvious adipose dorsal crest and ventral crest; entire body naked and de-pigmented. Although the new species has a similar distribution with $O$. macrolepis, it can be distinguished by scales (absent in $O$. elongatus vs. present in $O$. macrolepis), shape of snout (elongate vs. round), the opposite position of the dorsal and pelvic fins origins (behind vs. front). The new species shares the same possession of dorsal and ventral crests, a forked caudal fin, eyeless, naked body and incomplete lateral line with $O$. translucens, but can be distinguished from the latter by caudal fin crest (more developed and translucent in O. trans-


[^0]lucens), longer anterior nostril tube and barbel, extreme of pectoral fin reaching $2 / 3$ of the distance between origin of pectoral and pelvic fins, more vertebrae (4+38-39 vs. $4+32$ ).

Keywords Oreonectes elongatus sp.nov. Balitoridae • New species • Cavefish • China

## Introduction

There are about a hundred hypogean fishes distributed in China, which is nearly one-third of all the described hypogean fish species in the world (Romero et al. 2009) with new species described each year. The genus Oreonectes is a distinct group in hypogean fishes with almost all species in this genus having cave-dwelling behavior. Oreonectes are small loaches distributed in South China and North Vietnam (Zhu 1989; Kottelat 2001; Du et al. 2008).The species of Oreonectes share the following characters: head depressed, anterior and posterior nostrils separated, anterior nostril in an elongate tube with a barbel at the end, and air bladder enclosed in a paired bony capsule (Zhu 1989). Günther first described the genus in 1868 with $O$. platycephalus as the type species found in Hong Kong, China. In 1981, the second species $O$. anophthalmus was described by Zheng (1981) based
on some eyeless specimens collected from a cave in the Qifeng Mountain, Wuming County, Guangxi Zhuang Autonomous Region of China. Since then, several species have been discovered and reported intermittently, including: O. furcocaudalis Zhu and Cao 1987, O. retrodorsalis Lan et al. 1995, O. translucens Zhang et al. 2006, O. microphthalmus Du et al. 2008, O. polystigmus Du et al. 2008, O. macrolepis Huang et al. 2009, O. luochengensis Yang et al. 2011a, and $O$. guananensis Yang et al. 2011b. Among the ten species, $O$. platycephalus is the only one having a broad distribution including parts of Guangxi and Guangdong in China (Zhu 1989; Du et al. 2008; Huang et al. 2009) as well as Quang Ninh in North Vietnam (Kottelat 2001), and is often found in open streams. Interestingly, the rest species are all definitely cave dwellers and endemic to Guangxi with narrow distributions; they mainly occur in the Xijiang River, the largest tributary of the Pearl River in Southwest China (Günther 1868; Zhu 1989; Du et al. 2008).

In 2009, three specimens belonging to a blind Oreonectes species were collected from the underground waters of Mulun Township, Huanjiang County, Guangxi in China. The specimens showed several distinguishing characters compared to congeners, and subsequent examination enables us to recognize them as a new species.

## Materials and methods

Type specimens of the new species, Oreonectes translucens, $O$. microphthalmus and $O$. macrolepis as well as the specimens of $O$. furcocaudalis used to compare in the paper belong to the collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing (ASIZB) and Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming (KIZ) (institutional abbreviation according to Leviton et al. 1985). All these specimens were preserved in $75 \%$ alcohol. Detailed information on the specimens is given in the "Comparative materials" below.

Counts and measurements were taken on the left side of the fish body as shown in Fig. 1. All measurements were taken point to point with digital calipers to 0.1 mm . Vertebrae were counted from radiographs which were made with a Kodak DXS4000 X-ray unit.

## Results

Oreonectes elongatus sp. nov. (Figs. 2 and 3)
Holotype ASIZB 189288, 78.2 mm standard length (SL), from Donglei Cave in Mulun Township, Huanjiang County, Guangxi Zhuang Autonomous Region, China, collected in November 2009 by Mr. Wei Longtao et al.

Paratypes ASIZB 189289, 78.1 mm SL, deposited in ASIZB. SCAU20100106, 76.4 mm SL, deposited in South China Agricultural University, collected in another cave-Shangzhaida Cave in Mulun township. Other data for the two paratypes are the same as for the holotype.

Diagnosis Oreonectes elongatus can be distinguished from its congeners by the combination of the following characters: the most elongate body (body depth/SL $8.62-10.68 \%$ vs. $11.70-16.55 \%$ of its congeners), eyeless, caudal fin forked, welldeveloped adipose crests on caudal peduncle; body naked and de-pigmented. The new species is similar to $O$. translucens by lacking eyes and having a forked caudal fin, but differs from the latter by the appearance of anterior nostril (long nostril tube and barbel of the anterior nostril, 18.6-26.3\% HL) and caudal crests (adipose and not transparent) as well as more counts of vertebrae ( $4+38-39$ vs. $4+32$ ).

Description General body features are shown in Fig. 2. The meristic and morphometric data for type specimens of the new species are given in Table 1. Body very elongate and cylindrical, posterior portion slowly compressed from the end of the dorsal fin to the base of the caudal fin. Dorsal profile slightly convex from snout to dorsal fin insertion point, ventral profile nearly straight.

Head slightly depressed and flattened, width greater than depth, gradually narrow from opercle forward to the tip of the snout, Snout long and elongate, anterior edge obtuse. Eyes absent. Anterior and posterior nostrils are well separated with a short distance. Anterior nostril in a short tube, which extends into a relatively long barbel. Mouth inferior and curved. Upper and lower lips smooth, a marked median groove in the middle of the lower lip. Rostral and maxillary barbels very long, all extending over


Fig. 1 Principal measurements taken on Oreonectes species. Oreonectes furcocaudalis is treated as a typical example. All measurements are taken on the left side of the fish specimens. Standard length ( $\mathbf{A}-\mathbf{K}$ ), from the tip of the upper jaw to the position of the last half-centrum; body height at dorsal fin origin (a) and maximum body height (b); body width at dorsal fin origin (c) and at anus ( $\mathbf{x}$ ), maximum body width (d); predorsal length $(\mathbf{A}-\mathbf{B})$, prepelvic length $(\mathbf{A}-\mathbf{F})$, preanal length (A-I), prepectoral length (A-D), and pre-anus length ( $\mathbf{A}-\mathbf{H}$ ), from the tip of the upper jaw to the insertion of the dorsal fin, pelvic fin, anal fin, pectoral fin and anus respectively; length of dorsal fin (e), length of pelvic fin (f), length of anal fin (g), length of pectoral fin (h), and length of caudal fin (i), from the insertion of each fin to the tip of the longest ray; length of dorsal-fin base ( $\mathbf{B}-\mathbf{C}$ ), length of pelvic-fin base $(\mathbf{F}-\mathbf{G})$, length of anal-fin base ( $\mathbf{I}-\mathbf{J}$ ), length of pectoral-fin base ( $\mathbf{D}-\mathbf{E}$ ), from the anterior end to the posterior end of each fin base; length of caudal peduncle ( $\mathbf{J}-\mathbf{K}$ ), from the posterior end of anal-fin base to last half-centrum; depth of caudal peduncle ( $\mathbf{j}$ ), the depth at the most slender point of caudal peduncle; head length (k),
from the tip of the upper jaw to the posterior margin of operculum; head height ( $\mathbf{I}$ ), from the point between head and body vertically to the ventral midline; head width (m), the width at the nape; length of snout ( $\mathbf{n}$ ), from the tip of the upper jaw to the anterior margin of the eyes; eye diameter (o), the diameter of the circumorbital series; interorbital width (p), the shortest distance between the orbits; length of the anterior nostril tube and barbel ( $\mathbf{q}$ ), from the base of the anterior nostril tube to the tip of the nostril barbel; preanterior nostril length (r), the distance between the tip of the upper jaw and the base of anterior nostrils; distance between anterior and posterior nostrils (s), the shortest length from the posterior margin of the anterior nostril to the anterior margin of the posterior nostril; distance between posterior nostril and eye (t), the shortest distance between the posterior margin of posterior nostril and the anterior margin of the eye; distance between posterior nostrils ( $\mathbf{u}$ ), the shortest distance between posterior nostrils; length of outer rostral barbel (v) and length of maxillary barbel (w), the longest length of outer rostral barbels and maxillary barbels
posterior nostrils, outer rostral barbels' length over 1/2 of head length (average $57.9 \pm 2.9 \% \mathrm{HL}$ ).


Fig. 2 Lateral view of holotype of Oreonectes elongatus sp. nov. (ASIZB 189288, 78.2 mm SL )

Dorsal fin serrated along posterior edge, with the length nearly a full head length; dorsal-fin origin nearer to caudal-fin base than to snout tip, and posterior to pelvic-fin origin. Anal fin origin next to anus, tip nearly reaching middle of caudal peduncle. Pectoral fin long and narrow, greater than $1 / 2$ the distance between origins of pectoral and pelvic fins. Pelvic fin relatively slender, extending slightly over anus. Caudal fin forked. Caudal peduncle long and compressed laterally,


Fig. 3 Head (dorsal view) of holotype of Oreonectes elongatus sp. nov., showing anterior nostril with tube and barbel (a) and posterior nostril (b)
with adipose crests along both dorsal and ventral sides. Dorsal crest origin posterior to anal-fin insertion, ventral crest origin a short distance from the end of anal fin base; both crests connecting to caudal-fin rays. Body naked. Lateral line incomplete, with 4 pores behind opercle, connecting to the cephalic lateral-line system.

Coloration Overall body pale, yellowish without any special marks in alcohol, all fins including caudal crests pale.

Distribution The new species is only distributed in a few caves from Mulun Township, Huanjiang County, Guangxi Zhuang Autonomous Region, China (Fig. 4). The subterranean waters belong to Dahuangjiang River drainage, Pearl River system.

Etymology The species name derives from the Latin elongatus meaning elongated.

## Discussion

## Remarks

The first comprehensive review of Oreonectes was conducted by Du et al. (2008). In that paper, they described two new species and divided the genus into two species groups, i.e. platycephalus and furcocaudalis groups, mainly based on caudal fin shape (rounded vs. forked), snout shape (round vs. elongate) as well as the appearance and development of the caudal crests. In 2009, Huang et al. described another species-O. macrolepis and sorted it to the
furcocaudalis group. Oreonectes elongatus sp. nov. has a forked caudal fin, which indicates it belongs to the group furcocaudalis. Besides the new species, there are another four valid species in the group: $O$. furcocaudalis, O. translucens, $O$. microphthalmus, and $O$. macrolepis.

Oreonectes elongatus sp. nov. and O. furcocaudalis have a forked caudal fin with crests on both sides of the caudal peduncle and an incomplete lateral line in common. Lacking eyes and scales, origin of dorsal fin slightly behind pelvic-fin base origin can distinguish the new species from $O$. furcocaudalis.

Oreonectes elongatus sp. nov. and $O$. microphthalmus share the following common characters: a forked caudal fin, adipose crests present on both sides of the caudal peduncle, elongate snout, incomplete lateral line, body de-pigmented. However, O. elongatus can be distinguished from $O$. microphthalmus by eyes being absent (vs. vestigial with only black pigment in O. microphthalmus), the number of dorsal fin rays 89 (vs. 9-10), the number of anal fin rays 6 (vs.7), body naked (vs. whole body covered with degenerated scales or naked), and dorsal fin origin behind the origin of anal fin (vs. front).

Oreonectes elongatus sp. nov. and $O$. macrolepis are both distributed in Huanjiang County, but in different townships. The two species have the following characteristics in common: a forked caudal fin, absent eyes, possessing dorsal and ventral crest, body skin with no markings or spots, lateral line incomplete. The new species differs from $O$. macrolepis by naked body (vs. scaled body), disappeared eye (vs. present but degenerated eye) and elongate snout (vs. round snout).

The closest known relative to the new species appears to be Oreonectes translucens (Fig. 5), for both of them possess caudal crests, a forked caudal fin, vestigial eyes, naked body and incomplete lateral line. Du et al. (2008) synonymized $O$. translucens with Triplophysa longibarbatus without checking the type specimens. O. translucens has a clear short distance between anterior and posterior nostrils, and well-developed nostril tubes (Zhang et al. 2006), which apparently should not belong to Triplophysa. Therefore, $O$. translucens is still a valid species. The new species can be distinguished from $O$. translucens by having adipose caudal crests (vs. transparent and well-developed crests), slender anterior nostril tube with long barbel ( $18.6-26.3 \% \mathrm{HL}$ ) (vs. short nostril
Table 1 Comparison of meristic and morphometric characters among Oreonectes elongatus sp.nov., O. translucens, O. furcocaudalis, O. microphthalmus, and O. macrolepis

| Character |  | Oreonectes elongatus sp.nov. |  | O.translucens |  | O.furcocaudalis |  | O. microphthalmus |  | O. macrolepis |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD |
| No. of specimen | Holotype | 3 |  | 3 (type specimens) |  | 13 |  | 10 (type specimens) |  | 13 (type specimens) |  |
| Dorsal fin rays | iii, 9 | iii, 8 |  | iii, 8 |  | 8 (one specimen 7) |  | iii, 9-10 |  | iii, 9-10 |  |
| Anal fin rays | ii, 7 | ii, 6-7 |  | iii, 6 |  | 5(one specimen 6) |  | ii, 6 |  | ii, 6-7 |  |
| Pectoral fin rays | i, 10 | i, 10 |  | i, 11 |  | i, 11-12(most 12) |  | i, 10-11 |  | i, 10-11 |  |
| Pelvic fin rays | i, 6 | i, 6 |  | i, 6 |  | i, 7 |  | i, 7 |  | i, 6-7 |  |
| Caudal fin rays | 14 | 14 |  | 14 |  | 14 |  | 14 |  | 14 |  |
| Vertebrae | $4+38$ | 4+38~39 |  | 4+32 |  | 4+35-37 |  |  |  | 36.7-64.1 | $46.7 \pm 8.7$ |
| Standard Length (mm) | 78.2 | 76.4-78.2 | $77.6 \pm 1.0$ | 25.0-45.0 | $33.0 \pm 10.6$ | 27.7-42.2 | $32.4 \pm 4.2$ | 31.0-48.7 | $36.4 \pm 5.8$ |  |  |
| Percent (\%) of standard length |  |  |  |  |  |  |  |  |  |  |  |
| Body height | 10.5 | 8.6-10.7 | $9.9 \pm 1.1$ | 12.1-14.2 | $13.0 \pm 1.1$ | 10.0-13.4 | $11.7 \pm 1.1$ |  | 8.7-13.6 | $10.8 \pm 1.9$ | 8.2-18.7 | $12.4 \pm 3.4$ |
| Maximum body height | 10.5 | 8.9-11.0 | $10.1 \pm 1.1$ | 13.6-15.0 | $14.4 \pm 0.7$ | 12.0-13.9 | $12.7 \pm 0.6$ | 8.9-13.6 | $11.4 \pm 1.7$ | 10.1-20.4 | $13.4 \pm 3.4$ |
| Body width(at dorsal fin origin) | 6.2 | 3.7-6.2 | $4.9 \pm 1.2$ | 5.1-7.2 | $6.0 \pm 1.1$ | 5.0-7.8 | $6.1 \pm 0.8$ | 4.5-8.2 | $6.5 \pm 1.2$ | 6.0-10.6 | $7.7 \pm 1.7$ |
| Maximum body width | 8.9 | 7.6-8.9 | $8.3 \pm 0.7$ | 8.7-12.9 | $10.5 \pm 2.2$ | 9.9-13.1 | $11.7 \pm 1.0$ | 9.6-12.5 | $11.3 \pm 0.9$ | 10.3-15.3 | $12.4 \pm 1.6$ |
| Body width(at anus) | 5.3 | 2.8-5.3 | $4.1 \pm 1.3$ | 3.7-4.6 | $4.1 \pm 0.4$ | 3.4-5.9 | $4.3 \pm 0.9$ | 3.0-5.7 | $4.4 \pm 0.9$ | 3.6-5.9 | $4.7 \pm 0.9$ |
| Predorsal length | 55.6 | 53.8-58.0 | $55.8 \pm 2.1$ | 52.8-54.8 | $54.0 \pm 1.1$ | 52.0-58.2 | $55.3 \pm 2.0$ | 52.6-56.8 | $54.9 \pm 1.2$ | 53.6-58.9 | $56.5 \pm 1.6$ |
| Length of dorsal fin | 19.6 | 19.6-21.4 | $20.5 \pm 0.9$ | 20.6-22.6 | $21.6 \pm 1.0$ | 18.1-21.1 | $20.0 \pm 0.8$ | 19.6-21.7 | $20.4 \pm 0.9$ | 19.6-24.0 | $20.9 \pm 1.1$ |
| Length of dorsal fin base | 13.6 | 11.9-13.6 | $12.9 \pm 0.9$ | 12.0-14.6 | $13.0 \pm 1.4$ | 9.7-14.1 | $12.3 \pm 1.2$ | 12.7-15.4 | $14.5 \pm 0.7$ | 12.4-16.1 | $14.0 \pm 1.3$ |
| Prepelvic Length | 54.3 | 51.6-57.0 | $54.3 \pm 2.7$ | 51.5-55.9 | $53.4 \pm 2.2$ | 54.4-60.4 | $57.2 \pm 1.8$ | 55.6-58.8 | $57.1 \pm 1.1$ | 0.0-74.7 | $54.1 \pm 17.2$ |
| Length of pelvic fin | 15 | 15.0-16.6 | $15.6 \pm 0.9$ | 15.8-17.9 | $16.7 \pm 1.1$ | 12.0-15.9 | $14.7 \pm 1.1$ | 13.4-16.3 | $14.9 \pm 0.8$ | 0.0-16.9 | $14.3 \pm 4.4$ |
| Length of pelvic fin base | 1.9 | 1.9-2.7 | $2.2 \pm 0.4$ | 2.1-3.4 | $2.6 \pm 0.7$ | 1.9-3.1 | $2.4 \pm 0.4$ | 2.0-3.2 | $2.7 \pm 0.4$ | 0.0-4.2 | $2.3 \pm 0.9$ |
| Pre-anus length | 69.7 | 68.1-71.1 | $69.6 \pm 1.5$ | 64.2-70.8 | $67.4 \pm 3.3$ | 69.5-75.6 | $73.4 \pm 1.8$ | 72.3-76.0 | $74.1 \pm 1.1$ | 74.0-77.0 | $75.2 \pm 0.8$ |
| Preanal length | 73.6 | 73.6-75.3 | $74.5 \pm 0.9$ | 69.1-74.5 | $71.2 \pm 2.9$ | 74.0-78.7 | $77.0 \pm 1.4$ | 75.4-80.3 | $78.5 \pm 1.3$ | 78.4-81.1 | $79.5 \pm 0.8$ |
| Length of anal fin | 17.6 | 16.2-18.7 | $17.5 \pm 1.3$ | 17.8-19.6 | $18.7 \pm 0.9$ | 15.8-19.7 | $17.3 \pm 1.4$ | 14.3-17.6 | $15.9 \pm 0.9$ | 13.8-16.8 | $15.5 \pm 0.9$ |
| Length of anal fin base | 9.5 | 8.2-9.5 | $9.0 \pm 0.7$ | 8.1-11.0 | $10.0 \pm 1.6$ | 7.1-11.5 | $8.8 \pm 1.3$ | 7.0-10.3 | $8.5 \pm 1.1$ | 6.6-8.3 | $7.6 \pm 0.5$ |
| Prepectoral length | 23 | 22.6-24.8 | $23.5 \pm 1.1$ | 28.1-31.9 | $29.4 \pm 2.2$ | 23.7-29.8 | $27.4 \pm 1.6$ | 27.0-30.5 | $29.3 \pm 1.1$ | 25.4-30.0 | $27.2 \pm 1.5$ |
| Length of pectoral fin | 19.3 | 18.8-21.3 | $19.8 \pm 1.4$ | 22.2-23.3 | $22.6 \pm 0.6$ | 16.8-21.6 | $19.6 \pm 1.6$ | 14.2-19.5 | $16.5 \pm 1.7$ | 15.0-22.5 | $19.4 \pm 2.1$ |
| Length of pectoral fin base | 2.1 | 1.5-2.1 | $1.8 \pm 0.3$ | 3.0-3.6 | $3.2 \pm 0.3$ | 1.9-4.2 | $2.7 \pm 0.6$ | 2.1-3.4 | $2.9 \pm 0.4$ | 2.2-3.7 | $2.8 \pm 0.5$ |
| Length of caudal fin | 20.3 | 19.6-21.4 | $20.5 \pm 0.9$ | 21.8-24.6 | $23.6 \pm 1.6$ | 20.0-25.0 | $22.3 \pm 2.0$ | 17.2-22.7 | $17.0 \pm 9.0$ | 18.1-25.4 | $21.4 \pm 1.9$ |
| Length of caudal peduncle | 17.3 | 15.9-17.3 | $16.7 \pm 0.7$ | 17.3-18.9 | $18.2 \pm 0.8$ | 12.7-16.5 | $14.9 \pm 1.0$ | 11.5-15.5 | $13.6 \pm 1.3$ | 12.0-16.1 | $14.0 \pm 1.2$ |
| Depth of caudal peduncle | 5.1 | 3.1-5.4 | $4.6 \pm 1.2$ | 5.4-7.0 | $6.2 \pm 0.8$ | 5.2-8.9 | $6.5 \pm 1.0$ | 5.3-6.5 | $5.9 \pm 0.5$ | 4.9-7.5 | $6.0 \pm 0.8$ |

Table 1 (continued)

| Character |  | Oreonectes elongatus sp.nov. |  | O.translucens |  | O.furcocaudalis |  | O. microphthalmus |  | O. macrolepis |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD | Range | Mean $\pm$ SD |
| Head lenght | 22.6 | 20.2-22.8 | $21.9 \pm 1.4$ | 27.8-32.3 | $29.3 \pm 2.6$ | 22.4-30.2 | $27.0 \pm 2.1$ | 26.5-29.1 | $28.1 \pm 0.8$ | 24.7-27.6 | $26.1 \pm 0.9$ |
| Percent (\%) of head length |  |  |  |  |  |  |  |  |  |  |  |
| Head height(at nape) | 34.9 | 34.9-37.0 | $36.2 \pm 1.1$ | 34.8-39.0 | $36.8 \pm 2.1$ | 30.0-48.9 | $38.0 \pm 4.4$ | 34.1-38.5 | $36.6 \pm 1.4$ | 34.9-47.3 | $40.4 \pm 4.1$ |
| Head width | 38.3 | 38.3-45.0 | $41.8 \pm 3.3$ | 36.4-43.4 | $39.1 \pm 3.8$ | 41.1-56.7 | $47.2 \pm 4.6$ | 41.5-47.7 | $43.9 \pm 2.1$ | 44.7-61.8 | $50.9 \pm 5.4$ |
| Length of snout | - | - |  | - |  | 34.4-44.3 | $38.0 \pm 3.2$ | 35.6-42.2 | $38.7 \pm 1.7$ | 37.9-47.9 | $41.9 \pm 2.5$ |
| Length of outer rostral barbel | 55 | 55.0-60.2 | $57.0 \pm 2.9$ | 16.3-39.2 | $31.4 \pm 13.1$ | 36.9-62.5 | $46.4 \pm 6.2$ | 0.0-35.4 | $23.0 \pm 10.3$ | 27.6-48.9 | $39.0 \pm 5.5$ |
| Length of maxillary barbel | 38.7 | 38.7-45.4 | $42.5 \pm 3.4$ | 22.6-40.9 | $28.1 \pm 4.8$ | 27.0-59.9 | $38.2 \pm 8.5$ | 12.3-28.9 | $18.8 \pm 4.9$ | 0.0-36.2 | $27.3 \pm 9.1$ |
| Eye diameter | - | - |  | - |  | 6.7-16.0 | $10.1 \pm 2.3$ | 2.7-5.2 | $4.0 \pm 0.7$ | 1.4-5.2 | $3.4 \pm 1.1$ |
| Interorbital width | - | - |  | - |  | 19.9-38.0 | $28.1 \pm 4.8$ | 18.9-25.8 | $22.4 \pm 2.1$ | 25.1-34.4 | $29.9 \pm 2.8$ |
| Length of anterior nostril tube and barbel | 26.3 | 18.6-26.3 | $21.9 \pm 3.9$ | 7.6-9.4 | $8.8 \pm 1.0$ | 12.1-20.8 | $16.4 \pm 2.6$ | 2.8-7.2 | $5.9 \pm 1.4$ | 10.7-19.3 | $14.3 \pm 2.7$ |
| Preanterior nostril length | 10.8 | 9.9-11.8 | $10.9 \pm 0.9$ | 7.2-9.3 | $7.9 \pm 0.6$ | 11.2-18.9 | $14.3 \pm 2.3$ | 11.0-16.8 | $13.3 \pm 1.7$ | 12.7-20.0 | $16.0 \pm 2.3$ |
| Distance between anterior and posterior nostrils | 3.5 | 2.8-3.6 | $3.3 \pm 0.4$ | 2.4-2.9 | $2.6 \pm 0.2$ | 3.5-8.2 | $5.7 \pm 1.2$ | 2.8-4.2 | $3.4 \pm 0.4$ | 2.5-4.7 | $3.5 \pm 0.7$ |
| Distance between posterior nostril and eye | - | $-$ | $-$ | $-$ | - | 4.6-12.6 | $9.9 \pm 2.2$ | 14.4-17.1 | $15.6 \pm 0.9$ | 13.6-20.1 | $16.9 \pm 2.0$ |
| Distance between posterior nostrils | 12.3 | 12.3-17.7 | $14.7 \pm 2.8$ | 19.7-24.0 | $22.3 \pm 2.3$ | 23.4-39.3 | 26.65 | 20.3-25.6 | $22.7 \pm 1.5$ | 20.7-31.4 | $25.6 \pm 3.2$ |



Fig. 4 Distribution of Oreonectes elongatus sp. nov. and relative furcocaudalis species $(\star)$. elongatus sp.nov., $\bullet ~ O$. furcocaudalis, $\boldsymbol{\Delta}$. translucens, ■ $O$. microphthalmus, $\bullet$. macrolepis)
tube with valve-like barbel, $7.6-9.4 \% \mathrm{HL}$ ), pectoral fins end about $2 / 3$ between the origin of pectoral fin and pelvic fin (vs. extended to the origin of pelvic fin) as well as vertebrae $4+38-39$ (vs. $4+32$ ). They are also different in head length ( $20.2-22.8 \%$ vs. $27.8-$ $32.3 \%$ of SL) and outer rostral-barbel length (55.0$60.3 \%$ vs. $16.3-39.2 \%$ of HL).

## Key to the species of furcocaudalis group of Oreonectes

1. Eyes normal.....................O. furcocaudalis

Eyes vestigial .2
2. Eyes vestigial, only with black pigment on location of the eyes; whole body covered with scales except the abdomen .3

Totally eyeless, whole body naked .4
3. Snout round $\qquad$ .O. macrolepis

Snout elongate. $\qquad$ .O. microphthalmus
4. Long anterior nostril tube and barbel, caudal crests adipose and less than half of the caudal peduncle depth $\qquad$ ..O. elongatus sp. nov.
Relatively short anterior nostril with valvelike barbel, caudal crests transparent and developed over $1 / 2$ of the caudal peduncle depth $\qquad$ ..O. translucens

## Material examined

Oreonectes translucens ( 3 specimens, all type specimens) ASIZB 94785 (holotype), 45.0 mm SL ; ASIZB 94786, 29.0 mm SL; ASIZB 94787, 25.0 mm SL. All three specimens are from Xia'ao Town, Du'an County, Guangxi Zhuang Autonomous Region, China in Nov. 1999.

Oreonectes macrolepis ( 13 specimens, all type specimens), KIZ 2008008131 (holotype), 55.0 mm SL; KIZ2008008130, 64.1 mm SL; KIZ 2008008294, 61.8 mm SL; KIZ 2008008295, 44.9 mm SL; KIZ 2008008296, 41.9 mm SL; KIZ 2008008297, 45.9 mm SL; KIZ 2008008298, 44.6 mm SL; KIZ 2008008299, 39.5 mm SL; KIZ 2008008300, 47.4 mm SL; KIZ 2008008301, 40.1 mm SL; KIZ 2008008132, 48.4 mm SL; KIZ 2008008133, 36.7 mm SL ; KIZ 2008008134, 37.6 mm SL. All specimens are from Dacai township, Huanjiang County, Guangxi, China in June 2008.

Oreonectes microphthalmus ( 10 specimens, all type specimens), KIZ 2004009395 (holotype), 39.1 mm SL; KIZ 2004009394, 33.7 mm SL; KIZ 2004009396, 35.9 mm SL; KIZ 2004009397, 48.7 mm SL; KIZ 2004009398 , 31.0 mm SL; KIZ 2004009399, 32.4 mm SL; KIZ 2003007094, 37.6 mm SL; KIZ 2003007095, 42.7 mm SL; KIZ 2003007096, 31.4 mm SL; KIZ 2003007097, 31.2 mm SL. All specimens checked here are from Luocheng County in Guangxi.


Fig. 5 (a) Lateral view and (b) nostrils of holotype of Oreonectes translucens. B-a, anterior nostril, B-b, posterior nostril

Oreonectes furcocaudalis ( 13 specimens), ASIZB 74107, 42.2 mm SL; ASIZB 74108, 38.5 mm SL ; ASIZB 74109, 32.9 mm SL; ASIZB 74110, 32.2 mm SL; ASIZB 74111, 34.2 mm SL; ASIZB 74112, 33.6 mm SL; ASIZB 74113, 31.1 mm SL ; ASIZB 74114, 29.1 mm SL; ASIZB 74115, 28.0 mm SL ; ASIZB 74116, 27.7 mm SL; ASIZB 70341, 28.4 mm SL; ASIZB 70342, 32.7 mm SL; ASIZB 70343, 30.2 mm SL; ASIZB 74107-74116 from Rongshui County in Guangxi (the same locality as the type specimens of $O$. furcocaudalis), the other three specimens ASIZB 70341-70343 are from Du'an County in Guangxi.

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