

# A new species of Genus *Triplophysa* (Nemacheilinae: Balitoridae), *Triplophysa longipectoralis* sp. nov, from Guangxi, China

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**Abstract** A new species, *Triplophysa longipectoralis*, is described from Liujiang River, Guangxi, China. The new species is distinguished from other species of *Triplophysa* by the following combination of characters: pectoral fin highly developed, reaching beyond pelvic-fin origin; eyes present and vestigial; body covered with scales; dorsal and lateral sides of head and body mottled with blotches; dorsal fin emarginate; caudal fin forked; anus close to anal-fin origin. A key to all valid species of *Triplophysa* in Xijiang River water system is provided.

**Keywords** Balitoridae · *Triplophysa* · New species · Guangxi · China

## Introduction

The genus *Triplophysa* (Rendahl) belongs to the family Balitoridae, subfamily Nemacheilinae, and is one of the largest groups of subfamily Nemacheilinae. There are 112 nominal species in the genus *Trip-*

*lophysa* all over the world, and approximately 60% of species are found in China (Chen and Yang 2005; Froese and Pauly 2008). The genus *Triplophysa* is distinct from other genera by the character combination: nostrils close together; back wall of lateral bony bladder capsule bony and sexual dimorphism. Sexual dimorphism is one important character of *Triplophysa* in China. Males have a rectangular area of breeding tubercles on each side of head, and their outer rays of pectoral fin become hard and wide (Zhu 1989; Yang 1990; He et al. 2006).

Xijiang River water system is the largest water system in Guangxi Zhuang Autonomous Region. Sixteen valid species of *Triplophysa* have been previously recorded in Xijiang River. A new species was collected from Liujiang River, a main tributary of Xijiang River, in Xunle town, Huanjiang County, Guangxi Zhuang Autonomous Region, and is described herein.

## Materials and methods

Counts and measurements follow Kottelat (1990). Measurements were made with digital calipers and recorded to 0.1 mm. Some other characteristics selected are listed as follows: lateral head length is from tip of snout to hindmost point of opercle. Gill rakers refer to the count on the inner side of the first arch. Specimens examined are deposited in the collection of the Kunming Institute of Zoology

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(KIZ), Chinese Academy of Sciences, Kunming and the Institute of Zoology (IOZ), Chinese Academy of Sciences, Beijing. Abbreviations used in the text are: country=Co., examined specimen=ex., province=Prov., and standard length=SL.

***Triplophysa longipectoralis* sp. nov.** (Figs. 1, 2)

**Holotype:** KIZ2001004573, 52.1 mm SL, Liujiang River Basin: Xunle town, Huanjiang County, Hechi City, Guangxi Zhuang Autonomous Region, China, May 2001, collected by Mr. Lan Jiahu.

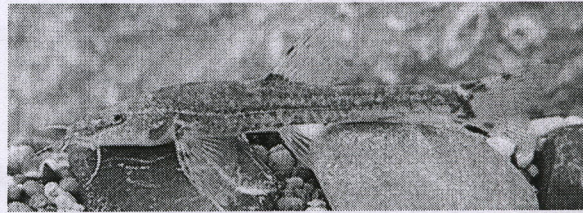
**Paratypes:** KIZ2001004574–576, KIZ2001004578–4579, 5 ex., 36.8–52.2 mm SL; OIZ 177636, 1 ex., 42.9 mm SL. Collected with the holotype.

**Etymology:** The specific epithet *longipectoralis* is derived from the Latin *longus* (long) and *pectoralis* (pectoral), alluding to the long pectoral fin. It is a noun in apposition.

**Diagnosis:** Pectoral fin highly developed, reaching beyond pelvic-fin origin; eyes present and vestigial; body covered with scales; dorsal and lateral sides of head and body mottled with blotches; dorsal fin emarginate; caudal fin forked; anus close to anal-fin origin. Counts and proportional measurements are shown in Table 1.

**Description:** D III, 8; A III, 5–6; P I, 10–11; V I, 7; C 16; inner gill rakers 13; vertebrae 4+35 (1 specimen). Cephalic lateral-line system with 2+2 supratemporal, 8 supraorbital, 3+9 infraorbital and 14 preoperculo-mandibular pores.

Body elongate, body and caudal-peduncle compressed, abdomen smooth. Highest point of body usually in front of dorsal-fin origin. Head pointed moderately compressed, width greater than depth. Snout relatively pointed, snout length less than postorbital length. Anterior and posterior nostrils closely situated, anterior nostrils in short tube, with elongate barbel-like tip, reaching midpoint between snout and anterior margin of eye. No valve around posterior

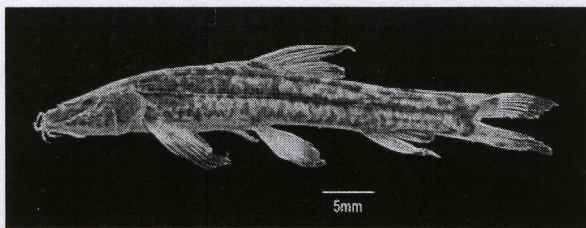


**Fig. 2** *Triplophysa longipectoralis*, living colour pattern (photographed by Lan J.H.)

nostrils. Eyes small and vestigial. Orbital cavity sunken, positioned dorsolaterally in head. Interorbital space slightly convex. Mouth inferior. Posterior margin of mouth situated below anterior nostrils. Lips thick with strong furrows and papillae; anterior margin of lower lip with a median notch, middle interrupted and forming a pair of furrows. Upper jaw arched and with weak processus dentiformis. Lower jaw arched, without median notch. Three pairs of barbels, moderately long; inner rostral barbels reaching corner of mouth; outer rostral barbels the longest, extending beyond posterior margin of eye; maxillary barbels reaching the mid point between posterior margin of eye and posterior margin of operculum. Barbels covered with papillae. Gill membranes united with isthmus. Lower corner of operculum reaching ventral insertion of pectoral-fin. Gill filament with tiny branches, and gill rakers short, with tiny protuberance. Lateral line complete.

Dorsal fin emarginate, its origin situated midway between tip of snout and caudal-fin base; last unbranched ray longest, slightly less than head length, reaching to or nearly to vertical through anal-fin origin. Anal fin emarginate. First branched anal-fin ray reaching or close to caudal-fin base. First branched pectoral-fin ray longest, reaching beyond pelvic-fin origin when extending horizontally. Pelvic-fin origin slightly posterior to dorsal-fin origin when extending horizontally. Second branched pelvic-fin ray longest, reaching or close to anus. Pelvic-fin origin situated midway between pectoral-fin origin and anal-fin origin. Auxiliary pelvic lobe absent. Anus close to anal-fin origin, equal to eye diameter. Caudal fin forked, upper lobe slightly longer than lower lobe, tips pointed.

Scales embedded, covering body except head, breast and belly. Cephalic lateral line canal developed. Supraorbital and infraorbital canals extending horizontally from ethmoid and base of outer rostral barbels respectively, converging at posterior orbital region and extending posteriorly, then converging



**Fig. 1** *Triplophysa longipectoralis* KIZ2001004573, holotype, 52.1 mm SL, Liujiang River Basin: Xunle town, Huanjiang County, Guangxi, China, Lateral view

**Table 1** Main morphometric characters of *Triplophysa longipectoralis*

Characters	Holotype (%)	Range (%)	Mean±SD (%)
In % of standard length (SL)			
Dorsal head length	23.9	22.7–25.4	24.1±0.8
Predorsal length (PDL)	49.8	49.0–53.1	50.4±1.4
Preventral length	50.9	49.7–53.5	51.4±1.3
Preanal length	76.3	53.5–78.3	73.3±8.3
Preanus length	72	69.6–74.2	72.4±1.4
Caudal-peduncle length (CPL)	13.8	12.2–15.8	13.9±1.0
Caudal-peduncle depth (CPD)	9.9	6.8–9.9	8.4±0.9
Body depth	15.2	12.2–16.4	14.5±1.5
Head width (maximum)	14.5	13.0–15.6	14.3±0.9
Head width (at eye)	8.6	7.3–8.6	8.2±0.4
Length of dorsal fin	25.3	24.6–28.6	26.1±1.2
Length of pectoral fin	28.8	25.7–30.0	28.3±1.4
Length of pelvic fin	20.9	19.1–22.3	20.3±1.1
Length of anal fin	22.6	17.9–22.6	21.1±1.4
Length of caudal fin	26.3	26.3–28.4	27.3±0.7
Length of median caudal ray	19.3	16.3–23.0	20.7±2.2
In % of dorsal head length			
Snout length	47.7	44.1–49.1	46.8±1.9
Eye diameter (ED)	11.8	11.8–16.4	14.5±1.6
Interorbital width	22.8	21.2–25.3	23.4±1.5
Head width (maximum)	60.5	54.7–66.1	59.4±3.6
Head width (at eye)	36.1	31.3–37.6	33.9±2.0
Head height (at eye)	35.5	32.0–37.4	33.7±1.9
In % of lateral head length (HL)			
Snout length	39.4	36.4–41.5	38.8±1.8
Eye diameter (ED)	9.7	9.7–13.7	12.0±1.2
Interorbital width	18.8	17.2–21.3	19.4±1.4
Caudal-peduncle depth/ length	71.7	49.8–73.1	60.7±8.7

with occipital canal on back of head, and uniting with lateral line canal. Lateral line complete and straight. Another lateral canal extending posteriorly from posterior end of lower lip to midpoint of anterior margin of operculum. Peritoneum without pigment. Air-bladder wrapped in bony bladder capsule, lateral opening large, no opening on back wall of air-bladder. Males with rectangular area of breeding tubercles on sides of head, not developed and extending from anterior lower margin of orbital to base of outer rostral barbels. Pectoral fin hardened.

**Color pattern:** Ground color of body light yellow, slightly lighter ventrally. Dorsal and lateral parts of body and head gray and black. Dorsal, pectoral, pelvic and anal fin rays brown, fin membrane hyaline.

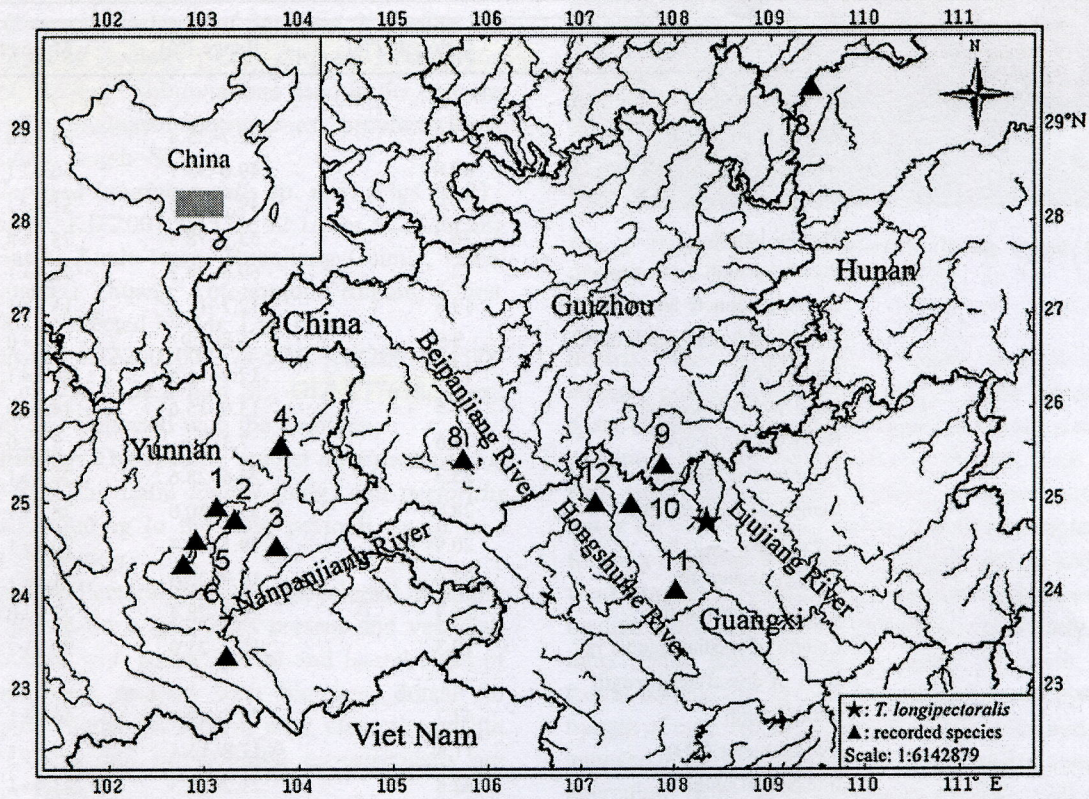
Blotches present on dorsal, pectoral and caudal fin. Pelvic and anal fins without blotches (Figs. 1, 2).

**Ecology:** Aquatic insects and copepods are found in the stomach (1 specimen). *Triplophysa longipectoralis* lives in the clear water in the cave, water temperature below 20°C.

**Distribution:** *Triplophysa longipectoralis* is distributed in a cave in Xunle town, Huanjiang County, Guangxi, belonging to Liujiang River (Fig. 3).

## Discussion

*Triplophysa longipectoralis* can be distinguished from all species of genus *Triplophysa* in China except



**Fig. 3** Distribution of fishes of genus *Triplophysa* in Southwestern China. ▲ specifically as follows: 1 *T. macromaculatus*, *T. macrophthalma*, *T. yunnanensis*; 2 *T. shilinensis*, *T. xiangshuingensis*; 3 *T. aluensis*; 4 *T. nanpanjiangensis*; 5 *T.*

*fluxianensis*; 6 *T. lacustris*; 7 *T. gejiuensis*; 8 *T. zhenfengensis*; 9 *T. longibarbatulus*, *T. nasobarbatula*; 10 *T. nandanensis*; 11 *T. flavicarpus*; 12 *T. tianeensis*; 13 *T. xiangxiensis*

*T. xiangxiensis* by pectoral fin highly developed, reaching beyond pelvic-fin origin. But *T. longipectoralis* can be further distinguished from *T. xiangxiensis* by the following characters: pectoral fin extend beyonding pelvic-fin origin (vs. reaching midpoint of anal-fin base in *T. xiangxiensis*); scaled (vs. scaleless in *T. xiangxiensis*); eyes present (vs. absent in *T. xiangxiensis*); body covered with blotches (vs. no blotches in *T. xiangxiensis*).

In Xijiang River, 16 valid nemacheiline loaches have been already described (Table 2) (Chu and Chen 1979; Zhu and Guo 1985; Zhu and Cao 1988; Yang and Chu 1990; Yang 1990; Chen et al. 1992; Lan et al. 1995; Chen et al. 1998; Li and Zhu 2000; Wang and Li 2001; Yang et al. 2004; Li 2004; Du et al. 2008). *Triplophysa longipectoralis* is most similar to *T. yunnanensis*, *T. flavicarpus*, *T. nasobarbatula* and *T. zhenfengensis* by body covered with scales, but it can be distinguished from *T. yunnanensis* by the

following characters: dorsal fin emarginate (vs. truncate in *T. yunnanensis*); caudal fin forked (vs. slightly emarginate in *T. yunnanensis*); *T. longipectoralis* can be also distinguished from *T. flavicarpus*, *T. nasobarbatula* and *T. zhenfengensis* by the following characters: eyes vestigial (vs. normal in *T. flavicarpus*, *T. nasobarbatula* and *T. zhenfengensis*); anus close to anal-fin origin (vs. far away from anal-fin origin in *T. flavicarpus*, *T. nasobarbatula* and *T. zhenfengensis*).

*Triplophysa longipectoralis*, *T. tianeensis*, *T. aluensis*, *T. gejiuensis*, *T. shilinensis* and *T. longibarbatulus* share the following common characters: scales rudimentary or absent; pigmentation degenerated; barbels developed; nostril valve elongated into a barbel-like process; fins developed. But *T. longipectoralis* can be further distinguished from *T. tianeensis* by the following characters: scaled (vs. scaleless in *T. tianeensis*); branched rays of dorsal fin 8 (vs. 7 in *T. tianeensis*);

**Table 2** Recorded fish species of *Triplophysa* in Xijiang River water system

Species name	Description	Type locality	Water system
<i>T. gejiuensis</i>	Chu and Chen (1979)	Gejiu, Yunnan	Nanpanjiang River
<i>T. macrophthalma</i>	Zhu and Guo (1985)	Yiliang, Yunnan	Nanpanjiang River
<i>T. nanpanjiangensis</i>	Zhu and Cao (1988)	Zhanyi, Yunnan	Nanpanjiang River
<i>T. fuxianensis</i>	Yang and Chu (1990)	Fuxianhu Lake, Yunnan	Fuxianhu Lake
<i>T. lacustris</i>	Yang and Chu (1990)	Xingyunhu Lake, Yunnan	Xingyunhu Lake
<i>T. macromaculatus</i>	Yang (1990)	Yiliang, Yunnan	Nanpanjiang River
<i>T. yunnanensis</i>	Yang (1990)	Yiliang, Yunnan	Nanpanjiang River
<i>T. shilinensis</i>	Chen et al. (1992)	Shilin, Yunnan	Nanpanjiang River
<i>T. nandanensis</i>	Lan et al. (1995)	Nandan, Guangxi	Hongshuihe River
<i>T. longibarbatus</i>	Chen et al. (1998)	Libo, Guizhou	Liujiang River
<i>T. aluensis</i>	Li and Zhu (2000)	Alu, Yunnan	Nanpanjiang River
<i>T. nasobarbatula</i>	Wang and Li (2001)	Libo, Guizhou	Liujiang River
<i>T. zhenfengensis</i>	Wang and Li (2001)	Zhenfeng, Guizhou	Beipanjiang River
<i>T. flavicorpus</i>	Yang et al. (2004)	Duan, Guangxi	Hongshuihe River
<i>T. tianeensis</i>	Chen et al. (2004)	Tiane, Guangxi	Hongshuihe River
<i>T. xiangshuingensis</i>	Li (2004)	Shilin, Yunnan	Nanpanjiang River

dorsal fin emarginate (vs. truncate in *T. tianeensis*); tip of pelvic fin extend beyond anus (vs. not extend beyond anus in *T. tianeensis*); dorsal-fin origin above pelvic-fin origin (vs. posterior to pelvic-fin origin in *T. tianeensis*). *T. longipectoralis* can be further distinguished from *T. aluensis* by the following characters: scaled (vs. scaleless in *T. aluensis*); dorsal fin emarginate (vs. truncate in *T. aluensis*); tip of pelvic fin extend beyond anus (vs. not extend beyond anus in *T. aluensis*); dorsal-fin origin above pelvic-fin origin (vs. anterior to pelvic-fin origin in *T. aluensis*). *T. longipectoralis* can be further distinguished from *T. gejiuensis* by the following characters: scaled (vs. scaleless in *T. gejiuensis*); blotches present (vs. absent in *T. gejiuensis*); dorsal fin emarginate (vs. truncate in *T. gejiuensis*); dorsal-fin origin above pelvic-fin origin (vs. anterior to pelvic-fin origin in *T. gejiuensis*). *T. longipectoralis* can be further distinguished from *T. shilinensis* by the following characters: scaled (vs. scaleless in *T. shilinensis*); blotches present (vs. absent in *T. shilinensis*); branched rays of dorsal fin 8 (vs. 7 in *T. shilinensis*); dorsal fin emarginate (vs. truncate in *T. shilinensis*). *T. longipectoralis* can be further distinguished from *T. longibarbatus* by the following characters: scaled (vs. scaleless in *T. longibarbatus*); 3dorsal fin emarginate (vs. truncate in *T. longibarbatus*); blotches present (vs. absent in *T. longibarbatus*); branched rays of caudal fin 16 (14 vs. in *T. longibarbatus*).

**Key to the species of *Triplophysa* in the Xijiang River water system**

- 1– Pectoral fin highly developed, reaching beyond pelvic fin origin ..... *Triplophysa longipectoralis* (Liujiang River)
  - Pectoral fin not reaching beyond pelvic fin origin ..... 2
- 2– Caudal fin slightly emarginate.....3
  - Caudal fin forked.....8
- 3– Body covered with scales.....4
  - Body not covered with scales.....5
- 4– Dorsal-fin origin above pelvic-fin origin.....
  - .....*Triplophysa nanpanjiangensis* (Nanpanjiang River)
    - Dorsal-fin origin anterior to pelvic-fin origin.....
      - ..... *Triplophysa yunnanensis* (Nanpanjiang River)
  - 5– Dorsal fin emarginate .....
    - .....*Triplophysa macromaculatus* (Nanpanjiang River)
      - Dorsal fin truncate ..... 6
    - 6– Branched rays of anal fin 7, branched rays of caudal fin 14 .....
      - .....*Triplophysa macrophthalma* (Nanpanjiang River)
        - Branched rays of anal fin 6, branched rays of caudal fin 15–17 ..... 7
      - 7– Rostral barbels short, reaching to or slightly reaching beyond vertical anterior margin of eyes, anus far away from anal-fin origin .....
        - .....*Triplophysa fuxianensis* (Fuxianhu Lake)
          - Rostral barbels long, reaching to or slightly reaching beyond vertical posterior margin of

eyes, anus close to anal-fin origin .....	
..... <i>Triplophysa lacustris</i> (Xingyunhu Lake)	
8– Body covered with scales.....9	
– Body not covered with scales.....11	
9– Dorsal fin closer to snout tip than caudal-fin base .....	
..... <i>Triplophysa nasobarbatula</i> (Liujiang River)	
– Dorsal fin at midpoint of body.....10	
10– Branched rays of caudal fin 14–15 .....	
..... <i>Triplophysa zhenfengensis</i> (Beipanjiang River)	
– Branched rays of caudal fin 16 .....	
..... <i>Triplophysa flavicarpus</i> (Hongshuihe River)	
11– Dorsal fin emarginate.....12	
– Dorsal fin truncate.....13	
12– Dorsal fin closer to snout tip than caudal-fin base .....	
..... <i>Triplophysa xiangshuingensis</i> (Nanpanjiang River)	
– Dorsal fin at midpoint of body.....	
..... <i>Triplophysa nandanensis</i> (Hongshuihe River)	
13– Tip of pelvic fin not extend beyond anus .....	
.....14	
– Tip of pelvic fin extend beyond anus.....15	
14– Dorsal-fin origin anterior to pelvic-fin origin .....	
..... <i>Triplophysa aluensis</i> (Nanpanjiang River)	
– Dorsal-fin origin posterior to pelvic-fin origin .....	
..... <i>Triplophysa tianeensis</i> (Hongshuihe River)	
15– Anterior nostrils without elongate barbel-like tip .....	
..... <i>Triplophysa gejiuensis</i> (Nanpanjiang River)	
– Anterior nostrils with elongate barbel-like tip .....	
.....16	
16– Branched rays of dorsal fin 7, branched rays of anal fin 5 .....	
..... <i>Triplophysa shilinensis</i> (Nanpanjiang River)	
– Branched rays of dorsal fin 8, branched rays of anal fin 6 .....	
..... <i>Triplophysa longibarbatus</i> (Liujiang River)	

## Comparative materials

*T. gejiuensis* Chu et Chen: KIZ 7803001-005, 7803007-008, 7 ex., syntypes, 36.5–45.8 mm SL, Nanpanjiang River Basin: Gejiu Co., Yunnan Prov., China.

*T. nanpanjiangensis* Zhu et Cao: KIZ 2008006575-576, 2 ex., 58.4–62.4 mm SL, Nanpanjiang River Basin: Luoping Co., Yunnan Prov., China.

*T. yunnanensis* Yang: KIZ 874197, 874199, 874200, 3 ex., syntypes, 48.5–62.7 mm SL, Nanpanjiang River Basin: Yiliang Co., Yunnan Prov., China.

*T. macromaculatus* Yang: KIZ 874021-022, 2 ex., syntypes, 70.5–83.7 mm SL, Nanpanjiang River Basin: Yiliang Co., Yunnan Prov., China.

*T. fuxianensis* Yang et Chu: KIZ 873126-128, 8611025-027, 029, 7 ex., syntypes, 56.6–71.2 mm SL, Nanpanjiang River Basin: Fuxianhu, Yunnan Prov., China.

*T. lacustris* Yang et Chu: KIZ 00394-396, 00400-401, 00404, 00409, 00411, 00412, 9 ex., syntypes, 49.7–55.8 mm SL, Nanpanjiang River Basin: Xingyunhu, Yunnan Prov., China.

*T. shilinensis* Chen et Yang: KIZ 913001-002, 2 ex., syntypes, 59.1–59.6 mm SL, Nanpanjiang River Basin: Shilin Co., Yunnan Prov., China.

*T. aluensis* Li: KIZ 2006005-007, 3 ex., 43.3–80.7 mm SL, Nanpanjiang River Basin: Alu Co., Yunnan Prov., China.

*T. nasobarbatula* Wang et Li: KIZ 200503030, 200503069, 2005030711-712, 4 ex., 31.1–41.2 mm SL, Liujiang River Basin: Libo Co., Guizhou Prov., China.

*T. nandanensis* Lan, Yang et Chen: KIZ 9110008-, 10 ex., syntypes, 56.6–71.2 mm SL, Hongshuihe River Basin: Nandan Co., Guangxi Zhuang Autonomous Region, China.

*T. flavicarpus* Yang, Chen et Lan: KIZ 995003, 0011051-554, 00120610, 00120614, 00120624, 8 ex., syntypes, 51.5–83.5 mm SL, Hongshuihe River Basin: Du'an Co., Guangxi Zhuang Autonomous Region, China.

*T. tianeensis* Chen, Cui et Yang: KIZ 200301001-006, 6 ex., syntypes, 35.8–58.6 mm SL, Hongshuihe River Basin: Tian'e Co., Guangxi Zhuang Autonomous Region, China.

*T. xiangxiensis* Yang et Yuan: KIZ 9705001-005, 5 ex., 50.0–99.5 mm SL, Yuanjiang River Basin: Longshan Co., Hunan Pro., China.

*T. longibarbatus* Chen, Yang, Sket et Aljancis: 953001-003, 3 ex., syntypes, 27.3–54.6 mm SL, Liujiang River Basin: Libo Co., Guizhou Prov., China.

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