A REVIEW OF THE CATFISH GENUS PSEUDECHENEIS (SILURIFORMES: SISORIDAE) FROM CHINA, WITH THE DESCRIPTION OF FOUR NEW SPECIES FROM YUNNAN

Wei Zhou, Xu Li and Ying Yang
Faculty of Conservation Biology, Southwest Forestry College, Kunming 650224, P. R. China; Key Laboratory of Forest Disaster Warning and Control in Yunnan Higher Education Institutions
Email: weizhou@public.km.yn.cn (Corresponding author)

ABSTRACT. – Presently, six species of Pseudecheneis have been recorded in China. They are Pseudecheneis intermedius Chu. P. immaculatus Chu, P. paviei Vaillant, P. stenura Ng, P. sulcata (McClelland) and P. sulcatoides Zhou & Chu. This study suggests that Pseudecheneis immaculatus, P. stenura and P. sulcatoides are valid species. Pseudecheneis intermedius is considered a junior synonym of P. paviei. Propseudecheneis tchangi, formerly treated as a junior synonym of Pseudecheneis sulcata, is a valid species belonging in Pseudecheneis and in China Pseudecheneis sulcata is only found in the Yaluzangbu River (Brahmaputra), Tibet. In addition, four new species from Yunnan are described. They are Pseudecheneis brachyurus, P. gracilis, P. longipectoralis and P. paucipunctatus. These four new species can be distinguished from each other by distinct stable morphological characters. They can be distinguished from all recorded species by certain characters. They differ from P. paviei in having 14–21 transverse ridges (laminae) of thoracic apparatus (vs. 9–13); differ from P. sulcatoides in having a neural spine of complex vertebra bifurcate (vs. single); differ from P. immaculatus in having yellow spots and patches at the occipital, post-temporal, origin and base end of the dorsal fin and adipose fin, and caudal fin base (vs. absent); differ from P. tchangi in having yellow spots and patches at origin and base end of the dorsal fin, origin and base end of the adipose fin, and the caudal fin base (vs. absent); differ from P. sulcata in having longer pelvic fin, reaching base of first anal fin ray (vs. not reaching); differ from P. crassicauda in having longer pectoral fin, reaching origin of pelvic fin (vs. not reaching); differ from P. serracula in having a shorter base of adipose fin (length of adipose fin base 125–166.7% in length of anal fin base vs. larger than 200%); and differ from P. sympelvica in having separate pelvic fins (vs. fused). Except P. gracilis, other three new species differ from P. stenura in having tubercles at caudal peduncle. Pseudecheneis gracilis differs from P. stenura in having a saddle patch at origin of dorsal fin (vs. isolated as two ovoid yellow patches on lateral of dorsal fin origin), and further in having shorter head length (head length 14.9–18.6 % SL vs. 20.1–23.7, postorbital head length 4.5–5.9% in head length vs. 8.5–11.4, body depth 73.9–112.2 % in head length vs. 67.1–88.5).

KEY WORDS. – Pseudecheneis, review, new species, Sisoridae, China.

INTRODUCTION

The catfish genus Pseudecheneis belongs to the Family Sisoridae in the Order Siluriformes. All species are small freshwater catfish, dwelling at the bottom of fast flowing streams. Their distribution in China includes the Honghe (Red River), Lancangjiang (the upper Mekong River), Nujiang (the upper Salween River), some branches of the Irrawaddy River and the Brahmaputra River. They are also found in adjacent countries, including Vietnam, Laos, Myanmar, India, Nepal and Pakistan (Mai, 1978; Chu, 1982; Zhou & Chu, 1992; Roberts, 1998; Kottelat, 1998, 2001; Rainbow, 1996; Zhou & Zhou, 2005; Ng & Edds, 2005; Ng, 2006a, 2006b; Ng & Tan, 2007; Vishwanath & Darshan, 2007).

Until 2006, six species of Pseudecheneis have been recorded in China. They are Pseudecheneis intermedius Chu, P. immaculatus Chu, P. paviei Vaillant, P. stenura Ng, P. sulcata (McClelland) and P. sulcatoides Zhou & Chu (Chu, 1982; Zhou et al., 1992; Zhou & Zhou, 2005; Ng, 2006a).

However, there are distinct problems when identifying specimens from China. External morphological characters are overlapping and characters of muscle and skeleton are identical when identifying specimens between P. paviei and P. intermedius. There are prominent differences in the external morphological characters and characters of the muscle and skeleton among specimens treated as Pseudecheneis sulcata from different localities between the Irrawaddy and Nujiang basins (Zhou & Zhou, 2005). Our
results of DNA sequence of cytochrome b show that samples of *P. paviei* and *P. intermedia*us are the same and samples of *P. sulcata* from Irrawaddy and Nujiang are obviously different (Zhou et al., 2007).

*Propseudecheneis tchangi* was treated as a junior synonym of *Pseudecheneis sulcatus* (Chu, 1982). When examining holotype’s pictures of *Propseudecheneis tchangi*, we found it could be distinguished from specimens of *Pseudecheneis sulcata* collected from Irrawaddy and Nujiang basins in having a longer pectoral fin, extending beyond pelvic fin base (vs. not extending to), and lacking pale colored patches on the body after the dorsal fin origin (vs. with pale colored patches). Ng (2006a) considered that *Pseudecheneis sulcata* was only distributed in Brahmaputra River drainage.

The facts stated above imply that the taxonomy of *Pseudecheneis* species occurring in China is confusing. This study reviews the *Pseudecheneis* species occurring in China. Ten species are recognized as valid, four of which are described as new in this study.

**MATERIAL AND METHODS**

Method for obtaining counts and measurements follows Chu (1982), Ng & Kottelat (1998) and Ng & Edds (2005). The description of premaxillary tooth band and tooth shape follows Chu (1979) and He (1996). Description of skin tubercles follows Mo & Chu (1986). Osteological characters were determined from cleared and stained specimens prepared by the methods of Dingerkus & Uhler (1977), but the step of cartilage staining was omitted. Observations, dissections, and drawings were made using a binocular microscope (Motic® D400), equipped with a drawing attachment. Nomenclature of muscles and skeleton follow Mo (1986), Saxena (1961, 1962), and Saxena et al. (1966). Anatomical results of muscle and skeleton had been reported in other papers (Zhou & Zhou 2005).

Examined specimens are deposited in the following institutions: Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS); Kunming Institute of Zoology, Chinese Academy of Sciences (KIZ); Museum of Zoology, Southwest Forestry College (SWFC). The information of specimens are given as follows total number of examined specimens (ex.), standard length (SL) and total length (TL) with range of specimens in millimeters (mm), collecting locality and river system. Numbers of dissected specimens and stained skeleton specimens (DS) are given in parentheses.

**TAXONOMY**

*Pseudecheneis brachyurus*, new species

(Fig. 1)

*Pseudecheneis sulcatus* – Chu, 1982: 431 (in part specimens from Irrawaddy); Chu & Mo 1999: 153–154, Fig. 98 (in part specimens from Irrawaddy).

**Material examined.** – Holotype. SWFC 200103294, 140 mm TL, 122 mm SL; Shudian (25°06.62’N 97°56.21’E) at a branch of Dayinjiang (tributary of Irrawaddy River), Yingjiang County, Yunnan Province; Y.-W. Zhou & X.-F. Pan, 3 Mar.2001.

**Paratypes.** SWFC 200103289–293, 200103295–302, 200103394, 14 ex. (1 DS), 131–156 mm TL, 110–131 mm SL, same date as holotype.

**Other material examined.** Dayinjiang (a tributary of Irrawaddy River): SWFC 9904095–099, 5 ex., 80–139 mm SL, Mangyun, Yingjiang County, Yunnan Province; SWFC 200101001–002, 200103303–304, 4 ex., 105–121 mm SL, Tungbiguan, Yingjiang County, Yunnan Province; SWFC 200102155–156, 200102198, 3 ex., 120–131 mm SL, Guyong, Tengchong County, Yunnan Province. Longchuanjiang (a tributary of Irrawaddy River): SWFC 9904035, 9904037–058, 9904060, 24 ex. (1DS), 64.5–155 mm SL, Gudong, Tengchong County, Yunnan Province. Muleijiang (a tributary of Irrawaddy River): SWFC 200103248–251, 4 ex., 56–89 mm SL, Laiza, Yingjiang County, Yunnan Province.

**Diagnosis.** – *Pseudecheneis brachyurus* is distinguished from *P. paviei* in having 14–20 transverse ridges (laminae) of thoracic apparatus (vs. 9–13). It differs from *P. paviei* and *P. sulcataioides* in having a furcated neural spine of complex vertebra (vs. single). It is distinguished from *P. immaculatus*, *P. tchangi* and *P. paucipunctatus* in having yellow spots and patches at occipital, post-temporal, origin and base end of the dorsal fin and adipose fin, and caudal fin base (vs. absent or lacking). It differs from *P. gracilis* and *P. stenura* in having a shorter caudal peduncle (19.9–30.0% SL vs. 26.0–35.8). It differs from *P. sulcata* in having...
a longer pelvic fin, reaching base of first anal fin ray (vs. not reaching), and from *P. crassicauda* in having a longer pectoral fin, reaching origin of pelvic fin (vs. not reaching). *Pseudecheneis brachyurus* is distinguished from *P. serracula* in having a longer adipose fin base (length of adipose fin base 125–166.7% in length of anal fin base vs. larger than 200%), and from *P. sympelvica* in having separate pelvic fins (vs. fused).

**Description.** — Morphometric data as in Table 1. Body elongate. Dorsal profile rising gradually from tip of snout to origin of dorsal fin, then sloping slowly ventrally to end of caudal peduncle. Head and abdominal region before origin of pelvic fin moderately broad. Body after dorsal fin compressed gradually. Caudal peduncle long and moderately compressed. Thoracic adhesive apparatus oval with 14–20 transverse ridges (laminae).

Head compressed and broadly rounded when viewed from above. Eye small and almost rounded, subcutaneous and located on dorsal surface of head. Distance to tip of snout longer than to dorsalmost extremity of gill openings. Mouth small, transverse and inferior. Lips with papillae. Premaxillary tooth band semicircular and two or four teeth along its outer edge (Fig. 2A). Mandibular tooth band crescent (Fig. 2B). Outer teeth shovel-shaped (Fig. 3A–C). Inner teeth conical (Fig. 3D–F). Teeth on premaxillary and mandibular tooth bands sparse and embedded in skin. Only tips exposed and arranged in irregular rows. Barbels flattened and in four pairs with papilla except nasal barbel. Nasal barbel short, not extending to orbit. Maxillary barbel not developed, only extending to level of anterior orbit margin and not reaching gill opening. Length of outer mandibular barbel longer than inner mandibular barbel, not reaching or just beyond the front of thoracic apparatus. Gill openings moderate, extending beyond base of first pectoral fin element.

First and second unbranched ray of dorsal fin not ossified. Dorsal fin post-dorsal margin concave slightly. Dorsal fin origin located at point through anterior third of body. Distance of dorsal fin base to origin of adipose fin longer than distance to front of orbit. Adipose fin origin at vertical
through anal fin origin. Length of adipose fin base shorter than distance of its origin to end of dorsal fin base. Pectoral fin enlarged with concave posterior margin, extending beyond origin of pelvic fin and not to end of pelvic fin base. Origin of pelvic fin at vertical through preceding end of dorsal-fin base. Pelvic fin extending to anus. First unbranched ray of paired fin broadened with regular striae on ventral surface. Anal fin post-ventral margin emarginate. Distance of anal fin origin to caudal fin base longer than to base of pectoral fin. Anus and urogenital openings located at origin of anal fin. Shortest ray of caudal fin circa 75% of longest ray. Upper lobe shorter than lower lobe.

Body covered with dense, rounded tubercles distributed irregularly, not uniformly (Fig. 4A). Tubercles decreasing in density gradually from occipital to caudal peduncle.

Lateral line complete and midlateral. Vertebrae 17+18=35 (1), 18+18=36 (2).

**Colouration.** – Alive, chestnut brown on dorsal and lateral surfaces of head and body. Light yellow on ventral region. Pink thoracic apparatus and oral region. Occipital having an obvious, small, yellow, triangular patch. Post-temporal having a small yellow ovate spot. Dorsal fin origin and end of base respectively having a yellow saddle patch (Fig. 5A). Before origin of adipose fin are three yellow patches. Median patch located at origin of adipose fin. Two lateral patches extending vertically to lateral line. Ovate patch on posterior end of adipose fin base. Another on base of caudal fin.


**Distribution.** – This species had been found in the Dayinjing and Longchuanjiang, tributaries of Irrawaddy River (Fig. 6).

---

**Fig. 4.** Tubercles at dorsal of head: A, rounded tubercles (*Pseudecheneis stenura*, SWFC 0502004, 78.6 mm SL); B, some longitudinal tubercles among rounded tubercles (*P. sulcatoides*, SWFC 200005030, 75 mm SL).

**Fig. 5.** Patch or spots at dorsal fin origin: A, spots connected as a saddle patch (*Pseudecheneis brachyurus*, SWFC 200103294, holotype, 122 mm SL); B, spots connected as a saddle patch (*P. gracilis*, SWFC 200102125, paratype, 168 mm SL); C, spots isolated as two ovoid spots (*P. stenura*, SWFC 0502001, 90.5 mm SL).
Etymology. - From the Latin *brachyurus*, meaning bobtail, in reference to the dumpier caudal peduncle, distinguished from *P. gracilis* and *P. stenura* in the same water system. Used as an adjective.

*Pseudecheneis gracilis*, new species (Fig. 7)

*Pseudecheneis sulcatus* – Chu, 1982: 431 (in part specimens from Irrawaddy); Chu, Mo & Kuang, 1990: 196–197, Fig. 196 (in part specimens from Irrawaddy); Chu & Mo 1999: 153–154, Fig. 98 (in part specimens from the Irrawaddy).

Material examined. – Holotype. SWFC 200102125, 201 mm TL, 168 mm SL; Qushi (25°14’N 98°36.43’E) at the upper of Longchuanjiang (branch of Irrawaddy River), Tengchong County, Yunnan Province; Y.-W. Zhou & X.-F. Pan, 24 Feb.2001.


Diagnosis. – *Pseudecheneis gracilis* is distinguished from *P. sulcata* in having longer pelvic fin, reaching base of first anal fin ray (vs. not reaching), and from *P. crassicauda* in having longer pectoral fin, reaching origin of pelvic fin (vs. not reaching). *Pseudecheneis gracilis* is further distinguished from *P. serracula* in having a shorter adipose fin base (length of adipose fin base 125–166.7% in length of anal fin base vs. larger than 200%), and from *P. sympelvica* in having separate pelvic fins (vs. fused). It can be distinguished from other congeners except *P. immaculatus* in having a long caudal peduncle (27.5–35.8% SL vs. 20.4–28.3), and further differs from other congeners except *P. stenura* in having deeper forked of caudal fin, the shortest ray of caudal fin circa 50% of longest ray (vs. 75%). *Pseudecheneis gracilis* is distinguished from *P. immaculatus* in having shorter pectoral fin (27.1–30.6% SL vs. 29.4–38.3), and having yellow spots and patches on the body (vs. lacking). *Pseudecheneis gracilis* differs from *P. stenura* in having a saddle patch at dorsal fin origin (vs. two ovoid, isolated yellow patches on lateral of dorsal fin origin) (Fig. 5B, C) and further in having shorter head length (head length 14.9–18.6% SL vs. 20.1–23.7, postorbital head length 4.5–5.9% head length vs. 8.5–11.4, body depth 73.9–112.2% head length vs. 67.1–88.5).

Description. – Morphometric data as in Table 1. Body elongate. Dorsal profile rising gradually from tip of snout to origin of dorsal fin, then sloping slowly ventrally to end of caudal peduncle. Head and abdominal region before origin of pelvic fin moderately broad. Body after dorsal fin compressed gradually. Caudal peduncle long and moderately compressed. Thoracic adhesive apparatus oval with 16–20 transverse ridges (laminae).

Head compressed and broadly rounded when viewed from above. Eye small and almost rounded, subcutaneous and located on dorsal surface of head. Distance to tip of snout longer than to dorsalmost extremity of gill openings. Mouth small, transverse and inferior. Lips with papillae. Premaxillary tooth band semicircular and two or four teeth along its outer edge (Fig. 2A). Mandibular tooth band crescent (Fig. 2B). Outer teeth shovel-shaped (Fig. 3A–C). Inner teeth conical (Fig. 3D–F). Teeth on premaxillary and mandibular tooth bands sparse and embedded in skin. Only tips exposed and arranged in irregular rows. Barbels flattened and in four pairs with papilla except nasal barbel. Nasal barbel short, not extending to orbit. Maxillary barbel not

![Fig. 6. Map showing distribution of *Pseudecheneis brachyurus*, *P. gracilis*, *P. immaculatus* and *P. longipectoralis*.](image)

![Fig. 7. *Pseudecheneis gracilis*, SWFC 200102125, holotype, 168 mm SL; China: Longchuanjiang (a branch of Irrawaddy River drainage). Dorsal, lateral and ventral views.](image)
Table 1. Counts and proportional measurements of *Pseudecheneis brachyurus* and *P. gracilis* (Roman and Arabic numerals that are in italics and bold show difference of data among species).

<table>
<thead>
<tr>
<th>Locality</th>
<th><em>P. brachyurus</em></th>
<th><em>P. gracilis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of specimens examined</td>
<td>16</td>
<td>15 (types)</td>
</tr>
<tr>
<td>Dorsal fin rays</td>
<td>ii, 6</td>
<td>ii, 6</td>
</tr>
<tr>
<td>Pectoral fin rays</td>
<td>i, 12–14</td>
<td>i, 12–14</td>
</tr>
<tr>
<td>Pelvic fin rays</td>
<td>i, 5</td>
<td>i, 5</td>
</tr>
<tr>
<td>Anal fin rays</td>
<td>iii, 7</td>
<td>iii, 7</td>
</tr>
<tr>
<td>Branched caudal rays</td>
<td>7+7</td>
<td>7+7</td>
</tr>
<tr>
<td>Transverse folds of thoracic apparatus</td>
<td>14–20</td>
<td>15–18</td>
</tr>
<tr>
<td>Body depth</td>
<td>14.9</td>
<td>12.5–18.6</td>
</tr>
<tr>
<td>Predorsal length</td>
<td>32.0</td>
<td>28.8–35.3</td>
</tr>
<tr>
<td>Head length</td>
<td>16.7</td>
<td>16.0–18.3</td>
</tr>
<tr>
<td>Snout length</td>
<td>11.2</td>
<td>10.3–12.5</td>
</tr>
<tr>
<td>Postorbital head length</td>
<td>5.2</td>
<td>4.6–6.5</td>
</tr>
<tr>
<td>Caudal peduncle length</td>
<td>28.1</td>
<td>26.6–30.0</td>
</tr>
<tr>
<td>Caudal peduncle depth</td>
<td>4.2</td>
<td>3.8–4.8</td>
</tr>
<tr>
<td>Length of dorsal base to adipose</td>
<td>16.6</td>
<td>12.7–20.0</td>
</tr>
<tr>
<td>Length of pre-adipose to snout</td>
<td>59.1</td>
<td>53.6–66.7</td>
</tr>
<tr>
<td>Length of pectoral fin</td>
<td>27.9</td>
<td>25.4–31.3</td>
</tr>
<tr>
<td>Snout length</td>
<td>67.4</td>
<td>62.9–71.7</td>
</tr>
<tr>
<td>Postorbital head length</td>
<td>31.5</td>
<td>27.3–40.0</td>
</tr>
<tr>
<td>Eye diameter</td>
<td>10.3</td>
<td>8.5–13.9</td>
</tr>
<tr>
<td>Interorbital width</td>
<td>27.2</td>
<td>25.0–33.7</td>
</tr>
<tr>
<td>Body depth</td>
<td>89.4</td>
<td>76.7–110.8</td>
</tr>
<tr>
<td>Length of pectoral fin</td>
<td>121.9</td>
<td>108.2–130.8</td>
</tr>
<tr>
<td>Depth of caudal peduncle</td>
<td>15.1</td>
<td>12.5–17.0</td>
</tr>
</tbody>
</table>

Mean, range, and S.D. in % of SL:

**Body depth**
- Mangy, Tngbguan, Lzha, Gguyng: 14.9 (15.1) ± 1.72
- Sudian: 13.3–16.8 ± 1.03
- Gudong: 12.8–18.8 ± 1.41
- Qush, Daju: 13.2–17.9 ± 1.48

**Predorsal length**
- Mangy, Tngbguan, Lzha, Gguyng: 32.0 (32.1) ± 1.96
- Sudian: 30.1–33.3 ± 0.93
- Gudong: 32.4–36.3 ± 1.01
- Qush, Daju: 27.3–34.8 ± 2.46

**Head length**
- Mangy, Tngbguan, Lzha, Gguyng: 16.7 (16.7) ± 0.57
- Sudian: 15.5–18.2 ± 0.79
- Gudong: 15.5–18.1 ± 0.65
- Qush, Daju: 14.9–18.6 ± 1.48

**Snout length**
- Mangy, Tngbguan, Lzha, Gguyng: 11.2 (11.5) ± 0.65
- Sudian: 10.1–16.23 ± 1.45
- Gudong: 11.6 ± 0.53
- Qush, Daju: 9.5–12.9 ± 1.12

**Postorbital head length**
- Mangy, Tngbguan, Lzha, Gguyng: 5.2 (5.3) ± 0.45
- Sudian: 4.6–5.7 ± 0.32
- Gudong: 5.1 ± 0.34
- Qush, Daju: 4.5–5.9 ± 0.48

**Caudal peduncle length**
- Mangy, Tngbguan, Lzha, Gguyng: 28.1 (27.6) ± 1.01
- Sudian: 19.9–29.8 ± 2.40
- Gudong: 24.7–28.8 ± 1.00
- Qush, Daju: 27.5–35.8 ± 2.74

**Caudal peduncle depth**
- Mangy, Tngbguan, Lzha, Gguyng: 4.2 (4.4) ± 0.30
- Sudian: 4.0–4.7 ± 0.18
- Gudong: 3.6–4.5 ± 0.23
- Qush, Daju: 3.7–5.2 ± 0.42

**Length of dorsal base to adipose**
- Mangy, Tngbguan, Lzha, Gguyng: 16.6 (17.9) ± 2.03
- Sudian: 15.7–19.3 ± 0.98
- Gudong: 15.5–29.0 ± 2.66
- Qush, Daju: 14.0–19.6 ± 1.61

**Length of pre-adipose to snout**
- Mangy, Tngbguan, Lzha, Gguyng: 59.1 (59.8) ± 3.11
- Sudian: 57.8–61.6 ± 1.21
- Gudong: 57.1–66.2 ± 2.04
- Qush, Daju: 54.2–64.3 ± 3.23

**Length of pectoral fin**
- Mangy, Tngbguan, Lzha, Gguyng: 27.9 (27.2) ± 1.56
- Sudian: 25.5–29.7 ± 1.28
- Gudong: 24.5–31.7 ± 1.54
- Qush, Daju: 27.1–30.6 ± 1.00

**in % of head length**

**Snout length**
- Mangy, Tngbguan, Lzha, Gguyng: 67.4 (68.7) ± 2.32
- Sudian: 60.0–92.5 ± 7.06
- Gudong: 60.9–73.7 ± 3.52
- Qush, Daju: 64.0–69.6 ± 1.55

**Postorbital head length**
- Mangy, Tngbguan, Lzha, Gguyng: 31.5 (31.7) ± 3.18
- Sudian: 29.7–35.0 ± 1.66
- Gudong: 25.6–36.4 ± 3.09
- Qush, Daju: 28.0–36.0 ± 1.92

**Eye diameter**
- Mangy, Tngbguan, Lzha, Gguyng: 10.3 (9.8) ± 1.35
- Sudian: 7.5–11.6 ± 1.06
- Gudong: 6.7–10.5 ± 0.97
- Qush, Daju: 8.3–17.3 ± 2.80

**Interorbital width**
- Mangy, Tngbguan, Lzha, Gguyng: 27.2 (26.0) ± 2.17
- Sudian: 22.2–30.0 ± 2.23
- Gudong: 20.5–28.2 ± 2.10
- Qush, Daju: 20.8–33.7 ± 4.00

**Body depth**
- Mangy, Tngbguan, Lzha, Gguyng: 89.4 (90.5) ± 9.93
- Sudian: 75.0–100.0 ± 7.01
- Gudong: 73.9–115.8 ± 9.62
- Qush, Daju: 73.9–112.2 ± 10.36

**in % P–V length**

**Length of pectoral fin**
- Mangy, Tngbguan, Lzha, Gguyng: 121.9 (118.1) ± 9.43
- Sudian: 107.9–130.0 ± 6.23
- Gudong: 103.3–133.3 ± 7.81
- Qush, Daju: 105.6–129.7 ± 7.31

**in % of length of caudal peduncle**

**Depth of caudal peduncle**
- Mangy, Tngbguan, Lzha, Gguyng: 15.1 (16.2) ± 1.20
developed, only extending to level of anterior orbit margin and not reaching gill opening. Length of outer mandibular barbel longer than inner mandibular barbel, not reaching or just beyond the front of thoracic apparatus. Gill openings moderate, extending beyond base of first pectoral fin element.

First and second unbranched ray of dorsal fin not ossified. Dorsal fin post-dorsal margin concave slightly. Dorsal fin origin located at point through anterior third of body, distance of dorsal fin base to origin of adipose fin longer than distance to front of orbit. Adipose fin origin at vertical through anal fin origin. Length of anal fin base shorter than distance to origin to end of dorsal fin base. Pectoral fin enlarged with concave posterior margin, extending beyond origin of pelvic fin and not to end of pelvic fin base. Origin of pelvic fin at vertical through preceding end of dorsal-fin base. Pelvic fin extending to anus. First unbranched ray of paired fin broadened with regular striae on ventral surface. Anal fin post-ventral margin emarginate. Distance of anal fin origin to caudal fin base larger than to base of pectoral fin. Anus and urogenital openings located at origin of anal fin. Shortest ray of caudal fin circa 50% of longest ray. Upper lobe shorter than lower lobe.

Body covered with dense, rounded tubercles distributed irregularly, not uniformly (Fig. 4A). Tubercles decreasing in density gradually from occipital to caudal peduncle which almost no tubercles.

Lateral line complete and midlateral. Vertebræ 19+19=38 (1).

**Colouration.** – Alive, chestnut brown on dorsal and lateral surfaces of head and body. Light yellow on ventral region. Pink thoracic apparatus and oral region. Occipital having an obvious, small, yellow, triangular patch. Post-temporal having a small yellow ovate spot. Dorsal fin origin and end of base respectively having a yellow saddle patch (Fig. 5B). Before origin of adipose fin with three yellow patches. Median patch just located at origin of adipose fin. Two lateral patches extending vertically to lateral line. An ovate patch on posterior end of adipose fin base. Another on base of caudal fin.


**Distribution.** – This species is found in the upper Longchuanjiang, belonging to Irrawaddy River drainage (Fig. 6).

**Etymology.** – From the Latin *gracil*, meaning long and slender, in reference to head smallish making body elongate and tenuous. Used as an adjective.

**Pseudecheneis immaculatus Chu, 1982**

(Fig. 8)

**Material examined.** – Lancangjiang (Mekong River) drainage: KIZ 748742 1 ex., holotype, 96mm SL, KIZ 748650–652, 748735–739, 748741, 9 ex., paratypes, 72.8–104mm SL, Baijixun, Weixi County, Yunnan Province; KIZ 748636–748640, 5 ex., paratypes, 74.5–89.2mm SL, Liutongjiang, Deqin County, Yunnan Province; SWFC 9908007, 0004081–085, 0004095, 7 ex., 76.5–102.5 mm SL (1 DS), Liutongjiang, Deqin County, Yunnan Province. Morphometric data as in Table 2.

**Diagnosis.** – *Pseudecheneis immaculatus* is distinguished from all other congeners in lacking yellow spots or patches on the body (vs. having). Distinguished from all congeners except *P. longipectoralis* in having longer pectoral fin, extending to pelvic fin base (vs. not extending). It differs from *P. longipectoralis* in having a longer caudal peduncle (28.2–32.9% SL vs. 24.9–28.2). Premaxillary tooth band semicircular with two or four teeth along outer edge (Fig. 2A). Body covered with dense, tubercles distributed uniformly, some longitudinal tubercles among rounded tubercles (Fig. 4B). Vertebræ 18+17=35 (1).

**Distribution.** – This species is found in the main river and branches of middle and upper Lancangjiang (Fig. 6).
Pseudecheneis longipectoralis, new species
(Fig. 9)

Pseudecheneis sulcatus – Chu, 1982: 431 (in part specimens from Nujiang); Chu, Mo & Kuang, 1990: 196–197, Fig. 196 (in part specimens from Nujiang); Chu & Mo 1999: 153–154, Fig. 98 (in part specimens from Nujiang).

Material examined. – Holotype. SWFC 0202003, 132 mm TL, 108 mm SL; Kejiehe (24°52’36"N 99°26’03’E) (a tributary of the Salween River), Kejie, Changning County, Yunnan Province; L.-Y. Chen, 15 Feb.2001.


Other material examined. Nujiang (Salween River) drainage: SWFC 9902133–136, 4 ex., 83–133 mm SL, Fengweihe, Zhenkang County, Yunnan Province; SWFC 0102063, 1 ex., 122 mm SL, Xiangda, Longlin County, Yunnan Province.

Diagnosis. – Pseudecheneis longipectoralis is distinguished from P. sulcata in having longer pelvic fin, reaching base of first anal fin ray (vs. not reaching), and from P. crassicauda in having longer pectoral fin, reaching origin of pelvic fin (vs. not reaching). Pseudecheneis longipectoralis is further distinguished from P. serracula in having a shorter adipose fin base (length of adipose fin base 125–166.7% in length of anal fin base vs. larger than 200%), and from P. sympelvica in having separate pelvic fins (vs. fused). Further distinguished from other congeners except P. immaculatus in having longer pectoral fin (28.7–38.1% SL vs. 24.5–35.9), extending to pelvic fin (vs. not extending), and differs from P. immaculatus in having yellow spots or patches on the body (vs. lacking).

Description. – Morphometric data as in Table 2. Body elongate. Dorsal profile rising gradually from tip of snout to origin of dorsal fin, then sloping slowly ventrally to end of caudal peduncle. Head and abdominal region before origin of pelvic fin moderately broad. Body after dorsal fin compressed gradually. Caudal peduncle long and moderately compressed. Thoracic adhesive apparatus oval with 14–21 transverse ridges (laminae).

Head compressed and broadly rounded when viewed from above. Eye small and almost rounded, subcutaneous and located on dorsal surface of head. Distance to tip of snout longer than to dorsalmost extremity of gill openings. Mouth small, transverse and inferior. Lips with papillae. Premaxillary tooth band semicircular and two or four teeth along its outer edge (Fig. 2A). Mandibular tooth band crescent (Fig. 2B). Outer teeth shovel-shaped (Fig. 3A–C). Inner teeth conical (Fig. 3D–F). Teeth on premaxillary and mandibular tooth bands sparse and embedded in skin. Only tips exposed and arranged in irregular rows. Barbels flattened and in four pairs with papilla except nasal barbel. Nasal barbel short, not extending to orbit. Maxillary barbel not developed, only extending to level of anterior orbit margin and not reaching gill opening. Length of outer mandibular barbel longer than inner mandibular barbel, not reaching or just beyond the front of thoracic apparatus. Gill openings moderate, extending beyond base of first pectoral fin element.


Body covered with dense, rounded tubercles distributed irregularly, not uniformly (Fig. 4A). Tubercles decreasing in density gradually from occipital to end of anal fin base, then increasing in density gently to caudal peduncle.

Lateral line complete and midlateral. Vertebrae 17+18=35 (1).

Colouration. – Alive, chestnut brown on dorsal and lateral surfaces of head and body. Light yellow on ventral region. Pink thoracic apparatus and oral region. Occipital and posttemporal without yellow spot. Dorsal fin origin and end of base respectively having a yellow saddle patch (Fig. 5B). Before origin of adipose fin having three yellow patches.

Fig. 9. Pseudecheneis longipectoralis, SWFC 0202003, holotype, 108 mm SL; China: Nujiang (the upper Salween River) drainage. Dorsal, lateral and ventral views.
Table 2. Counts and proportional measurements of *Pseudecheneis immaculatus*, *P. longipectoralis* and *P. paucipunctatus* (Roman and Arabic numerals that are in italics and bold show difference of data among species).

<table>
<thead>
<tr>
<th></th>
<th><em>P. immaculatus</em></th>
<th><em>P. longipectoralis</em></th>
<th><em>P. paucipunctatus</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locality</strong></td>
<td>Deqin, Weixi</td>
<td>Kejie</td>
<td>Zhenkuang, Longling</td>
</tr>
<tr>
<td><strong>Number of specimens examined</strong></td>
<td>22 (15 types)</td>
<td>35 (types)</td>
<td>5</td>
</tr>
<tr>
<td><strong>Dorsal fin rays</strong></td>
<td>ii, 5–6</td>
<td>ii, 5–6</td>
<td>ii, 6</td>
</tr>
<tr>
<td><strong>Pectoral fin rays</strong></td>
<td>i, 12–13</td>
<td>i, 12–13</td>
<td>i, 12–13</td>
</tr>
<tr>
<td><strong>Pelvic fin rays</strong></td>
<td>i, 5</td>
<td>i, 5</td>
<td>i, 5</td>
</tr>
<tr>
<td><strong>Anal fin rays</strong></td>
<td>iii, 7–8</td>
<td>iii, 7</td>
<td>iii, 7</td>
</tr>
<tr>
<td><strong>Branched caudal rays</strong></td>
<td>7+/8</td>
<td>7+/8 or 7+/8</td>
<td>7+/8 or 7+/8</td>
</tr>
<tr>
<td><strong>Transverse folds of thoracic apparatus</strong></td>
<td>14–18</td>
<td>14–21</td>
<td>14–18</td>
</tr>
<tr>
<td><strong>Gill rakers on outer side of 1st gill arch</strong></td>
<td>8–10</td>
<td>7–9</td>
<td>7–9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body depth</strong></td>
<td>16.1</td>
<td>13.1–18.1</td>
<td>1.22</td>
<td>15.6</td>
<td>12.3–20.4</td>
<td>1.63</td>
<td>16.0</td>
<td>15.7–17.7</td>
<td>0.86</td>
<td>17.0</td>
<td>13.7–21.7</td>
<td>2.46</td>
</tr>
<tr>
<td><strong>Predorsal length</strong></td>
<td>31.2</td>
<td>28.9–33.4</td>
<td>1.18</td>
<td>34.1</td>
<td>30.7–37.9</td>
<td>1.64</td>
<td>31.9</td>
<td>30.1–33.7</td>
<td>1.36</td>
<td>32.6</td>
<td>30.7–35.8</td>
<td>1.52</td>
</tr>
<tr>
<td><strong>Head length</strong></td>
<td>17.5</td>
<td>15.6–19.7</td>
<td>1.03</td>
<td>18.5</td>
<td>17.8–20.5</td>
<td>0.72</td>
<td>17.3</td>
<td>16.9–18.1</td>
<td>0.46</td>
<td>18.7</td>
<td>16.1–22.0</td>
<td>2.10</td>
</tr>
<tr>
<td><strong>Snout length</strong></td>
<td>10.6</td>
<td>9.4–11.7</td>
<td>0.69</td>
<td>11.8</td>
<td>11.1–13.6</td>
<td>0.61</td>
<td>11.7</td>
<td>11.1–12.2</td>
<td>0.47</td>
<td>11.4</td>
<td>10.3–12.1</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>Postorbital head length</strong></td>
<td>6.0</td>
<td>5.2–6.8</td>
<td>0.51</td>
<td>5.8</td>
<td>5.1–6.8</td>
<td>0.36</td>
<td>5.5</td>
<td>5.3–5.6</td>
<td>0.14</td>
<td>6.6</td>
<td>4.7–9.6</td>
<td>1.48</td>
</tr>
<tr>
<td><strong>Caudal peduncle length</strong></td>
<td>30.2</td>
<td>28.2–32.9</td>
<td>1.32</td>
<td>26.0</td>
<td>24.9–28.2</td>
<td>0.83</td>
<td>26.6</td>
<td>25.5–27.1</td>
<td>0.70</td>
<td>27.1</td>
<td>23.9–29.3</td>
<td>1.75</td>
</tr>
<tr>
<td><strong>Caudal peduncle depth</strong></td>
<td>4.8</td>
<td>4.0–5.7</td>
<td>0.40</td>
<td>4.1</td>
<td>3.3–4.9</td>
<td>0.32</td>
<td>4.3</td>
<td>4.1–4.5</td>
<td>0.17</td>
<td>4.3</td>
<td>3.9–5.1</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>Length of dorsal base to adipose</strong></td>
<td>18.3</td>
<td>15.7–22.6</td>
<td>1.69</td>
<td>21.5</td>
<td>15.0–31.8</td>
<td>4.68</td>
<td>17.1</td>
<td>16.1–18.1</td>
<td>0.93</td>
<td>19.4</td>
<td>16.7–21.6</td>
<td>1.65</td>
</tr>
<tr>
<td><strong>Length of pre-adipose to snout</strong></td>
<td>59.2</td>
<td>55.5–62.5</td>
<td>1.82</td>
<td>59.0</td>
<td>56.3–76.0</td>
<td>3.31</td>
<td>58.9</td>
<td>57.9–59.8</td>
<td>0.91</td>
<td>61.6</td>
<td>57.2–66.2</td>
<td>3.10</td>
</tr>
<tr>
<td><strong>Length of pectoral fin</strong></td>
<td>32.1</td>
<td>29.4–38.3</td>
<td>2.32</td>
<td>31.4</td>
<td>28.7–38.1</td>
<td>2.19</td>
<td>30.2</td>
<td>29.2–31.2</td>
<td>0.89</td>
<td>27.4</td>
<td>24.9–29.9</td>
<td>1.65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>in % of standard length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Snout length</strong></td>
<td>60.5</td>
<td>54.6–65.5</td>
<td>2.7</td>
<td>62.2</td>
<td>59.3–73.0</td>
<td>3.16</td>
<td>67.6</td>
<td>64.3–70.6</td>
<td>2.32</td>
<td>61.1</td>
<td>53.5–72.4</td>
<td>6.16</td>
</tr>
<tr>
<td><strong>Postorbital head length</strong></td>
<td>34.2</td>
<td>30.3–40.7</td>
<td>2.29</td>
<td>30.7</td>
<td>27.3–35.7</td>
<td>1.80</td>
<td>31.7</td>
<td>31.0–32.4</td>
<td>0.59</td>
<td>34.8</td>
<td>29.0–44.6</td>
<td>4.41</td>
</tr>
<tr>
<td><strong>Eye diameter</strong></td>
<td>6.6</td>
<td>4.4–9.3</td>
<td>1.47</td>
<td>6.9</td>
<td>5.0–9.2</td>
<td>0.98</td>
<td>10.6</td>
<td>9.2–11.8</td>
<td>1.18</td>
<td>9.6</td>
<td>6.2–11.8</td>
<td>1.89</td>
</tr>
<tr>
<td><strong>Interorbital width</strong></td>
<td>31.6</td>
<td>20.8–41.4</td>
<td>6.47</td>
<td>37.0</td>
<td>34.3–41.7</td>
<td>1.99</td>
<td>26.8</td>
<td>23.5–28.6</td>
<td>2.08</td>
<td>26.7</td>
<td>19.5–30.7</td>
<td>3.12</td>
</tr>
<tr>
<td><strong>Body depth</strong></td>
<td>92.2</td>
<td>75.0–107.6</td>
<td>7.96</td>
<td>82.3</td>
<td>62.5–100.0</td>
<td>8.23</td>
<td>98.1</td>
<td>92.9–102.4</td>
<td>3.54</td>
<td>90.9</td>
<td>82.1–104.0</td>
<td>6.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
<th>mean</th>
<th>range</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>in % P–V length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Length of pectoral fin</strong></td>
<td>140.6</td>
<td>110.0–164.2</td>
<td>7.7</td>
<td>130.2</td>
<td>120.4–156.0</td>
<td>8.00</td>
<td>130.0</td>
<td>123.3–150.6</td>
<td>11.59</td>
<td>116.5</td>
<td>104.6–125.7</td>
<td>7.08</td>
</tr>
<tr>
<td><strong>in % of length of caudal peduncle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Depth of caudal peduncle</strong></td>
<td>16.0</td>
<td>12.6–19.7</td>
<td>1.50</td>
<td>14.9</td>
<td>13.3–18.5</td>
<td>1.14</td>
<td>16.3</td>
<td>15.2–17.5</td>
<td>0.95</td>
<td>16.0</td>
<td>13.6–19.2</td>
<td>1.87</td>
</tr>
</tbody>
</table>
Median patch just located at origin of adipose fin. Two lateral patches extending vertically to lateral line. An ovate patch on posterior end of adipose fin base. Another on base of caudal fin.


**Distribution.** – This species is found in the branches of middle Nujiang River drainage (Fig. 6).

**Etymology.** – From the Latin long, meaning long, and pectoralis, meaning pectoral fin, in reference to pectoral fin longer and extending to pelvic fin base. Used as an adjective.

*Pseudecheneis paucipunctatus*, new species  
(Fig. 10)

*Pseudecheneis sulcatus* – Chu, 1982: 431 (in part specimens from Nujiang); Chu, Mo & Kuang, 1990: 196–197, Fig. 196 (in part specimens from Nujiang); Chu & Mo 1999: 153–154, Fig. 98 (in part specimens from Nujiang).

**Material examined.** – **Holotype**. SWFC 200203003, 136 mm TL, 109 mm SL; Nangunhe (23°16.49’N 99°04.34’E) (a tributary of Salween River), Cangyuan County, Yunnan Province; L. Zheng, 15 Mar.2002.

**Paratypes.** SWFC 200203001–002, 200203004-005, 4 ex. 89.8–165.1 mm TL, 73.9–135.4 mm SL; same data as holotype. SWFC 9902138–139, 2 ex. (1DS), 108–139 TL, 87–114 mm SL; Nangunhe (23°16.49’N 99°04.34’E), Cangyuan County, Yunnan Province; M.-L. Bao, 2 May 2000. SWFC 200104001–003, 3 ex., 90–91 TL, 73–75.8 mm SL, Dahedi in Nangunhe (23°16.16’N 99°01.41’E), Cangyuan County, Yunnan Province; Z.-S. Wang, 7 Apr.2001.

**Diagnosis.** – *Pseudecheneis paucipunctatus* is distinguished from *P. sulcata* in having longer pelvic fin, reaching base of first anal fin ray (vs. not reaching), and from *P. crassicauda* in having longer pectoral fin, reaching origin of pelvic fin (vs. not reaching). *Pseudecheneis paucipunctatus* is further distinguished from *P. serracula* in having a shorter adipose fin base (length of adipose fin base 125–166.7% in length of anal fin base vs. larger than 200%), and from *P. sympelvica* in having separate pelvic fins (vs. fused). Distinguished from *P. paviei* in having 14–18 transverse ridges (laminae) of thoracic apparatus (vs. 9–13), and further differs from *P. paviei* and *P. sulcatoides* in having a furcated neural spine of complex vertebra (vs. single). And *P. paucipunctatus* is distinguished from *P. immaculatus* in having yellow spots and patches on some parts of the body except occipital and posttemporal (vs. absent). Differs from *P. tchangi* and *P. brachyurus* in lacking yellow spots and patches on occipital and posttemporal (vs. having). Differs from *P. longipectoralis* in having shorter pectoral fin, not extending to base of pelvic fin (vs. extending). And *P. paucipunctatus* further differs from *P. gracilis* and *P. stenura* in having a shorter caudal peduncle (23.9–29.3% SL vs. 26.0–35.8).

**Description.** – Morphometric data as in Table 2. Body elongate. Dorsal profile rising gradually from tip of snout to origin of dorsal fin, then sloping slowly ventrally to end of caudal peduncle. Head and abdominal region before origin of pelvic fin moderately broad. Body after dorsal fin compressed gradually. Caudal peduncle long and moderately compressed. Thoracic adhesive apparatus oval with 14–18 transverse ridges (laminae).

Head compressed and broadly rounded when viewed from above. Eye small and almost rounded, subcutaneous and located on dorsal surface of head. Distance to tip of snout longer than to dorsalmost extremity of gill openings. Mouth small, transverse and inferior. Lips with papillae. Premaxillary tooth band semicircular and two or four teeth along its outer edge (Fig. 2A), mandibular tooth band crescent (Fig. 2B). Outer teeth shovel-shaped (Fig. 3A–C). Inner teeth conical (Fig. 3D–F). Teeth on maxillary and mandibular tooth bands sparse and embedded in skin. Only tips exposed and arranged in irregular rows. Barbels flattened and in four pairs with papilla except nasal barbel. Nasal barbel short, not extending to orbit. Maxillary barbel not.
developed, only extending to level of anterior orbit margin and not reaching gill opening. Length of outer mandibular barbel longer than inner mandibular barbel, not reaching or just beyond the front of thoracic apparatus. Gill openings moderate, extending beyond base of first pectoral fin element.

First and second unbranched ray of dorsal fin not ossified. Dorsal fin post-dorsal margin concave slightly. Dorsal fin origin located at point through anterior third of body. Distance of dorsal fin base to origin of adipose fin longer than distance to front of orbit. Adipose fin origin at vertical through anal fin origin. Length of adipose fin base shorter than distance of its origin to end of dorsal fin base. Pectoral fin enlarged with concave posterior margin, extending beyond origin of pelvic fin and not to end of pelvic fin base. Origin of pelvic fin at vertical through preceding end of dorsal-fin base. Pelvic fin extending to anus. First unbranched ray of paired fin broadened with regular striae on ventral surface. Anal fin post-ventral margin emarginate. Distance of anal fin origin to caudal fin base longer than to base of pectoral fin. Anus and urogenital openings located at origin of anal fin. Shortest ray of caudal fin circa 75% of longest ray. Upper lobe shorter than lower lobe.

Body covered with dense, rounded tubercles distributed irregularly, not uniformly (Fig. 4A). Tubercles decreasing in density gradually from occipital to caudal peduncle.

Lateral line complete and midlateral. Vertebrae 17+18=35 (1).

**Colouration.**—Alive, chestnut brown on dorsal and lateral surfaces of head and body. Light yellow on ventral region. Pink thoracic apparatus and oral region. Occipital and posttemporal without yellow spots. Lateral sides of dorsal fin origin respectively having two yellow ovate spots. End of dorsal fin base having a yellow saddle patch (Fig. 5C). Before origin of adipose fin having three yellow patches. Median patch located at origin of adipose fin. Two lateral patches respectively extending vertically to lateral line. An ovate patch on posterior adipose fin base. Another on caudal fin base.


**Distribution.**—This species is found in the branches of the upper Nujing (Salween River) drainage (Fig. 11).

**Etymology.**—From the Latin pauc, meaning a few, and punctatus, meaning spotted, in reference to occipital and posttemporal without yellow spots. Used as an adjective.
Table 3. Counts and proportional measurements of *Pseudecheneis paviei*, *P. intermedius*, *P. sulcatoides* and *P. stenura* (Roman and Arabic numerals that are in italics and bold show difference of data among species).

<table>
<thead>
<tr>
<th>Locality</th>
<th><em>P. paviei</em></th>
<th><em>P. intermedius</em></th>
<th><em>P. stenura</em></th>
<th><em>P. sulcatoides</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of specimens examined</td>
<td>52</td>
<td>21 (7 types, 14 topotypes)</td>
<td>14</td>
<td>76 (10 types)</td>
</tr>
<tr>
<td>Dorsal fin rays</td>
<td>ii, 6</td>
<td>ii, 6</td>
<td>i, 6</td>
<td></td>
</tr>
<tr>
<td>Pectoral fin rays</td>
<td>i, 11–13</td>
<td>i, 11–12</td>
<td>i, 13–14</td>
<td>i, 11–12</td>
</tr>
<tr>
<td>Pelvic fin rays</td>
<td>i, 5</td>
<td>i, 4–5</td>
<td>i, 5</td>
<td></td>
</tr>
<tr>
<td>Anal fin rays</td>
<td>ii, 7</td>
<td>ii, 6</td>
<td>ii, 7</td>
<td></td>
</tr>
<tr>
<td>Branched caudal rays</td>
<td>7+8</td>
<td>7+8</td>
<td>7+6</td>
<td>7+8</td>
</tr>
<tr>
<td>Transverse folds of thoracic apparatus</td>
<td>9–13</td>
<td>9–12</td>
<td>15–19</td>
<td>14–18</td>
</tr>
<tr>
<td>Gill rakers on outer side of 1st gill arch</td>
<td>7–11</td>
<td>8–11</td>
<td>7–9</td>
<td>10–11</td>
</tr>
<tr>
<td><strong>in % of standard length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body depth</td>
<td>18.7</td>
<td>10.8–24.0</td>
<td>2.97</td>
<td>19.5</td>
</tr>
<tr>
<td>Predorsal length</td>
<td>38.9</td>
<td>34.4–49.4</td>
<td>2.60</td>
<td>40.0</td>
</tr>
<tr>
<td>Head length</td>
<td>23.0</td>
<td>19.3–28.1</td>
<td>1.96</td>
<td>24.3</td>
</tr>
<tr>
<td>Snout length</td>
<td>14.8</td>
<td>12.5–18.1</td>
<td>1.33</td>
<td>15.4</td>
</tr>
<tr>
<td>Postorbital head length</td>
<td>8.0</td>
<td>6.8–9.42</td>
<td>0.62</td>
<td>8.8</td>
</tr>
<tr>
<td>Caudal peduncle length</td>
<td>20.6</td>
<td>18.0–24.5</td>
<td>1.59</td>
<td>20.4</td>
</tr>
<tr>
<td>Caudal peduncle depth</td>
<td>7.1</td>
<td>6.1–9.2</td>
<td>0.63</td>
<td>7.7</td>
</tr>
<tr>
<td>Length of dorsal base to adipose</td>
<td>18.5</td>
<td>11.7–23.5</td>
<td>2.45</td>
<td>20.3</td>
</tr>
<tr>
<td>Length of pre-adipose to snout</td>
<td>68.1</td>
<td>60.9–75.3</td>
<td>3.24</td>
<td>69.8</td>
</tr>
<tr>
<td>Length of pectoral fin</td>
<td>29.2</td>
<td>22.0–34.7</td>
<td>2.74</td>
<td>31.1</td>
</tr>
<tr>
<td><strong>in % of head length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snout length</td>
<td>64.5</td>
<td>57.7–71.1</td>
<td>2.98</td>
<td>63.3</td>
</tr>
<tr>
<td>Postorbital head length</td>
<td>34.9</td>
<td>30.0–42.5</td>
<td>2.51</td>
<td>36.1</td>
</tr>
<tr>
<td>Eye diameter</td>
<td>9.82</td>
<td>6.5–13.3</td>
<td>1.50</td>
<td>10.4</td>
</tr>
<tr>
<td>Interorbital width</td>
<td>27.9</td>
<td>20.3–40.0</td>
<td>4.93</td>
<td>32.8</td>
</tr>
<tr>
<td>Body depth</td>
<td>81.5</td>
<td>50.0–105.1</td>
<td>13.2</td>
<td>80.1</td>
</tr>
<tr>
<td><strong>in % of P–V length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of pectoral fin</td>
<td>129.6</td>
<td>90.4–171.8</td>
<td>15.0</td>
<td>133.0</td>
</tr>
<tr>
<td><strong>in % of length of caudal peduncle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth of caudal peduncle</td>
<td>34.7</td>
<td>29.4–41.9</td>
<td>3.55</td>
<td>37.9</td>
</tr>
</tbody>
</table>


*Pseudecheneis intermedius* – Chu, 1982: 430–431, Fig. 2 (Jingdong); Chu & Mo 1999: 156–157, Fig. 100 (Jingdong).

**Material examined.** – Yuanjiang (main of Red River) drainage: SWFC 9712177–1285, 9801013, 9812001–010, 9903001, 20 ex. (3DS), 69–132 mm SL, Nanxihe, Pinbian County, Yunnan Province; SWFC 9902010, 0005151–154, 0010001–020, 25 ex. (2DS), 42–94 mm, Tengtiaojiang, Jinping County, Yunnan Province; SWFC 0005080–084, 5 ex. (2DS), 59–69 mm SL, Sanjiangkou, Xinping County, Yunnan Province; KIZ 914106–107, 2 ex., 60.5–73 mm SL, Xiaoluzhi, Yimen County, Yunnan Province.

Lixianjiang (a tributary of Red River) drainage: KIZ 737173, 1 ex., holotype of *Pseudecheneis intermedius*, 56.5 mm SL, KIZ 737172, 737179, 737183–184, 737188–189, 6 ex., paratypes, 49–56.5 mm SL, Chuanhe, Jingdong County, Yunnan Province; SWFC 0412014–030, 14 ex. (2DS), 36–83.5 mm SL, Chuanhe, Jingdong County, Yunnan Province; SWFC 0412031–044, 14 ex., 44.9–95.5 mm SL, Baozang, Jiangcheng County, Yunnan Province.

Morphometric data as in Table 3.

**Diagnosis.** – *Pseudecheneis paviei* is distinguished from other congeners by the combination of following characters. Thoracic adhesive apparatus with 9–14 transverse ridges (laminae) (vs. 14–20). Snout wide and flat, the ratio of snout width at mouth corner to distance between pectoral fin base larger than 0.75 (vs. smaller than 0.75). Caudal peduncle deeper (depth of caudal peduncle 6.1–9.3% SL and 29.4–46.7% in length of caudal peduncle vs. 3.3–5.7, 11.5–24.5). Caudal fin with four yellow spots, isolated each other, not connected (vs. connected each other and forming an entire patch, or only one spot at lower lobe isolated) (Fig. 13). Premaxillary tooth band semicircular and six or eight teeth along its outer edge (vs. two or four) (Fig. 2C). Body covered with dense, rounded tubercles distributed irregularly, not uniformly (Fig. 4A). Tubercles increasing in density gradually from occipital to caudal peduncle. Vertebrae 17+16=33 (1), 17+17=34 (4).

**Distribution.** – This species is found only in the Honghe (Red River) drainage (Fig. 11).

**Remarks.** – Chu (1982) asked Dr. Greenwood working in the Natural History Museum (London) to examine types of *Pseudecheneis paviei* deposited in Museum National d’Histoire Naturelle (Paris). Dr. Greenwood could not find types of *P. paviei*. In this study, examined specimens are included some specimens collected from Tengtiaojing of Jinping County in Yunnan, China where is near to the type locality of *P. paviei* in Laichou of Vietnam. Meanwhile, all types of *P. intermedius* deposited in KIZ had been examined.

**Pseudecheneis stenura Ng, 2006**

![Fig. 13](image-url)

**Fig. 13. Spots or patch at caudal fin:** A, four spots isolated each other (*Pseudecheneis paviei*, SWFC 9812006, 102 mm SL); B, one spot at lower lobe isolated from the big patch (*P. brachyurus*, SWFC 200103394, paratype, 112 mm SL).

of head longer, head length 20.1–23.7% SL (vs. 14.9–18.6),
postorbital head length 8.5–11.4% in head length (vs. 4.5–
5.9), body depth 67.1–88.5% in head length (vs. 73.9–
112.2%). It differs from *P. paviei* in having 15–19 transverse
ridges (laminae) of thoracic apparatus (vs. 9–13),
Premaxillary tooth band semicircular and two or four teeth
along its outer edge (Fig. 2A). Body covered with dense,
rounded tubercles distributed irregularly, not uniformly (Fig.
4A). Tubercles decreasing in density gradually from
occipital to caudal peduncle which almost no tubercles.
Vertebrae 19+20=39.

**Distribution.** – This species is found in the Longchuanjiang,
part of the Irrawaddy River drainage (Fig. 11).

**Pseudecheneis sulcata** (McClelland, 1842)

*Glyptosternon sulcatus* – McClelland, 1842: 587, Pl. 6 Figs. 1–3
(type locality: Kasyah [Khasi] Hills, Meghalaya, India)

**Pseudecheneis sulcatus** – Blyth, 1860: 154; Wu et al, 1981: 75–76
(Motuo and Chayu of Tibet); Wu & Wu, 1992: 534–536,
fig. 147 (Motuo of Tibet); Zhang et al, 1995: 131–132 (Chayu
of Tibet).

**Pseudecheneis sulcata** – Ng, 2006a: 47–51, Fig. 1; Thomson & Page,
2006: 61 (Brahmaputra drainage).

**Diagnosis.** – *Pseudecheneis sulcata* is distinguished from
congeners except *P. paviei*, *P. sulcatoides*, and *P. sympelvica* in
lacking a prominent bony spur on the anterodorsal surface
of the first dorsal-fin pterygiophore (vs. spur present; Fig.
2). *Pseudecheneis sulcata* can be distinguished from *P. paviei*
and *P. sympelvica* in having an elongate body with 36–39
vertebrae (vs. short body with 33–35 vertebrae) and 12–14
(vs. 8–12) transverse laminae on the thoracic adhesive
apparatus, and further differs from *P. sympelvica* in having
separate (vs. fused) pelvic fins. It differs from *P. sulcatoides*
in having a longer caudal peduncle (25.0–28.3% SL vs. 22.5–
23.7), a first dorsal-fin element (vs. element absent), and bifid
(vs. non-bifid) neural spines on the complex vertebra.

**Pseudecheneis sulcata** can be further distinguished from *P. crassicauda* in having a more slender caudal peduncle (4.0–5.2% SL vs. 6.0–6.6) and larger eye (8.8–10.6% HL vs. 7.5–8.3), from *P. eddsi* in having a longer pelvic fin (21.2–28.7% SL vs. 18.0–20.9), from *P. immaculata* in having (vs. lacking) pale colored patches on the body and shorter
adipose-fin base (17.8–22.7% SL vs. 27.7), and from *P. serracula* in having a shorter adipose-fin base (17.8–22.7% SL vs. 26.8–30.4) and the neural spines of the last 2–3 preanal
and first 6–7 postanal vertebrae gradually increasing in height
(vs. corresponding neural spines strongly elevated). It further
differs from *P. stenura* in having a shorter caudal peduncle
(25.0–28.3% SL vs. 30.3–34.5) and pectoral fin (121.6–156.3% HL vs. 160.4–196.9), and from *P. tchangi* in having fewer transverse lamellae (12–14 vs. 21) on the thoracic adhesive apparatus. Vertebrae 18+19=37. Diagnosis and data
from Ng (2006a).

**Distribution.** – This species is found in the Brahmaputra
drainage (Fig. 11).

**Pseudecheneis sulcatoides** Zhou & Chu, 1992

(Fig. 15)

*Pseudecheneis sulcatoides* – Chu & Chen, 1987: 375 (Xishuanbanna,
Yunnan).

Fig. 14. *Pseudecheneis stenura*, KIZ 9811088, 93.9 mm SL; China:
Longchuanjiang (a branch of Irrawaddy River) drainage. Dorsal,
lateral and ventral views.

Fig. 15. *Pseudecheneis sulcatoides*, KIZ 839059, holotype, 105
mm SL; China: Lancangjiang (the upper Mekong River) drainage. Dorsal,
lateral and ventral views.
Pseudecheneis sulcatoides Zhou & Chu, 1992: 111–112, Fig. 1 (Lancangjiang system); Thomson & Page, 2006: 61 (Mekong drainage, China).

Material examined. – Lancangjiang (Mekong River) drainage: KIZ 839059, 1 ex., holotype, 105 mm SL, KIZ 839060, 839063, 748792, 749495, 4 ex., paratypes, 88–100 mm SL, Yangbi, Yambg County, Yunnan Province; KIZ 76, 1 ex., paratype, 83 mm SL, Xiaoganlanba, Simao County, Yunnan Province; KIZ 764006, 1 ex., paratype, 73 mm SL, Xiahejiang, Simao County, Yunnan Province; KIZ 737016, 863867–868, 863871, 4 ex., paratypes, 74–95 mm SL, Menghai, Menghai County, Yunnan Province; SWFC 9910001, 0005015–052, 38 ex. (2 DS), 49–100 mm SL, Yangbi, Yangbi County, Yunnan Province.

Distribution. – This species is found in the main river and branches of low and middle Lancangjiang (Fig. 11).

Pseudecheneis tchangi (Hora, 1937) (Fig. 16)

Propseudecheneis tchangi – Hora, 1937: 348–350, Fig. 11 (Yunnan).

Material examined. – IZCAS 20010 (original No 12016 in Zoological Museum of Fan Memorial Institute of Biology), 1 ex., holotype, 120 mm SL, Yunnan, China (photograph examined).

Diagnosis. – Pseudecheneis tchangi is distinguished from all other congeners except P. immaculatus in lacking yellow spots or patches on adipose fin base and caudal peduncle (vs. having). And it is distinguished from other congeners except P. immaculatus and P. longipectoralis in having longer pectoral fin, extending to pelvic fin base (vs. not extending). It differs from P. immaculatus and P. longipectoralis in having a yellow, triangular patch at occipital (vs. lacking).

Distribution. – This species was described from Yunnan, but its exact locality is not known.

Remarks. – Hora (1937) described Propseudecheneis tchangi based on drawings and simple description of Pseudecheneis sulcatus from Yunnan by Tchang (1936), and suggested that this species occurred in Red River system and could not provide evidence to support his idea.

Key to Pseudecheneis from China

1. Presence of 14–21 transverse ridges (lamellae) on thoracic apparatus; snout rounded and pointed, the ratio of snout width at mouth corner to distance between pectoral fin base smaller than 0.75; caudal peduncle depth 11.5–24.5% in caudal peduncle length, 3.3–5.7% SL; yellow spots of caudal fin connected each other, forming an entire patch, or only one spot at lower lobe isolated from the big patch; body covered with tubercles, and tubercle density at caudal peduncle more exiguous than that of occipital; outer teeth of premaxillary tooth band two or four.......................................................... 2

2. Pectoral fin longer, extending beyond pelvic fin origin .... 3

3 Body colour uniform, without yellow spots or patches; maxillary barbel long, reaching level of gill opening (middle and upper Lancangjiang) .................................................. P. paviei

4 Body without pale colored spots or patches after dorsal fin origin (Yunnan) .............................................. P. tchangi

5 Body with pale colored patches at origin and end of dorsal fin, origin and end of adipose fin, base of caudal fin ........................ P. immaculatus

6.1–9.3% SL; caudal fin with four yellow spots, isolated each other, not connected; body covered with tubercles, and tubercle density at caudal peduncle denser than that of occipital; outer teeth of premaxillary tooth band six or eight (Red River drainage) .......................................................... P. paviei

121

Fig. 16. Pseudecheneis tchangi, IZCAS 20010, holotype, 120 mm SL; China: Yunnan. Dorsal and ventral views.
Zhou et al.: Review of *Pseudecheneis* from China

5 Pelvic fin not reaching anus (Brahmaputra drainage) ............
   - Pelvic fin reaching anus (branches of Nujiang River drainage)

6 Length of caudal peduncle bigger than 30% SL; shortest ray
   of caudal fin about 50% of longest ray; caudal peduncle without
   tubercles .......................................................... *P. sulcata*
   - Length of caudal peduncle smaller than 30% SL; shortest ray
   of caudal fin about 75% of longest ray; caudal peduncle with
   obvious tubercles .............................................

7 Yellow spots at dorsal fin origin isolated as two ovoid spots; head
   length 20.1–23.7% SL, postorbital head length 8.5–11.4% in
   head length, and body depth 67.1–88.5% in head length
   (middle and lower reaches of Longchuanjiang, Irrawaddy River
   drainage) ............................................................ *P. stenura*
   - Yellow spots at dorsal fin origin connected as a saddle patch;
     head length 14.9–18.6% SL, postorbital head length 4.5–5.9% in
     head length, and body depth 73.9–112.2% in head length
     (upper of Longchuanjiang, Irrawaddy River drainage) ......
     - Occipital without spot or patch; body covered some
       longitudinal tubercles among rounded tubercles, which
       distributed uniformly (lower and middle of Lancangjiang)..

8 Posttemporal with a small yellow ovate spot; yellow spots at
   dorsal fin origin connected as a saddle patch ............
   - Post-temporal without a small yellow ovate spot; yellow spots
   at dorsal fin origin isolated as two ovoid spots (Nujiang River
   drainage) .......................................................... *P. paucipunctatus*
   - Occipital with a small, obvious, yellow triangular patch; body
     only covered rounded tubercles, which gradually decreasing
     in density from occipital to caudal peduncle (Irrawaddy River)
     ................................................................. *P. brachyurus*
   - Occipital without spot or patch; body covered some
     longitudinal tubercles among rounded tubercles, which
     distributed uniformly (lower and middle of Lancangjiang)..

**DISCUSSION**

The status of *Pseudecheneis paviei* Vaillant and *Pseudecheneis intermedius* Chu

Types of *Pseudecheneis paviei* deposited in Muséum National d’Histoire Naturelle could not be found (Chu, 1982). In this study, we examined specimens from Tengtiaojing of Jinning County in Yunnan, China (which is near to the type locality of *Pseudecheneis paviei* in Laichou of Vietnam), all type material of *Pseudecheneis intermedius* deposited in KIZ, and fourteen topotypic material of *P. intermedius* deposited in SWFC. According to comparison results, the characteristics of external, muscle and skeleton morphology between *P. paviei* and *P. intermedius* are nearly identical (Zhou & Zhou, 2005). Chu (1982) indicated that the types’ standard length of *Pseudecheneis intermedius* is smaller (the largest one is only 56.5mm SL) than that of *P. paviei*, which was as a diagnosis to distinguish *P. intermedius* from *P. paviei*. However, the standard length of the largest topotypic specimen of *P. intermedius* deposited in SWFC is 83.5mm SL and is larger than that of the largest types of *P. intermedius* deposited in KIZ. Meanwhile, the results of DNA sequences analysis showed that there was no difference in partial cytochrome b sequences between *P. paviei* (six specimens from Sanjiangkou of Xingsiping County, Nanxihe of Pinbian County and Tengtiaojiang of Jinning County) and *P. intermedius* (one specimen from Chuanhe of Jindong County), and constituted a haplotype (Zhou et al., 2007). The characteristics of external, muscle and skeleton morphology, and the evidence of molecular biology support that *P. intermedius* is the junior synonym of *P. paviei*.

The status of *Pseudecheneis tchangi* and its collection locality

According to the original account of Tchang (1936), a specimen of rheophilic catfish from Yunnan was recognized as *Pseudecheneis sulcata*. Tchang described the color of the specimens in alcohol as having a blackish body with several large irregular yellowish blotches; and having yellowish brown fins with black bars. However, his drawing did not depict the large irregular blotches on the body (Tchang, 1936: Fig. 4) and the location of collection was just recorded as Yunnan.

Hora (1937) described a new species and new genus, *Propseudecheneis tchangi*, based on drawings and simple description of *Pseudecheneis sulcatus* from Yunnan by Tchang (1936), and arbitrarily suggested that this species occurred in Red River system and could not provide evidence to support his idea. Chu (1982) examined the types of *Propseudecheneis tchangi* deposited in IZCAS and indicated that its body was flattened (body depth 10.0–13.9% SL). Based on the results of the review of rheophilic catfishes from China, Chu (1982) considered *Propseudecheneis* as the subjective synonym of *Pseudecheneis* and *Propseudecheneis tchangi* was the junior synonym of *Pseudecheneis sulcatus*. Meanwhile, he examined the collection data recorded in field and the type locality of *Propseudecheneis tchangi* was only listed as Yunnan. However, he inferred that the type locality of *Propseudecheneis tchangi* was in the vicinity of Tengchong (which lies within the Irrawaddy River drainage) according to the other specimens with catalogue numbers which was adjacent to *Propseudecheneis tchangi* and whose collection locality and distribution was in west of Yunnan (Irrawaddy River system) (Zhou & Chu, 1992).

In the process of the description of *Pseudecheneis sulcatooides*, Zhou & Chu (1992) examined the radiographs of *Propseudecheneis tchangi*, which showed that the skull had obvious lateral processes of frontal, the parapophysis of complex vertebra and the body axis formed a right angle, neural spine of complex vertebra bifid. The osteological characteristics of *Propseudecheneis tchangi* is consistent with *Pseudecheneis sulcata*. Thus there is further evidence that *Propseudecheneis tchangi* is a synonym of *Pseudecheneis sulcatus*.

Ng (2006) considered *Pseudecheneis sulcata* to be restricted to the Brahmaputra River drainage. His results imply that specimens from Nujiang and Irrawaddy of Yunnan may not be *Pseudecheneis sulcata*. We re-examined the photographs of the holotype of *Propseudecheneis tchangi* (which is deposited in IZCAS) and found that holotype of *P. tchangi* possessed yellow spots on occipital, and post-temporal region without yellow spots. Its colour pattern is nearly identical to
Tchang’s drawing (1936: Fig. 4) but is not consistent with the description listed by Tchang (1936: 49). The morphology of Propseudecheneis tchangi differs from other recorded congeners in Pseudecheneis from China. There are six river systems in Yunnan of China. Pseudecheneis occurs in Yuanjiang (Red River), Lancangjiang (the upper Mekong River), Nujiang (the upper of Salween River), Longchuanjiang and Daoyinjiang (branches of Irrawaddy River); except in Jinshajiang (the upper of Yangtze River) and Nanpanjiang (the upper of Pearl River). The first author examined many specimens of Pseudecheneis deposited in the Museum of Zoology, Yunnan University and had a special interest in Propseudecheneis tchangi since 1985. Until now the specimens similar to Propseudecheneis tchangi could not be found from Yunnan yet. According to its morphological characteristics, we concur that Propseudecheneis tchangi is a valid species, however its exact collection area remains unknown.

The study of speciation and taxonomy on Pseudecheneis

The results of DNA sequences analysis showed that there was difference in partial cytochrome b sequences between specimens recognized as Pseudecheneis sulcata from Nujiang (Kejie of Changning County, Nangunhe of Cangyuan County) and Irrawaddy (Qushi of Tengchong County, Shudian of Yingjiang County). The specimens between the two river basins did not form a monophyletic group and the specimens from different localities in the same river system could not constitute a haplotype (Zhou et al., 2006). The comparison results of muscle and osteological characteristics showed that there were some differences between specimens recognized as Pseudecheneis sulcata from Nujiang and Irrawaddy (Zhou & Zhou, 2005). So the descriptions of new species Pseudecheneis brachyurus, P. longipectoralis, P. gracilis and P. paucipunctatus in this study are based on the results of morphology and molecular biology comparison.

Catfishes of Pseudecheneis are rheophilic and bottom dwelling. The swimming capacity of Pseudecheneis is poor and their mobility is limited. The populations of Pseudecheneis among river systems and/or in the same river system are easily isolated due to lack of individual migration and gene exchange, which is the main reason resulting in the speciation. Recently, more species of Pseudecheneis had been described, indicating the possible presence of more new species of Pseudecheneis and highlighting its diversity (Ng & Edds, 2005; Ng, 2006a, 2006b; Ng & Tan, 2007; Vishwanath & Darshan, 2007).

ACKNOWLEDGEMENT

We give special thanks to Yong-Wu Zhou and Xiao-Fu Pan, postgraduate students of SWFC, who have contributed much during the collection of specimens. Thanks are also extended to many people who had assisted in the field collection of specimens. We wish to express our thanks to Prof. Jun-Xin Yang and Associate Prof. Gui-Hua Cui at the Kunming Institute of Zoology, Chinese Academy of Sciences, who provided access to specimens deposited in KIZ. And thanks to Prof. Chun-Guang Zhang at the Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS), who provided pictures of P. tchangi type material. Thanks to Prof. Jiang Xiong at the Kunming institute of Zoology, Chinese Academy of Sciences, who took some specimen photographs. This study was supported by grants from Key Laboratory of Biodiversity Conservation in Southwest China (Southwest Forestry College), State Forestry Administration and the Natural Science Foundation of Yunnan Province (98C005M). Field collections were partially supported by the All Catfish Species Inventory (NSF DEB-0315963), USA.

LITERATURE CITED


McClelland, J., 1842. On the fresh-water fishes collected by William Griffith, Esq., F. L. S. Madras Medical Service, during...


