

Acantopsis bruinen, a new species of horseface loach from Southeast Asia (Teleostei: Cobitidae)

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Acantopsis bruinen, new species, is described from the Mekong River basin in Cambodia, Thailand, and Laos, and from the Mae Khlong and Tapi River basins in Thailand. It is distinguished from all other species of *Acantopsis* by combination of 11–13 pectoral-fin rays, 10½ branched dorsal-fin rays; 3 labial barbel pairs; a single, undivided row of spots on the dorsal surface of the head; wide dorsal saddles with straight or concave margins; and a faint spot on the upper margin of the caudal-fin base. An updated key to the species of *Acantopsis* is provided.

Introduction

The horseface loaches, *Acantopsis* (Cobitidae), are sand-dwelling fishes recognizable by their slender bodies and elongate heads and snouts. Species of *Acantopsis* occur in rivers throughout Southeast Asia from Java, Sumatra, and Borneo to northern Vietnam and eastern India. The genus is distinguishable from closely related taxa *Aperioptus* and *Kottelatlimia* (Šlechtová et al., 2008; Havird et al., 2010) by the position of the bifid suborbital spine, an appendage shared with almost all cobitid loaches, halfway between the eye and the tip of the snout and by possession of 8½ or more branched dorsal-fin rays (Siebert, 1991).

The revision of *Acantopsis* by Boyd et al. (2017) recognized seven valid species, three new to science: *A. runghthipae*, *A. dinema*, and *A. ioa* (Eschmeyer et al., 2018). Species are differenti-

ated from one another primarily on the basis of color pattern (often highly variable), labial barbel structure, and fin-ray and vertebral counts. A fourth new species, with disjunct distribution, was revealed by phylogenetic analysis but left undescribed (Boyd et al., 2017). Based on genetic and morphological characteristics, this new species of *Acantopsis* from tributaries of the Mekong River basin in Thailand, Laos, and Cambodia, and in the Mae Khlong and Tapi River drainages of western and peninsular Thailand is described herein.

Materials and methods

Measurements were taken to the nearest 0.1 mm using dial calipers. Morphometric data of the body are expressed as percentages of standard

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Fig. 1. *Acantopsis bruinen*: **a**, UF 190188, holotype, 96.0 mm SL (lateral view reversed); Cambodia: Tonle Kong River; **b**, UF 235990, 60.6 mm SL; live specimen (reversed), Thailand: Phachi River. Scale bars: 20 mm. Photographed by Zachary Randall.

length (SL) and of the head as percentages of head length (HL). Measurements were taken with fins depressed and follow Hubbs & Lagler (2004), except as follows: body depth and width were measured at the dorsal-fin origin (Kottelat, 1990); prepectoral, prepelvic, and preanal lengths were taken from the snout to the origin of each fin; and caudal-peduncle length was measured as the oblique distance between the base of the last anal ray, not the fin membrane, and the caudal-fin base. Data for all comparative species are from Boyd et al. (2017). All species of *Acantopsis* have a single pair of labial barbels that may be branched or unbranched and that may or may not perforate the medial flap, or labium, of the lower

lip. Labial barbel counts herein follow Boyd et al. (2017) in representing the number of exposed barbel branches. Branched ray counts are given for unpaired fins, total ray counts for paired fins. The last branched ray of the dorsal and anal fins, sharing a pterygiophore with the penultimate ray, is given as $\frac{1}{2}$ (Kottelat, 1990). Dorsal saddle count was taken posterior to the opercle and omitted, if present, the saddle anterior to the opercle which is broken or incomplete in many specimens. Lateral spots were counted along the length of the body to the caudal-fin base. Measurements and counts were taken from the left side whenever possible.

Whole specimen photographs were taken with a Canon 7D camera and mouth photographs

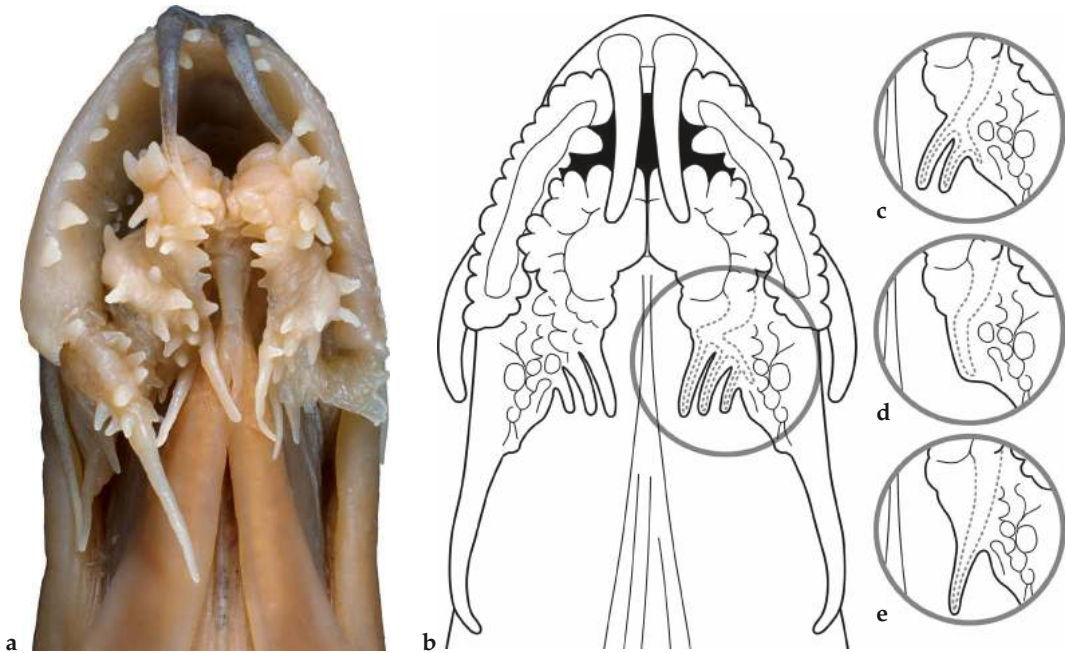


Fig. 2. a, Mouth of *Acantopsis bruinen*, CAS 244381, 155.7 mm SL (missing one mandibular barbel); b, diagram, showing external labial barbels and internal structure (dashed gray lines) for *A. bruinen* and *A. dialuzona*. Insets show comparative labial barbel structure in c, *A. dinema*, d, *A. rungthipae* and *A. ioa*, and e, *A. thiemmedhi*. Photographed by Zachary Randall.

with a Visionary Digital (Palmyra, Virginia, USA) system. The map was produced using ArcMap 10.5 in ArcGIS. Figures were edited using Adobe Photoshop CC 2014. Abbreviations for institutional collections are as follows: CAS, California Academy of Sciences, San Francisco; IFRDI, fish collection of the Inland Fisheries Research and Development Institute, Phnom Penh; NIFI, National Inland Fisheries Institute, Bangkok; THNHM, Thailand Natural History Museum, National Science Museum, Pathum Thani; UF, University of Florida, Gainesville; and UMMZ, University of Michigan Museum of Zoology, Ann Arbor.

***Acantopsis bruinen*, new species**
Polkadot Horseface Loach
 (Fig. 1)

Holotype. UF 190188, 96.0 mm SL; Cambodia: Stung Treng: Tonle Kong River 10 km upstream of confluence with Mekong River, 13°36'34"N 106°05'32"E; T. Phanara, S. Sueng, L. M. Page, P. J. Ciccotto and D. A. Boyd, 22 May 2016.

Paratypes. IFRDI 6895, 1, 91.0 mm SL; and THNHM F0015390, 1, 93.4 mm SL; collected with holotype. – UF 191444, 1, 85.3 mm SL; Thailand: Kanchanaburi: Dan Makham Tia: Phachi River at Ban Hin Daen (village), Mae Khlong River basin, 13°46'49"N 99°25'15"E; L. M. Page et al., 14 Jan 2017.

Additional material (non-types). Thailand: NIFI 4522, 1, 159.5 mm SL; Chiang Mai: Fang: Pong Nam Dang Waterfall, Mekong River basin, 19°51'50"N 99°05'45"E; C. Vidthayanon, 26 Sep 1999. – UF 191657, 1, 92.1 mm SL; Mukdahan: Wan Yai: Mekong River at Wat Song Khon, Mekong River basin, 16°46'30"N 104°44'23"E; G. Deen, 5 Jan 2015. – CAS 238317, 3, 46.0–60.5 mm SL; Kanchanaburi: Si Sawat: Kha Khaeng River at mouth of Krueng Krai, Mae Khlong River basin, 15°01'30"N 99°11'16"E; T. R. Roberts, 21 Jan 1991. – UMMZ 250307, 1, 148.9 mm SL; Kanchanaburi: Mueang Kanchanaburi: Mae Khlong River at Kanchanaburi, Mae Khlong River basin, 14°01'08"N 99°31'36"E; K. F. Lagler et al., 23 Mar 1965. – UF 235990, 5, 46.8–60.6 mm SL; Kanchanaburi: Dan Makham Tia: Phachi River at Rt. 3085, Mae Khlong River basin, 13°55'05"N 99°22'55"E; S. Tongnunui et al., 1 Feb 2014. – NIFI 1751, 5, 140.0–181.0 mm SL; Surat Thani: Phum Duang River, Tapi River basin, 9°01'59"N 99°01'24"E; L. Sonkphan et al., 4 Apr 1985. – NIFI 1829,

7, 87.1–155.3 mm SL; Surat Thani: Phrasaeng: Tapi River, Tapi River basin, 8°34'16"N 99°15'14"E; M. Kottelat et al., 3 Apr 1985. Laos: CAS 244381, 1, 155.7 mm SL; Attapeu: market in Attapeu, Mekong River basin, 14°48'02"N 106°50'09"E; T. R. Roberts, 1 Mar 1995.

Diagnosis. *Acantopsis bruinen* is distinguished from its congeners by possession of 11–13 pectoral-fin rays (vs. usually 10 or fewer, no greater than 11). It is further distinguished by the combination of 10½ branched dorsal-fin rays; 3 labial barbel pairs; a single, undivided row of spots on the dorsal surface of the head; wide dorsal saddles with straight or concave margins; and a faint spot on the upper margin of the caudal-fin base.

Description. Measurements and meristics in Table 1. Body long and slender, straight to slightly

arched predorsally, deepest between head and origin of dorsal fin, tapering thereafter to narrow caudal peduncle (Fig. 1). Head exceptionally long (25.2–31.4 % SL); snout long (59–78 % HL), pointed, and exhibiting allometric growth, occupying a greater proportion of head length in larger specimens. Bifid suborbital spine situated in groove halfway between eye and tip of snout, just behind nare. Mouth small, narrow; lips and labium densely papillated. One pair each of rostral, maxillary, and mandibular barbels; 3 (rarely 2 or 4) pairs of labial barbels, largest closest to tip of snout and decreasing in size posteriorly (Fig. 2).

Body with many embedded ctenoid scales; scales absent on head. Lateral line complete. Dorsal-fin rays iii, 10½; pectoral-fin rays 11–13; pelvic-fin rays 7; anal-fin rays iii, 5½; caudal-fin

Table 1. Morphometric and meristic data for all examined specimens of *Acantopsis bruinen*. Range, mean, standard deviation (SD), and mode include values for holotype.

	Holotype	range (n=28)	mean	SD
Standard length (mm)	96.0	46.0–181.0		
In percent of standard length				
Body depth	10.8	9.8–12.7	10.8	0.69
Body width	7.8	7.1–9.0	7.7	0.53
Predorsal length	53.0	50.1–54.1	51.6	1.01
Prepectoral length	27.3	23.2–28.8	26.5	1.34
Prepelvic length	55.7	54.1–59.1	56.6	1.16
Preal length	79.5	78.7–82.5	80.6	1.00
Caudal-peduncle length	14.2	11.2–14.9	13.5	0.81
Caudal-peduncle depth	4.8	4.7–5.8	5.2	0.27
Dorsal-fin base length	13.5	12.5–15.0	13.6	0.53
Anal-fin base length	6.6	4.9–7.6	6.6	0.60
Dorsal-fin length	17.9	17.1–20.6	18.7	0.98
Pectoral-fin length	17.6	15.0–20.0	17.6	1.34
Pelvic-fin length	11.9	10.2–13.5	11.9	0.89
Anal-fin length	12.2	10.1–13.9	12.2	0.91
Head length	29.4	25.2–31.4	28.2	1.35
In percent of head length				
Head depth	38.3	38–43	40.2	1.38
Snout length	70.6	59–78	68.2	5.24
Postorbital-head length	27.7	25–33	28.4	2.23
Eye length	11.7	10–17	12.8	1.70
Counts				
		range	mode	n
Exposed labial barbel pairs	3	2–4	3	28
Dorsal-fin rays	iii, 10½	iii, 10½	iii, 10½	28
Pectoral-fin rays	11	11–13	12	28
Pelvic-fin rays	7	7	7	28
Anal-fin rays	iii, 5½	iii, 5½	iii, 5½	28
Caudal-fin rays	13	13–14	14	28
Lateral spots	9	5–14	9	28
Dorsal saddles	12	8–13	11	14
Vertebrae	43	40–43	40, 43	5

rays 13–14; 29–30 abdominal + 11–13 caudal = 40–43 total vertebrae. Dorsal-fin origin anterior to pelvic-fin origin. First branched pectoral-fin ray elongate, ramified in adult male. Caudal fin forked. Largest recorded size 181.0 mm SL (NIFI 1751).

Coloration. In life, body and head beige dorsally to just below lateral line, translucent white ventrally. Green-gold iridescence on operculum and cheek. Dorsal surface of head with single, undivided row of 4–6 large brown spots extending from tip of snout to eye (Fig. 3a). Black stripe visible beneath suborbital groove. Sides of head with one row of 2–5 large brown blotches and in some specimens an additional row of smaller blotches above. Eight to 13 brown saddles along back, faint or absent in large specimens, widest at and posterior to dorsal-fin origin; width of saddles typically greater than or equal to distance between saddles (Fig. 3c). Saddle margins concave or flat. Brown vermiculation present on body below saddles. Row of 5–14 black-brown spots along lateral line, spots smaller than or equal to eye in diameter; terminal spot always present at center of caudal-fin base. Faint brown spot on third unbranched dorsal-fin ray. Faint black spot at upper margin of caudal-fin base (Fig. 3f) and faint bands on caudal fin may be present or absent.

Specimens preserved in alcohol lose green-gold iridescence and ventral translucence; body becomes opaque pale yellow or gold.

Distribution and habitat. *Acantopsis bruinen* is currently known only from a few, scattered locations in the Mekong River basin in Thailand, Laos, and Cambodia, and from the Mae Khlong and Tapi River drainages in western and peninsular Thailand, where it appears to be more abundant (Fig. 4). Curiously, no records are known from the Chao Phraya River in central Thailand, which effectively divides the Mekong from the Mae Khlong and southern drainages. Specimens collected by the authors, including type specimens, were from sandy riverbeds in turbid waters (Fig. 5).

Etymology. Named for the River Bruinen, or Loudwater, of Rivendell and the flood that took the form of great horses in J. R. R. Tolkien's *The Fellowship of the Ring*. A noun in apposition.

Discussion

Acantopsis bruinen co-occurs with *A. runghthipae* in every drainage from which it is known, and with *A. dinema* and *A. ioa* in the Mekong River basin. It is distinguished from all three species above by a single row of spots on the dorsal surface of the head (vs. typically 2 rows of spots posterior to the nares [Fig. 3a–b]), and by 11–13 pectoral-fin rays (vs. usually 10, rarely 11). Furthermore, *A. bruinen* can be separated from *A. runghthipae* and *A. ioa* by the presence of 3 pairs of labial barbels (vs. absence [Fig. 2]) and 10½ branched dorsal-fin rays (vs. usually 9½). *Acantopsis bruinen* can be separated from *A. ioa* in having fewer total vertebrae (40–43 vs. 46–48, respectively) and fewer dorsal saddles (8–13 vs. 15–23, respectively). It further differs from *A. ioa* by greater dorsal-fin length (17.1–20.6 % SL vs. 13.6–17.0, respectively) and pectoral-fin length (15.0–20.0 % SL vs. 12.3–14.9, respectively). *Acantopsis bruinen* is distinguished from *A. dinema* in lacking pronounced, teardrop shaped lobes on the pectoral fins of mature males; smaller head depth (37.6–42.8 % SL vs. 43.9–48.7, respectively); by the presence of one row of large spots on the cheeks (vs. absence); and the absence of black specks beneath the lateral spots (vs. presence). The head length of *A. bruinen* is among the largest of any species of *Acantopsis* (25.2–31.4 % SL); it is always greater than that of *A. ioa* (21.8–24.2 % SL) and almost always greater than that of *A. runghthipae* (21.6–25.6 % SL). The dorsal saddles of *A. bruinen* are wide and spaced close together, the width of the saddles greater than or equal to the distance between them, with straight or concave lateral edges (vs. narrow, widely spaced saddles with usually rounded lateral edges in *A. runghthipae* and *A. dinema* and blotch-like saddles in *A. ioa* [Fig. 3c–e]).

Acantopsis bruinen may be sympatric with *A. dialuzona* in the southern provinces of Thailand, and can be differentiated from it by the possession of 11–13 pectoral-fin rays (vs. usually 10, rarely 11) and the absence of a well-developed ocellus on the upper margin of the caudal-fin base (vs. presence [Fig. 3f–g]). *Acantopsis bruinen* (as “*A. species*”) was hypothesized as sister to *A. dialuzona* in a two-gene phylogenetic reconstruction in Boyd et al. (2017, fig. 4), and their inferred relationship to other species of *Acantopsis* is shown in Figure 6. The two species share similar morphometrics, 3 pairs of labial barbels, 10½ branched dorsal-fin rays, and a single row of spots atop the head.

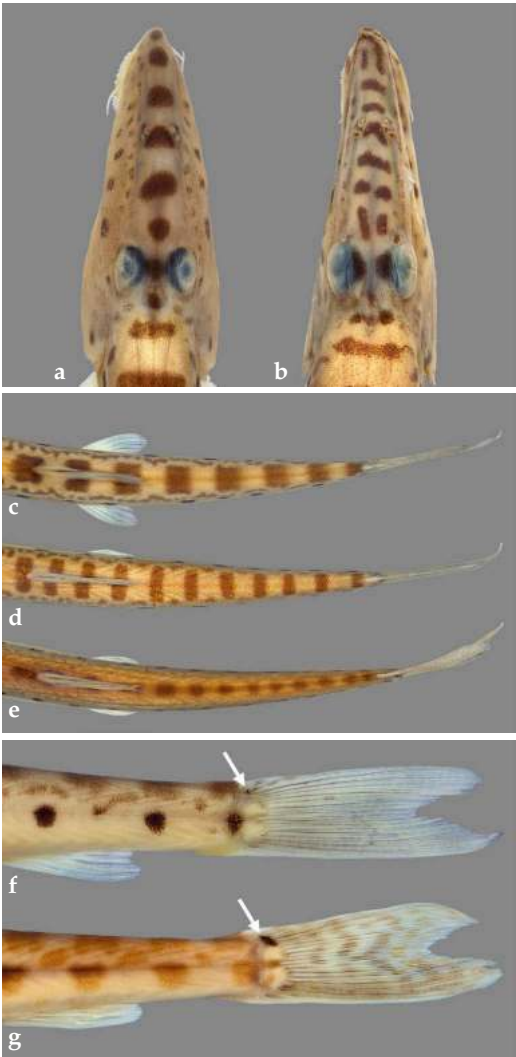


Fig. 3. Spots on dorsal surface of head in: **a**, *Acontopsis bruinen*, IFRReDI 6895, paratype, 91.0 mm SL; **b**, *A. runghthipae*, THNHM F0013610, holotype, 107.4 mm SL. Dorsal saddles posterior to dorsal fin in: **c**, *A. bruinen*, THNHM F0015390, paratype, 93.4 mm SL; **d**, *A. runghthipae*, THNHM F0013610; **e**, *A. ioa*, UF 188135, paratype, 95.6 mm SL. Spot on upper margin of caudal-fin base in: **f**, *A. bruinen*, THNHM F0015390; **g**, *A. dialuzona*, UF 235415, 100.5 mm SL.

Key to the species of *Acontopsis*

- 1 – Large black spots or blotches on caudal fin. 2
- No black spots or blotches on caudal fin. 3

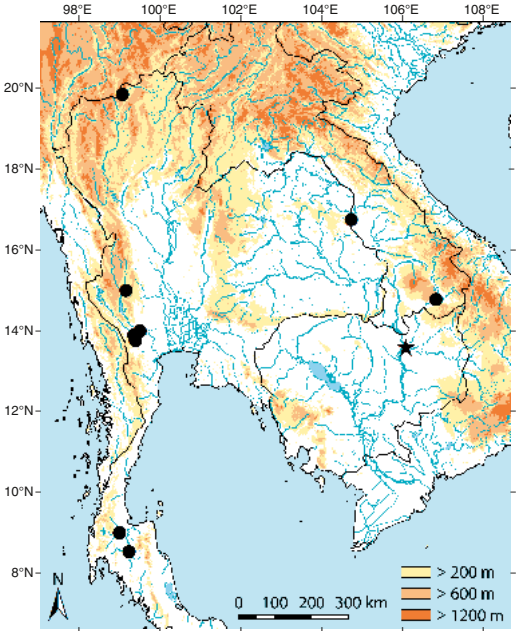


Fig. 4. Collection localities of examined specimens of *Acontopsis bruinen*. Star indicates type locality.

- 2 – Two or three wide, black bands or bands of irregular blotches on caudal fin; usually 10 or more lateral spots; 2–3 pairs of labial barbels; southern Myanmar to Irrawaddy and Salween River basins.
..... *A. spectabilis*
- Large, black blotch at extremity of each caudal-fin lobe; usually 9 or fewer lateral spots; one pair of labial barbels; Chao Phraya River basin.
..... *A. thiemmedhi*
- 3 – Eight ½ branched dorsal-fin rays; Sabah, Malaysia.
..... *A. octoactinotos*
- Nine ½ or more branched dorsal-fin rays. 4
- 4 – Labial barbels present; usually 10½ branched dorsal-fin rays. 5
- Labial barbels absent; usually 9½ branched dorsal-fin rays. 7



Fig. 5. Habitat of *Acantopsis bruinen* at paratype locality in Thailand: Phachi River, Mae Khlong basin, 13°46'49" N 99°25'15" E, 14 January 2017. Photographed by Zachary Randall.

- 5 – Cheek spots present; one row of spots on dorsal surface of head; black specks beneath lateral spots absent.
..... 6
- Cheek spots absent; 2 rows of spots on dorsal surface of head posterior to nares; black specks or “peppering” beneath lateral spots; Mekong River basin.
..... *A. dinema*
- 6 – Well-developed ocellus on upper margin of caudal-fin base; 10, rarely 11, pectoral-fin rays; Indonesia to extreme southern Thailand.
..... *A. dialuzona*
- No ocellus on upper margin of caudal-fin base, but faint spot may be present; 11–13 pectoral-fin rays; Tapi, Mae Khlong, and Mekong River basins.
..... *A. bruinen*, new species

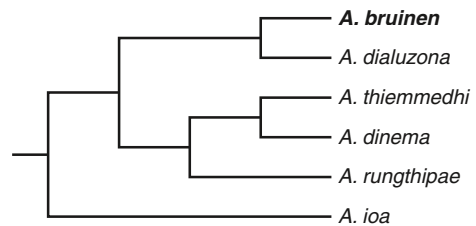


Fig. 6. Phylogenetic relationship of *Acantopsis bruinen* to other species in the genus, from Boyd et al. (2017).

- 7 – Dorsal saddles long and narrow; faint spot on upper margin of caudal-fin base; 41–43 vertebrae; southwestern and central Thailand to Mekong River basin.
..... *A. rungthipae*
- Dorsal saddles rounded, blotch-like; no faint spot on upper margin of caudal-fin base; 46–48 vertebrae; Mekong River basin.
..... *A. ioa*

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