

## Two new species of *Psilorhynchus* (Teleostei: Psilorhynchidae) from Bihar and Uttar Pradesh, India

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### Abstract

Species of *Psilorhynchus* are small stream and river dwelling fishes that are currently known from India, Nepal, Myanmar, and Bangladesh. While once considered a relatively depauperate genus, several new species have been described over the past decade. This increase in the number of species has come from an increasing number of expeditions to areas poorly inventoried or never sampled before, museum holdings containing previously unrecognized species, and significant efforts by some scientists working on the group. The genus was once placed in the family Cyprinidae, one of the largest families of freshwater fishes, but was removed to its own family Psilorhynchidae based on phylogenetic relationships relative to other groups also placed in Cyprinidae. Recent research expeditions of the rivers and streams of India resulted in the discovery of two additional new species of *Psilorhynchus*. Herein, we describe two species, *P. platydorsalis*, from Bihar, and *P. kuwana*, from Uttar Pradesh, and compare them to other species of the genus.

**Keywords:** *Psilorhynchus*, New species, Son and Kuwana rivers, Tributaries of Ganges.

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### Introduction

Species diversity of Psilorhynchidae, a recently recognized (Conway and Mayden 2007; Nelson et al. 2016) and historically species-depauperate family of Cypriniformes (Conway et al. 2015; Conway 2011), has increased notably in recent years with descriptions of several new species (Conway 2011; Conway and Britz 2010, 2015; Conway and Kottelat 2007, 2010; Conway and Mayden 2007, 2008a, b; Conway and Pinion 2016; Conway et al. 2013; Shangningam and Viswanath 2016). The increase in diversity of this South Asian clade has resulted from increased focus on the group by researchers, an increased effort in biotic inventories of fishes in historically poorly sampled waterways of many regions in Asia, and documentation of this diversity through museum holdings. The new species discovered and described in recent years have been from India, Nepal, Myanmar and Bangladesh (Table 1).

Species of the genus *Psilorhynchus* are generally small and with body and head coloration in life similar to the substrates of the flowing streams or rivers where captured. In life, they are usually tan to brown with darker, more melanistic dorsal saddles, and with iridescent highlights on the head and some scales. All of the species possess a notably arched dorsum of varying degrees and a flattened and usually naked venter. Multiple species of *Psilorhynchus* are known to exist in the Indian region of Asia, within the major Ganga-Brahmaputra river drainages. Across the distribution of this genus, only one species is known to occur outside the range of Myanmar, Bangladesh, Nepal and north and north-eastern India. This species is *Psilorhynchus tenura* (Arunachalam and Muralidharan 2008) and is the only species reported from the Western Ghats of Peninsular India.

Recent collections made during an ichthyological survey of the Son, Bihar, and Kuwana rivers, Uttar Pradesh, India, have revealed the occurrence of two new, morphologically distinct species of *Psilorhynchus* from the lowland and sandy rivers of northern India. Herein, we describe these species as new and compare them with other species of the genus.

**Table 1.** Species of the genus *Psilorhynchus*. Valid species found in Ganga-Brahmaputra River Basin and from Peninsular India, and general distributions. INGR=Species from the Indian region within the major Ganga-Brahmaputra River drainages of Asia. PEN=Peninsular India. See reference literature for more detailed information and ranges of species.

<i>Psilorhynchus sucatio</i>	Northeast Bengal	(Hamilton, 1822) <b>INGR</b>
<i>Psilorhynchus homaloptera</i>	Brahmaputra drainage	Hora and Mukerji, 1935 <b>INGR</b>
<i>Psilorhynchus rowleyi</i>	Chindwin River, India	Hora and Misra, 1941 <b>INGR</b>
<i>Psilorhynchus pseudecheneis</i>	Koshi River, Nepal	Menon and Datta, 1964 <b>INGR</b>
<i>Psilorhynchus microphthalmus</i>	Chindwin River, Manipur, India	Vishwanath and Manojkumar, 1995 <b>INGR</b>
<i>Psilorhynchus arunachalensis</i>	Brahmaputra River, Arunachal Pradesh,	Nebeshwar et al. 2007 <b>INGR</b>
<i>Psilorhynchus amplicephalus</i>	Barak River, Assam, India	Arunachalam et al. 2007 <b>INGR</b>
<i>Psilorhynchus robustus</i>	Ataran River drainage, Myanmar	Conway and Kottelat, 2007
<i>Psilorhynchus tenura</i>	Thunga River, Krishna drainage, India	Arunachalam and Muralidharan, 2008 <b>PEN</b>
<i>Psilorhynchus breviminor</i>	Ayeyarwaddy River drainage	Conway and Mayden, 2008a
<i>Psilorhynchus nepalensis</i>	Drainages of Central Nepal	Conway and Mayden, 2008b <b>INGR</b>
<i>Psilorhynchus rahmani</i> ,	Lower Hilltracks, Bangladesh	Conway and Mayden, 2008b <b>INGR</b>
<i>Psilorhynchus melissa</i>	Ann Chaung River drainage	Conway and Kottelat, 2010
<i>Psilorhynchus pavimentatus</i>	Ann Chaung River drainage	Conway and Kottelat, 2010
<i>Psilorhynchus brachyrhynchus</i>	Ayeyarwaddy River drainage, Myanmar	Conway and Britz, 2010
<i>Psilorhynchus piperatus</i>	Ayeyarwaddy River drainage, Myanmar	Conway and Britz, 2010
<i>Psilorhynchus gokkyi</i>	Ayeyarwaddy River drainage, Myanmar	Conway and Britz, 2010
<i>Psilorhynchus chakpiensis</i>	Chindwin basin, Manipur, India	Shangningam and Vishwanath, 2013a <b>INGR</b>
<i>Psilorhynchus hamiltoni</i>	Tista River, Brahmaputra drainage	Conway et al. 2013 <b>INGR</b>
<i>Psilorhynchus maculatus</i>	Chindwin River, Manipur, India	Shangningam and Vishwanath, 2013b <b>INGR</b>
<i>Psilorhynchus ngathanu</i>	Chindwin River, Manipur, India	Shangningam and Vishwanath, 2014 <b>INGR</b>
<i>Psilorhynchus nudithoracicus</i>	Ganges, Brahmaputra, Meghna and Suugu rivers, Bangladesh, Nepal and India	Tilak and Husain, 1980 <b>INGR</b>
<i>Psilorhynchus khopai</i>	Tuisi River, Kaladan River, Mizoram, India	Lalramliana et al. 2014 <b>INGR</b>
<i>Psilorhynchus olliei</i>	Ayeyarwaddy River drainage, Myanmar	Conway and Britz, 2015
<i>Psilorhynchus kaladanensis</i>	Tuisi River, Kaladan River, Mizoram, India	Lalramliana et al. 2015 <b>INGR</b>
<i>Psilorhynchus konemi</i>	Chindwin River basin Manipur, India	Shangningam and Vishwanath 2016

## Material and Methods

Fish collections were made between 1996-2012. Measurements were made point to point using digital calipers. Methods used for the meristic and morphometric characters are based on Hubbs and Lagler (1964) except for snout to anus length, anus to anal-fin length, and mandible length. Snout to anus length was measured as tip of snout to origin of anus; anus to anal-fin length was from the end of the anus to the origin of the anal fin; mandible length was from the tip of the lower jaw to the end of the mandible. Morphometric characters from landmarks 8, 17-31, 33-34 and 36-37 (Table 2) were additional truss measurements (Strauss and Bookstein 1982).

**Abbreviations:** SL, standard length; HL, head length; UMMZ, University of Michigan Museum of Zoology, Ann Arbor, Michigan, USA; KU, University of Kansas Museum of Natural History; ZSI/SRS, Zoological Survey of India (Southern Regional Station, Chennai, India); MSUMNH, Manonmaniam Sundaranar University Museum of Natural History, Alwarkurichi, Tamil Nadu, India; CMA, Collections of M. Arunachalam.

## Results

### *Psilorhynchus platydorsalis*, new species

(Figs. 1-4, Tables 2-3)

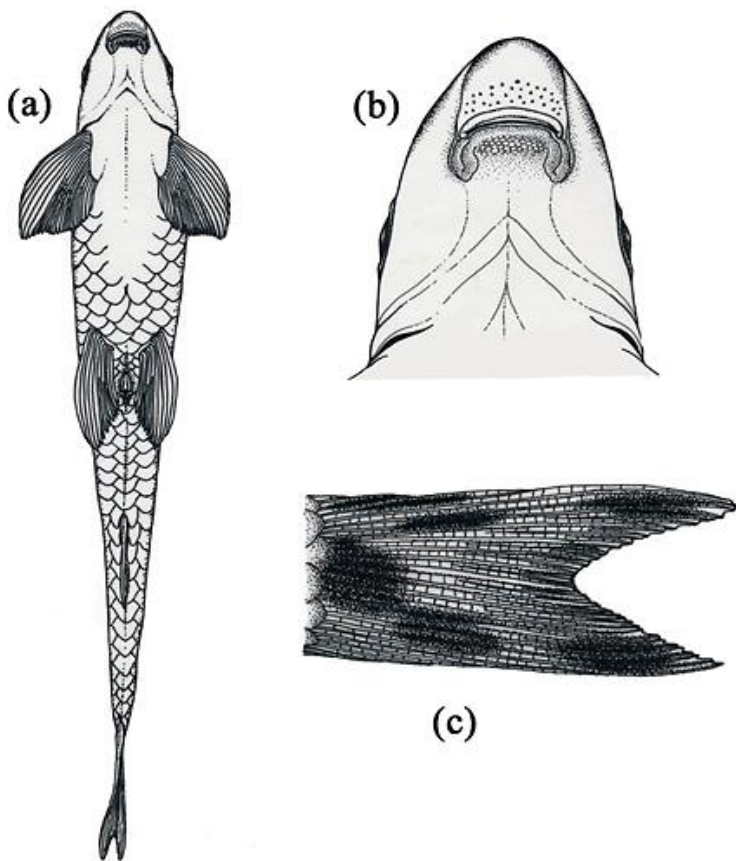
**Holotype:** ZSI/SRS F.8440, male, 38.39 mm SL; Son River, Koilwar Village, Bhojpur District, Bihar, India, (25°18'15.2"N, 84°25'38.2"E), M. Arunachalam and C. Vijayakumar, 21 February 2011.

**Paratypes:** MSUMNH 55, 1, male, 47.50 mm SL; CMA 13, 1, male, 39.78 mm SL; same data as holotype.

**Diagnosis:** Morphometric and meristic characters of the holotype and paratypes are given in Tables 2 and 3. *Psilorhynchus platydorsalis* differs from *P. balitora* in having fewer pectoral-fin rays (v,9 vs. vi,10-11), more



**Figure 1.** Lateral coloration of *Psilorhynchus platydorsalis* sp. nov. Holotype: ZSI/SRS F.8440, male, 38.39 mm SL; Son River, Koilwar Village, Bhojpur District, Bihar, India.



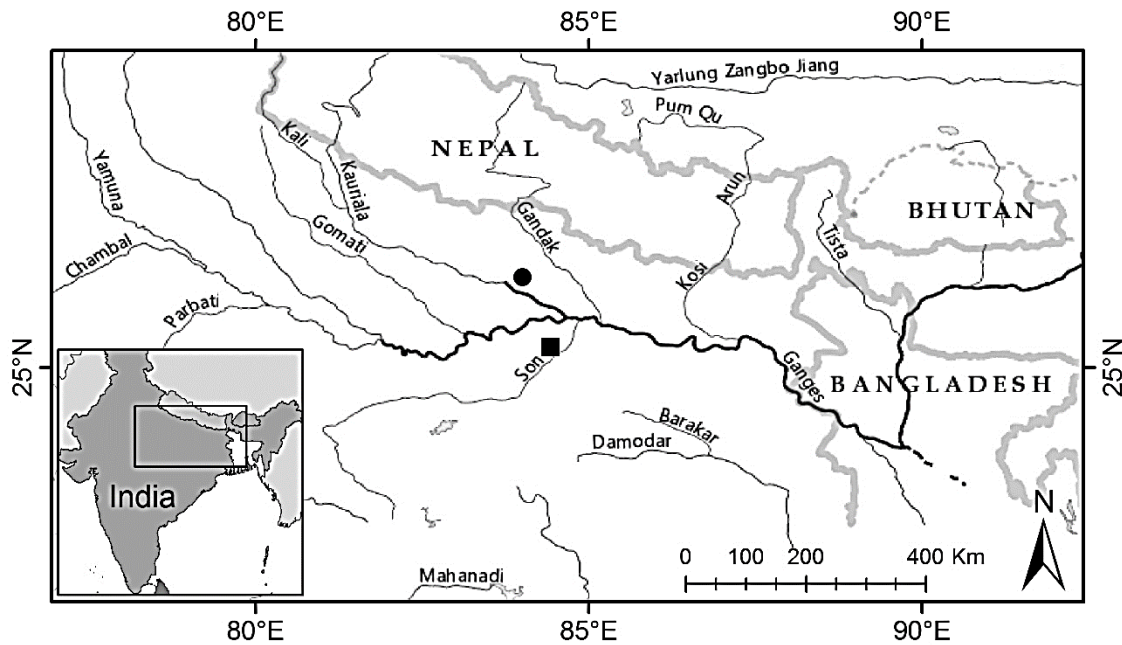
**Figure 2.** Drawings of *Psilorhynchus platydorsalis*, sp. nov., showing aspects of body, head, and fins for shape, size, squamation and pigmentation. (a) ventral view and squamation patterns, (b) ventral view of head and mouth, and (c) pigment pattern on caudal fin.

lateral-line scale rows (35 vs. 33-34), shorter pectoral-fin (19.1-20.5 vs. 24.3-28.2 %SL), and shorter occiput to pectoral-fin insertion (11.8-12.5 vs. 14.9-18.6 %SL).

*Psilorhynchus platydorsalis* differs from *P. sucatio* in several features. These include absence of transverse breast scale rows (vs. present), more dorsal-fin rays (iii,8 vs. ii,7), fewer principle caudal-fin rays (9+8 vs. 9+9), fewer scale rows between anus and anal fin (8.5-9 vs. 10-11), greater pre-pelvic length (53.2-53.8 vs. 41.5-49.1 %SL), shorter caudal fin (21.2-22.8 vs. 25.4-26.1 %SL), shorter distance between dorsal-fin insertion and base of caudal fin (38.7-40.6 vs. 43.9-45.9 %SL), greater distance between pectoral and pelvic insertions (31.3-33.1 vs. 22.2-29.9 %SL), greater post-dorsal length (51.9-54.6 vs. 40.6-46.2 %SL), greater distance between snout and anus (62.3-63.3 vs. 58.2-60.1 %SL), shorter upper jaw (11.7-11.8 vs. 26.3-30.1 %HL), narrower internasal width (24.9-29.7 vs. 32.6-34.9 %HL), greater head depth at nostril (33.2-33.5 vs. 23.26-24.7 %HL), at pupil

**Table 2.** Morphometric character variation in *Psilorhynchus platydorsalis* sp. nov. and *Psilorhynchus kuwana* sp. nov. Body character measurements are represented as % standard length and head character measurements are represented as % head length.

Measurements from point to point (identified by numbers and names)	<i>P. platydorsalis</i>		<i>P. kuwana</i>	
	Holotype ZSI/SRC F. 8440.	Paratypes MSUMNH55, CMA 13, n=2	Holotype MSUMNH1.	Paratypes ZSI/SRC F.8576, MSUMNH56, CMA14, n=15
Standard length (mm)	38.79	39.78-47.50	65.62	46.2-.57.6
<b>% standard length</b>				
Snout to urocentrum	96.85	95.96-96.00	95.7	92.4-97.8
Pre-anal length	79.84	80.24-83.18	79.0	74.7-83.6
Pre-dorsal length	46.29	46.61-46.67	43.9	43.6-46.6
Pre-pelvic length	53.24	53.37-53.80	49.8	47.8-52.6
Pre-pectoral length	19.77	20.21-21.27	22.4	21.6-24.4
Pre-occipital length	21.94	22.07-22.52	98.1	89.2-105.3
Caudal peduncle length	12.29	11.11-13.31	13.7	11.4-15.4
Dorsal-fin origin to pelvic-fin insertion	17.92	17.93-18.98	19.6	17.2-22.1
Dorsal spinous height	20.08	19.83-20.79	17.4	17.1-24.8
Anal fin height	15.00	13.60-14.11	14.0	12.2-16.7
Depth of caudal peduncle	7.27	7.08-8.20	6.1	5.8-12.2
Caudal fin length	21.28	22.60-22.85	23.4	19.4-25.5
Dorsal fin height	20.58	20.60-22.02	21.4	21.4-26.5
Pectoral fin length	19.07	20.26-20.59	17.1	15.6-19.4
Pelvic fin length	17.60	16.72-17.27	18.7	17.0-19.4
Pelvic axillary scale length	3.18	2.74-3.59	4.7	4.1-5.9
Occiput to dorsal-fin origin	25.03	24.43-25.61	24.0	22.0-27.7
Occiput to pectoral-fin insertion	12.58	11.88-12.19	13.6	12.3-14.6
Occiput to pelvic-fin insertion	34.23	34.09-34.99	35.6	32.9-38.5
Dorsal-fin origin to pelvic -fin insertion	15.81	14.39-16.54	14.1	12.6-15.1
Dorsal -fin origin to pectoral -fin insertion	29.33	28.72-29.11	22.2	22.2-26.5
Dorsal-fin origin to anal-fin origin	36.26	37.56-40.62	39.5	44.4-48.1
Dorsal-fin insertion to caudal fin base	40.04	38.79-40.62	46.1	44.4-48.1
Dorsal-fin origin to anal-fin origin	22.58	26.77-27.04	30.1	25.2-30.1
Dorsal-fin origin to anal-fin insertion	29.25	29.20-31.65	32.3	29.0-34.3
Dorsal -fin base length	14.59	12.83-13.55	11.5	9.6-12.4
Anal -fin base length	6.90	5.72-6.06	5.2	4.3-5.9
Pectoral-fin insertion to pelvic-fin insertion	31.36	31.33-33.16	27.0	24.9-28.2
Pectoral-fin insertion to anal-fin origin	57.46	60.41-63.42	53.6	49.8-55.0
Pelvic -fin insertion to anal-fin origin	26.54	28.62-31.80	27.5	24.1-28.6
Post-dorsal length	54.60	51.96-53.50	56.7	54.2-58.8
Body depth	15.16	15.16-18.80	17.7	14.7-19.9
Distance between pectoral -fin and vent	38.76	39.94-42.53	37.6	34.9-39.1
Distance between pelvic -fin and vent	9.27	9.69-10.58	12.3	9.7-12.3
Caudal peduncle width	3.12	3.14-3.16	2.2	1.9-2.5
Snout to anus length	63.30	60.12-63.34	57.9	26.7-61.7
Anus to anal -fin length	21.37	18.40-19.65	22.3	9.5-22.3
Head length	19.66	20.12-20.84	21.7	10.1-23.5
<b>% head length</b>				
Snout to opercle	89.63	87.20-94.25	87.8	85.2-91.2
Upper jaw length	11.75	11.71-11.88	11.9	11.3-16.6
Snout length	46.50	51.12-51.60	54.6	48.3-56.6
Prenasal length	40.23	35.63-42.68	44.3	38.2-50.4
Orbit width	32.00	30.61-33.33	29.0	25.7-44.1
Interorbital width	35.75	33.72-40.85	42.4	31.0-43.0
Internasal width	28.00	24.90-29.76	38.1	31.8-43.0
Head width	62.13	62.13-63.98	63.4	54.2-65.0
Gape width	21.32	20.98-21.46	22.6	20.4-30.2
Lower jaw to isthmus	52.02	51.98-52.44	56.2	48.7-57.0
Head depth at nostril	33.38	33.21-33.54	26.4	22.5-28.3
Head depth at pupil	46.25	44.70-46.25	37.7	33.6-38.5
Head depth at occiput	52.88	52.56-55.56	46.2	39.5-49.6
Mandible length	6.87	6.83-6.92	12.3	9.6-14.7



**Figure 3.** Type localities of *Psilorhynchus platydorsalis* (solid square) and *P. kuwana* (solid circle).

(44.7-46.2 vs. 33.7-38.9 %HL), and at occiput (52.5-55.5 vs. 41.9-47.9 %HL), and a much shorter mandible (6.8-6.9 vs. 16.3-18.4 %HL) rows.

*Psilorhynchus platydorsalis* differs from *P. nudithoracicus* in having fewer pectoral-fin rays, (v,9 vs. iv,10), more pre-anal scales (7 vs. 6), greater pre-anal length (79.8-83.1 vs. 74-78.5 %SL), greater pre-pelvic length (53.2-53.8 vs. 45.7-49.5 %SL), shorter caudal fin (21.2-22.8 vs. 29.9-34.5 %SL), shorter pectoral fin (19.0-20.5 vs. 23.8-25.4 %SL), shorter pelvic fin (16.7-17.6 vs. 19.5-20.3 %SL), shorter length of pelvic axillary scales (2.7-3.5 vs. 4.2-5.7 %SL), shorter distance between dorsal-fin origin and pectoral-fin insertion (28.7-29.3 vs. 30.6-32.2 %SL), shorter length from dorsal-fin origin to base of caudal fin (38.7-40.6 vs. 41.1-45.1 %SL), greater post-dorsal length (51.5-54.6 vs. 36.9-41.6 %SL), wider caudal peduncle (3.1-3.2 vs. 1.9-2.9 %SL), shorter upper jaw (11.7-11.8 vs. 29.3-34.8 %HL), narrower internasal width (24.9-29.7 vs. 32.1-34.5 %HL), narrower gape width (20.9-21.4 vs. 24.6-29.3 %HL), greater mandible to isthmus distance (51.9-52.4 vs. 46.2-49.5 %HL), greater head depth at nostril (33.2-33.5 vs. 24.2-26.2 %HL), at pupil (44.7-46.3 vs. 53.1-61.9 %HL), and at occiput (52.5-55.5 vs. 37.5-39.1 %HL), and shorter mandible (6.83-6.9 vs. 18.1-21.9 %HL).

*Psilorhynchus platydorsalis* differs from *P. amplicephalus* in having fewer scale rows between anus and anal fin (8½-9 vs. 10), shorter pre-dorsal length (46.2-46.6 vs. 48.8-54.1 %SL), shorter distance between dorsal-fin origin and pelvic-fin insertion (17.9-18.9 vs. 22.4-24.8 %SL), shorter pectoral fin (19-20.5 vs. 23.6-28 %SL), shorter pelvic fin (16.7-17.6 vs. 19-22.3 %SL), shorter distance between occiput and dorsal-fin origin (24.4-25.6 vs. 27.8-31.8 %SL), shorter distance between occiput and pectoral-fin insertion (11.8-12.5 vs. 17.2-20.4 %SL), shorter distance between occiput and pelvic-fin insertion (34.0-34.9 vs. 38.4-43.1 %SL), greater distance between pectoral-fin insertion and anal-fin origin (57.4-63.4 vs. 50.7-54.6 %SL), lesser body depth (15.1-18.8 vs. 20.5-22.8 %SL), shorter upper jaw (11.7-11.8 vs. 18.3-23.4 %HL), shorter snout length (46.5-51.6 vs. 53-57.3 %HL), narrower head width (62.1-63.9 vs. 77.5-84.5 %HL), narrower gape width (20.9-21.4 vs. 28.4-33.5 %HL) and at pupil (44.7-46.2 vs. 50.9-55.3 %HL), lesser head depth at occiput (52.5-55.5 vs. 60.4-64.4 %HL), and shorter mandible length (6.8-6.9 vs. 16.6-19.1 %HL).

*Psilorhynchus platydorsalis* is distinguished from *P. tenura* by presence of abdominal scales (vs. absence), more circumferential scale rows (18 vs. 15), fewer pectoral-fin rays (v,9 vs. v-vi,10-12), more principal caudal

**Table 3.** Meristic characters of *Psilorhynchus platydorsalis* sp. nov. and *Psilorhynchus kuwana* sp. nov.

Meristic characters	<i>P. platydorsalis</i>		<i>P. kuwana</i>	
	Holotype ZSI/SRS F. 8440.	Paratypes MSUMNH55, CMA 13, n=2	Holotype MSUMNH1.	Paratypes ZSI/SRS F.8576, MSUMNH56, CMA14, n=15
Dorsal-fin rays	iii.8	iii.8	iii.7	iii.7
Anal-fin rays	ii.5	ii.5	ii.5	ii.5
Pelvic-fin rays	ii.7	ii.7	ii. 7-8	ii. 7-8
Pectoral-fin rays	v.10	v. 9	iv.9	iv. 8-9
Caudal-fin rays	9+8	9+8	8+8	8+8
Upper transverse scale rows	4	4	4	4
Lower transverse scale rows	2.5	2.5	2	2-2.5
Lateral line to pelvic scale rows	2	2	2	2
Lateral line scales	35	35	37	36-37
Pre-dorsal scales	10	10	10	10
Circumpeduncular scale rows	10	10	10	10
Circumferential scale rows	18	18	16	16-18
Anal scale rows	8.5	8.5-9	10	9-10

rays (9+8 vs. 8+7), greater pre-pelvic length (53.2-53.8 vs. 46.7-52.8 %SL), greater dorsal fin height (19.8-20.8 vs. 13.6-16.5 %SL), greater length between dorsal-fin origin and pectoral-fin insertion (28.7-29.3 vs. 18.7-24.6 %SL), greater caudal peduncle width (3.1-3.2 vs. 2.3-2.8 %SL), greater snout to anus length (62.3-63.3 vs. 52.5-60.7 %SL), shorter pectoral fin (19.1-20.6 vs. 24.3-28.5 %SL), shorter pelvic fin (16.7-17.6 vs. 18.6-21.1 %SL), shorter upper jaw (11.7-11.8 vs. 16.1-20.2 %HL), narrower orbit (30.6-33.3 vs. 34.5-37.8 %HL), narrower head width (62.1-64.0 vs. 67.8-74.1 %HL), narrower gape width (20.9-21.4 vs. 26.8-32.7 %HL), and shorter mandible (6.8-6.9 vs. 14.3-16.7 %HL).

*Psilorhynchus platydorsalis* differs from *P. kuwana* sp. nov. in having more dorsal-fin rays (iii.8 vs. iii. 7), typically more pectoral-fin rays (v,9 vs. vi,8-9), fewer lateral-line scales (35 vs. 36-37), more branched caudal-fin rays (9+8 vs. 8+8), and shorter axillary pelvic scale (2.7-3.5 vs. 3.9-5.9 %SL), greater distance between pectoral-fin insertion and pelvic-fin insertion (31.3-33.1 vs. 24.8-28.2 %SL), greater distance between pectoral-fin insertion and anal-fin origin (57.4-63.4 vs. 49.7-55 %SL), wider caudal peduncle (3.12-3.16 vs. 1.73-2.47 %SL), greater snout to anus length (62.3-63.3 vs. 56-61.9 %SL), narrower internasal width (24.9-29.7 vs. 39.7-42.9 %HL), narrower gape width (20.9-21.4 vs. 22.4-30.1 %HL), greater head depth at nostril (33.2-33.5 vs. 22.5-28.3 %HL), at pupil (44.7-46.2 vs. 33.5-38.5 %HL), and at occiput (52.5-55.5 vs. 39.5-49.5 %HL), and shorter mandible (6.8-6.9 vs. 9.6-14.7 %HL).

*Psilorhynchus platydorsalis* is distinguished from *P. pseudecheneis* in having more principal caudal-fin rays (9+8 vs. 8+7), more dorsal-fin rays (iii.8, vs. ii,7), fewer pelvic-fin rays (ii,7 vs. vii-x,9-11), more pectoral-fin rays (v,9 vs. ii,7), fewer lateral-line scales (35-36 vs. 48-50), fewer upper transverse scale rows (4 vs. 5), presence of scales on venter (vs. absent). It also differs in having a greater pre-pectoral length (19.77-21.27 vs. 13.94-18.32 %SL), greater pre-pelvic length (53.24-53.80 vs. 43.3-46.25 %SL), greater pre-occipital length (21.9-22.5 vs. 18.4-20.9 %SL), greater dorsal-fin origin to pelvic-fin insertion (17.92-18.98 vs. 9.86-13.67 %SL), deeper caudal peduncle (7.08-8.2 vs. 5.38-6.48 %SL), shorter pectoral fin (19.07-20.59 vs. 26.95-30.84 %SL), shorter pelvic fin (16.72-17.6 vs. 19.25-21.45 %SL), greater distance between dorsal-fin origin and pelvic-fin insertion (14.39-16.54 vs. 7.92-11.95 %SL), greater distance between dorsal-fin origin and pectoral-fin insertion (28.72-29.33 vs. 18.59-24.62 %SL), deeper body (15.16-18.8 vs. 7.57-9.53 %SL), greater caudal peduncle width (3.12-3.16 vs. 1.71-1.87 %SL), greater distance between snout and anus (62.34-63.3 vs. 55.32-59.95 %SL), shorter distance between anus and anal fin (18.41-21.37 vs. 21.77-25.5 %SL), shorter upper jaw



**Figure 4.** Type locality of *Psilorhynchus platydorsalis*. Son River, Koilwar Village, Bhojpur District, Bihar, India.

(11.71-11.88 vs. 18.4-27.43 %HL), narrower interorbital width (33.72-40.85 vs. 42.9-49.76 %HL), narrower internasal width (24.9-29.76 vs. 32.37-37.77 %HL), narrower head (62.13-63.98 vs. 75.81-84.79 %HL), narrower gape (20.98-21.46 vs. 28.1-35.26 %HL), greater head depth at nostril (33.21-33.54 vs. 22.66-30.73 %HL) and at occiput (52.56-55.56 vs. 42.93-50.73 %HL), and shorter mandible (6.83-6.9 vs. 14.33-21.9 %HL).

*Psilorhynchus platydorsalis* is distinguished from *P. nepalensis* in having more principal caudal-fin rays (9+8 vs. 8+7), shorter pre-dorsal length (46.29-46.67 vs. 48.13-49.17 %SL), shorter pre-occipital length (21.94-22.52 vs. 23.08-23.4 %SL), greater caudal peduncle length (11.11-13.31 vs. 9.44-9.52 %SL), shorter distance between dorsal-fin origin and pelvic fin insertion (17.92-18.98 vs. 22.01-22.87 %SL), greater dorsal fin height (19.83-20.79 vs. 14.57-15.57 %SL), shorter pectoral fin (19.07-20.59 vs. 23.31-24.69 %SL), shorter pelvic fin (16.72-17.62 vs. 19.65-20.00 %SL), shorter pelvic axillary scale (2.74-3.59 vs. 4.44-4.52 %SL), shorter distance between occiput and dorsal origin (24.43-25.61 vs. 27.45-28.83 %SL), shorter distance between occiput and pectoral insertion (11.88-12.58 vs. 16.66-16.85 %SL), greater distance between dorsal-fin origin to pectoral-fin insertion (28.72-29.33 vs. 23.98-25.19 %SL), shorter dorsal fin base (12.83-14.59 vs. 15.26-15.98 %SL), greater distance between pectoral-fin insertion and anal-fin origin (57.46-63.42 vs. 51.28-52.44%SL), shorter head (19.66-20.84 vs. 21.76-22.31 %SL), shorter distance from pelvic-fin to vent (9.27-10.58 vs. 11.39-12.47 %SL), wider caudal peduncle (3.12-3.16 vs. 2.43-2.63 %SL), shorter upper jaw (11.71-11.88 vs. 20-20.43 %HL), shorter snout (46.5-51.6 vs. 56.14-58.34 %HL), narrower internasal width (24.9-29.76 vs. 30.65-33.44 %HL), narrower head (62.13-63.98 vs. 73.44-76.38 %HL), narrower gape (20.98-21.46 vs. 30.52-31.12 %HL), shorter distance from mandible to isthmus (51.98-52.44 vs. 56.04-61.25 %HL), narrower head depth at nostril (33.21-33.54 vs. 35.51-37.01 %HL), at pupil (44.7-46.25 vs. 56.25-56.98 %HL), and at occiput (52.56-55.56 vs. 66.46-68.88 %HL), and shorter mandible (6.83-6.9 vs. 17.19-19.78 %HL).

*Psilorhynchus platydorsalis* is distinguished from *P. chakpiensis* in having fewer principal caudal-fin rays (9+8 vs. 10+9), fewer pectoral-fin rays (v,9 vs. v,10), fewer anal-fin rays (ii, 5 vs. ii, 6), more lateral-line scales (35 vs. 30-31). From *P. microphthalmus* it is distinguished in having fewer pectoral-fin rays (v,9 vs. vii,10),

fewer lateral-line scales (35 vs. 37-38). From *P. breviminor* it is distinguished in having fewer dorsal-fin rays (iii,8 vs. iii, 9), pectoral-fin rays (v,9 vs. v,10-11), and anal-fin rays (ii,5 vs. iii,6); and more lateral-line scales (35 vs. 32). It is distinguished from *P. brachyrhynchus* in having fewer dorsal-fin rays (iii,8 vs. iii,9), fewer pectoral-fin rays (v,9 vs. v,10), fewer principal caudal-fin rays (9+8 vs. 10+9-10), more lateral-line scales (35 vs. 32-34). It is distinguished from *P. piperatus* in having fewer dorsal-fin rays (iii,8 vs. iii,9), fewer pectoral-fin rays (v,9 vs. v,11), more anal-fin rays (ii 7 vs. ii 6), fewer principal caudal-fin rays (9+8 vs. 9+9), more lateral-line scales (35 vs. 32-33). From *P. gokkyi* it is distinguished in having fewer dorsal-fin rays (iii,8 vs. iii,9-10), fewer pectoral-fin rays (v,9 vs. v-vi,10-11), fewer principal caudal-fin rays (9+8 vs. 10+9), and more lateral-line scales (35 vs. 32-34). From *P. rowleyi* it is distinguished in having fewer anal-fin rays (ii 5 vs. ii 6), principal caudal-fin rays (9+8 vs. 9+9), and lateral-line scales (35 vs. 39-42). It is distinguished from *P. khopai* in having fewer pre-dorsal scales (10 vs. 14-17) and fewer lateral-line scales (35 vs. 39-41).

*Psilorhynchus platydorsalis* is distinguished from *P. homaloptera* in having fewer lateral-line scales (35 vs. 37-38) and fewer pre-dorsal scales (10 vs. 12-13). From *P. arunachalensis* it differs in having fewer lateral-line scales (35 vs. 42-44) and fewer pre-dorsal scales (10 vs. 13-18). It differs from *P. hamiltoni* in having fewer dorsal-fin rays (iii,8 vs. iii,9), fewer anal-fin rays (ii,5 vs. ii,6), usually fewer pectoral-fin rays (v,9 vs. v-vi,9-11) and usually fewer pre-dorsal scales (10 vs. 10-11). It is distinguished from *P. pavimentatus* in having more lateral-line scales (35 vs. 31-33) and usually fewer pre-dorsal scales (10 vs. 10-12). It is distinguished from *P. rahmani* in having fewer dorsal-fin rays (iii,8 vs. iii,9), usually fewer anal-fin rays (ii,5 vs. iii,5-6), and more lateral-line scales (35 vs. 29-32). From *P. robustus* it is distinguished in having fewer pectoral-fin rays (v,9 vs. v,10-11), principal caudal-fin rays (9+8 vs. 10+10), and more lateral-line scales (35 vs. 32-34). It is distinct from *P. melissa* in having fewer pectoral-fin rays (v,9 vs. v,11), principal caudal-fin rays (9+8 vs. 10+9), more lateral-line scales (35 vs. 32-34). It is distinct from *P. maculatus* in having fewer pre-dorsal scales (10 vs. 11-12) and fewer anal-scale rows (8.5-9 vs. 10-11). It is distinct from *P. ngathanu* in having fewer pre-dorsal scales (10 vs. 11) and fewer anal-scale rows (8.5-9 vs. 10-11). It is distinct from *P. kaladanensis* in having fewer dorsal-fin rays (iii,8 vs. iii,9) and more lateral-line scales (35 vs. 31-34). It is distinct from *P. olliei* in having more lateral-line scales (35 vs. 31-32) and fewer anal-scale rows (8.5-9 vs. 10-11). It is distinct from *P. tysoni* in having more pre-dorsal scales (10 vs. 9) and fewer dorsal-fin rays (iii,8 vs. iii,9). It is distinguished from *P. konemi* in having fewer lateral-line scales (35 vs. 39-40+2), fewer pre-dorsal scales (10 vs. 13), and fewer anus to anal fin scale rows (8.5-9 vs. 12).

**Description:** Body elongate; dorsum slightly arched; venter flat, ventral profile horizontal up to anal-fin origin and inclining to base of caudal fin (Fig. 1a, b). Body depth greatest at dorsal fin origin. Head and eye small, mouth inferior, snout not rounded but somewhat conical in shape. Ventral surface of snout bordered by deep longitudinal groove on each side. Rostral cap and upper lip fused, separated by a shallow groove. Lower jaw covered by thick cushion composed of two folds of adnate tissues. Papillated posterior lateral skin fold appears as two cushions. Upper lip with horizontally arranged uncini; lower lip strongly papillated (Fig. 2a, b).

Dorsal-fin rays iii,8 (3 specimens), anal-fin rays ii,5(3), pelvic-fin rays ii,7(3), pectoral-fin rays iv,9(2) or 10(1), and caudal-fin rays 9+8(3). Paired fins large, horizontally placed; when depressed, pectoral fin not reaching vertical of dorsal fin origin (two scales posterior dorsal origin); depressed pectoral fin reaching to one and ½ scales anterior to insertion of pelvic fin. Pelvic fin insertion anterior to dorsal fin origin by three branched dorsal-fin rays. Skin on ventral surface of unbranched pectoral-and pelvic-fin rays thick and covered by a layer of uncini forming friction or adhesive pads. Dorsal fin high, tip weakly rounded; posterior margin concave. Anal fin short with pointed tip; depressed fin not reaching base of caudal fin. Anus located 3 scale rows posterior to pelvic fin origin.

Lateral-line scales 35(3), pre-dorsal scales 10(3), upper transverse scale rows 4(3), lateral line to pelvic scale



rows 2(3), lower transverse scale rows 2.5(3), circumpeduncular scale rows 10(3), circumferential scale rows 18(3), and anal scale rows 8.5(2) or 9(1).

**Coloration:** Dorsum of body and head lightly pigmented; scales on body from dorsum to upper half of scales in scale row below lateral line with dark distal edges and few to no melanophores basally and centrally; no stripped pattern created by pigmentation on dorsolateral scales. Scales below with pigmented upper halves, those immediately below lateral line immaculate. Venter immaculate. Body with 8-9 indistinct squarish dark blotches on mid-lateral scales in region of lateral line; no dark lateral stripe connecting blotches. First blotch beginning at posterior edge of operculum, second near pectoral fin insertion, third near depressed tip of pectoral fin, fourth at vertical to dorsal fin origin, fifth, sixth, seventh and eighth before caudal fin and ninth nearer caudal fin base. Preorbital stripe extending onto short snout. Dorsum with eight squarish to indistinct oval dark blotches. Margins of caudal-fin rays of upper and lower lobes with dark aggregated melanophores; single dark blotch present in middle of caudal lobe; aggregations and irregularly shaped melanophores occurring immediately below blotch. Melanophores present above black caudal fin blotch in narrow stripe, more slender relative to that of the lower lobe. Two dark blotches on upper and lower lobes of caudal fin anterior to distal dark band. Anterior-most dark blotches on first to third branched rays of upper and lower lobes separated from caudal spot and caudal base by narrow clear band; posterior-most dark blotches occurring immediately anterior to distal dark band and on first two to three branched rays (Fig. 2c). Bases of dorsal, anal, pectoral, and pelvic fins without dark spots. Pectoral fin rays each with narrow line of melanophores. Dorsal-fin rays lined with melanophores; dark concentrations creating dark spot on anterior branched rays 2-4; distal edge of dorsal fin with band from concentration of melanophores. Pelvic- and anal-fin rays lightly lined with melanophores; anal fin with darkened subdistal band.

**Distribution and Habitat:** The Son River (Figs. 3 and 4; 25°18'15.2"N, 84°25'38.2"E (Square)) (also spelled Sone) originates near Amar Gantak in Madhya Pradesh, India, just east of the headwaters of the Narmada River (Gujarat), and flows north-northwest through the state of Madhya Pradesh before turning sharply eastward where it enters the Kaimur Hill Range and flows in a southwest to northeast direction. The Son River parallels the Kaimur Hills, flowing east-northeast through the Indian states of Uttar Pradesh, Jharkhand, and Bihar before joining the Ganges River just upstream of Patna. It is a lowland sandy river at the village of Koilwar, Bhojpur District, Bihar. The river where this species was sampled was shallow (0.5 m) and the substrate consisted predominantly of sand with vascular hydrophytes and algae. The river reach (500 m) is highly disturbed with sand mining from the active floodplain along the right (north) bank. The left (south, east, and west) bank is completely devoid of sand on this side of the river; bathing and washing of cloths and utensils by the local villagers is very common.

**Etymology:** From the Greek *platy* for flat and the Latin *dorsalis* for “of the back” in reference to the flat dorsum.

**Distribution:** This species is currently known only from its type locality.

### ***Psilorhynchus kuwana*, new species**

(Figs. 5-7, Tables 2-3)

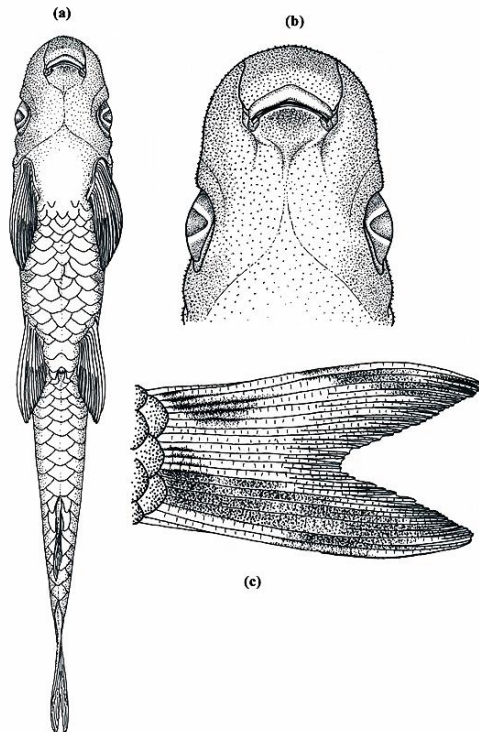
**Holotype:** MSUMNH 1, male, 65.62 mm SL; Kuwana River, Pathar Village, Devario District, Uttar Pradesh, India (26°20'56.4"N, 84°00'38.7"E), M. Arunachalam & C. Vijayakumar, 21 February 2011.

**Paratypes:** ZSI/SRS F.8576, 1, male, 62.6 mm SL; MSUMNH 56, 9, 46.2-53.6 mm SL; CMA14, 5, 45.2-57.6 mm SL; All with same data as holotype.

**Diagnosis:** *Psilorhynchus kuwana* is distinguished from all other species of *Psilorhynchus* in having a combination of multiple traits. It is distinguished from *P. balitora* in having fewer dorsal-fin rays (iii,7 vs. iii,8), fewer pectoral-fin rays (vi,8-9 vs. vi,10-11), more lateral-line scales (36-37 vs. 33-34), shorter pre-dorsal length (43.5-46.6 vs. 47.0-53.3 %SL), greater caudal peduncle length (11.3-17.4 vs. 5.8-7.7 %SL), shorter pectoral fins



**Figure 5.** Dorso-lateral (upper) and ventral (lower) coloration of *Psilorhynchus kuwana* sp. nov. Holotype; MSUMNH 1, male, 65.62 mm SL; Kuwana River, Pathar Village, Devario District, Uttar Pradesh, India.



**Figure 6.** Drawings of *Psilorhynchus kuwana*, sp. nov. showing aspects of body, head, and fins for shape, size, squamation, and pigmentation. (a) ventral view and squamation pattern, (b) ventral view of head and mouth, and (c) pigment pattern on caudal fin.

(15.6-19.3 vs. 24.3-28.3 %SL), and greater post-dorsal length (54.2-58.7 vs. 47.2-53.8 %SL). It is distinguished from *P. sucatio* in having fewer branched caudal-fin rays (8+8 vs. 9+9), usually fewer scale rows between anus and anal fin (9-10 vs. 10-11), greater pre-pectoral length (21.6-24.3 vs. 16.6-20.2 %SL), greater post-dorsal length (54.2-58.7 vs. 40.6-46.2 %SL), shorter upper jaw (11.3- 16.5 vs. 26.3-30.1%HL), narrower interorbital (31-36.4 vs. 41.5-45 %HL), broader internasal (39.7-42.9 vs. 32.6-34.9 %HL), and shorter mandible (9.6-14.7 vs. 16.3-18.4 %HL). It is distinguished from *P. nudithoracicus* in having fewer dorsal-fin rays (iii,7 vs. iii,8),

pectoral-fin rays (iv,8-9 vs. iv,10), and branched caudal-fin rays (8+8 vs. 9+8), greater pre-pectoral length (21.6-24.3 vs. 18-20.8 %SL) and post-dorsal length (54.2-58.7 vs. 36.9-41.6 %SL), shorter caudal fin length (21.4-25.5 vs. 29.9-34.5 %SL), pectoral-fin length (15.6-19.3 vs. 23.8-25.4 %SL), and pelvic fin (16.9-19.3 vs. 19.5-20.3 %SL); shorter distance between dorsal-fin origin and pectoral-fin insertion (22.2-26.7 vs. 30.6-32.2 %SL), shorter upper jaw (11.3-16.5 vs. 29.2-34.8 %HL), smaller orbit (25.7-32.18 vs. 33.1-37.8 %HL), narrower interorbital width (31-36.4 vs. 38-43.9 %HL), broader internasal width (39.7-42.9 vs. 32.1-34.5 %HL), lesser head depth at pupil (33.5-38.5 vs. 53.1-61.9 %HL), and shorter mandible (9.6-14.7 vs. 18.1-21.9 %HL). It is distinguished from *P. amplicephalus* in having fewer dorsal-fin rays (iii,7 vs. iii,8), pectoral-fin rays (vi, 8-9 vs. v,12), and principle caudal-fin rays (8+8 vs. 9+8), more pre-anal scale rows (12-16 vs. 6-8), shorter pre-dorsal length (43.5-46.6 vs. 48.8-54.1 %SL), pectoral fin length (15.6-19.3 vs. 23.6-28 %SL), distance between occiput and dorsal-fin origin (22.0-27.7 vs. 27.8-31.8 %SL), distance between occiput and pectoral-fin insertion (12.2-14.6 vs. 17.2-20.4 %SL), distance between dorsal-fin origin and pelvic-fin insertion (12.57-15.1 vs. 15.1-20.5 %SL), length of dorsal fin base (9.6-12.4 vs. 14.5-17.6 %SL), length of anal fin base (4.2-5.87 vs. 6.5-7.2 %SL), distance between pectoral-fin insertion and pelvic-fin insertion (24.8-28.2 vs. 30.1-33.8 %SL), distance between insertion of pectoral fin and vent (34.9-39 vs. 40.5-43.4 %SL), lesser body depth (14.7-19.8 vs. 20.5-22.8 %SL), narrower caudal peduncle (1.7-2.4 vs. 2.7-4.1 %SL), shorter upper jaw (11.3-16.5 vs. 18.3-23.4 %SL), narrower interorbital (31-36.4 vs. 40.4-44 %HL), broader internasal with (39.7-42.9 vs. 31.2-36.6 %HL), lesser head depth (64-72.9 vs. 77.5-84.5 %HL), depth at nostril (22.5-28.3 vs. 33.2-38 %HL), at pupil (33.5-38.5 vs. 50.9-55.3 %HL), and at occiput (39.5-49.5 vs. 60.4-64.4 %HL), and shorter mandible (9.6-14.7 vs. 16.6-19.1 %HL). It is distinguished from *P. tenura* in having abdominal scales (vs. absent), fewer pectoral-fin rays (vi, 8-9 vs. v-vi, 10-12), usually fewer pre-dorsal scales (10 vs. 10-11), more branched caudal-fin rays (8+8 vs. 8+7), more circumferential scale rows (16-18 vs. 15), fewer scale rows between anus and anal fin origin (9-10 vs. 11-12), greater length of caudal peduncle (11.3-17.4 vs. 9.7-11.1 %SL), taller first dorsal fin (17.1-24.8 vs. 13.6-16.5 %SL), shorter pectoral fin (15.6-19.3 vs. 24.3-28.5 %SL), shorter dorsal-fin base (9.63-12.4 vs. 14.1-17.5 %SL), greater post-dorsal length (54.2-58.7 vs. 48.7-52.8 %SL), smaller orbit (25.7-32.1 vs. 34.5-37.8 %HL), and greater internasal width (39.7-42.9 vs. 21.4-29.3 %HL).

*Psilorhynchus kuwana* is distinguished from *P. pseudecheneis* in having fewer lateral-line scales (36-37 vs. 48-50), fewer upper transverse scale rows (4 vs. 5), presence of circumferential scale rows (vs. absent), presence of anal scale rows (vs. absent), greater distance from dorsal-fin origin to pelvic-fin insertion (17.16-22.06 vs. 9.86-13.67 %SL), greater pre-pelvic length (47.79-52.6 vs. 43.3-46.25 %SL), greater pre-pectoral length (21.6-24.38 vs. 13.94-18.32 %SL), shorter pectoral fin (15.63-19.37 vs. 26.95-30.84 %SL), longer head (21.35-24.12 vs. 18.3-20.21 %SL), deeper body (14.72-19.85 vs. 7.57-9.53 %SL), shorter head (11.32-16.59 vs. 18.4-29.43 %HL), and narrower head (53.04-64.98 vs. 75.81-84.79 %HL).

*Psilorhynchus kuwana* is distinguished from *P. nepalensis* in having fewer dorsal-fin rays (iii,7 vs. iii,8), pectoral-fin rays (vi,8 vs. v-vi,10-11), more principal caudal-fin rays (8+8 vs. 8+7), shorter pre-dorsal length (43.67-46.62 vs. 48.13-49.17 %SL), greater pre-pectoral length (21.6-24.38 vs. 20.05-20.43 %SL), greater caudal peduncle length (11.38-17.41 vs. 9.14-9.42 %SL), greater dorsal fin height (17.13-24.82 vs. 14.59-15.57 %SL), shorter pectoral fin (15.63-19.37 vs. 23.31-24.69 %SL), shorter pelvic fin (16.97-19.39 vs. 19.65-20 %SL), shorter distance between occiput and pectoral-fin insertion (12.29-14.61 vs. 16.66-16.83 %SL), shorter dorsal-fin base (9.63-12.4 vs. 15.26-15.98 %SL), shorter anal-fin base (4.29-4.85 vs. 6.46-6.57 %SL), shorter distance between pectoral and pelvic fin insertions (24.85-28.25 vs. 30.48-32.6 %SL), greater post-dorsal length (54.24-58.75 vs. 50.71-53.25 %SL), lesser distance between pectoral fin and vent (34.93-39.14 vs. 41.08-43.01 %SL), shorter upper jaw (11.32-16.59 vs. 20.2-20.43 %HL), narrower head (53.04-64.98 vs. 73.44-76.38 %HL), narrower gape width (20.4-30.19 vs. 30.52-31.12 %HL), lesser head depth at nostril, pupil, and occiput (22.52-

28.32 vs. 35.31-37.01 %HL; 33.57-38.54 vs. 56.25-56.98 %HL; 39.52-49.58 vs. 66.46-68.88 %HL, respectively) and shorter mandible (9.65-14.72 vs. 17.19-19.78 %HL). It is distinguished from *P. maculatus* in having fewer pre-dorsal scales (10 vs. 11-12) and fewer dorsal-fin rays (iii,7 vs. iii,9); from *P. ngathanu* it is distinguished in having fewer pre-dorsal scales (10 vs. 11) and fewer dorsal-fin rays (iii,7 vs. iii,9); from *P. kaladanensis* it is distinguished by fewer dorsal-fin rays (iii,7 vs. iii,9) and more lateral-line scales (36-37 vs. 31-34). It is distinguished from *P. olliei* in having more lateral-line scales (36-37 vs. 31-32) and from *P. tysoni* in having more pre-dorsal scales (10 vs. 9) and fewer dorsal-fin rays (iii,7 vs. iii,9). It is distinguished from *P. konemi* in having fewer lateral line-scales (35-37 vs. 39-40+2), fewer pre-dorsal scales (10 vs. 13) and fewer scale rows between anus and anal fin (9-10 vs. 12).

**Description:** Body elongate with dorsal profile highly arched up to dorsal fin origin, thereafter followed by notable slope postero-ventrally towards caudal peduncle (Fig. 5a, b). Ventral profile also slightly arched from lower jaw to caudal fin base. Caudal peduncle narrow and elongate. Head depressed and both upper and lower surfaces flattened; head 1.5 times as long as broad; length of head six times in SL. Body depth 1.5 times length of head. Snout broad and rounded; interorbital space concave. Eyes large and visible from ventral side. Eye diameter 3.5 times in length of head; snout 2 times diameter of eye. Interorbital width more than 1.5 times in eye diameter. Rostral cap fused with upper lip; mouth broadened by deep longitudinal groove (Fig. 6a, b). Lower jaw covered by a thin cushion-like structure folded backwards and composed of two adnate tissue layers; lower lip not continuous with upper lip around corner of mouth. Lower lip with unculi; lip thick and connected with rostral cap by a narrow strip of skin around corner of mouth. Upper lip bordered with unculi up to the rostral cap; unculi distributed throughout ventral side of head.

Dorsal-fin rays iii,7(16), anal-fin rays ii,5(16), pelvic-fin rays ii,7(16), pectoral-fin rays iv.8(4) or 9(12), and caudal-fin rays 8+8(16). Dorsal fin origin one scale row anterior to vertical of pelvic fin insertion; dorsal origin nearer to tip of snout than to base of caudal fin; dorsal fin margin truncate, oblique and free. Paired fins large and horizontally placed. Depressed pectoral fin not reaching vertical origin of dorsal fin and three scale rows anterior to pelvic fin insertion. Pelvic fin insertion seven scale rows posterior to vertical of dorsal fin origin; insertion opposite of fifth branched dorsal-fin ray. Ventral surface of unbranched pectoral and pelvic-fin rays thickened, forming adhesive pads. Anal fin short, tip pointed, posterior margin concave; depressed anal fin not reaching caudal fin base. Anus 5 scale rows posterior to pelvic fin insertion.

Scales moderate in size; lateral-line scales 36(8) or 37(8), upper transverse scale rows 4 (16), lower transverse scale rows 2(14) or 2.5(2), circumpeduncular scale rows 10(16), circumferential scale rows 16(4), 17(4) or 18(8), pre-dorsal scales 10(16), anal scale rows 9(4) or 10(12). Belly scaled; breast naked, only four transverse scale rows posteriorly.

**Coloration:** Live specimens with eight dark lateral blotches connected by deep dark transverse stripe from tip of snout to caudal fin base; stripe extending posteriorly onto lower lobe of caudal fin where stripe dips ventrally; above caudal spot, base of caudal fin, hypural plate and procurrent rays light, contrasting with regions dorsal and ventral to this area; multiple, separate discontinuous reddish blotches centered on lateral stripe. Upper lobe of caudal fin with two blotches and reddish stripe. Dorso-lateral scales pigmented and creating multiple dusky stripes, usually three, from occiput to procurrent rays of dorsal caudal fin; stripes widely separated anteriorly and merging at caudal fin. Dorsal-most stripe extending from occiput to dorsal fin origin, extending posteriorly as several connected dark markings to upper lobe of caudal fin; upper lobe of caudal fin with two reddish-colored stripes on upper four caudal-fin rays. Four to five fin rays of lower lobe of caudal fin with one wide reddish-colored stripe positioned posterior to and contiguous with dark lateral stripe of body. Base of dorsal-fin rays at origin darkly pigmented; fin with three indistinct stripes, one sub-basal, one distal, and one marginal near distal band; bands formed from concentrations of melanophores on anterior rays and membranes; spots not as



**Figure 7.** Type locality of *Psilorhynchus kuwana*, Kuwana River, Pathar Village, Devario District, Uttar Pradesh, India.

dark on posterior rays and membranes. Band best formed on second unbranched and first and second branched rays. Anterior pectoral-fin rays at insertion darkly pigmented, creating dark basal spot; melanophores forming bands on pectoral fin; concentrations of melanophores starting at base of unbranched rays 2-4 in pectoral fin and becoming lighter and less distinct on posterior rays. Anterior anal-fin rays at origin darkly pigmented, creating dark basal spot; remaining color pattern similar to that of pectoral fin. Anal fin without melanophores. Dorsal surface of head with light background, similar to predorsal area, and dark lines in vermiculate pattern to tip of snout. Postorbital stripe present and continuous with dark lateral stripe; postorbital stripe lighter in colour than stripe on body. Distinct dark spot on anterior and posterior portions of opercle and preopercle behind eye; posterior portion of opercle cream. Distinct lightly colored area separating dark region of head with that of body. Ventral surface immaculate except for melanophores on anterior edge of rostral cap, creating dark band around head and distinct dark and short stripes on branchiostegal rays. Venter with two distinct dark stripes, one on each side of immaculate center of venter, extending from insertion of pectoral fin to base of caudal fin.

**Habitat:** The Kuwana River, also known as Kuano River, begins in the lower areas in the east of Bahraich District of Uttar Pradesh and flows through the center of Gonda. The Kuwana River has three main tributaries, Rawai, Manwar, and Katneha, and also forms a part of the Gangetic system; it is a lowland river with unstable banks. The river first reaches the district west of Rasulpur village, then into Pargana village and then Basti village; then passing through Mahuli village where it leaves the district and joins with the Ghaghra River in Gorakhpur. Riparian vegetation in the vicinity covered 30-50% of the 500 m sampling reach (Fig. 7; 26°20'56.4"N, 84°00'38.7"E); however, both banks devoid of vegetation. Paddy/wheat fields existed beyond the riparian zone; the right bank was undercut, leading to the instability of the bank due to denudation of tree canopy. At and near the sampling reach, bathing and clothes washing from the nearby villages are common as well as sand mining in the active floodplain. In the vicinity of the sampling reach boats were used for sand-mining. Substratum of river sand similar to most of the Gangetic River basin. Rooted vegetation was observed in the river where most of the *Psilorhynchus* were captured; in this area there was little flow during sampling period.

**Etymology:** The name *kuwana* is a noun in apposition and derived from the name of the river where the species is currently known and was first collected.

**Distribution:** *Psilorhynchus kuwana* is currently known only from its type locality.

**Comparative Materials:** *Psilorhynchus sucatio*: UMMZ 205339, 8, 46.3-73.3 mm SL; Rangpani Khal, Surma (Meghna) drainage (25°10'N, 92°06'E), 6 km NNW of Janitapur, Sylhet District, Bangladesh, W. Rainboth, A. Rahman & S. Ahmed, 19 February 1978.

*Psilorhynchus nudithoracicus*: UMMZ 205343, 5, 31.8-45.4 mm SL; Jabuneswari River at Badarganj, Rangpur District, Bangladesh, W. Rainboth & A. Rahman, 3 April 1978.

*Psilorhynchus amplicephalus*: — Holotype: ZSI F 7601, 53.9 mm SL; Balishwar River at Malidor village (24°14'N, 92°32'E), Silchar, Assam, India, collected by M. Arunachalam and team. — Paratypes: MSUMNH345, 8, 42.9-53.9 mm SL; collection data same as holotype.

*Psilorhynchus tenura*: — Holotype: ZSI/SRS F.7600, male, 51.9 mm SL, Korkanhalla, (tributary of Thunga River) inside Khudremukh National Park (13°20'22.3"N, 75°10'19.4"E), Karnataka, India, collected by M. Arunachalam, M. Muralidharan and P. Sivakumar, 23 February 2002. — Paratypes: MNUMNH45, 5, 46.4-50.8 mm SL, collection data same as holotype. CMA25, 2ex, 41.6-44.6 mm SL; collection data same as holotype.

*Psilorhynchus balitora*: CMA342, 10, 28.0-35.4mm SL; Darbonta River, Pasidava Village, West Bengal, India, M. Arunachalam & C. Vijayakumar, 29 November 2012.

*Psilorhynchus kaladanensis*: Data from Lalramliana et al. (2015).

*Psilorhynchus tysoni*: Data from Conway and Pinion (2016).

*Psilorhynchus maculatus*: Data from Shangningam and Vishwanath (2013a).

*Psilorhynchus ngathanu*: Data from Shangningam and Vishwanath (2014).

*Psilorhynchus khopai*: Data from Lalramliana and Baichi (2014).

*Psilorhynchus rowleyi*: Data from Shangningam and Kosygin (2013b).

*Psilorhynchus nepalensis*: KU 40611, 2, 44.11-47.83 mm SL; Khair Khola at bridge crossing, highway east of Ratnanagar Town (27.61841667, 84.53266667), Chitwan, Narayani River, Nepal, R.L. Mayden, K.W. Conway, R. Napit & J. Shrestha, 1 November 2008.

*Psilorhynchus pseudechenesis*: KU29519, 9, 29.04-37.01 mm SL; at Manakaamana, 1 hour walk upstream from Tumlingtar (27.3400002, 87.188301), D. Edds, 17 August 1996.

*Psilorhynchus hamiltoni*: Data from Conway et al. (2013).

*Psilorhynchus microphthalmus*: Data from Vishwanath and Manojkumar (1995).

*Psilorhynchus breviminor*: Data from Conway and Mayden (2008a).

*Psilorhynchus rubustus*: Data from Conway and Kottelat (2007).

*Psilorhynchus brachyrhynchus*, *Psilorhynchus piperatus* and *Psilorhynchus gokkyi*: Data from Conway and Britz (2010).

*Psilorhynchus arunachalensis*: Data from Nebeshwar et al. (2007).

*Psilorhynchus pavimentatus* and *Psilorhynchus melissa*: Data from Conway and Kottelat (2007).

*Psilorhynchus rahmani*: Data from Conway and Mayden (2008b).

*Psilorhynchus homaloptera*: Data from Hora (1920).

*Psilorhynchus olliei*: Data from Conway and Britz (2015).

*Psilorhynchus kaladensis*: Data from Lalramliana et al. (2015).

*Psilorhynchus konemi*: Data from Shangningam and Viswanath (2016).

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