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***Pethia longicauda*, a new species of barb (Teleostei: Cyprinidae) from the northern Western Ghats, India**

UNMESH KATWATE¹, MANDAR S. PAINGANKAR^{2,3}, RAJEEV RAGHAVAN^{2,4} & NEELESH DAHANUKAR^{2,5,6}

¹Bombay Natural History Society, Hornbill House, Opp. Lion Gate, Shaheed Bhagat Singh Road, Mumbai, Maharashtra 400 001, India

²Systematics, Ecology & Conservation Laboratory, Zoo Outreach Organization (ZOO), 96 Kumudham Nagar, Vilankurichi Road, Coimbatore, Tamil Nadu 641 035, India

³Department of Zoology, University of Pune, Ganeshkhind, Pune, Maharashtra 411 007, India

⁴Conservation Research Group (CRG), Department of Fisheries, St. Albert's College, Kochi, Kerala 682 018, India

⁵Indian Institute of Science Education and Research, G1 Block, Dr. Homi Bhabha Road, Pashan, Pune, Maharashtra 411 008, India

⁶Corresponding author. E-mail: n.dahanukar@iiserpune.ac.in

Abstract

Pethia longicauda, a new cyprinid fish, is described from Hiranyakeshi River, Krishna drainage, Maharashtra, India. It can be distinguished from congeners based on a combination of characters including: a long caudal peduncle, incomplete lateral line, absence of barbels, upper lip thick and fleshy, distinct lateral fold on snout, 22–24 scales in lateral series, 5–6 lateral-line pored scales, nine predorsal scales, 9–10 prepelvic scales, 15–17 preanal scales, ½3/1/3½ transverse scales, 11–15 pairs of serrae on the distal half of the last unbranched dorsal-fin ray, 11–13 branched pectoral fin rays, 4+26 total vertebrae, 4+5 predorsal vertebrae, 4+13 abdominal and 13 caudal vertebrae, body iridescent silver in color with a black humeral spot, two black blotches on caudal peduncle and dorsal fin usually without any color bands or blotches but in breeding males with two rows of minute, indistinct black spots.

Key words: Maharashtra, freshwater fish, molecular phylogeny, osteology, taxonomy

Introduction

Fishes of the genus *Pethia* are characterized by small adult size (usually less than 50 mm SL, exceptionally to 80 mm SL), absence of rostral barbels, maxillary barbels usually absent or if present minute, last unbranched dorsal-fin ray stiff and serrated, 3 to 4 unbranched and 8 branched dorsal-fin rays, 3 unbranched and 5 branched anal-fin rays, 11–13 precaudal and 13–16 caudal vertebrae, lateral line complete, interrupted or incomplete with 19–24 scales in lateral series (except *Pethia sharmai* (Menon & Rema Devi, 1993), which has 40–41 scales) and color pattern consisting of a black blotch on caudal peduncle with other black blotches, spots or bars on body (Pethiyagoda *et al.* 2012; Knight 2013). The genus, endemic to south Asia, currently comprises of 36 species across India, Sri Lanka, Bhutan and Myanmar (Pethiyagoda *et al.* 2012; Knight 2013; Dishma & Vishwanath 2013; Gurung *et al.* 2013; Kottelat 2013; Katwate *et al.* 2014). In India, the genus is represented by 24 species, out of which eight are endemic to the Western Ghats (Katwate *et al.* 2014).

The true diversity of the genus *Pethia* in India, however, is still underestimated for two reasons. Firstly, several areas, especially in the northern part of Western Ghats, are still unexplored (Dahanukar *et al.* 2011); and secondly, several nominal species apparently comprise of species complexes. *Pethia ticto* (Hamilton, 1822) has long been treated as a widely distributed species found throughout the Indian subcontinent (Hora *et al.* 1939; Jayaram 1991). However, recent taxonomic work has suggested that *P. ticto* is a species complex comprising several distinct species (Beevi & Ramachandran 2005; Linthoingambi & Vishwanath 2007; Mercy & Jacob 2007; Knight *et al.* 2012; Katwate *et al.* 2014), with *P. ticto* sensu stricto possibly restricted to the Ganges watershed. Taxonomic validation of several reports of *P. ticto* from the Western Ghats, therefore, is likely to result in the description of new species.

While exploring fish diversity in the northern Western Ghats, we encountered a population of *Pethia* in the upper reaches of the Hiranyakeshi River, Maharashtra, with distinct morphological characters. A taxonomic and phylogenetic study demonstrated that it represents a new species, which is herein described as *Pethia longicauda*.

Material and methods

Study site and sampling. Specimens were collected from upstream catchments of the east-flowing Hiranyakeshi River near Gavse-Ajara (16°04'06"N, 74°05'30"E, 690 m a.s.l.), in the northern Western Ghats, Maharashtra State, India. The series (limited to 10 individuals) was fixed in 10% formalin and transferred to 70% ethanol for storage.

Morphology, morphometry and osteology. Measurements were taken point-to-point to the nearest 0.1mm using dial calipers. Subunits of the body are presented as percent of standard length (SL), and subunits of the head as percent of head length (HL). Lateral-line pored scales were counted and the same scale row (lateral series) followed up to the base of the caudal fin for the lateral-scale count. Methods for taking counts and measurements follow Kullander (2008) and Pethiyagoda *et al.* (2012). Values in parentheses after a count represent the frequency of that count. One of the paratypes, BNHS FWF 99 (female), was cleared and stained for osteology following the procedure described by Potthoff (1984). Osteological nomenclature follows Conway (2011) and the description of osteology follows Pethiyagoda *et al.* (2012) and Dishma & Vishwanath (2013) for easy comparison with related taxa. Illustrations were made from images captured by a digital camera fitted to a stereo-zoom light microscope (Leica S8 APO, USA).

Voucher specimens and museum abbreviations. Material reported herein is deposited in the collections of the Bombay Natural History Society (BNHS), Mumbai; the Wildlife Information Liaison Development (WILD) Society, Coimbatore; and the Western Regional Center of the Zoological Survey of India (ZSI-WRC), Pune. Other material examined is in the museum collection of Zoological Survey of India, Kolkata (ZSI-K); the Natural History Museum (BMNH), London and the Museum of Comparative Zoology (MCZ), Harvard University.

Phylogenetic analysis. Gills were harvested from two fresh specimens (BNHS FWF 100 and WILD-14-PIS-075) and were preserved in absolute Ethanol. DNA extraction, PCR amplification for cytochrome b (cytb) gene sequences and sequencing protocols follow Katwate *et al.* (2013). Sequences were analyzed by BLAST tool (Altschul *et al.* 1990). Sequences generated as part of the study are deposited in GenBank under the accession numbers KJ681101 and KJ681102. For phylogenetic analysis, we used the cytb gene sequences from Katwate *et al.* (2013). GenBank accession numbers for sequences used for comparison are mentioned in the respective figure and in Appendix A. Gene sequences were aligned using MUSCLE (Edgar 2004) and a molecular phylogenetic analysis was performed using the freeware MEGA 6 (Tamura *et al.* 2013). Best fit model for nucleotide substitution was selected from 24 models using MEGA 6 (Tamura *et al.* 2013) based on minimum Bayesian Information Criterion (BIC) value (Schwarz 1978; Nei & Kumar 2000). Reliability of the phylogenetic tree was estimated using bootstrap values run for 1000 iterations.

Results

Pethia longicauda, sp. nov.

(Figure 1, 2, 3)

Holotype. BNHS FWF 96, 36.0 mm SL; India: Maharashtra: Kolhapur District: Hiranyakeshi River near Gavse-Ajara, 16°04'06"N 74°05'30"E, 690 m a.s.l.; U. Katwate, M. Paingankar and N. Dahanukar, 11 June 2013.

Paratypes. BNHS FWF 97–100, 4 ex., 32.0–37.7 mm SL; same data as holotype; WILD-14-PIS-073–075, 3 ex., 30.1–35.7 mm SL; same data as holotype; ZSI-WRC P/3950–51, 2ex., 31.4–37.6 mm SL; same data as holotype.

Diagnosis. *Pethia longicauda* is distinguished from all its congeners by a combination of characters that includes a distinct long and shallow caudal peduncle; incomplete lateral line; lateral-line pored scales ceasing after 5th or 6th lateral-line scale; 22–24 scales in lateral series; ½/1/3½ transverse scale rows; barbels absent; lips well developed with a distinct lateral fold on snout; 13–14 rakers on the first ceratobranchial; dorsal fin origin closer to

the snout tip than to base of the caudal peduncle; 5 predorsal neural spines; dark-black humeral spot covering 3rd and 4th lateral-line scales and extending to one scale above the lateral-line row; two black blotches on caudal peduncle with first one distinct, covering 16th–18th scale in lateral series, and second hazy, covering 20th–22nd scales in lateral series.



FIGURE 1. *Pethia longicauda*, holotype, BNHS FWF 96, 36.0 mm SL.

Description. For general shape and appearance see Figure 1. Morphometric and meristic data for the holotype and 9 paratypes provided in Table 1.

Body elongate, shallow; compressed laterally; predorsal contour convex, rising gradually up to dorsal-fin origin, thereafter sloping down towards hypural notch. Ventral profile convex up to base of pelvic fin, running almost straight towards anal-fin origin, sloping down sharply from anal-fin origin towards posterior end of anal-fin base, then almost straight to hypural notch. Caudal peduncle slender, elongate, its length 1.2–1.8 times its depth.

Head small, laterally compressed. Snout rounded, smooth, slightly shorter than or equal to eye diameter, with a distinct lateral fold and fleshy overhanging upper lip. Eyes large, dorso-laterally positioned, closer to snout tip than margin of operculum, diameter 1.3–1.7 interorbital width. Mouth small, subterminal, ventrally ‘U’ shaped, angle of gape not reaching to vertical from anterior margin of eye. Upper lip relatively thicker, more fleshy than lower lip; lower lip not interrupted. Barbels absent.

Dorsal fin originating behind the pelvic-fin origin, closer to tip of snout than to base of caudal peduncle, its distal margin concave, height less than head length. Dorsal fin with 3 unbranched and 8 branched rays, last unbranched ray strong, osseous, densely serrated posteriorly. Pectoral fin with one unbranched and 11 (1), 12 (7) or 13 (2) branched rays, its tip rounded, reaching one or two scales anterior to pelvic-fin origin. Pelvic fin with one unbranched and 7 branched rays, its tip rounded, not reaching vent when adpressed. Anal fin with 3 unbranched and 5 branched rays, its distal margin concave with rounded corners. Caudal fin forked, lobes making more than half of fin length, their tips rounded. Principal branched caudal-fin rays dorsally 8 (9) or 9 (1), ventrally 8 (9) or 9 (1); procurvent rays dorsally 4 (1), 5 (3) or 6 (6), ventrally 4 (3), 5 (5) or 6 (2).

Lateral line incomplete; 22 (1), 23 (4) or 24 (5) scales in lateral series, which runs almost straight to caudal fin base, piercing anteriormost 5 (8) to 6 (2) scales. Scales in transverse row $\frac{1}{2}$ 3/1/3 $\frac{1}{2}$, predorsal scales 9, prepelvic scales 9 (2) or 10 (8), preanal scales 15 (1), 16 (3) or 17 (6), circumpeduncular scales 12. Pelvic axillary scale present, reaching to $\frac{1}{4}$ adpressed pelvic-fin length.

Osteology. Four supraneurals (1); predorsal neural spines 5 (1). First pterygiophore of dorsal fin inserted between 9th and 10th vertebrae (Figure 2A). Weberian apparatus constitutes first four vertebrae. Predorsal vertebrae including weberian apparatus 9 (1). Total number of vertebrae 4 + 26, with 4+13 abdominal and 13 caudal vertebrae (1). Infraorbital 3 deep, partially overlapping the cheek and preoperculum (Figure 2B); post-epiphysial fontanelle absent (Figure 2C). Gill rakers simple, acuminate, 3 on epibranchial, one at angle and 13–14 (2) on ceratobranchial region. Last unbranched dorsal-fin ray serrated posteriorly with 11 (2), 12 (6), 13 (1) or 15

(1) pairs of serrae on its distal half, 1 (6) to 2 (4) serrae on apical half (Figure 2D). Caudal fin with six hypurals and one parhypural, last three caudal vertebrae support caudal fin (Figure 2E). Free uroneural absent, last neural spine on compound centrum small, stunted. Neural and haemal spines of the 2nd and 3rd pleural centra well developed, equally supporting caudal peduncle. Paired neural and haemal spines on 3rd pleural centra.

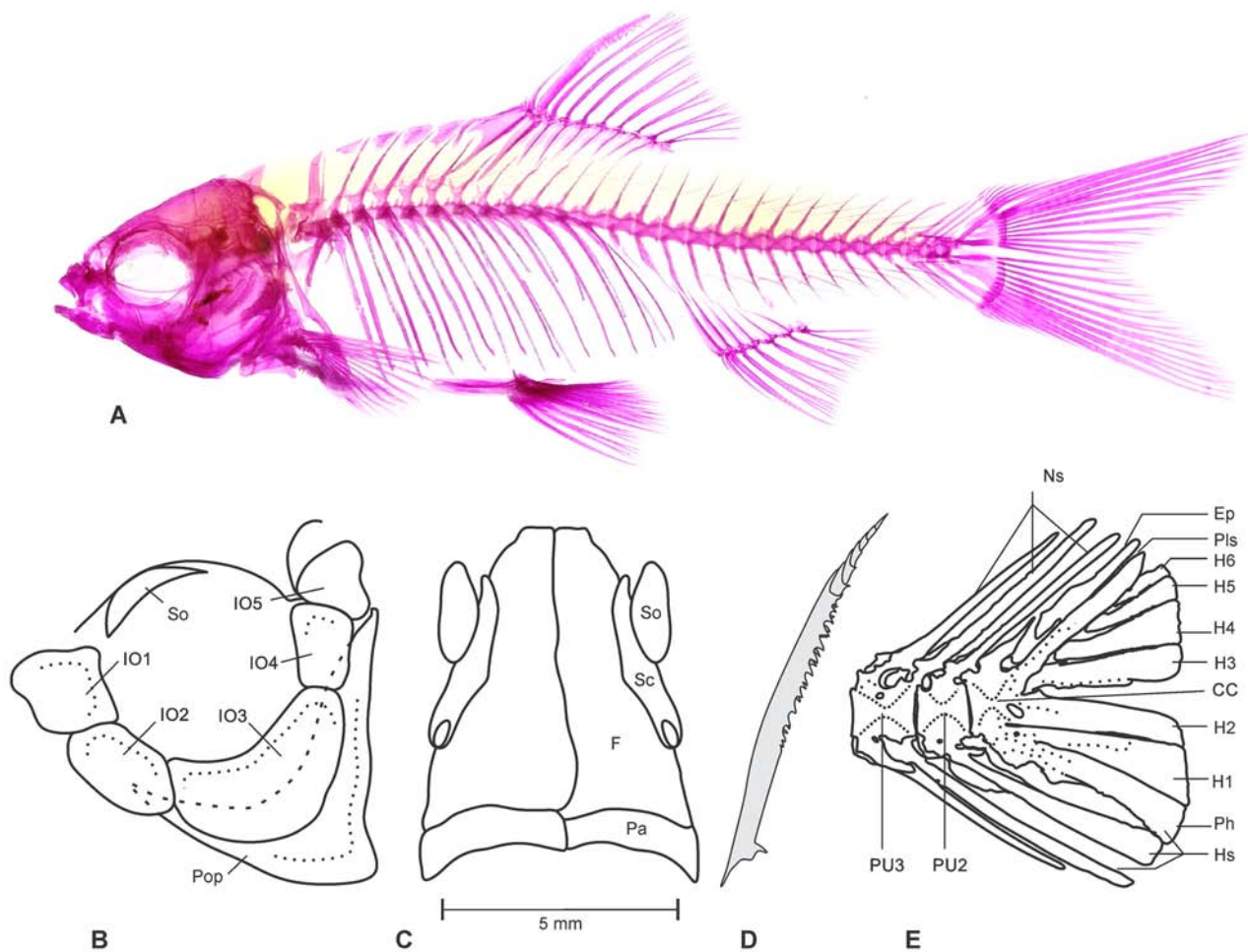


FIGURE 2. Osteology of *Pethia longicauda* (A) Cleared and stained specimen BNHS FWF 99 (female); (B) circumorbital series (So, supraorbital; IO1-5, infraorbitals 1-5; Pop, preopercle); (C) dorsal view of orbital region of cranium (F, frontal; Pa, parietal;; Sc, supraorbital sensory canal); (D) last unbranched dorsal-fin ray; and (E) caudal skeleton (CC, compound centrum; Ep, epural; H1-6, hypurals 1-6; Ph, parhypural; Pls, pleurostyle; PU2-3, preural centra 2-3).

Coloration in preservative. For general appearance see Figure 1; body above lateral-line scale row dark brown; snout, head, dorsum dark brown; lower lip, cheek, opercular region below inferior border of eye cream; ventral region uniformly cream white. Body with one dark black humeral spot (10), overlapping 3rd and 4th lateral-line scales, extending one scale above lateral-line row (10); two black blotches on caudal peduncle, first overlapping 16th and 17th (3) or 17th and 18th (7) scales of lateral series, second overlapping 20th–21st (3) or 21st–22nd (2) scale of lateral series (Figure 3), hazy in some preserved specimens (5). Dorsal fin usually without any color bands or blotches but in breeding males sometimes studded with two rows of indistinct minute black spots. Anal and caudal fins hyaline, without any color bands or spots. Pectoral and pelvic fins lightly pigmented with melanophores. Each body scale bordered with black pigmentation.

TABLE 1. Morphometric characters and meristics of *Pethia longicauda* holotype (BNHS FWF 96) and paratypes (BNHS FWF 97–100, WILD-14-PIS-073–075, ZSI-WRC P/3950–51).

Characters	Holotype	Paratypes (n= 9)	
		Mean (s.d.)	Range
Morphometric data			
Total length (mm)	44.8	42.2 (3.7)	36.4–48.5
Standard length (SL, mm)	36.0	33.5 (2.5)	30.1–37.7
%SL			
Head length (HL)	25.8	27.2 (1.8)	25.1–30.4
Head depth	22.3	20.9 (2.2)	17.4–23.3
Head width	14.5	15.1 (0.9)	13.8–16.3
Body depth	32.3	33.1 (2.6)	29.1–37.2
Body width at dorsal-fin origin	19.1	16.8 (2.4)	13.2–19.8
Body width at anal-fin origin	13.9	11.2 (2.1)	7.4–13.8
Pre-dorsal distance	43.0	49.5 (1.6)	47.0–51.5
Dorsal to hypural distance	47.5	52.5 (1.5)	50.7–54.8
Prepelvic distance	46.7	46.8 (1.6)	44.7–50.4
Preanal distance	68.7	68.6 (1.2)	66.9–70.5
Prepectoral distance	26.7	26.6 (2.2)	23.9–31.0
Dorsal-fin length	22.1	22.9 (1.7)	20.1–24.9
Dorsal-fin spine length	19.2	17.6 (2.1)	15.1–21.3
Length of dorsal-fin base	14.3	14.8 (1.5)	12.3–16.9
Pectoral-fin length	18.1	19.3 (1.3)	17.5–21.3
Anal-fin depth	15.7	15.5 (1.6)	12.6–17.2
Caudal-peduncle length	19.0	22.6 (2.3)	19.4–25.6
Caudal-peduncle depth	13.4	14.0 (1.1)	12.6–16.3
% HL			
Head depth	86.3	77.0 (6.5)	68.5–85.3
Head width	56.4	55.7 (5.3)	47.9–64.2
Snout length	24.2	25.6 (3.3)	20.1–29.7
Eye diameter	27.4	28.1 (2.7)	23.5–31.4
Inter-orbital width	43.4	39.3 (4.7)	31.6–45.1
Meristic data			
Lateral-line scales	23		22–24
Number of lateral-line pores	5		5–6
Last unbranched dorsal-fin serrae	13		11–15
Transverse scale rows	$\frac{1}{2}3/1/3\frac{1}{2}$		$\frac{1}{2}3/1/3\frac{1}{2}$
Predorsal scales	9		9
Prepelvic scales	10		9–10
Preanal scales	17		15–17
Circumpeduncular scales	12		12
Dorsal-fin rays	iii 8		iii 8
Pectoral-fin rays	i 12		i 11–13
Pelvic-fin rays	i 7		i 7
Anal-fin rays	iii 5		iii 5
Caudal-fin rays (procurrent)	4+4		4–6+4–6
Caudal-fin rays (principal)	9+8		8–9+8–9

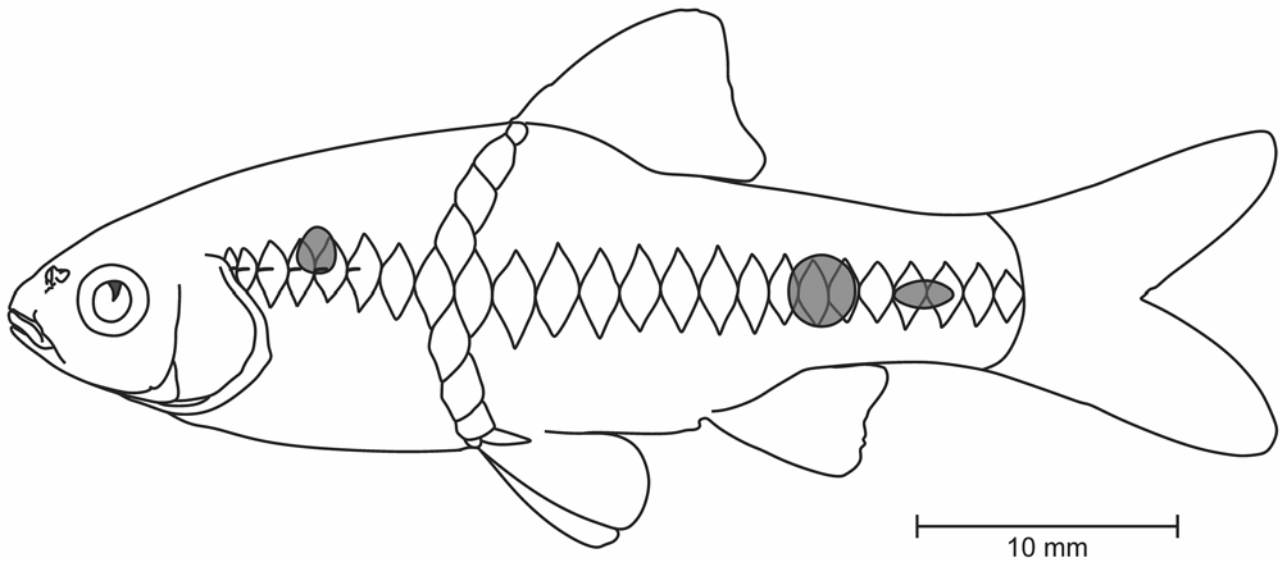


FIGURE 3. *Pethia longicauda*, holotype, BNHS FWF 96, 36.0 mm SL, showing distribution of prominent body pigmentation.



FIGURE 4. *Pethia longicauda*, uncatalogued specimen, showing colour in life. Second blotch on caudal peduncle was distinct in freshly-collected specimens, but disappeared shortly after collection.

Coloration in life. Fresh specimens (Figure 4) with body iridescent silver, each scale bordered with black pigmentation. Position of humeral spot and caudal blotches same as described for preserved specimens, first caudal peduncle blotch more distinct than second in fresh specimens. Second blotch on caudal peduncle distinct in freshlycollected live specimens, but disappears immediately after collection and in stressed condition. Dorsal fin usually hyaline without any markings but in breeding male studded with two rows of indistinct minute black spots. Pectoral, pelvic and anal fins hyaline. Pectoral and pelvic fins with scattered melanophores. Caudal fin colorless. Sclera uniform iridescent silver in females and immature males, red in breeding males. Opercular and infraorbital region studded with black spots.

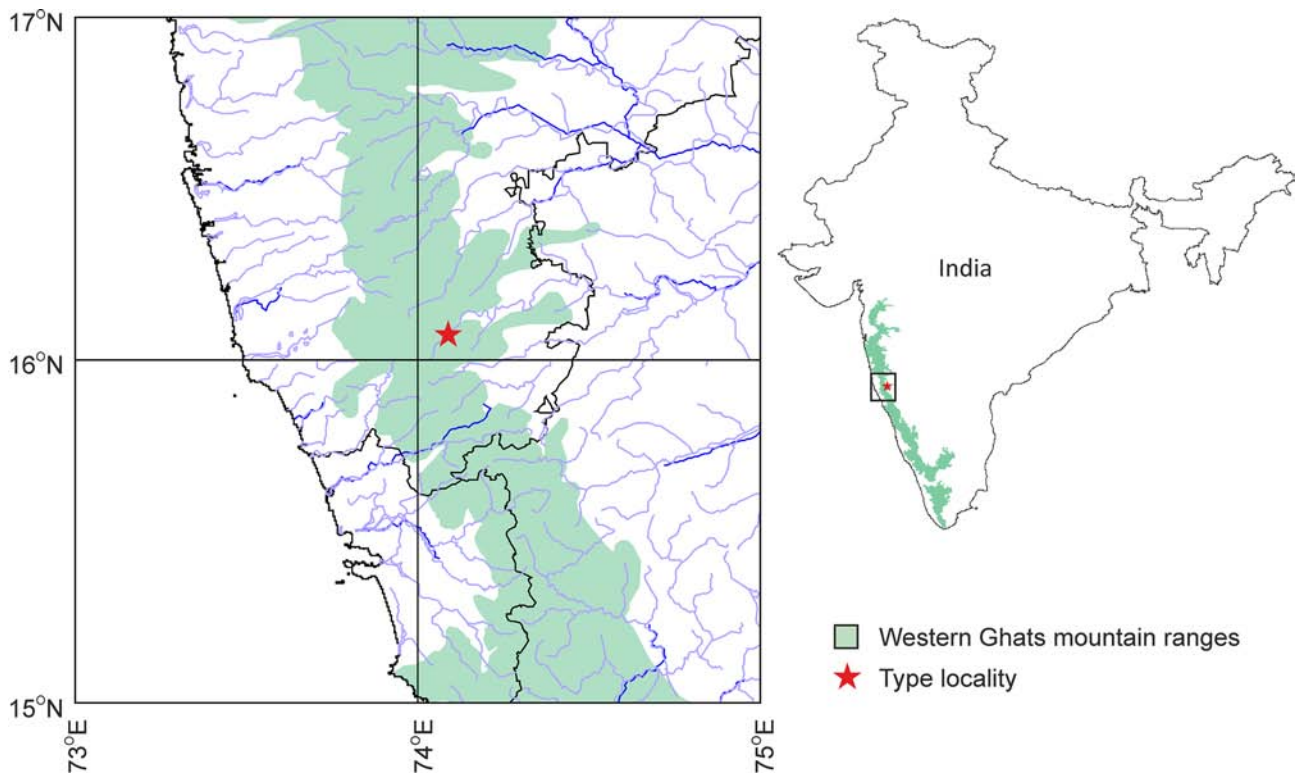


FIGURE 5. Map showing type locality of *Pethia longicauda* in the northern part of the Western Ghats mountain ranges.



FIGURE 6. Habitat at type locality of *Pethia longicauda* .

Distribution. *Pethia longicauda* is currently known only from its type locality (Figure 5) located in the upstream catchments of the east-flowing Hiranyakeshi River near Gavse-Ajara, Kolhapur District, Maharashtra, India.

Habitat. *Pethia longicauda* occurs in flooded temporary pools, riffles and runs with boulders and gravel as substratum (Figure 6) with riparian vegetation. Co-occurring fishes included species of *Salmostoma*, *Devario*, *Danio*, *Rasbora* and *Acanthocobitis*.

Etymology. The species name ‘*longicauda*’ is Latin for ‘long tail’ and is named for the characteristic long caudal peduncle in the species. Gender feminine.

Common name. Long-tailed Pethia.

Phylogenetic position. Model test suggested best fit nucleotide substitution model to be Tamura & Nei (1993) model with gamma distribution and invariant sites (TN93+G+I, BIC = 15439.70, lnL = -6879.61, G = 0.79, I = 0.43). *Pethia longicauda* was nested within the clade of *Pethia* (Figure 7) conforming its generic status, but was genetically distinct from the other *Pethia* species for which genetic data are available.

Discussion

Eight species of *Pethia* are presently known to be endemic to drainages originating in the Western Ghats, viz.; *P. lutea* Katwate, Katwate, Raghavan, Paingankar & Dahanukar, 2014; *P. muvattupuzhaensis* (Beevi & Ramachandran, 2005); *P. narayani* (Hora, 1937); *P. nigripinna* (Knight, Rema Devi, Indra & Arunachalam, 2012); *P. pookodensis* (Mercy & Jacob, 2007); *P. punctata* (Day, 1865); *P. setnai* (Chhapgar & Sane, 1992); and *P. sharmai* (Menon & Rema Devi 1993). *Pethia longicauda* differs from its Western Ghats congeners by having an incomplete lateral line (vs. complete except in *P. pookodensis*, *P. nigripinna* and *P. sharmai*) (Day 1865; Hora 1937; Chhapgar & Sane 1992; Menon & Rema Devi 1993; Beevi & Ramachandran 2005; Mercy & Jacob 2007; Knight *et al.* 2012; Knight 2013; Katwate *et al.* 2013; Katwate *et al.* 2014). The new species is distinguished from *P. pookodensis* and *P. nigripinna* by having $\frac{1}{2}3$ transverse scale rows between the lateral-line scale row and the dorsal-fin origin (vs. $\frac{1}{2}4$ in both *P. pookodensis* and *P. nigripinna*), 5–6 pored lateral-line scales (vs. 6–8 in *P. pookodensis* and 3–5 in *P. nigripinna*) and 13–14 rakers on the first ceratobranchial (vs. 6 in *P. pookodensis* and 5–6 in *P. nigripinna*) (Mercy & Jacob 2007; Knight *et al.* 2012). *Pethia longicauda* differs greatly from *Pethia sharmai* in two most prominent characters: by having fewer scales in lateral series (22–24 vs. more than 42) and absence of barbels (vs. pair of maxillary barbels) (Menon & Rema Devi 1993).

Jerdon (1849) described *Systomus tripunctatus* from the coast of Canara (= southern Karnataka), the current taxonomic status of which remains uncertain because of the vague description. Nevertheless, an important character that separates *Pethia longicauda* from *Systomus tripunctatus* is the distinct color pattern provided in the description of the latter. Jerdon (1849) mentioned 3 spots over the body, 2 black spots under end of the dorsal and one at the base of the tail, which color pattern is immediately distinct from that of *P. longicauda*.

Pethia ticto, which also possesses an incomplete lateral line, was described from southeastern parts of Bengal (Hamilton 1822, p. 314). Hora *et al.* (1939) considered this species to be widely distributed in India, Myanmar and Sri Lanka. But because Hora *et al.* (1939) based their conception of *P. ticto* on a widely distributed collection it probably included multiple species which they did not discriminate. The only population studied by Hora *et al.* (1939), which is within the broader limits of the type locality of *P. ticto*, was from Raniganj (West Bengal). However, that population had no humeral spot or caudal blotches, which distinguishes it from *P. longicauda*. A recent revision of *P. ticto* by Linthoingambi & Vishwanath (2007) based on samples from Assam, Nagaland and Manipur too, did not include topotypic material. Nevertheless, *P. longicauda* differs from the description of *P. ticto* provided by Linthoingambi & Vishwanath (2007) by the absence or scarcely visible indistinct bands on the dorsal fin (vs. two complete black bands on dorsal fin), 5 to 6 lateral-line pored scales (vs. 6 to 11), $\frac{1}{2}3/1/3\frac{1}{2}$ (vs. $\frac{1}{2}5/1/5\frac{1}{2}$ scales in transverse line on body), two blotches on caudal peduncle (vs. a single caudal blotch) and 5 predorsal neural spines (vs. 4). Although the original description of *P. ticto* is not in detail, the most prominent character that separates *P. longicauda* from *P. ticto* is the absence or scarcely visible indistinct bands on the dorsal fin (vs. well spotted dorsal fin) (Hamilton 1822). In addition, *P. longicauda* is genetically distinct (Figure 7) from *P. ticto* collected from West Bengal (26.85°N, 80.95°E) with a raw cytb distance of 12.1±2% from JQ795476 and 11.8±2% from JQ795475.

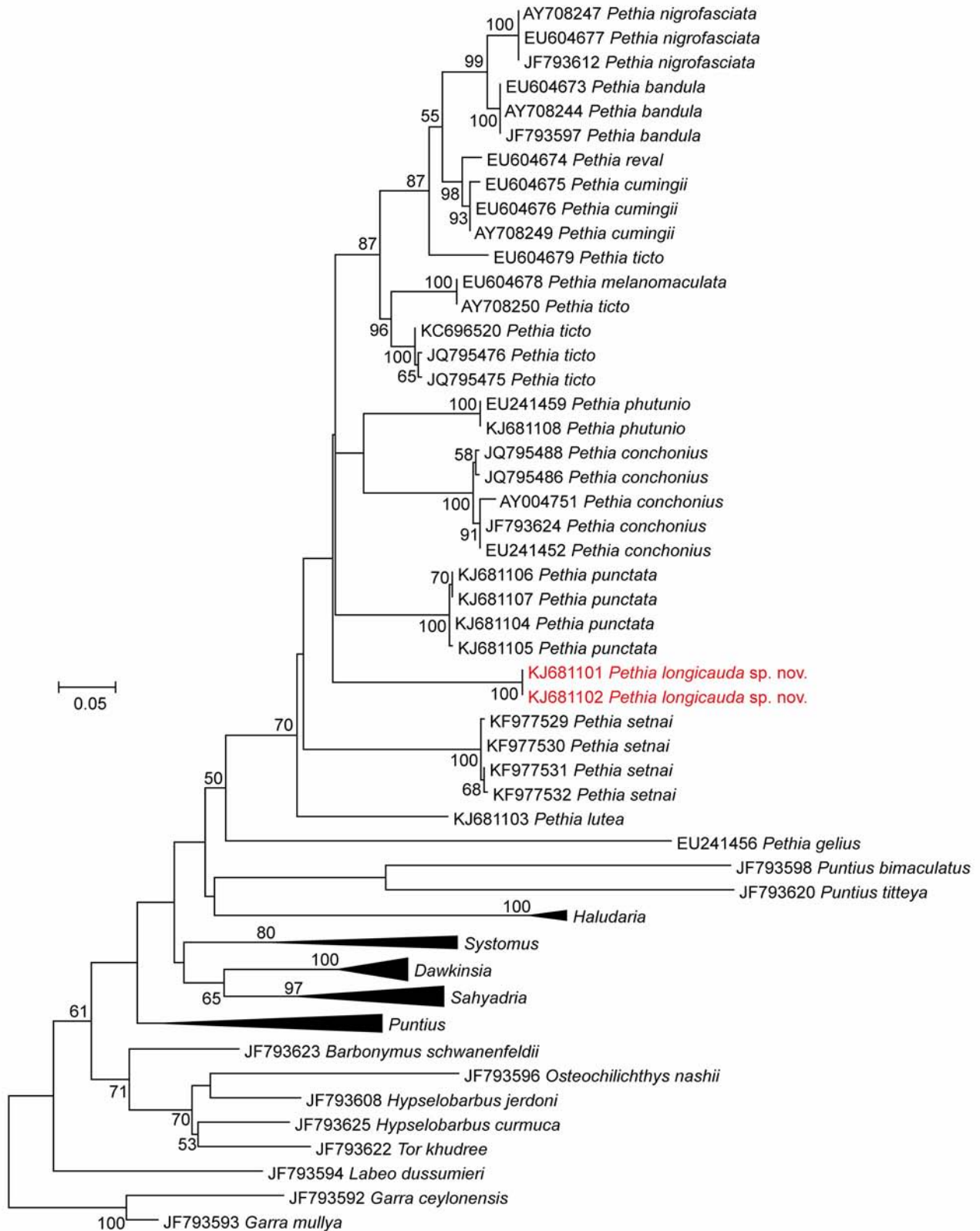


FIGURE 7. Phylogenetic position of *Pethia longicauda* based on maximum likelihood method. Values along the nodes are percent bootstraps for 1000 iterations. *Garra* species are used as outgroup.

From its Sri Lankan congeners, which possess incomplete lateral lines, *P. longicauda* differs by having only a small humeral spot covering the 3rd–4th scale of the lateral line (vs. large vertical humeral band in *P. bandula* (Kottelat & Pethiyagoda, 1991), *P. cumingii* (Günther, 1868) and *P. reval* (Meegaskumbura *et al.*, 2008)), more scales in lateral series (22–24 vs. 19–21 in *P. bandula*, 19–21 in *P. cumingii* and 18–21 in *P. reval*) and a shallower body (25.6–37.2% SL vs. 39.3–46.0% SL in *P. bandula*, 41.9–46.0 in *P. cumingii* and 93.2–44.4% SL in *P. reval*) (Kottelat & Pethiyagoda 1991; Günther 1868; Meegaskumbura *et al.* 2008). *Pethia longicauda* differs from *P. melanomaculata* (Deraniyagala, 1956) by having 3½ transverse scale rows between dorsal fin origin and lateral line (vs. 4½ scales). Further, *P. longicauda* is genetically distinct from *P. melanomaculata* (Figure 7) by a raw cyt b distance of 14.8±2.4%.

From its other congeners having an incomplete lateral line, *Pethia longicauda* differs from *P. atra* (Linthoingambi & Vishwanath, 2007), *P. conchionius* (Hamilton, 1822) and *P. khugae* (Linthoingambi & Vishwanath, 2007) by having fewer scales in lateral series (22–24 vs. 25–29 in *P. atra*, 24–26 in *P. conchionius* and 28–30 in *P. khugae*) (Linthoingambi & Vishwanath 2007; Hamilton 1822); from the superficially similar *P. manipurensis* (Menon, Rema Devi & Viswanath, 2000) by absence of or scarcely visible dorsal-fin bands (vs. 2–3 distinct dark dorsal fin bands), fewer scales in lateral series (22–24 vs. 24–25), more gill rakers on first ceratobranchial (13–14 vs. 7) and having the dorsal fin origin closer to the snout tip than to the base of the caudal peduncle (vs. dorsal fin origin closer to caudal-fin base) (Menon *et al.* 2000); from *P. phutunio* (Hamilton, 1822) by having one humeral spot and two caudal blotches (vs. four vertical bands across the body), lips well developed with a distinct lateral fold on snout (vs. lips thin, snout-fold absent) and more lateral-line pored scales (5–6 vs. 3–4); from *P. shalynius* (Yazdani & Talukdar, 1975) by having fewer pored scales in lateral series (5–6 vs. 11) (Yazdani & Talukdar 1975); from *P. meingangbii* (Arunkumar & Tombi Singh, 2003), *P. ornatus* (Vishwanath & Laisram, 2004) and *P. yuensis* (Arunkumar & Tombi Singh, 2003) in having fewer scales in transverse line on body (½3/1/3½ vs. ½5/1/3½ in *P. meingangbii*, ½4/1/2½ in *P. ornatus* and ½4/1/2½ in *P. yuensis*) (Arunkumar & Tombi Singh 2003; Vishwanath & Laisram 2004); from *P. aurea* Knight, 2013, *P. canius* (Hamilton, 1822) and *P. gelius* (Hamilton, 1822) by having one humeral and two caudal blotches (vs. dark band across caudal peduncle, 2–3 diffuse black blotches across body in *P. aurea*, *P. canius* and *P. gelius*) and fewer scales in transverse line on body (½3/1/3½ vs. ½5/1/3½ in *P. aurea*, ½4/1/2 in *P. canius* and ½4/1/2½ in *P. gelius*) (Knight 2013); from *P. didi* (Kullander & Fang, 2005), *P. erythromycter* (Kullander, 2008), *P. nankyweensis* (Kullander, 2008), *P. padamya* (Kullander & Britz, 2008) and *P. thelys* (Kullander, 2008) in having more scales in lateral series (22–24 vs. 19–21 in *P. didi*, 18–20 in *P. erythromycter* and 19–21 in *P. padamya*), absence of barbels (vs. a pair of maxillary barbels in *P. padamya* and *P. nankyweensis*), presence of a humeral spot (vs. no humeral spot in *P. nankyweensis* and *P. thelys*) and fewer pored lateral-line scales (5–6 vs. 6–11 in *P. thelys*) (Kullander & Fang 2005; Kullander 2008; Kullander & Britz 2008).

Rivers in the northern part of the Western Ghats are relatively less well explored for their fish diversity and distribution (Dahanukar *et al.* 2011; Katwate *et al.* 2012). The present description supports the need for a comprehensive taxonomic reassessment of earlier records of *P. ticto* sensu lato from this region.

Comparative material. *Pethia lutea* (n= 22): Holotype, BNHS FWF 71, collected from Bhira (18.4410N & 73.2670E, elevation 50m), Kundalika River, Raigad District, Maharashtra, India by Unmesh Katwate and Chetana Katwate on 23.xii.2012; Paratypes, 3 exs., BNHS FWF 72, 78 and 79, collected from Bhira (18.4410N & 73.2670E, 50m), Kundalika River, Raigad District, Maharashtra, India by Unmesh Katwate and Chetana Katwate on 23.xii.2012; 1 ex., WILD-14-PIS-061, collected from Bhira (18.4410N & 73.2670E, 50m), Kundalika River, Raigad District, Maharashtra, India by Unmesh Katwate and Chetana Katwate on 23.xii.2012; 1 ex., ZSI-WRC-P/3686, collected from Bhira (18.4410N & 73.2670E, 50m), Kundalika River, Raigad District, Maharashtra, India by Unmesh Katwate and Chetana Katwate on 23.xii.2012; 3 exs., BNHS FWF 73, 80 and 81, collected from Karjat (18.9220N & 73.3320E, 48m), Ulhas River, Raigad District, Maharashtra, India by Neelesh Dahanukar and M. Paingankar on 23.vi.2012; 2 exs., BNHS FWF 74 and 82, collected from Mangaon (18.2330N & 73.2560E, 7m), Kal River - tributary of Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate and Chetana Katwate on 05.i.2013; 1 ex., BNHS FWF 75, collected from Mahad (18.0910N & 73.4660E, 16m), Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate, Chetana Katwate, Rajendra Pawar and Vishwas Shinde on 23.ix.2013; 1 ex., WILD-14-PIS-062, collected from Mahad (18.0910N & 73.4660E, 16m), Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate, Chetana Katwate, Rajendra Pawar and Vishwas Shinde on 23.ix.2013; 1 ex., ZSI-WRC-P/3687, collected from Mahad (18.0910N & 73.4660E, 16m), Savitri River,

Raigad District, Maharashtra, India by Unmesh Katwate, Chetana Katwate, Rajendra Pawar and Vishwas Shinde on 23.ix.2013; 1 ex., BNHS FWF 76, collected from Shivathar Ghal (18.1480N & 73.6190E, 145m), Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate, Chetana Katwate, Rajendra Pawar and Vishwas Shinde on 26.xi.2013; 1 ex., WILD-14-PIS-063, collected from Shivathar Ghal (18.1480N & 73.6190E, 145m), Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate, Chetana Katwate, Rajendra Pawar and Vishwas Shinde on 26.xi.2013; 1 ex., ZSI-WRC-P/3688, collected from Shivathar Ghal (18.1480N & 73.6190E, 145m), Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate, Chetana Katwate, Rajendra Pawar and Vishwas Shinde on 26.xi.2013; 2 exs., BNHS FWF 83 and 84, collected from Poladpur (17.9830N & 73.4700E, 34m), Savitri River, Raigad District, Maharashtra, India by Unmesh Katwate and Chetana Katwate on 27.xi.2013; 2 exs., BNHS FWF 77 and 85, collected from Sangameshwar (17.1870N & 73.5500E, 12m), Shastri River, Ratnagiri District, Maharashtra, India by Unmesh Katwate and Saurabh Rane on 16.ix.2013; 1 ex., WILD-14-PIS-064, collected from Sangameshwar (17.1870N & 73.5500E, 12m), Shastri River, Ratnagiri District, Maharashtra, India by Unmesh Katwate and Saurabh Rane on 16.ix.2013.

Pethia punctata (n = 11): Day's material (syntype?), 1 ex., MCZ 4303, Canara (Cannanore, on the Malabar Coast, Kerala, India), coll. F. Day (only photograph examined); Day's material (syntype?), 1 ex., BMNH 1889.2.1.755, Wayanad, Kerala, India, coll. F. Day (only photograph examined); 3 ex., CRGSAC-2010.05.01-03, collected from Cochin, Kerala, collected by F. Baby on 18.v.2010; 6 ex., BNHS FWF 86-90, 92, Bandiwade, Gad River, Sindhudurga District, Maharashtra, collected on 15.ix.2013 by U. Katwate and S. Rane; 1 ex. BNHS FWF 91, collected from Terekhol River at Madkhol, Maharashtra, by U. Katwate, M. Paingankar and N. Dahanukar on 9.viii.2013.

Pethia setnai (n = 35): Holotype, ZSI-K FF2766, collected from Sanguem, Goa, by S. R. Sane on 1.iii.1985; Paratypes, 6 ex., ZSI-K FF2767, collected from Sanguem, Goa, by S. R. Sane on 1.iii.1985; 9 ex., BNHS FWF 53, 63 to 70, collected from Sanguem, Goa, by U. Katwate, M. Paingankar and N. Dahanukar on 10.viii.2013; 3 ex.; WILD-13-PIS-043 to 045, collected from Sanguem, Goa, by U. Katwate, M. Paingankar and N. Dahanukar on 10.viii.2013; 2 ex., ZSI-WRC-P/3567, collected from Sanguem, Goa, by U. Katwate, M. Paingankar and N. Dahanukar on 10.viii.2013; 9 ex., BNHS FWF 54 to 62, collected from Terekhol River at Madkhol, Maharashtra, by U. Katwate and N. Dahanukar on 12.vi.2013; 3 ex., WILD-13-PIS-046 to 48, collected from Terekhol River at Madkhol, Maharashtra, by U. Katwate and N. Dahanukar on 12.vi.2013; 2 ex., ZSI-WRC-P/3568, collected from Terekhol River at Madkhol, Maharashtra, by U. Katwate and N. Dahanukar on 12.vi.2013. Osteological details were obtained from Katwate et al. (2013).

Pethia narayani (n = 2): Syntypes, 2 ex., ZSI-K F12180/1, collected from Cauvery River, Coorg, by C.R.N. Rao (only photographs examined).

Pethia pookodensis (n = 2): 2 ex., specimens not collected, from Pookode lake, Wayanad, Kerala, by R. Raghavan and A. Ali, on 14.iv.2004. Photographs examined.

Pethia phutumio (n = 3): 1 ex., BNHS-FWF-95, collected from Sambalpur, Odisha, by S. Jadhav, on 7.vii.2012; 2 ex., BNHS FWF 93 and 94, collected from Hooghly, West Bengal, by R. Pandit on 12.v.2010.

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APPENDIX A. NCBI accession numbers for cytochrome-b gene sequences used for this study.

Species	Accession number	Species	Accession number
<i>Pethia longicauda</i> sp. nov.	KJ681101	<i>Puntius sophore</i>	JF793619
<i>Pethia longicauda</i> sp. nov.	KJ681102	<i>Puntius cf layardii</i>	JF793603
<i>Pethia lutea</i>	KJ681103	<i>Puntius kelumi</i>	JF793604
<i>Pethia setnai</i>	KF977531	<i>Puntius dorsalis</i>	JF793605
<i>Pethia setnai</i>	KF977532	<i>Puntius mahecola</i>	JF793611
<i>Pethia setnai</i>	KF977529	<i>Dawkinsia filamentosa</i>	JF793607
<i>Pethia setnai</i>	KF977530	<i>Dawkinsia filamentosa</i>	JX975487
<i>Pethia punctata</i>	KJ681104	<i>Dawkinsia singhala</i>	JF793617
<i>Pethia punctata</i>	KJ681105	<i>Dawkinsia srilankensis</i>	JF793618
<i>Pethia punctata</i>	KJ681106	<i>Dawkinsia tambraparniei</i>	JX975490
<i>Pethia punctata</i>	KJ681107	<i>Dawkinsia exclamatio</i>	JX975489
<i>Pethia conchonius</i>	JQ795488	<i>Dawkinsia rohani</i>	JX975488
<i>Pethia conchonius</i>	JQ795486	<i>Dawkinsia tambraparniei</i>	JX049981
<i>Pethia conchonius</i>	JF793624	<i>Dawkinsia arulius</i>	EU241450
<i>Pethia conchonius</i>	EU241452	<i>Haludaria fasciata</i>	JF793606
<i>Pethia conchonius</i>	AY004751	<i>Haludaria melanampyx</i>	EU241458
<i>Pethia ticto</i>	KC696520	<i>Haludaria fasciata</i>	AY708262
<i>Pethia ticto</i>	JQ795476	<i>Haludaria fasciata</i>	JQ795453
<i>Pethia ticto</i>	JQ795475	<i>Sahyadria denisonii</i>	GQ247558
<i>Pethia ticto</i>	AY708250	<i>Sahyadria denisonii</i>	GQ247559
<i>Pethia ticto</i>	EU604679	<i>Sahyadria denisonii</i>	JX470421
<i>Pethia phutunio</i>	EU241459	<i>Sahyadria denisonii</i>	JX470426
<i>Pethia phutunio</i>	KJ681108	<i>Sahyadria chalakkudiensis</i>	JX470424
<i>Pethia melanomaculata</i>	EU604678	<i>Sahyadria chalakkudiensis</i>	JX311437
<i>Pethia reval</i>	EU604674	<i>Sahyadria chalakkudiensis</i>	JX481182
<i>Pethia nigrofasciata</i>	JF793612	<i>Sahyadria denisonii</i>	JX470431
<i>Pethia nigrofasciata</i>	AY708247	<i>Systemus martenstyni</i>	JF793609
<i>Pethia nigrofasciata</i>	EU604677	<i>Systemus sp WHT8836</i>	JF793610
<i>Pethia bandula</i>	EU604673	<i>Systemus sarana</i>	JF793616
<i>Pethia bandula</i>	AY708244	<i>Systemus timbiri</i>	JF793614
<i>Pethia bandula</i>	JF793597	<i>Systemus pleurotaenia</i>	JF793613
<i>Pethia cumingii</i>	EU604675	<i>Tor khudree</i>	JF793622
<i>Pethia cumingii</i>	EU604676	<i>Barbonymus schwanenfeldii</i>	JF793623
<i>Pethia cumingii</i>	AY708249	<i>Hypselobarbus jerdoni</i>	JF793608
<i>Pethia gelius</i>	EU241456	<i>Hypselobarbus curmuca</i>	JF793625
<i>Puntius bimaculatus</i>	JF793598	<i>Labeo dussumieri</i>	JF793594
<i>Puntius titteya</i>	JF793620	<i>Osteochilichthys nashii</i>	JF793596
<i>Puntius thermalis</i>	JF793600	<i>Garra ceylonensis</i>	JF793592
<i>Puntius chola</i>	JF793601	<i>Garra mullya</i>	JF793593