

Resurrection and Re-description of *Pampus candidus* (Cuvier), Silver Pomfret from the Northern Indian Ocean

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Pomfrets (Genus *Pampus*) are commercially important fish in the Indo-Pacific region. The systematics of this genus is complicated because of morphological similarities between species. The silver pomfret from Indian waters has long been considered to be *Pampus argenteus*. Morphological and molecular examination of specimens from the Arabian Sea and Bay of Bengal regions suggested the silver pomfret from the region represents two species that are distinct both from each other and from *P. argenteus* from the South China Sea. Based on detailed morphological, meristic and molecular examinations, the most common species from the Indian Ocean was found to correspond with the descriptions of *Stromateus candidus* (Cuvier), which is resurrected from the synonymy of *P. argenteus* and redescribed here as *Pampus candidus* (new combination). The second species, which has restricted distribution in Indian waters needs further studies to arrive at taxonomic conclusions and is hence not described in the current study. Lectotypes are also designated for *Pampus candidus*.

Key words: *Pampus argenteus*, India, Resurrection, Morphology, *Stromateus candidus*.

BACKGROUND

Fishes of the genus *Pampus*, commonly called pomfrets or butterfishes, are widespread in coastal waters from the Persian Gulf to the Sea of Japan and contribute to important fisheries throughout this range. *Pampus* belongs to the family Stromateidae under Stromateoidei, a relatively small suborder of the order Perciformes, which that are mostly marine and pelagic, and occur worldwide in tropical to temperate regions (Haedrich 1967). The members of the family Stromateidae include species belonging to three genera—*Pampus*, *Peprilus* and *Stromateus*—distributed in waters of North and South America, western Africa and the Indo-Pacific

(Froese and Pauly 2018). *Stromateus* is characterized by the absence of blade-like spines in advance of the median fins, which are never falcate, and *Peprilus* is characterized by one to three blade-like spines ahead of the median fins, and a ventral spine on the pelvic bone. *Pampus* is diagnosed by the median fins often being falcate, with five to ten small blade-like spines protruding ahead of the fin, and the absence of a spine at the end of the pelvic bone (Haedrich 1967). *Pampus* includes the most commercially important species among Stromateids. The name *Pampus*, a masculine noun, is from the vernacular of the 19th century East Indian Spanish and Portuguese colonials, who generally used the term “*pampus*” (ultimately from “pompano”)

for any silvery, compressed fish. The genus *Pampus* was proposed by Bonaparte (1837) and currently includes eight species distributed worldwide (Liu and Li 2013; Eschmeyer et al. 2017) viz.: *Pampus argenteus* (Euphrasen 1788; Liu et al. 2013b), *P. chinensis* (Euphrasen 1788), *P. cinereus* (Bloch 1793, 1795; Liu et al. 2013a), *P. punctatissimus* (Temminck and Schlegel 1845), *P. echinogaster* (Basilewsky 1855), *P. minor* (Liu and Li 1998) and *P. liorum* (Liu and Li 2013). The eighth species, *P. nozawae* (Ishikawa 1904), was considered a synonym of *P. cinereus* by Liu et al. (2013a), but Jawad and Jig (2016) have recently confirmed the validity of this species based on studies of the axial skeleton.

Pampus argenteus, commercially the most important of all *Pampus* species, was originally described by Euphrasen (1788) on the basis of a single specimen from “Castellum Chinese Bocca Tigris”, Humen, Guangdong Province, China. The silver pomfret is reported throughout the distribution of the genus and is considered to represent a complex of closely related species (Haedrich 1967, Cui et al. 2010, Liu et al. 2013b). *Pampus punctatissimus*, *P. cinereus* and *P. minor* were considered synonyms of *P. argenteus* for many years before they were redescribed and resurrected (Liu and Li 1998, Liu et al. 2013a). A molecular analysis of *Pampus* specimens from across their distribution range (Divya et al. 2017) revealed the presence of two putative species of *Pampus* from

Indian waters, *Pampus* sp1 from the Arabian Sea and Bay of Bengal and *Pampus* sp2 from the Bay of Bengal, which were more closely related to *P. cinereus* than to *P. argenteus*. Several names are available in the literature for species of *Pampus* from Indian waters and a detailed analysis based on external morphology, meristics and osteology revealed *Pampus* sp1 is identical to the syntypes of *Stromateus candidus* (Cuvier, in Cuvier and Valenciennes 1833) while *Pampus* sp2 needs further examination to arrive at a taxonomic conclusion. *Pampus candidus* (new combination) is resurrected from the synonymy of *P. argenteus* and redescribed here. In addition to the molecular identity of silver pomfrets in India based on the cytochrome oxidase I gene, published earlier by Divya et al. (2017), the mitochondrial cytochrome *b* and 16S rRNA genes were also used to confirm the genetic identity of the silver pomfrets in Indian waters, compared to *P. argenteus* and *P. cinereus* from the South China Sea.

MATERIALS AND METHODS

Morphological Analysis

Specimens were collected from various locations in India covering the Arabian Sea and Bay of Bengal (28 individuals) during 2013–15 (Fig. 1), fixed in 10% formalin, then transferred to 70% ethanol, and deposited

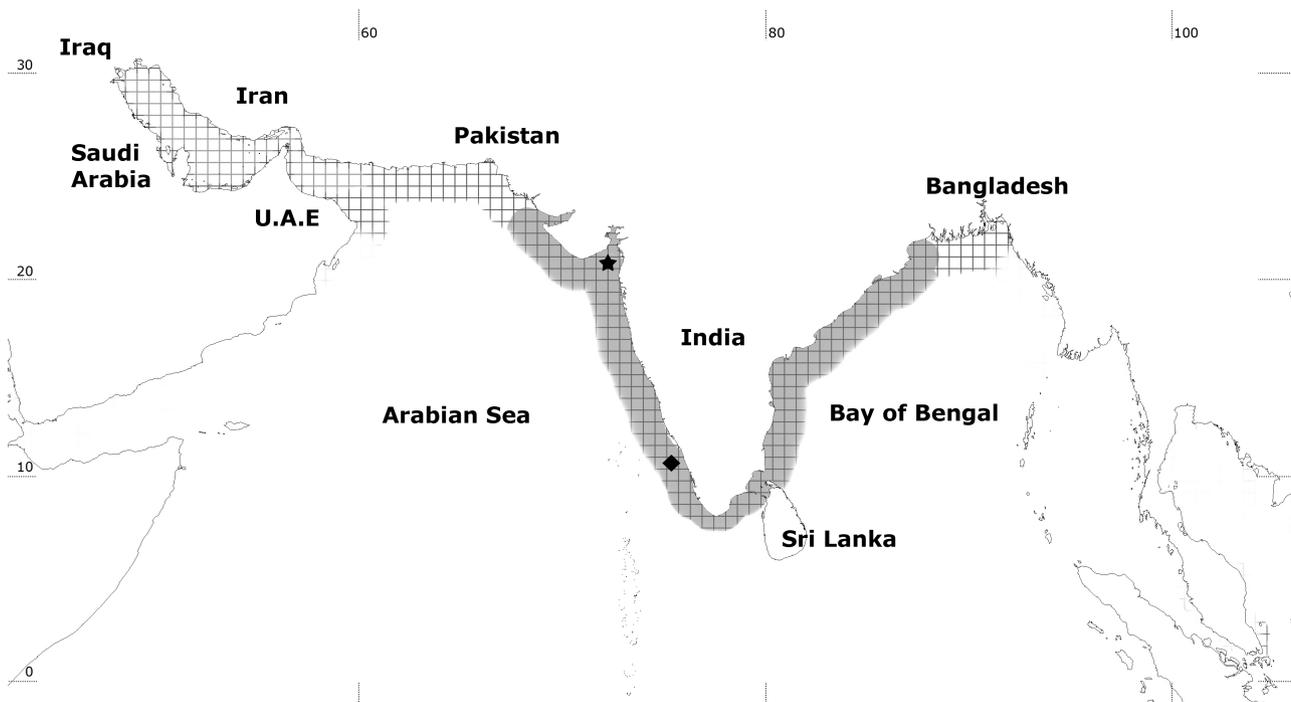


Fig. 1. ◆Type locality for *Pampus candidus*. ★Type locality for *Stromateus securifer*. Shaded area represents region from which specimens were sampled for this study. Cross-hatched area represents distribution of *Pampus candidus* based on sequences from Genbank.

in the national repositories of the Central Marine Fisheries Research Museum, Kochi, India and National Bureau of Fish Genetic Resources, Lucknow, India. Methods for measurements follow Haedrich (1967) and Liu et al. (2013 a b). One specimen was cleared and stained with alizarin red. Vertebrae were counted from x-radiographs and cleared specimens. Total vertebrae were counted as the number of precaudal vertebrae plus the number of caudal vertebrae, including the urostyle. The formula for the vertebral column follows Jawad and Jig (2016). Fin ray counts were taken under a stereo zoom microscope using transmitted light. Colour and pigmentation were noted in digital images of fresh specimens, but detailed observations were made from preserved material. Syntypes of *Stromateus candidus* (MNHN-IC-A-5712 and MNHN-IC-A-5713) and holotype of *P. securifer* (MNHN-IC-A-5649) were examined from photographs and radiographs. All drawings were made from digital images.

Molecular Analysis

Voucher numbers of specimens included in the molecular analysis are given in table 1. DNA extraction, from tissue samples preserved in absolute alcohol, followed the protocol of Miller et al. (1988). The cytochrome *b* (Cyt *b*) gene was amplified using the universal primers L14724: (5'-GTG ACT

TGAAAAACCACCGTT G-3' and H15700: 5'-GTT TAC AAG ACC GGT GCT CTG A-3'); and the 16S rRNA gene was amplified using 16SAR (5'-CGCCTGTTTATCAAAAACAT-3') and 16S BR (5'-CCGGTCTGAACTCAGATCACGT-3') primers (Palumbi et al. 1991). PCR amplification, sequencing and data analysis followed Divya et al. (2017). Comparative sequences for molecular analysis were downloaded from GenBank (Table 2). Neighbor Joining trees based on the Maximum Composite Likelihood model were generated to provide a graphic representation of divergence.

Institutional abbreviations used

Museum National D'histoire Naturelle, Paris, France (MNHN); Natural History Museum, London, U.K. (NHM); ICAR Central Marine Fisheries Research Institute, Kochi, India (CMFRI); ICAR National Bureau of Fish Genetic Resources, Lucknow, India (NBFGR).

RESULTS

Molecular Analysis

The Cyt *b* sequences derived from the specimens of *Pampus candidus* from Indian waters, together with

Table 1. *Pampus* specimens used in genetic analysis with gene information, sampling location, GenBank accession numbers and references

Species and gene	Sampling location	Accession no. /Code	References
<i>Pampus argenteus</i> (Cyt <i>b</i> gene)	South China Sea	KJ630457.1	
<i>Pampus cinereus</i> (Cyt <i>b</i> gene)	China	NC_029152.1	
<i>Pampus candidus</i> (Cyt <i>b</i> gene and 16S rRNA gene)	India	<i>Pampus candidus</i> 1 (NBFGR-CH-1170) <i>Pampus candidus</i> 2 (NBFGR-CH-1171) <i>Pampus candidus</i> 3 (NBFGR-CH-1167) <i>Pampus candidus</i> 4 (NBFGR-CH-1168) <i>Pampus candidus</i> 5 (NBFGR-CH-1178) <i>Pampus candidus</i> 6 (NBFGR-CH-1179) <i>Pampus candidus</i> 7 (NBFGR-CH-1180)	This study (MH 401670-76); (MH 401683-89)
<i>Pampus argenteus</i> (16S rRNA gene)	South China Sea	GU983961.1	Zhao and Ma 2010
<i>Pampus cinereus</i> (16S rRNA gene)	South China Sea	FJ 652413 FJ 652414	Cui et al. 2010
<i>Stromateus stellatus</i> (16S rRNA gene)	Japan	AB205428.1	Doiuchi and Nakabo 2006
<i>Stromateus stellatus</i> (Cyt <i>b</i> gene)	Japan	AB205472	Doiuchi and Nakabo 2006

those of *P. argenteus* and *P. cinereus* from the South China Sea, where the neotypes of these species were collected, were aligned to yield a final alignment of 790 bp. The 16S rRNA sequences from all four species were aligned to yield a final alignment of 520 bp. In our analysis, the species from the Indian Ocean showed a greater genetic affinity to *P. cinereus* than *P. argenteus* (Table 3). *P. candidus* exhibited a mean genetic difference greater than 17% for the Cyt *b* gene, and greater than 7% for the 16S rRNA gene, when compared to *P. argenteus* from the South China Sea. *Pampus candidus* also exhibited a mean genetic difference greater than 12% for the Cyt *b* gene when compared to *P. cinereus*. Intra-specific genetic differences for *P. candidus* varied from 0.0-0.5% for the Cyt *b* gene and 0.0-0.2% for the 16S rRNA gene. Neighbor Joining trees based on a Maximum Composite Likelihood model were generated using the Cyt *b* gene to provide

a graphic representation of the divergence of *Pampus candidus* from India and *Pampus argenteus* from the South China sea (Fig. 2).

Morphological Analysis

Counts and proportional measurements of 28 specimens of *P. candidus* are given in table 1.

Redescription of *Pampus candidus*

- Pampus candidus* (Cuvier, in Cuvier and Valenciennes 1833) New Combination
- Stromateus securifer* (Cuvier, in Cuvier and Valenciennes 1833)
- Stromateus cinereus* (Day 1876) [in part]
- Pampus argenteus* (Haedrich 1967) [in part]
- Pampus argenteus* (Talwar and Kacker 1984) [in part]
- Pampus argenteus* (Mishra and Srinivasan 1999)
- Pampus argenteus* (Bijukumar and Sushama 2000)

Table 2. Comparison of morphometric characters of *P. candidus* (n = 28), lectotype of *Stromateus candidus* (MNHN 5712), *Pampus candidus* (NHM 1889.2.1.3308), *Pampus argenteus* (NHM1891.1.31.8) and additional data on *P. argenteus*, *P. cinereus* and *P. liorum* from the literature* (Liu et al. 2013a b)

Characters	<i>Pampus candidus</i> (This study) n = 28	<i>Pampus candidus</i> (MNHN 5712)	<i>Pampus candidus</i> (NHM 1889.2.1.3308)	<i>Pampus argenteus</i> *
Dorsal fin rays	vii-ix; 40-42	ix; 40	ix; 40	ix-xi; 44-48
Anal fin rays	v-vii; 36-41	vi; 37	vii; 36	vi-vii; 43-47
Pectoral fin rays	22-24	-	-	22-24
Caudal fin rays	22-24	24	24	20-22
Gill rakers	1-2+6-8 (8-10)	-	-	3-4+13-15 (16-19)
Total vertebrae	37	37	37	40
Measurements				
Length of specimens	78.4-132.9	155	165	70.5-181.5
As percentage of standard length				
Maximum body depth	63-76	70.0	76	53.5-61.4
Length of the dorsal, anal, caudal and pectoral fins were the length of the longest rays				
Dorsal fin length	26-40	31.3		
Anal fin length	30-55	53.5	47	28.8-28.4
Pectoral fin length	39-51	45.8	42	30.5-35.0
Caudal fin length	39-76	-	-	-
Predorsal distance	51-58.4	51.3	53.7	44.4-50.8
Preanal distance	49.2-61.2	55.5	53.6	46.3-52
Length of the dorsal fin base	47.37-56	51.6	46	53.7-57.7
Length of the anal base	47-57.5	46	46	48.7-56.2
Caudal peduncle length	8.87-14.6	9.7	10.9	8.2-10.5
Caudal peduncle depth	9.1-12.6	12.3	9.8	7.7-9.6
Head length	25.3-31.2	27.1	25	14.4-20.6
Snout length	23-31.7	23	27	16.7-22
Inter-orbital width	40.5-47.3	46	47	35.4-46.3
Eye diameter	23-31	28.6	26	24.6-27.1
Length of upper jaw	26.5-32.4	32.1	30	17.7-25.9
Color	Bluish silvery or white	-	-	Silvery with bluish cast on the back and fading to silvery white on ventral sides

Specimens Examined: Lectotype (present designation) - MNHN-IC-A-5712, 155 mm SL, “Malabar, India” (Modern day Kerala, on the south

western coast of India) (Fig. 3). Paralectotypes- MNHN-IC-A-5713, 2 specimens, same locality as lectotype Others -: CMFRI-GB-31.145.1.5, 123.1 mm SL,

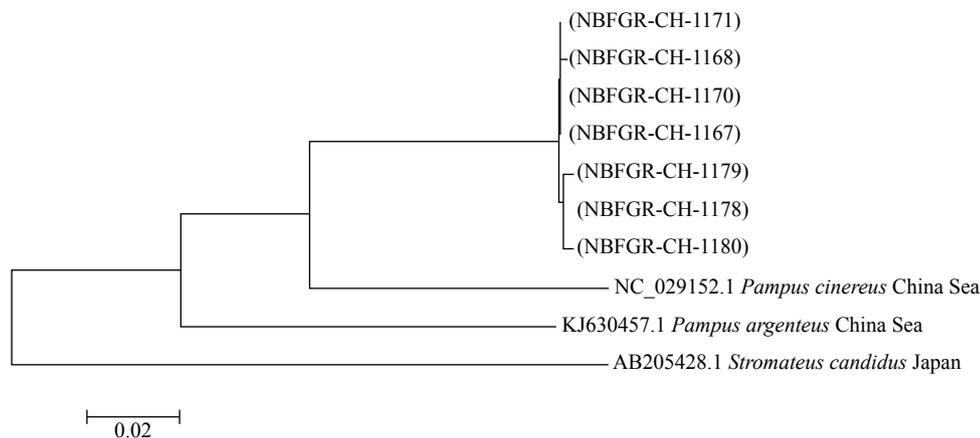


Fig. 2. Neighbor joining tree depicting genetic difference among *Pampus candidus* from India and *Pampus argenteus* from China sea.

Table 2. (Continued)

Characters	<i>Pampus argenteus</i> (NHM18 91.1.31.8)	<i>Pampus cinereus</i> *	<i>Pampus liuorum</i> *
Dorsal fin rays	xi; 48	viii-x; 37-41	vii-ix; 37-41
Anal fin rays	vii, 47	v-vii; 36-41	iv-vi; 36-40
Pectoral fin rays	22	20-22	22-24
Caudal fin rays	21	22-24	24-26
Gill rakers		1-2+6-8 (7-10)	2-3+6-9 (8-12)
Total vertebrae	40	36	38
Measurements			
Length of specimens	210	117.5-158.5	129.5-230
As percentage of standard length			
Maximum body depth	63	61.3-68.1	61.3-65.9
Length of the dorsal, anal, caudal and pectoral fins were the length of the longest rays			
Dorsal fin length	-	33.5-43.8	29.36-41.7
Anal fin length	-	48.4-59.9	48.7-66.7
Pectoral fin length	38	42.0-47.2	31.5-41.5
Caudal fin length	46.6	43.3-49.8	40.2-45.3
Predorsal distance	44.4	51.3-59.7	49.5-55.7
Preanal distance	53	46.2-55.8	50.5-55.5
Length of the dorsal fin base	53	49.8-53.6	48.3-53.5
Length of the anal base	51.1	48.4-55.9	49.1-56.0
Caudal peduncle length	8	9.4-10.1	9.1-12.0
Caudal peduncle depth	8	10.6-11.6	10.2-11.99
Head length	20.8	24.2-27.7	22-25.3
Snout length	18	20.6-23.2	22.4-27.5
Inter-orbital width	47	42.1-47	45.0-49.8
Eye diameter	25	27.7-30.7	19.4-25.0
Length of upper jaw	26	27.6-29.3	21.3-29.5
Color	-	Silvery grey	Head dark grey, golden bronze or yellowish blue on back, fading to silver grey on ventral sides

Cochin, Kerala. NBFGR-CH-1164-1171, 8 specimens 84.3 mm–132.9 mm SL, Cochin, Kerala. NBFGR-CH-1159-1163, NBFGR-CH-1181-1185, 10 specimens 83 mm–98.3 mm SL, Karaikal, Tamil Nadu. NBFGR-CH-1172-1180, 9 specimens 78.4 mm–89.9 mm SL, Veraval, Gujarat.

Diagnosis: *Pampus candidus* (Fig. 4) can be distinguished from its congeners by the following combination of characters: colour bluish silvery or white; greater body depth (> 63%) in comparison with standard length; 37 total vertebrae, including 16 pre-caudal and 21 caudal vertebrae; gill rakers 8–10, minute and tubercular. Dorsal fin rays VII–IX 40–42, anal fin rays V–VII, 36–41, anterior rays of dorsal and anal fins produced into falcate lobes, preceded by small blade-like spines embedded in skin and not obvious in large specimens; pectoral fins 39–51% of SL; caudal fin forked, the lower lobe usually not longer than the upper one in adults, while it is greatly extended in sub-adults.

Description: Body compressed and rhombic,

covered with small, deciduous, orbicular scales. Head compressed; dorsal profile strongly keeled, being more prominent behind the eye; snout obtuse. Eye small, greater than snout length. Mouth small, oblique, reaching to middle of eye; upper jaw covered with skin, not moveable. Branchiostegal membrane fused with isthmus. Gill membranes joined to belly; gill slit long, its lower margin below the level of pectoral-fin base; total gill rakers on first gill arch number 7–10 and appear minute and tubercular (Fig. 5). Dorsal fin rays VII–IX 40–42, preceded by 7–9 short, blade-like spines with pointed ends which are visible externally in juveniles and embedded in the skin in adults; anal fin rays V–VII 36–41, preceded by 5–6 short, blade-like spines with pointed ends which are visible externally in juveniles and embedded in the skin in adults; both median fins lobe-like anteriorly, originating behind pectoral-fin base; a vertical drawn from the first externally visible ray in the anal fin passes through the fourth or fifth dorsal fin ray. Anterior rays of anal fin



Fig. 3. Image of *Stomateus candidus* MNHN-IC-A-5712.

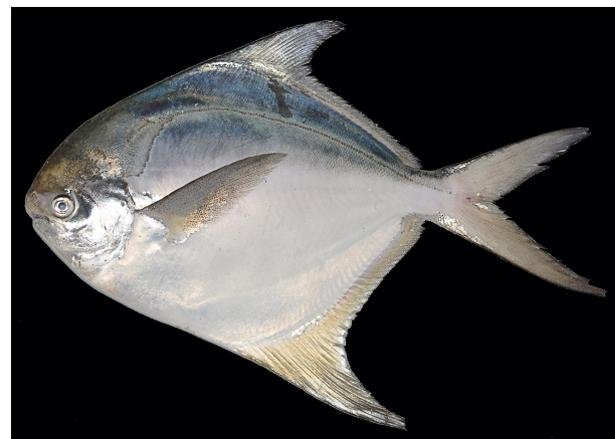


Fig. 4. Image of *Pampus candidus*.

Table 3. Pairwise K2P distance among *Pampus* species in India and South China Sea based on *Cyt b* and 16S rRNA genes. *Stomateus stellatus* forms the outgroup (Pairwise distance estimated using *Cyt b* gene is represented below the diagonal and 16S rRNA gene above diagonal)

	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC	PA	SS
<i>Pampus_candidus_1</i> (PC 1) (NBFGR-CH-1170)	0	0.002	0.000	0.000	0.000	0.000	0.000	0.008	0.072	0.072
<i>Pampus_candidus_2</i> (PC 2) (NBFGR-CH-1171)	0.000	0	0.002	0.002	0.002	0.002	0.002	0.006	0.07	0.072
<i>Pampus_candidus_3</i> (PC 3) (NBFGR-CH-1167)	0.000	0.000	0	0.00	0.00	0.00	0.00	0.008	0.072	0.072
<i>Pampus_candidus_4</i> (PC 4) (NBFGR-CH-1168)	0.001	0.001	0.001	0	0.00	0.00	0.00	0.008	0.072	0.072
<i>Pampus_candidus_5</i> (PC 5) (NBFGR-CH-1178)	0.001	0.001	0.001	0.003	0	0.00	0.00	0.008	0.072	0.072
<i>Pampus_candidus_6</i> (PC 6) (NBFGR-CH-1179)	0.004	0.004	0.004	0.005	0.003	0	0.00	0.008	0.072	0.072
<i>Pampus_candidus_7</i> (PC 7) (NBFGR-CH-1180)	0.003	0.003	0.003	0.004	0.001	0.004	0	0.008	0.072	0.072
<i>Pampus_cinereus</i> (PC)	0.120	0.120	0.120	0.121	0.121	0.123	0.123	0	0.068	0.070
<i>Pampus_argenteus</i> (PA)	0.166	0.166	0.166	0.168	0.168	0.167	0.170	0.177	0	0.070
<i>Stromateus_stellatus</i> (SS)	0.254	0.254	0.254	0.256	0.256	0.254	0.256	0.252	0.263	0.103

usually extended. Caudal fin long, deeply forked, lower lobe usually extended in sub adults, but progressively shorten with age and specimens over 100 mm SL have both lobes of almost equal length. Pectoral fins long, with 22–24 rays. Pelvic fins absent. Head and nape with a well-developed network of longitudinal sensory canals, the posterior end of which intersects a vertical drawn through the pectoral fin origin. Lateral line high, extending from the upper edge of opercle, along the line of the back, to caudal peduncle. Total vertebrae 37 (Fig. 6), with the formula $T_{37} = (a1 = 2) A = 15 (i = 1) + C = 22$, where T is total number of vertebrae; A is the number of abdominal vertebrae; a1 is the number of predorsal vertebrae; I is the number of intermediate vertebrae; and C is the number of caudal vertebrae, including the last complex of preural-uralscentra (Jawad and Jig 2016).

Color in formalin: Dorsal surfaces of head and lateral sides of body brownish, fading to pale creamy or yellow and brownish on ventral sides. Snout marked with fine chromatophores. All fins brownish with dark outer margins.

Color in life: Dorsal sides of body and head dark, lateral surfaces of body bluish silver or white. Dorsal, anal and caudal fins with dark outer margins; pectoral fins hyaline.

Etymology: The specific epithet, from the Latin for “bright white”, apparently refers to the typical colour of the fish.

DISCUSSION

The Cyt *b* and 16S rRNA sequences derived from the resurrected species *Pampus candidus* from Indian waters, together with those of *P. argenteus* and

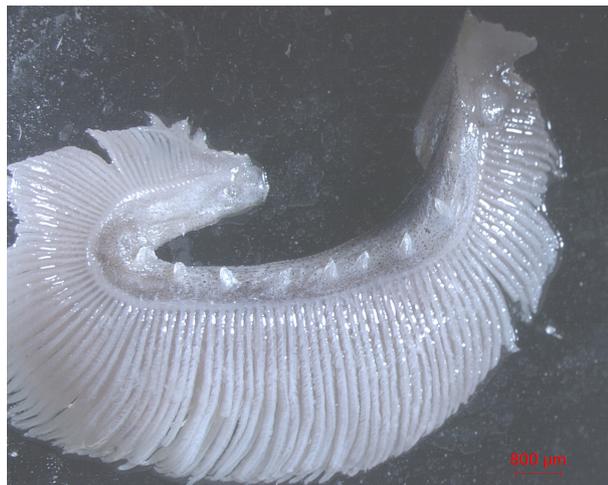


Fig. 5. First Gill raker of *Pampus candidus*.

P. cinereus from the South China Sea, were compared. High genetic differentiation was noted among silver pomfrets from India and the South China Sea, similar to previously obtained results using the *COI* gene (Divya et al. 2017). The species from the Indian Ocean showed a greater genetic affinity to *P. cinereus* than *P. argenteus*, differing by 12% from the former for the Cyt *b* gene and by 17% and 7%, for the Cyt *b* and 16S rRNA genes from the latter, respectively. However, the 16S rRNA gene could not differentiate *P. candidus* from *P. cinereus*, perhaps due to its low resolving power among closely related species. The unavailability of sequences of these genes representing other species in the genus precluded their inclusion in our analysis. The use of nuclear genes is also to be considered to further establish the relationships between these species. Intra-specific genetic differences of *Pampus candidus* for the Cyt *b* (0.0–0.5%) and 16S rRNA (0.0–0.2%) gene, were similar to the intra-specific variation among other fishes (Ward et al. 2005).

The results of our study suggest that *Pampus argenteus* is absent from the Indian coast (as evident from the Neighbor Joining tree generated using the Cyt *b* gene) and the fish reported under this name from Indian waters is made up of two putative species that bear closer affinity to *P. cinereus* than *P. argenteus*. *Stromateus cinereus* was described from a single specimen without a stated location (Bloch 1795), but, a subsequent publication (Bloch and Schneider 1801) lists Tranquebar (modern day Tharangambadi) on the east coast of India as the type locality. In redescribing the species, Liu et al. (2013b) designated a specimen from Guangdong, South China Sea as the neotype. Our specimens of *Pampus* from the Bay of Bengal (*Pampus* sp2 in Divya et al. 2017) exhibit minor differences when compared to *P. cinereus sensu* (Liu et al. 2013), but a more detailed analysis is required to determine if the two are distinct species. The name *Pampus griseus* (Cuvier and Valenciennes 1833) is available if the species from the Bay of Bengal proves to be distinct.

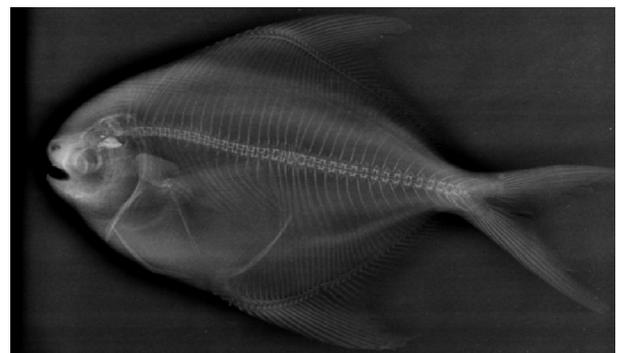


Fig. 6. Radiograph of *Pampus candidus*.

The other putative species recovered in our study is distinct from both *P. cinereus* and *Pampus* sp2, and identical to *Stromateus candidus* (Cuvier in Cuvier and Valenciennes 1833). Genetic differences between *P. argenteus*, *P. cinereus* and resurrected species *P. candidus* based on the *COI* gene have been already established (Divya et al. 2017), and our results based on the *Cyt b* and 16S rRNA genes support previous findings.

Russell (1803) in his collection of fishes from Vizag on the Coromandel Coast of India, described four species under the genus *Stromateus*: *Stromateus argenteus* (*Stromateus* with squamous rhomboidal body-Tella Sandawah), *S. niger* (*Stromateus* with squamous ovoid body- Nala Sandawah), *Stromateus* with body nearly orbicular (Atoo Koia), and *Stromateus* with rhomb-form body (Sudi Sandawah). *Stromateus* “atoo koia”, based on the description and figure in Russell is a species similar to *Pampus chinensis*, this species is also the basis of Cuvier’s *Stromateus atous*. *Stromateus* “Sudi-Sandawah” is apparently based on a sub-adult specimen of a species very similar to *Pampus cinereus* and Cuvier considered it identical to his *Pampus griseus* from Pondicherry. The names Atoo Koia and Sudi Sandawah are native names recorded by Russell and are not available. Five species of stromateids from India were described in Cuvier and Valenciennes (1833): *Stromateus candidus* from Malabar (Kerala) and Pondicherry (now Puducherry), *Stromateus griseus* from Pondicherry, *Stromateus securifer* from Bombay (now Mumbai), *Stromateus albus* and *Stromateus atous* from Vizagapatnam. *Stromateus albus* and *S. atous* are based on specimens similar to *Pampus chinensis* and have been treated as synonyms. Molecular analysis suggests the fish reported as *P. chinensis* from Indian waters is distinct from *P. chinensis sensu stricto* (Cui et al. 2010 and Divya et al. 2017) and names are thus available if a detailed examination shows the Indian form is a separate species.

Stromateus candidus is represented by several syntypes at the Muséum National d’Histoire Naturelle (Eschmeyer et al. 2017). Of the material we were able to examine, MNHN IC-1994-0701 (from Mahe, on the west coast of India) is in a poor state, but is evidently a specimen of *Parastromateus niger* (Bloch 1795). MNHN-IC-A-5712 (1 specimen) and MNHN-IC-A-5713 (2 specimens), both from “Malabar” in modern day Kerala on the west coast of India, are identical to fresh material we had on hand. Morphometric and meristic counts for these specimens are also within the range of variation exhibited by the fresh material. As the syntypes of *S. candidus* include two species, we designate MNHN-IC-A-5712 as the lectotype for *Stromateus candidus* in order to fix the

name. *Stromateus securifer* was described on the basis of a sub-adult specimen (MNHN-IC-A-5649) and is evidently identical to the species described as *S. candidus*. Both descriptions were published in the same manuscript and, as first reviser, we give priority to *S. candidus*. It must be noted that specimens of *P. candidus* from Veraval in Gujarat, close to Bombay from where *S. securifer* was described, exhibit a lesser body depth when compared to specimens from Kerala and the Bay of Bengal. *Stromateus candidus* is also the type for the genus *Pampus* (Bonaparte 1837; Fowler 1906). *Pampus candidus* (Cuvier in Cuvier and Valenciennes 1833) is treated here as a species with a distribution in the Arabian Sea and the Bay of Bengal. While all examined material is from the Indian coast, genetically identical material has been reported (as *P. argenteus*) from Pakistan and Kuwait (Divya et al. 2017), suggesting the range of the species extends up to the Persian Gulf.

Pampus candidus can be readily distinguished from *P. argenteus* and *P. echinogaster* in possessing fewer total vertebrae (37 vs 39–41), fewer gill rakers (8–10 vs > 16) and fewer branched rays (< 42 vs > 44) in the dorsal fin. *Pampus candidus* can be further distinguished from *P. argenteus* in possessing a greater maximum body depth (63–76% SL vs 53.5–61.4% SL). *Pampus candidus* can be distinguished from *P. minor* in possessing fewer gill rakers (8–10 vs 12–16) and more total vertebrae (37 vs < 30); and from *P. punctatissimus* in possessing a greater number of total vertebrae (37 vs 34–35) and a longer pectoral fin (39–51% SL vs 30.6–38.1% SL). *Pampus candidus* can be distinguished from *P. cinereus* in possessing more total vertebrae (37 vs 36); and from *P. liuorum* in possessing fewer total vertebrae (37 vs 38) and in possessing 14 (vs 15) vertebrae between the first pterygiophore on the dorsal fin and the first pterygiophore on the anal fin. *Pampus candidus* can be distinguished from *P. chinensis* in the anterior rays of the median fins being prolonged into falcate lobes (vs. not prolonged into falcate lobes), in the presence of flat blade-like spines in advance of the median fins (vs spines absent), and in possessing more total vertebrae (37 vs 32–33).

CONCLUSIONS

Morphological and molecular examination of specimens from the Arabian Sea and Bay of Bengal regions suggest the silver pomfret from the Indian region represents two species which are distinct from each other and from *P. argenteus* from the South China Sea. Names available in the literature, such as *Stromateus candidus* (Cuvier in Cuvier and Valenciennes 1833), *Stromateus securifer* (Cuvier

in Cuvier and Valenciennes 1833), and *Stromateus griseus* (Cuvier in Cuvier and Valenciennes 1833), could apply to the species from Indian waters. The most common species from the Indian Ocean were found to correspond with the description of *Stromateus candidus* (Cuvier in Cuvier and Valenciennes 1833), which is resurrected from the synonymy of *P. argenteus* and re-described here. A Lectotype is also designated for *Pampus candidus*. A second species, which has rare and restricted distribution in Indian waters needs further study to arrive at taxonomic conclusions.

Comparative Material

Stromateus securifer: [Holotype] MNHN-IC-A-5649 (Bombay, India) (Photographs)

Stromateus cinereus: NHM 1889.2.1.3308-3309 (Madras, India) F. Day collection

Stromateus argenteus: NHM 1891.1.31.8 (Shanghai, Yellow Sea, China)

Pampus minor: Data from Liu and Li 1998

Pampus liuorum: Data from Liu and Li 2013

Pampus cinereus: Data from Liu et al. 2013a

Pampus echinogaster: Data from Liu et al. 2013a

Pampus punctatissimus: Data from Liu et al. 2013a and Liu and Li 1998

Pampus argenteus: Data from Liu et al. 2013b

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Availability of data and materials: Specimens are available in the repositories mentioned in manuscript and sequence data are submitted to NCBI, an open access database.

Consent for publication: Being the corresponding author to this manuscript, I state that all authors agree to its submission and the Corresponding author has been authorized by the co-authors.

Ethics approval consent to participate: Dead specimens were collected from the fish landing centres; hence ethical approval is not required.

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