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The identity of *Pethia punctata*, a senior synonym of *P. muvattupuzhaensis* (Teleostei: Cyprinidae)

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Abstract

Francis Day described *Pethia punctata* from Cochin, on the Malabar (south western) coast of India. Although, the species is now recovered from its synonymy with *P. ticto*, an accurate diagnosis and description have been lacking. A redescription of *P. punctata* based on external morphology, osteology and genetics is provided, which revealed that *P. muvattupuzhaensis*, described from Muvattupuzha River, Ernakulam District, Kerala, India, is its junior synonym. *Pethia punctata* can be diagnosed from other known species in the genus by a combination of characters including lateral line complete, with 23–25 pored scales; 8 predorsal scales; $\frac{1}{2}4/1\frac{1}{3}\frac{1}{2}$ scales in transverse line; dorsal fin originating almost opposite to, or slightly before pelvic-fin origin; gill rakers 7 on first ceratobranchial; 4+26 total vertebrae; a small black humeral spot covering anterior half of the fourth scale of the row below the lateral-line row; two minute dark spots below the humeral spot; a prominent spot on the caudal peduncle, surrounded by a golden hoop covering scales 19–21 of the lateral-line row; and dorsal fin with 2–3 longitudinal rows of black spots, third row occupying only anterior portion of the fin.

Key words: Kerala, *Puntius*, small barb, taxonomy, Western Ghats

Introduction

Pethia punctata was described as *Puntius punctatus* by Day (1865, p. 302) from Cochin, on the Malabar coast of India. While earlier authors considered *P. punctata* as a synonym or a subspecies of *P. ticto* (Hora *et al.*, 1939; Jayaram 1991; Talwar & Jhingran 1991; Rema Devi 1992), others more recently have treated *P. punctata* as a valid species (Rema Devi *et al.* 1996; Menon *et al.* 2000; Beevi & Ramachandran 2005; Pethiyagoda *et al.* 2012; Katwate *et al.* 2014a, b). However, the recognition of *P. punctata* as a valid species has not until now been accompanied by a detailed description and diagnosis so as to facilitate definitive identification.

Beevi & Ramachandran (2005) described *Puntius muvattupuzhaensis* (now *Pethia muvattupuzhaensis*) as a small, elongate barb from the Muvattupuzha River, Ernakulam District, Kerala, India. The current distribution of the species is known to encompass the lower and middle reaches of the Muvattupuzha River, including the Ithipuzha and Murinjapuzha tributaries, and the lower reaches of Periyar River in Kerala (Beevi & Ramachandran 2005; 2009; Zeena & Beevi 2011). Except for these records, the species has not been documented in the scientific literature. Examination of the type material of *P. muvattupuzhaensis* deposited at the Southern Regional Center of the Zoological Survey of India (SRC-ZSI), Calicut, India, revealed several discrepancies with the original description, while the species showed remarkable similarity to *Pethia punctata*.

Here we provide morphometric, meristic, genetic and osteological evidence to characterize *P. punctata* based on topotypic material. Further, based on the examination of the type material and genetic analysis of fresh topotypic specimens we show that *P. muvattupuzhaensis* is a junior synonym of *P. punctata*.

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).

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References

- Altschul, S.F., Gish, W., Miller, W., Myers, E.W. & Lipman, D.J. (1990) Basic local alignment search tool. *Journal of Molecular Biology*, 215, 403–410.
[http://dx.doi.org/10.1016/S0022-2836\(05\)80360-2](http://dx.doi.org/10.1016/S0022-2836(05)80360-2)
- Beevi, K.S.J. & Ramachandran, A. (2009) Checklist of freshwater fishes collected from Ernakulam District, Kerala, India. *Journal of Threatened Taxa*, 1, 493–494.
<http://dx.doi.org/10.11609/JoTT.o1559.493-4>
- Beevi, K.S.J. & Ramachandran, A. (2005) A new species of *Puntius* (Cyprinidae, Cyprininae) from Kerala, India. *Journal of the Bombay Natural History Society*, 102, 83–85.
- Conway, K.W. (2011) Osteology of the South Asian genus *Psilorhynchus* McClelland, 1839 Teleostei: Ostariophysi: Psilorhynchidae, with investigation of its phylogenetic relationships within the order Cypriniformes. *Zoological Journal of the Linnean Society*, 163, 150–154.
<http://dx.doi.org/10.1111/j.1096-3642.2011.00698.x>
- Day, F. (1865) On the fishes of Cochin, on the Malabar Coast of India. *Proceedings of the Zoological Society of London*, 33, 286–318.
<http://dx.doi.org/10.1111/j.1469-7998.1865.tb02337.x>
- Day, F. (1871) Monograph of Indian Cyprinidae. Part 2. *Journal and Proceedings of the Asiatic Society of Bengal*, 40, 277–336.
- Day, F. (1873) *Report on the fresh water fish and fisheries of India and Burma*. Office of the Superintendent of Government Printing, Calcutta. i-ccciv + 118 pp.
- Dishma, M. & Vishwanath, W. (2013) A new species of the genus *Pethia* from Mizoram, northeastern India (Teleostei: Cyprinidae). *Zootaxa*, 3736, 82–88.
- Doornik, J.A. & Hansen, H. (2008) An Omnibus Test for Univariate and Multivariate Normality. *Oxford Bulletin of Economics and Statistics*, 70, 927–939.

<http://dx.doi.org/10.1111/j.1468-0084.2008.00537.x>

- Edgar, R.C. (2004) MUSCLE: multiple sequence alignment with high accuracy and high throughput. *Nucleic Acids Research*, 32, 1792–1797.
<http://dx.doi.org/10.1093/nar/gkh340>
- Hamilton, F. (1822) *An Account of the Fishes of River Ganges and its Branches*. George Ramsay and Co., London, vii+405 pp. [39 plates]
- Hammer, Ø., Harper, D.A.T. & Ryan, P.D. (2001) PAST: Paleontological statistics software package for education and data analysis. *Palaeontologia Electronica*, 4, 1–9.
- Harris, R.J. (2001) *A primer for multivariate statistics*. Third Edition. Lawrence Erlbaum Associates Publishers, London.
- Hora, S.L., Misra, K.S. & Malik, G.M. (1939) A study of variations in *Barbus (Puntius) ticto* (Hamilton). *Records of the Indian Museum*, 41, 263–279.
- Huberty, C.J. & Olejnik, S. (2006) *Applied MANOVA and Discriminant Analysis*. 2nd Edition. John Wiley and Sons, N.J., 488 pp.
- Jayaram, K.C. (1991) Revision of the genus *Puntius* (Hamilton) from the Indian Region (Pisces: Cypriniformes, Cyprinidae, Cyprininae). *Records of the Zoological Survey of India, Occasional Paper*, 135, 1–178.
- Katwate, U., Paingankar, M.S., Raghavan, R. & Dahanukar, N. (2014a) *Pethia longicauda*, a new species of barb (Teleostei: Cyprinidae) from the northern Western Ghats, India. *Zootaxa*, 3846 (2), 235–248.
<http://dx.doi.org/10.11646/zootaxa.3846.2.4>
- Katwate, U., Katwate, C., Raghavan, R., Paingankar, M.S. & Dahanukar, N. (2014b) *Pethia lutea*, a new species of barb (Teleostei: Cyprinidae) and new records of *P. punctata* from northern Western Ghats of India. *Journal of Threatened Taxa*, 6, 5797–5818.
<http://dx.doi.org/10.11609/JoTT.o3929.5797-818>
- Katwate, U., Paingankar, M.S., Jadhav, S. & Dahanukar, N. (2013) Phylogenetic position and osteology of *Pethia setnai* (Chhapgar & Sane, 1992), an endemic barb (Teleostei: Cyprinidae) of the Western Ghats, India, with notes on its distribution and threats. *Journal of Threatened Taxa*, 5, 5214–5227.
<http://dx.doi.org/10.11609/JoTT.o3857.5214-27>
- Katwate, U., Raghavan, R. & Dahanukar, N. (in prep.) The identity of Hamilton's Ticto Barb *Pethia ticto* (Teleostei: Cyprinidae) with genetic and osteological details.
- Kullander, S.O. (2008) Five new species of *Puntius* from Myanmar (Teleostei: Cyprinidae). *Ichthyological Exploration of Freshwaters*, 19, 59–84.
- Lalramliana, Knight, J.D.M. & Lalramliana, Z. (2014) *Pethia rutila* (Teleostei: Cyprinidae), a new species from Mizoram, northeast India. *Zootaxa*, 3827 (3), 366–374.
<http://dx.doi.org/10.11646/zootaxa.3827.3.6>
- Linthoingambi, I. & Vishwanath, W. (2007) Two new fish species of the genus *Puntius* Hamilton (Cyprinidae) from Manipur, India, with notes on *P. ticto* (Hamilton) and *P. stoliczkanus* (Day). *Zootaxa*, 1450, 45–56.
- Mattox, G.M.T., Britz, R., Toledo-Piza, M. & Marinho, M.M.F. (2013) *Cyanogaster noctivaga*, a remarkable new genus and species of miniature fish from the Rio Negro, Amazon basin (Ostariophysi: Characidae). *Ichthyological Exploration of Freshwaters*, 23, 297–318.
- Menon, A.G.K., Rema, Devi, K. & Vishwanath, W. (2000) A new species of *Puntius* (Cyprinidae: Cyprininae) from Manipur, India. *Journal of the Bombay Natural History Society*, 97, 263–268.
- Nei, M. & Kumar, S. (2000) *Molecular Evolution and Phylogenetics*. Oxford University Press, New York, 333 pp.
- Pethiyagoda, R., Meegaskumbura, M. & Maduwage, K. (2012) A synopsis of the South Asian fishes referred to *Puntius* (Pisces: Cyprinidae). *Ichthyological Exploration of Freshwaters*, 23, 69–95.
- Potthoff, T. (1984) Clearing and staining techniques. In: Moser, H.G., W.J. Richards, D.M. Cohen, M.P. Fahay, A.W. Kendall, Jr. & S.L. Richardson (eds.). *Ontogeny and Systematics of Fishes. No. 1*. American Society for Ichthyology and Herpetology, Special Publication, pp. 35–37. [760 pp]
- Rema Devi, K. (1992) Fishes of Kalakad Wildlife Sanctuary, Tirunelveli District, Tamil Nadu, India, with a redescription of *Horallabiosa joshuai* Silas. *Records of the Zoological Survey of India*, 92, 193–209.
- Rema Devi, K., Indra, T.J. & Emiliyamma, K.G. (1996) On the fish collections from Kerala, deposited in Southern Regional Station, Zoological Survey of India by NRM Stockholm. *Records of the Zoological Survey of India*, 95, 129–146.
- Schwarz, G. (1978) Estimating the dimension of a model. *Annals of Statistics*, 6, 461–464.
- Talwar, P.K. & Jhingran, A.G. (1991) *Inland Fishes of India and Adjacent Countries*. Oxford-IBH Publishing Co. Pvt. Ltd., New Delhi, 1158pp.
- Tamura, K. & Nei, M. (1993) Estimation of the number of nucleotide substitutions in the control region of mitochondrial DNA in humans and chimpanzees. *Molecular Biology and Evolution*, 10, 512–526.
- Tamura, K., Stecher, G., Peterson, D., Filipski, A. & Kumar, S. (2013) MEGA6: Molecular Evolutionary Genetics Analysis version 6.0. *Molecular Biology and Evolution*, 30, 2725–2729.
<http://dx.doi.org/10.1093/molbev/mst197>
- Zeena, K.V. & Beevi, K.S.J. (2011). Fish diversity in Ithipuzha and Murinjapuzha, Kerala, India. *Journal of the Bombay Natural History Society*, 108, 98–102.