

A Rare Lateral Line Variation in *Cynoglossus quadrilineatus* (Bleeker, 1851): Insights from Morphological and Molecular Analyses

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INTRODUCTION & AIM

- Cynoglossidae, commonly known as tongue soles, are bottom-dwelling flatfishes with both eyes on the same side of the head and a distinct ocular-side lateral line system.
- The configuration of ocular-side lateral lines is considered a stable morphological feature and is widely used for identifying *Cynoglossus* species.
- Cynoglossus quadrilineatus* (Four-lined tongue sole) is typically diagnosed by two well-defined ocular-side lateral lines.
- A specimen was encountered with three ocular side lateral lines, while all other morphological and meristic characters corresponded closely with *C. quadrilineatus*.
- This discordance between general diagnostic traits and ocular side lateral line configuration hindered precise taxonomic identification.
- Such rare deviations indicate potential taxonomic ambiguities within the genus and underscore the need for integrative analysis
- Aim:** To determine whether the additional lateral line represents a distinct species character or an individual developmental variation using morphological and COI-based molecular analyses.

METHOD

- Specimens (n=2; TL 294.8 and 306.6 mm) were collected from shallow coastal waters of Swaraj Dweep Island, Andaman and Nicobar Islands, using a gill net.
- Methods of counting and measuring were followed from Menon (1977) and Fricke (2019)
- The specimens were deposited in the museum collections of the Zoological Survey of India, Andaman and Nicobar regional center, India (voucher number ZSIANRC/M/31596).
- DNA was extracted using the DNeasy Blood and Tissue Kit (Qiagen), and the COI region was amplified using the FishF1 and FishR1 primers of Ward et al. (2005).
- Amplified PCR products were sequenced using the Sanger method
- COI sequences were analyzed in MEGA X with NCBI reference sequences for phylogeny and K2P distance estimation, and deposited in GenBank (PQ803351, OR515115).

RESULTS & DISCUSSION

Table 1. Comparative meristic characters of *Cynoglossus quadrilineatus*.

Meristic Characters	<i>C. quadrilineatus</i> (2 L.L*, Figure 1) Present study	<i>C. quadrilineatus</i> (3 L.L, Figure, 2) present study	Menon (1977)#
Dorsal fin rays	109	108	107
Anal fin rays	86	85	86
Caudal fin rays	12	12	12
Pelvic fin rays	4	4	-
lateral lines ES*	2	3	2
lateral lines BS*	2	2	2
Lateral line scales	91	90	88–96
Lateral line transverse scales	14	14	14

*LL= Lateral line, *ES= Eyed side, *BS= Blind side
Menon (1977) named the species as *C. bilineatus*, which is presently a synonym of *C. quadrilineatus*

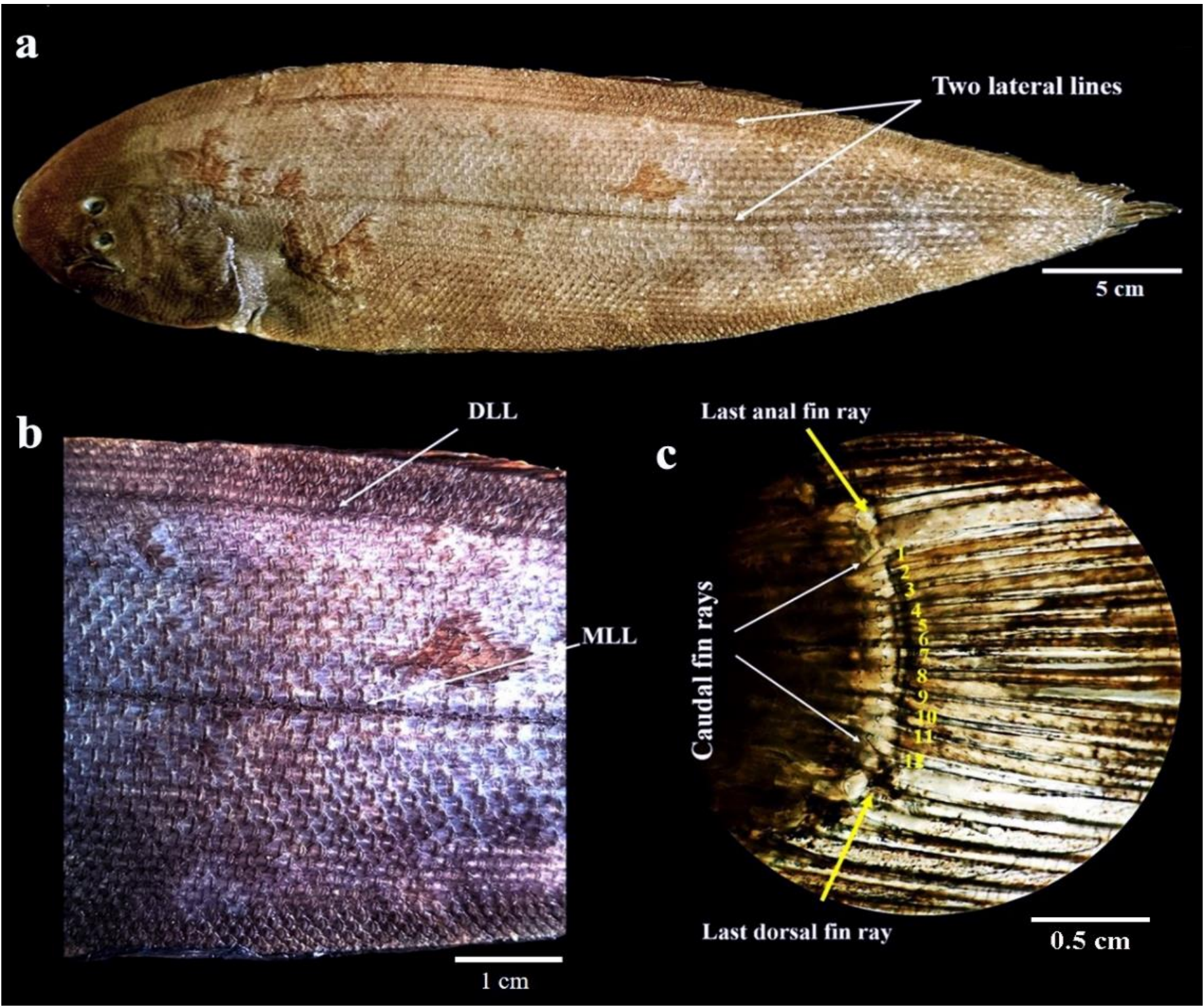


Figure 1 (a–c): Morphological features of *Cynoglossus quadrilineatus* with two ocular side lateral lines. (a) Whole body; (b) ocular side showing dorsal and mid lateral lines (DLL, MLL); (c) caudal fin on blind side with 12 rays.

RESULTS & DISCUSSION

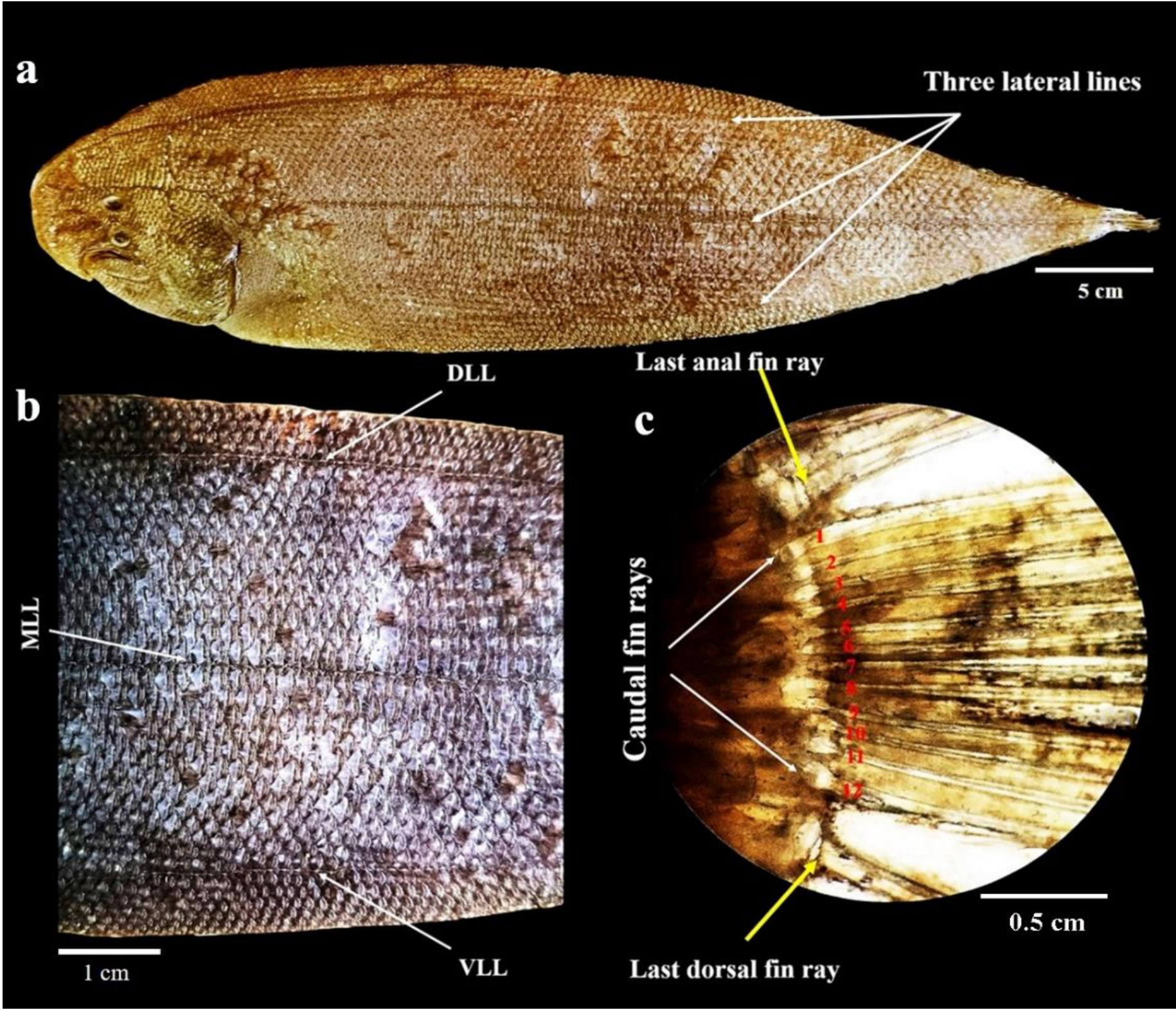


Figure 2 (a–c): Morphological features of *Cynoglossus quadrilineatus* with three ocular side lateral lines. (a) Whole body; (b) ocular side showing DLL, MLL, and an additional VLL; (c) caudal fin with 12 rays.

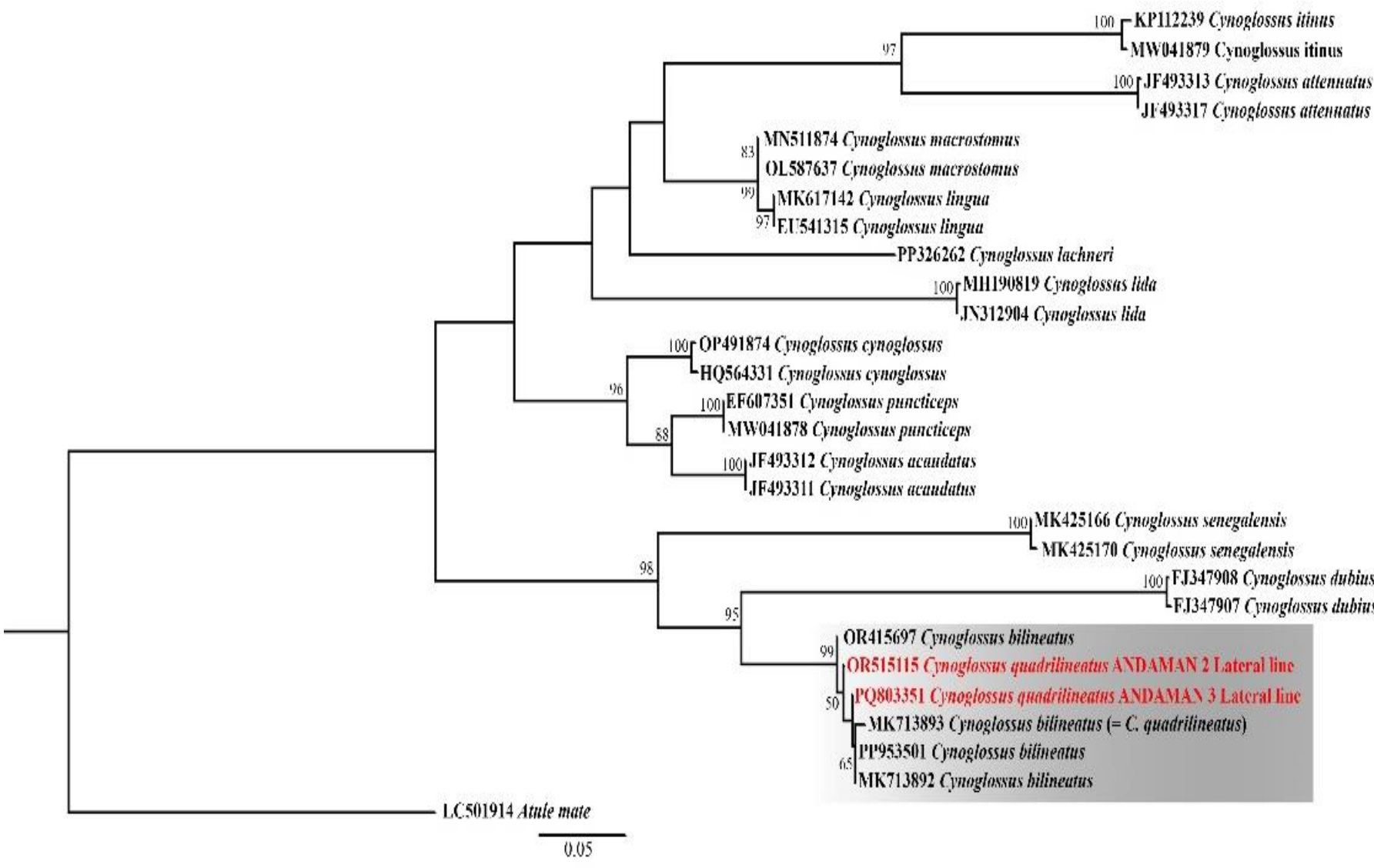


Figure 3. Maximum likelihood COI tree of *Cynoglossus quadrilineatus* from the Andaman Islands; *Atule mate* used as outgroup.

Table 2. K2P pairwise genetic distances (%) between Andaman isolates of *C. quadrilineatus* (two and three ocular-side lateral lines) and other congeners

Accession number	Species name	1	2	3	4	5	6
OR515115	<i>Cynoglossus quadrilineatus</i> Andaman 2 L.L						
PQ803351	<i>Cynoglossus quadrilineatus</i> Andaman 3 L.L	0.48					
MK713893	<i>Cynoglossus quadrilineatus</i>	0.93	0.74				
FJ347908	<i>Cynoglossus dubius</i>	16.4	15.6	15.4			
MK425166	<i>Cynoglossus senegalensis</i>	18.8	18.5	19.1	24.9		
OP491874	<i>Cynoglossus cynoglossus</i>	19.3	19.1	18.9	26.5	22.1	

CONCLUSION

- Morphological traits and COI sequences confirmed that both specimens belong to *Cynoglossus quadrilineatus*.
- The species is conventionally diagnosed by two ocular side lateral lines, but our finding shows this character can range from two to three, with one specimen displaying a fully developed ventral line.
- The third lateral line does not signify species differentiation and is instead an atypical individual variation
- The present interpretation is constrained by the limited number of variant specimens, and additional material will be required to assess the consistency of this trait in *C. quadrilineatus*.

REFERENCES

- Menon AGK (1977) A systematic monograph of the tongue soles of the genus *Cynoglossus* Hamilton-Buchanan (Pisces, Cynoglossidae). <https://doi.org/10.5479/si.00810282.238>
- Fricke R (2019) *Cynoglossus westraliensis*, a new species of tonguesole from Western Australia (Teleostei: Cynoglossidae). FishTaxa 4:31–40