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Seahorses and pipefishes of Sri Lanka (Teleostei: Syngnathidae)

Sri Lanka, situated within the biodiversity-rich Indo-Pacific, is recognized as a hotspot for marine and freshwater fish diversity. Although numerous new teleost species have been described from the island in recent decades (Pethiyagoda & Sudasinghe 2021), the family Syngnathidae, which includes seahorses, pipefishes, and pygmy pipehorses, remains poorly documented. Despite early taxonomic contributions, such as those by Duncker (1910), who described the pipefish species *Siokunichthys southwelli* and *Microphis ocellatus* from 'Ceylon', modern systematic studies on Sri Lanka's syngnathid fauna are lacking. Given the morphological complexity of this group and the potential for cryptic species, a comprehensive taxonomic synthesis is overdue. Accurate field identification of syngnathid species in Sri Lanka is further complicated by the lack of region-specific diagnostic tools and the morphological conservatism typical of the group. Foundational works, including Dawson (1985), provide broad Indo-Pacific coverage but are not tailored to the local fauna. The distinct morphology of syngnathids, characterized by elongate bodies, reduced fins, and cryptic traits, can hinder differentiation among closely related congeners (Lourie *et al*. 2004, Dawson 1985). Moreover, recent advances in molecular systematics have revealed that several syngnathid taxa previously regarded as single species may represent complexes of genetically distinct but morphologically similar lineages, a pattern increasingly evident in other teleost groups across the region (Hamilton *et al*. 2017, Stiller *et al*. 2022). In light of these challenges, the development of a comprehensive, Sri Lanka-specific checklist and identification key is a necessary first step toward resolving taxonomic uncertainties and supporting future biodiversity assessments.

Members of the Syngnathidae occupy a broad range of habitats in temperate and tropical waters of the Atlantic and Indo-Pacific Oceans (Lourie *et al*. 2004, Dawson 1985). Seahorses (genus *Hippocampus* Rafinesque, 1810) are typically associated with structurally complex environments, including seagrass beds, coral reefs, mangroves, estuaries, and sandy or rubble substrates (Foster & Vincent 2004, Perera *et al*. 2017). Pipefishes, though more elongate and generally lacking the ornamentation seen in seahorses, occur across a similarly diverse range of habitats. While most are found in marine or estuarine environments, some species are adapted to freshwater and exhibit considerable variation in reproductive mode and ecological specialization (Dawson 1985, De Silva *et al*. 2015). To address the identification difficulties encountered in fieldwork and to summarize the syngnathid research conducted thus far on the island as an early precursor to broader exploration, we present here, for the first time, a revised checklist and a comprehensive identification key to the species of this family in Sri Lanka, along with their distributional records and current conservation status. Insights discussed in this article are based on fieldwork conducted between 2022 and 2024, which involved direct observations and interviews with local fishing communities across the island. Additionally, publications related to the Syngnathidae fishes of Sri Lanka up to February 2024 were gathered and thoroughly reviewed. Other reliable sources cited and referred to in the IUCN Red List (2022) and the Convention on International Trade in Endangered Species (CITES; Appendix II) were also consulted.

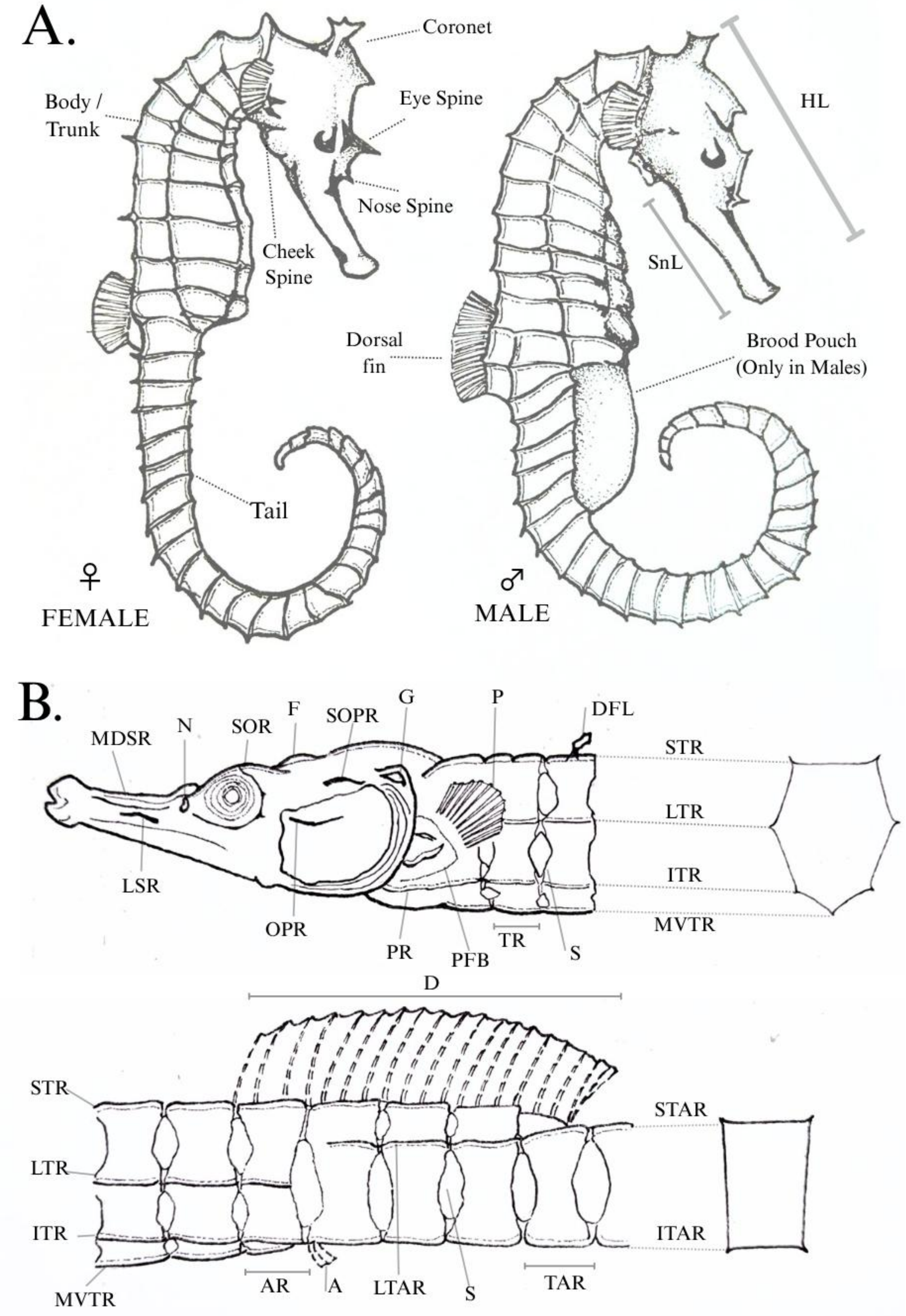

Figure 1. (A) Morphology of a seahorse. HL: Head length; SnL: Snout length; (**B)** Lateral and cross-sections of a typical pipefish depicting selected morphological features as presented in Dawson (1985): A-anal fin; AR-anal ring; D-dorsal fin; DFL-dermal flap; F- frontal ridge; G-gill opening; IT AR- inferior tail ridge; TR-inferior trunk ridge; LSR-lateral snout ridge; LTAR-lateral tail ridge; LTR-lateral trunk ridge; MDSR-median dorsal snout ridge; MVTR-median ventral trunk ridge; N-naris; OPR-opercular ridge; P-pectoral fin; PPB-pectoral-fin base; PR-pectoral ring (1st trunk ring); S-scutellum; SOPR- supra-opercular ridge; SOR-supraorbital ridge; STAR-superior tail ridge; STR-superior trunk ridge; TAR-tail ring; TR-trunk ring.

Furthermore, we examined the latest IUCN Red List assessments and FishBase profiles <www.fishbase.se> (Froese & Pauly 2024) for each species to verify the information presented. The identification key was formulated based on the morphological characters presented in Dawson (1985) and Lourie *et al*. (1999, 2004).

We confirmed the presence of 21 valid syngnathid species representing 13 genera in Sri Lanka, occurring across freshwater and marine habitats (Sup. Table 1). Among them, only two species (10% of the total Syngnathidae recorded) are seahorses: *Hippocampus kuda* (Bleeker, 1852) and *H. spinosissimus* Weber, 1913, while the remaining 19 species (90%) are pipefishes. The recorded pipefishes represents 12 genera: three species each from *Microphis* Kaup, 1853 and *Halicampus* Kaup, 1856 (each representing 16% of total pipefishes recorded); two species each (11%) from *Corythoichthys* Kaup, 1853, *Doryrhamphus* Kaup, 1856 and *Trachyrhamphus* Kaup, 1853 and one species (~5%) each from *Hippichthys* Bleeker, 1849, *Ichthyocampus* Kaup, 1853, *Siokunichthys* Herald, 1953, *Cosmocampus* Dawson, 1979, *Nannocampus* Günther, 1870, *Phoxocampus* Dawson, 1977 and *Syngnathoides* Bleeker, 1851 (Sup. Table 1).

The identification key for species is given below. This key was developed especially for use in the field based on easily distinguishable morphological characters (Fig. 1). Apart from two confirmed seahorse species, we include three other species (*Hippocampus histrix* Kaup, 1856; *H. kelloggi* Jordan & Snyder, 1901 and *H. trimaculatus* Leach, 1814), which have multiple sighting records from the Indian Ocean and nearby regions (see Lourie *et al*. 2004) (including unverified sightings from Sri Lanka), in the key to facilitate identification if they are encountered in Sri Lankan waters.

Here we present the formulated dichotomous identification key as follows:

1. Head directed at a distinct angle to the longitudinal body axis (usually > 70º) 2
   – Head and body form a straight line 6

2. Dorsal region/body is smooth and lacks spines 3
   – Dorsal region has body spines 5

3. Prominent 'hook'-shaped cheek and eye spines; three dark spots in the dorsal region .... *Hippocampus trimaculatus*[1]
   – Cheek and eye spines are not 'hook'-shaped; no distinct dark spots in the dorsal region 4

4. Narrow body structure; medium-high distinct coronet .... *Hippocampus kelloggi*[1]
   – Deep body structure; low-round coronet angled posteriorly .... *Hippocampus kuda*

5. Snout spine is low or absent; single or double cheek spines .... *Hippocampus spinosissimus*
   – Snout spine is high; single cheek spine .... *Hippocampus histrix*[1]

6. Presence of a caudal fin (sometimes rudimentary) 7
   – Caudal fin absent in sub-adults and adults .... *Syngnathoides biaculeatus*
7. Anal fin absent 8
   – Anal fin present 9

8. Trunk rings 8, total rings 57–58 .... *Siokunichthys southwelli*
   – Trunk rings 18–19, total rings 66–68 .... *Nannocampus pictus*
9. Caudal fin rays typically 9 10
   – Caudal fin rays typically not 9 14

10. Trunk rings 21–24; total rings 64–86 11
    – Trunk rings 15–22; total rings 39–55 12

11. Snout length 2.2–2.8 in HL; snout depth averages 3.9 in snout length .... *Trachyrhampus serratus*
    – Snout length 1.9–2.1 in HL; snout depth averages 5.9 in snout length .... *Trachyrhampus longirostris*

12. HL 4.2–5.3 in SL; pectoral-fin rays usually 20–21 (19–23) .... *Microphis brachyurus*
    – HL 7.3–10.3 in SL; pectoral-fin rays usually 17–18 (never exceeds 19) 13

13. Dorsal-fin rays 37–42; total rings (15–17 + 27–32) = 42–49 .... *Microphis ocellatus*
    – Dorsal-fin rays 47–56; total rings (16–18 + 24–27) = 40–45 .... *Microphis cuncalus*

14. Superior trunk-tail ridge continuous 15
    – Superior trunk-tail ridge discontinuous 16

15. Lateral trunk ridge deflected ventrally near the anal ring; total rings (14–15 + 37–40) = 51–55 .... *Ichthyocampus carce*
    – Lateral trunk ridge not deflected ventrally near the anal ring; total rings (15–16 + 25–33) = 40–49 (never exceed 50) . *Phoxocampus diacanthus*

16. Inferior trunk and tail ridges continuous 17
– Inferior trunk and tail ridges discontinuous 20

17. Lateral snout ridge absent .... *Cosmocampus investigatoris*
– Lateral snout ridge present or implied 18

18. Lateral trunk ridge straight or deflected ventrad near the anal ring .... *Hippichthys heptagonus*
– Lateral trunk ridge confluent with the inferior tail ridge 19

19. Trunk rings modally 15; no prominent lateral stripes on head; body usually with broad brown bars .... *Corythoichthys amplexus*
– Trunk rings modally 16; prominent lateral stripes on head; body with narrow reticulate bars .... *Corythoichthys flavofasciatus*

20. HL 7.7–10.9 in SL; dorsal-fin rays 19–21 21
– HL 3.5–5.3 in SL; dorsal-fin rays 16–30 22

21. Tail rings 21–23 .... *Doryrhamphus janssi*
– Tail rings 11–17 .... *Doryrhamphus excisus*

22. Dorsal rim of orbit elevated with spines or spine-like ridges on postorbital and posterior supraorbital regions ...... *Halicampus spinirostris*
– Dorsal rim of orbit not strongly elevated; no spines on postorbital or posterior supraorbital regions 23

23. HL 10.2–13.0 in SL; snout depth 1.2–2.7 in SL; pectoral-fin rays 12–14 .... *Halicampus mataafae*
– HL 7.7–10.9 in SL; snout depth 3.3–5.3 in SL; pectoral-fin rays 15–20 (usually 16–19) .... *Halicampus grayi*

Note: [1]No verified sightings from Sri Lanka to date; HL = Head Length; SL = Snout Length

Distribution. Perera *et al*. (2017) recorded *Hippocampus kuda* (referred to as *H. fuscus* Ruppell 1838*,* now a junior synonym to *H. kuda* according to Lourie *et al*. 2016) and *H. spinosissimus* from Puttalam Lagoon, an area with abundant seagrass. Specimens resembling *H. kuda* were observed by the first author along the southern coast (Polhena), though species-level identification could not be confirmed. Several pipefish species have also been recorded from inland waters, including *Hippichthys heptagonus* from Bolgoda Lake, reported by Herath *et al*. (2014); *Microphis ocellatus* (type locality: Wakwella, Galle; Duncker 1910) from Horana, Pahiyangala, and Kitulgala; and *M. brachyurus* from coastal areas of the southwestern regions, as documented by Pethiyagoda (1991) and De Silva *et al*. (2015).

Here, we report five additional marine syngnathid species from Sri Lanka that were not included in the most recent National Red List Assessment (Kumara 2012). In addition to the 21 confirmed species, Kumara (2012) reported an unidentified *Doryrhamphus* specimen from southern Sri Lanka, originally referenced from Perera and Weerakkody (2004). As this record lacks definitive identification, it has not been included in the present checklist. It is also noteworthy that, based on currently available literature, there are no confirmed records of ghost pipefishes (family Solenostomidae) or pipehorses (e.g., *Acentronura*, *Idiotropiscis*) from Sri Lankan waters.

All confirmed seahorses are classified as Vulnerable (VU), representing 10% of confirmed syngnathids. Approximately 76% of the confirmed Syngnathidae,16 pipefish species, are listed as Least Concern (LC): *Corythoichthys amplexus*, *C. flavofasciatus*, *Hippichthys heptagonus*, *Doryrhamphus excisus*, *D. janssi*, *Cosmocampus investigatoris*, *Halicampus grayi*, *H. mataafae*, *H. spinirostris*, *Nannocampus pictus*, *Phoxocampus diacanthus*, *Ichthyocampus carce*, *Microphis brachyurus*, *M. cuncalus*, *Syngnathoides biaculeatus*, and *Trachyrhamphus longirostris*. The remaining three pipefish species—*Microphis ocellatus*, *Siokunichthys southwelli*, and *Trachyrhamphus serratus*—are classified as Data Deficient (DD), comprising 14% of the total confirmed species. The high proportion of Least Concern pipefishes contrasts with the Vulnerable status of seahorses, reflecting differential threats and collection pressures within the family.

Seahorse species face significant threats from illegal trade, particularly for use in traditional Chinese medicine. In Sri Lanka, additional pressures arise from collection for ornamental jewelry and the aquarium trade, although these activities do not appear to occur at a large scale (pers. obs.). Continued research, systematic monitoring, and regulatory oversight are essential to support the conservation of these ecologically important and increasingly vulnerable species within Sri Lanka's marine and freshwater ecosystems.

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Supplemental data

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