# AN INTRODUCTION TO THE IDENTIFICATION OF SEAHORSES

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## Introduction

The seahorses have increasing demand in the international market as they are highly sought after for use in traditional Chinese Medicines (TCM), marine aquarium trade and as curios. Globally, studies have indicated depletion of seahorse population in the wild, due to their heavy demand in the international export market and the consequent over-harvest from the wild. The last global assessment of seahorses conducted in 2016 by Project Seahorse with the IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group established that atleast one-third of the 41 species then recognised were threatened (2 are Endangered, 12 are Vulnerable, 17 are Data Deficient, 10 are Least Concern). In India, a total of seven species have been reported *viz*., *Hippocampus kuda*, *H. trimaculatus*, *H. spinosissimus*, *H. histrix*, *H. kelloggi*, *H. mohnikei* and *H. camelopardalis* and of these, except for one species (*H. camelopardalis*), all the other species are listed as Vulnerable in the IUCN Red List of Threatened Species (Table 1).

**Table 1. List of seahorse species reported from India**

| Sl. No. | Species | Common Name | IUCN Red List Status | Status in the Indian Wildlife (Protection) Act, 1972 | CITES |
|---|---|---|---|---|---|
| 1. | *Hippocampus kuda* Bleeker, 1852 | Spotted seahorse | VU | Schedule I | Appendix II |
| 2. | *Hippocampus trimaculatus* Leach, 1814 | Longnose seahorse | VU | Schedule I | Appendix II |
| 3. | *Hippocampus spinosissimus* Weber, 1913 | Hedgehog seahorse | VU | Schedule I | Appendix II |
| 4. | *Hippocampus histrix* Kaup, 1856 | Thorny seahorse | VU | Schedule I | Appendix II |
| 5. | *Hippocampus kelloggi* Jordan & Snyder, 1901 | Great seahorse | VU | Schedule I | Appendix II |
| 6. | *Hippocampus mohnikei* Bleeker, 1853 | Japanese seahorse | VU | Schedule I | Appendix II |
| 7. | *Hippocampus camelopardalis* Bianconi, 1854 | Giraffe seahorse | DD | Schedule I | Appendix II |

**Habitat**

The seahorses belong to the family Syngnathidae, which also encompasses pipefishes and seadragons. The members of Syngnathidae are generally found distributed from 50° North to 50° South latitude, with most species occurring in Western Atlantic Ocean and Indo-Pacific region. Seahorses are generally marine, except for some, which are found in estuaries. The seagrasses, seaweeds and coral reefs are the preferred habitats of seahorses, while some species are also found in the mangroves. Some of them are found to be associated with soft bottom communities such as sponges, sea squirts and gorgonids.

**Feeding in seahorses**

The seahorses are slow moving and hold on to the hold-fast using their prehensile tail. Most seahorses are active during day and feed on tiny organisms that come on their way. They feed on small crustaceans, fish fry and invertebrates (Tipton and Bell, 1988; Vincent, 1996; Do et al., 1998; Teixeira and Musick, 2001). They also have the ability to camouflage and change their colour in minutes to match their surroundings.

**Reproduction**

The seahorses show peculiar breeding behaviour in that the males becomes pregnant and give birth to young ones. They show highly structured social behaviour and male and female seahorses form faithful bonds. Most species of seahorses are monogamous (Vincent, 1994; Vincent and Sadler, 1995; Masonjones and Lewis, 2000); after pairing, the adult male and female remain as partners and mate successive times during the entire breeding season and sometimes even during successive breeding seasons. If one of the pair dies, the remaining partner will take many weeks to find a replacement (Vincent and Sadler, 1995).

The seahorses attain its first maturity and starts breeding at an age of six months to one year (Jiaxin, 1990; Lourie et al., 1999). Sexual maturity in male can be recognised by the appearance of brood pouch. The fecundity is low and the eggs are large, pear-shaped, orange and semi-transparent. Mating occurs after an elaborate courtship, and the female deposits her entire egg clutch into the male's brood pouch where it gets fertilized. The embryonic development takes place inside the male's brood pouch. The gestation period ranges from 12 to 15 days at a temperature of 28 to 20°C. At the end of pregnancy, the males expel the young ones from the brood pouch through muscular contractions, during the late night or early morning hours. The young ones look like miniature adult seahorses, 6 to 12 mm long. Most of the seahorse species produce about 100 to 300 young ones per pregnancy.

**Commercial uses of seahorse**

The seahorses form the major constituents in the Traditional Chinese Medicines (TCM). TCM is practised in China, Hong Kong, Taiwan, Singapore and ethnic communities worldwide. In the Central Philippines, seahorses are used to treat

asthma, gas pains and hyperactivity (Alino et al., 1990). The seahorses are also one of the most popular fishes in the marine aquarium trade. Their peculiar body features like the horse-like head, tubular snout, prehensile tail and camouflaging behaviour make them a favourable choice of marine aquarium hobbyists. The dried seahorses are also used as curios like key chains, paper weights and jewellery and are kept as souvenirs in beach side shops and resorts in many countries.

**Taxonomy of seahorses**

Identification of species of seahorse is very important for the sustainable fisheries management and to achieve long-term conservation goals. The habitat requirements, reproductive behaviour etc. may differ from one species to the other, and hence the right species identity is a pre-requisite.

**Morphological characteristics**

The seahorse has peculiar body characteristics with a horse-like head, tubular snout, bony plates and a prehensile tail. Hence, unlike other teleost fishes, the morphological characteristics which are considered for the identification of seahorses are slightly different. The spines, rings, coronet and tubercles are some of the key characteristics which are used in the identification of species. The important morphological characteristics are given in figure 1 and table 2.

Table 2. Morphological characteristics of seahorse

| **Characteristics** | **Description** |
|---|---|
| Height | Distance from the tip of the coronet to the tip of the uncurled tail |
| Operculum | Flap that covers the gill slits |
| Keel | Sharp median ridge running down the ventral side of the trunk (in some species) |
| Tubercles | Raised rounded nodules located at the intersections of rings and ridges (in some species) |
| Dorsal fin rays | Bones supporting the dorsal fin |
| Pectoral fin rays | Bones supporting the pectoral fin |
| Coronet | Large crown-like structure found on top of the head (in some species) |
| Eye spines | Spines found directly above the eye |
| Nose spine | Single spine located in front of the eyes on the upper side of the snout (in some species) |
| Cheek spines | Spines located at the bottom of the operculum on each side of the head |
| Cleithral ring | Bony ring just behind the operculum |

| | |
|---|---|
| Trunk rings | Raised bony ridges that encircle the body |
| Tail rings | Raised bony ridges encircling the tail of the seahorse |
| Snout length | Distance between the bump immediately in front of the eye (not the nose spine) to the tip of the snout |
| Head length | Distance from the mid-point of the cleithral ring to the tip of the snout |
| Trunk length | Distance from the mid-point of the cleithral ring to the lateral mid-point of the last trunk ring |
| Tail length | Distance between the lateral mid-point of the last trunk ring to the tip of the uncurled tail |

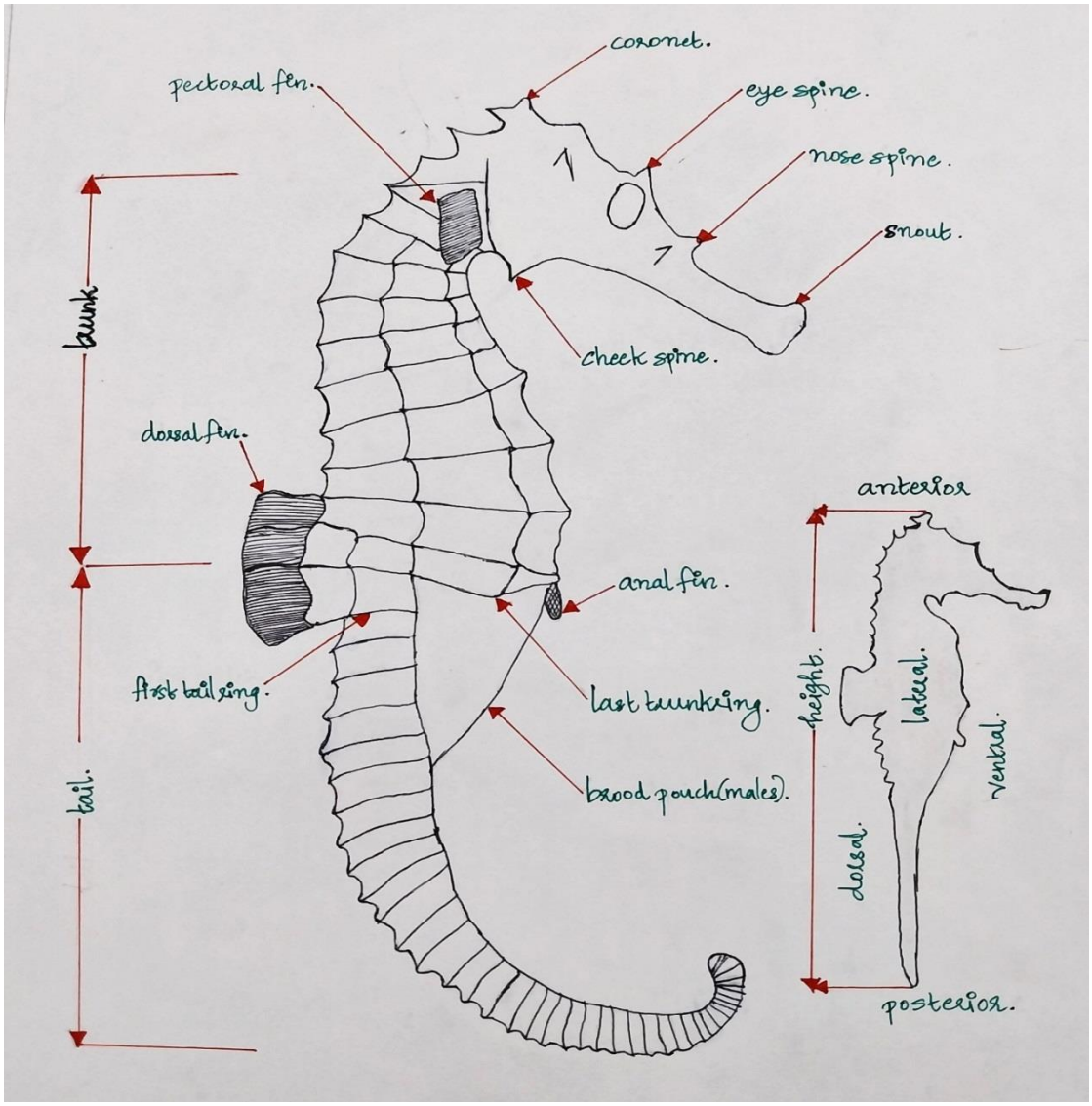


Fig. 1. Lateral view of seahorse

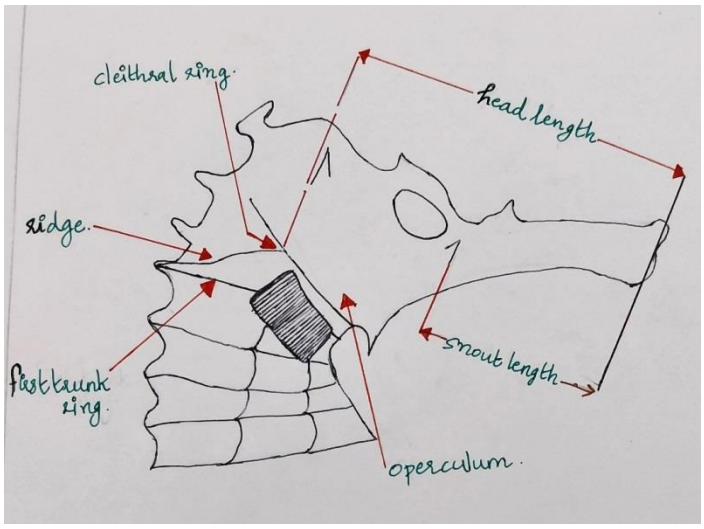


Fig. 2. Lateral view of seahorse head

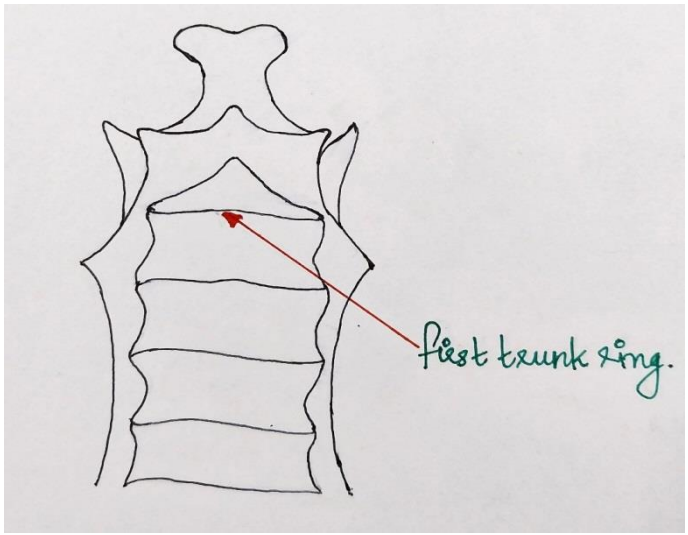


Fig. 3. Dorsal view of seahorse head

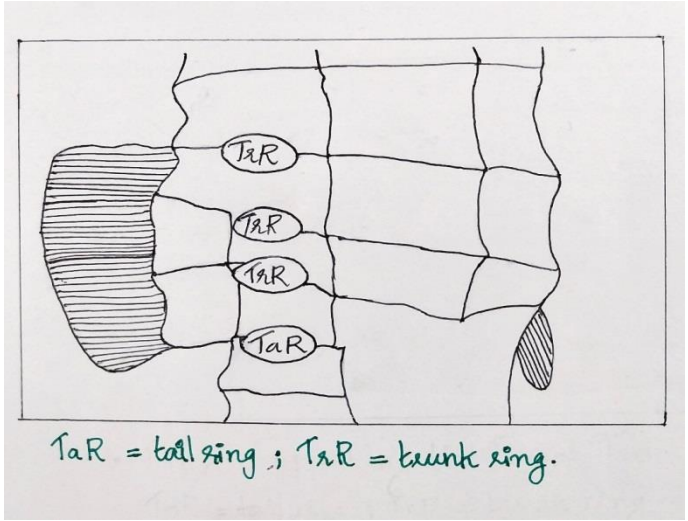


Fig. 4. Lateral view showing the rings supporting the dorsal fin

**Steps in identification of seahorse specimen**

***A) Record the common characters used in seahorse species identification***

| | |
|---|---|
| 1. | Record the height of the specimen (Ht): using a string/wire |
| 2. | Measure the head length (HL) |
| 3. | Measure the snout length (SnL) |
| 4. | Calculate the HL/SnL ratio of the specimen |
| 5. | Count the number of tail rings (TaR) |
| 6. | Count and record the number of trunk rings (TrR) |
| 7. | Record the number of cheek spines (CS): counts range from 0 to 2. |
| 8. | Record the number of eye spines (ES): counts range from 0 to 2. |
| 9. | Record the number of trunk rings (TrR) that support the dorsal fin |
| 10. | Record the number of tail rings (TaR) that support the dorsal fin |
| 11. | Record the number of dorsal fin rays |
| 12. | Record the number of pectoral fin rays |

***B) Verify the recorded characteristics with the tables provided in the seahorse identification data sheet*** **(Tables 3 to 7; not an exhaustive table, given as examples only)**

1. Compare the height of the unidentified specimen with information of species in table.
2. Compare the HL/SnL value.
3. Compare the number of tail rings recorded for the unidentified specimen.
4. Compare the number of dorsal fin rays.
5. Compare the number of pectoral fin rays.
5. Compare the trunk rings, rings supporting the dorsal fin, cheek spines and eye spines.

Table 3. Maximum height of selected species (Step B1)

| **Species** | **Maximum height (cm)** |
|---|---|
| *Hippocampus trimaculatus* | 17.0 |
| *Hippocampus kuda* | 17.0 |
| *Hippocampus histrix* | 17.0 |
| *Hippocampus spinosissimus* | 17.2 |
| *Hippocampus kelloggi* | 28.0 |

| | |
|---|---|
| *Hippocampus mohnikei* | 8.0 |
| *Hippocampus camelopardalis* | 10.0 |

Table 4. Ratio of Head Length to Snout Length (HL/SnL) of selected species (Step B2)

| **Species** | **Possible range of HL/SnL** | **Most common value** |
|---|---|---|
| *Hippocampus trimaculatus* | 1.9 – 2.4 | 2.2 |
| *Hippocampus kuda* | 2.0 – 2.6 | 2.3 |
| *Hippocampus histrix* | 1.7 – 2.0 | 1.8 |
| *Hippocampus spinosissimus* | 2.0 – 2.4 | 2.2 |
| *Hippocampus kelloggi* | 2.0 – 2.3 | 2.1 |
| *Hippocampus mohnikei* | 2.8 – 3.9 | 3.0 |
| *Hippocampus camelopardalis* | 2.7 – 2.9 | 2.8 |

Table 5. Number of tail rings in selected species (Step B3)

| **Species** | **Range of number of tail rings** | **Most common value** |
|---|---|---|
| *Hippocampus trimaculatus* | 38 - 43 | 40, 41 |
| *Hippocampus kuda* | 34 - 38 | 36 |
| *Hippocampus histrix* | 34 - 37 | 35 |
| *Hippocampus spinosissimus* | 33 - 39 | 36 |
| *Hippocampus kelloggi* | 39 - 41 | 40 |
| *Hippocampus mohnikei* | 37 - 40 | 38 |
| *Hippocampus camelopardalis* | 38 | 38 |

Table 6. Number of dorsal fin rays in selected species (Step B4)

| **Species** | **Range of numbers of dorsal fin rays** | **Most common numbers** |
|---|---|---|
| *Hippocampus trimaculatus* | 18 - 22 | 20 |
| *Hippocampus kuda* | 17 - 18 | 17 |
| *Hippocampus histrix* | 15 - 18 | 17 |

| | | |
|---|---|---|
| *Hippocampus spinosissimus* | 16 - 20 | 17, 18 |
| *Hippocampus kelloggi* | 17 - 19 | 18 |
| *Hippocampus mohnikei* | 15 - 16 | 15, 16 |
| *Hippocampus camelopardalis* | 19 - 22 | - |

Table 7. Number of pectoral fin rays in selected species (Step B5)

| **Species** | **Range of numbers of pectoral fin rays** | **Most common numbers** |
|---|---|---|
| *Hippocampus trimaculatus* | 16 - 19 | 17, 18 |
| *Hippocampus kuda* | 15 - 18 | 16 |
| *Hippocampus histrix* | 17 - 20 | 18 |
| *Hippocampus spinosissimus* | 16 - 19 | 17 |
| *Hippocampus kelloggi* | 17 - 19 | 18 |
| *Hippocampus mohnikei* | 12 - 14 | 13 |
| *Hippocampus camelopardalis* | 17 - 18 | 17, 18 |

***C) After elimination of the above 5 steps, the following characters need to be considered***

1. Height and shape of the coronet
2. Number, distribution and size of spines on the body
3. Patterns or markings such as stripes or spots.

Table 8. Number of trunk rings, trunk & tail rings supporting the dorsal fin, cheek spines and eye spines

| Species | Trunk Rings | Rings supporting Dorsal Fin | | Cheek Spines | Eye Spines |
|---|---|---|---|---|---|
| | | Trunk Rings | Tail Rings | | |
| *H. trimaculatus* | 11 | 2 | 1 | 1 | 1 |
| *H. kuda* | 11 | 2 | 1 | 1 or 2 | 0 or 1 |
| *H. histrix* | 11 | 2 | 1 | 1 | 1 |
| *H. spinosissimus* | 11 | 2 | 1 | 1 or 2 | 1 |
| *H. kelloggi* | 11 | 2 | 1 | 1 | 1 |
| *H. mohnikei* | 11 | 2 | 1 | 2 | 0 |
| *H. camelopardalis* | 11 | 2 | 1 | 0 | 1 |

Thus, careful examination of the collected specimens, and proper recording of data is essential to arrive at the correct species identification. 'A Guide to the Identification of Seahorses' by Lourie et al. (2004) gives an insight to the step-by-step identification of seahorses, which can be referred in addition to the other standard literature that are available for species identification.

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