Evaluation of a simple tagging method to monitor the growth of endangered species of seahorse

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Identification of an individual seahorse is important for captive breeding and conservation studies. A simple and cost-effective tagging method was devised to suit the rigid body structure and small fins of *Hippocampus kuda*. The first generation sexually matured individuals (452 numbers) were tagged using plastic strips tied around the neck. No significant differences ($P > 0.05$) in growth between the tagged and untagged groups were noted. All the tags persisted for one year without any perceptible changes in sexual and social behaviour.

Keywords: Conservation, growth, seahorse, sexual and social behaviour, tagging.

IDENTIFICATION of an animal within groups is one of the important tactics in biological studies such as growth, fecundity, movement, sexual and social behaviour, and also in conservation-related studies. Several methods are evolved for tagging fishes. Dewey and Zigler[1] studied the effect of fluorescent elastomer marking in bluegill sunfish. Haines *et al.*[2] and Winner *et al.*[3] reported the feedback of small T-anchor and dart tags in red drum, *Sciaenops ocellatus* hatcheries.

The continuous demand for seahorse in traditional Chinese medicine and consequent targetted fishing together with other methods of exploitation necessitated much information on their biology[4]. *Hippocampus kuda* is one of the most exploited seahorses along the Palk Bay coast of India[5]. As seahorses have a rigid body and unusual morphology with small dorsal and pectoral fins, it is difficult to mark them unlike other finfishes. Woods and Martin-Smith[6] have conducted laboratory studies with visible implant fluorescent elastomer (VIFE) tags in *H. abdominalis*. However, they did not undertake field studies.

Considering the cost of such tags and the rigid body of the seahorses, a simple and cost-effective method was devised. The method of tag preparation and tagging together with the merits are presented in this communication.

Each tag of 7×5 mm size was prepared using 0.39 ± 0.01 mm thick plastic sheets (Figure 1 *a*). The respective serial number (i.e. 1, 2, 3,...) was engraved using a heated needle of 0.30 mm tip in each tag. The first generation, laboratory-reared juveniles of *H. kuda* were tagged in the neck region (Figure 1 *b*). Before tagging, all the morphometric and meristic characters of each seahorse were recorded according to standard protocols[7]. The average length and weight were 106 ± 14.08 mm and 2.57 ± 1.22 g respectively, with a male : female ratio of 1 : 1.43.

The behavioural changes following the tagging are summarized in Table 1. After about 2 to 3 h, they exhibited normal social behaviour, such as chasing of prey, tail grasping, wrestling, and sexual behaviour such as daily greetings and courtship movement with the tagged and untagged seahorses. Among the tagged groups also, no behavioural and choice bias was observed.

Of the 452 tagged seahorses, 366 were sea-ranched at depths ranging from 6 to 7 m, comprising sea grass and soft coral beds of Puthupattinam and Mullimunai villages, along Palk Bay, during June 2004. The fishermen residing in coastal villages were appraised about the release of tagged seahorses, and pamphlets were distributed, ex-

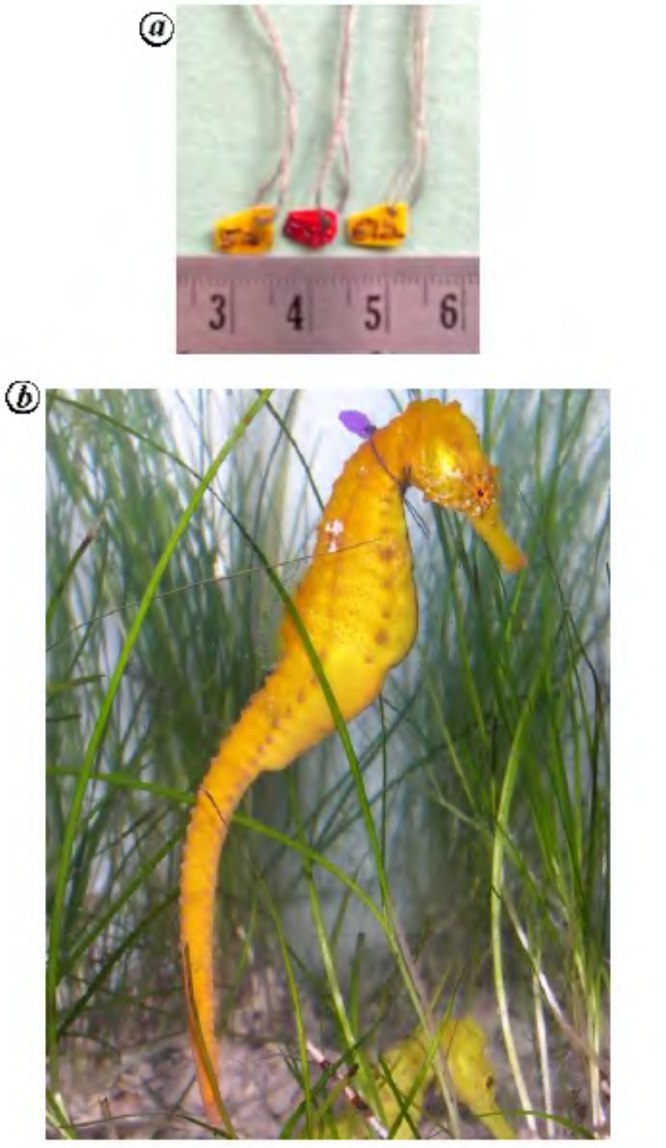

Figure 1. ***a***, Close-up view of tags; ***b***, A tagged seahorse.

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Table 1. Immediate behavioural changes (within 3 h) of tagging among *Hippocampus kuda*

Observed behavioural pattern
Some seahorses rushed and hid inside the holdfast, while others swam near the water surface.
Head tucked down for about 1 h.
Most of them did not chase prey up to 3 h.
All clumped together and grasped each other's tail for about 3 h.
No courtship movement for 3 h.
Increased opercular movement up to about 2 h.

Table 2. Growth of tagged and recaptured *H. kuda*

Tag number	Date and size (mm) on sea ranching		Date and size (mm) on recapturing	
252	03.06.2004	80.00	15.11.2004	105.00
298	03.06.2004	88.00	05.02.2005	115.00

plaining the importance of tagged seahorses. The remaining 86 tagged seahorses were maintained in two FRP tanks of 1 tonne capacity with twenty untagged seahorses. Routine husbandry practices such as removal of faeces, unfed food particles and water exchange (25.0%) were carried out. Mean specific growth rate, and social and sexual behaviours were observed in tagged and untagged seahorses. Local fishermen recaptured two of the sea-ranched seahorses during their routine fishing (Table 2). The growth was compared with the captive tagged seahorses.

One-way analysis of variance (ANOVA) was used to test the significance of growth difference between tagged and untagged individuals in captivity and also to determine the growth rate of tagged seahorses in captive and wild condition. Mean specific growth rate was calculated as SGR = ($fSL - iSL/t$), where fSL was the final length, iSL the initial length and t the time. The differences between casual mortality and post-tagging mortality in captive condition were assessed and statistical analysis was performed using SPSS package.

Earlier studies by Vincent and Sadler[8] on *H. whitei* with neck-tagging did not report mortality and growth. Malone *et al.*[9] reported that VIFE tags did not affect the growth of two species of temperate goby. Woods and Martin-Smith[6] found that VIFE had a negative effect on seahorse, *H. abdominalis*, which suffered growth depression of 6%. Retention of a tag is important and according to observations, all tags (100%) were retained over a period of about one year in captive and eight months in wild conditions. Woods and Martin-Smith[6] reported 100% VIFE tag retention in *H. abdominalis* in captivity for a period of seven months, but they have not assessed the retention rate in wild condition. Differences among the tagged and untagged seahorses to escape predation are yet to be ascertained. Evidently, the present simple tag and tagging procedure has no negative effect in captive as well as wild seahorses. The following points are to be noted:

(i) The tag should be tied with soft material and markings should be waterproof.

(ii) Care should be taken to avoid lifting the seahorse outside the water while tagging, as it leads to gas ingestion.

(iii) The seahorse should not be injured during tagging around the neck.

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