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Colour change in the ghost pipefish *Solenostomus cyanopterus*

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There are four species of ghost pipefish found in the Indian and Pacific oceans: *Solenostomus cyanopterus*, which is found over a wide area, S. halimeda from the Indo-Pacific, *S. paradoxicus*, which is found near Australia and Madagascar, *S. armatus*, which is only found around Japan (Orr & Fritzsche 1993). All three species mimic weed, and can be found floating head down in weed beds, at depths of up to 30m, but mostly near the surface. They grow up to 17cm long, in that the female broods the eggs in a pouch made from specially modified pelvic fins (Playfair & Gunther 1866). They eat plankton, small crabs and fish fry.

On the 19th of December 2007, one 8cm long, dark brown young adult male specimen of *S. cyanopterus* was found in the coral rubble around La Passe, Silhouette Island, Seychelles. Only three have previously been recorded in the Seychelles before, at Mare Anglaise, Mahé Island (Gerlach 2001). Of the previously recorded individuals, two were a bright green colour and one dark brown. The cause of colour variation in the species is not known, but possibilities include variation and diet. The potential for colour change was investigated with the new record.

Methods

The specimen collected on 19th December 2007 was kept for about 12 hours in an aquarium containing coral rubble and sand (similar to the original habitat), and then was moved to a smaller aquarium for study. This measured 30x20cm by 15cm deep, containing large amounts of green weed and no substrate. The colour pattern was described on placing the fish in the aquarium and on several occasions over the next 3 days.

Results

Initially the fish was dark brown with irregular grey patches. After 4 hours of being in the green weed the rear half of the body and the base of the tail had begun to turn yellowish brown. The next morning (after 18 hours), the whole fish was yellow, with a large orange-brown patch around the eye and the underside of the beak. The edges of the fins and the tip of the tail were very dark brown, and there were visible brown spots along the spine.

Fig. 1. *Solenostomus cyanopterus* before capture (left) and after 18 hours (right)

Discussion

The results of the experiment show that ghost pipefish change colour very slowly, lightening from brown to yellowish over a period of about 36 hours. This colour change enables them to live in various habitats such as *Sargassum*, green turtle grass and brown turtle grass. They are a slow moving fish, so slow change is normally sufficient to allow effective camouflage. The mechanism of colour change in this species has not been studied, in other fish it arises from changes in pigment cells, either as a result of rapid movement of chromatophores leading to physiological colour change or changes in chromatophore morphology and density leading to morphological colour change (Sugimoto 2002). The slow adaptation recorded here resembles morphological colour change but this process involves the death of chromatophores and is only very slowly reversible. Colour change in ghost pipefish is more likely to be physiological than morphological. Considerable variation in the rate of physiological colour change has been recorded (Kimler & Taylor 2002).

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