

PYGMY SPECIES EXPLOSION

> YET AGAIN I FIND MYSELF IN AN EXOTIC DIVE DESTINATION LOOKING BEYOND SCHOOLS OF STUNNING FISH AND VIBRANT CORAL LIFE AT ONE OF THE REEF'S TINIEST INHABITANTS: THE PYGMY SEAHORSE. WHILE THEY'VE ONLY BEEN ON DIVERS' WISHLISTS FOR THE PAST DECADE OR SO, THEY'VE QUICKLY BECOME THE STAR ATTRACTION IN MANY PARTS OF THEIR RANGE. LUCKILY THE ONLY PREREQUISITES FOR SEEING THESE MINUTE BUT FASCINATING CRITTERS ARE A LITTLE PATIENCE (OK, A LOT) AND GOOD EYESIGHT – OR A GOOD GUIDE WITH THESE ATTRIBUTES.

I'm studying pygmy seahorses for my doctorate and have spent several months at Wakatobi Dive Resort in southeast Sulawesi and many hours watching their every move, counting each and every one on a given dive site and seeing how they take to being photographed by overly keen photographers. The world of pygmies has changed quite dramatically recently with the number of scientifically described species jumping from three to seven since the end of 2008! Gorgonian coral is no longer the realm of the pygmy seahorse since only two of the seven live there. The new species are, with one exception, free-living so now pygmies can be found on practically any reef from Borneo to Fiji.

What's so special about seahorses?

Seahorses are one of those animals that people tend to have an affinity for. They stick out as one of nature's oddities, being fish without obvious fins, having pregnant fathers and they are one of the only true monogamists in the natural world. Their reproductive behaviours are most endearing with male and female pairs meeting regularly to carry out courtship dances that solidify their pair bond and allow them to gauge when their partner is next ready to mate, so they can prepare for the event. Females must hydrate their eggs several days before mating so the daily courtship helps them to estimate when their mate will give birth and they can prepare the eggs shortly afterwards. Often within a few hours or less of giving birth, the female transfers a clutch of eggs to her mate after which he fertilises them and takes on all further parental care. The male is therefore 100% sure that all the offspring are his, which is why



: RICHARD SMITH www.OceanRealmImages.com

Three Denise's pygmy seahorse (Hippocampus denise) settling a dispute which lasted several minutes and one animal sprained his tail! Wakatobi Resort, southeast Sulawesi, Indonesia.

Severn's pygmy seahorse (Hippocampus severnsi) is beautiful when seen up close with a predominantly brown colouration and red, orange and white patches. Wakatobi Resort, southeast Sulawesi, Indonesia.

This Pygmy pipehorse (Kyonemichthys rumengani) was only discovered recently due to its tiny size, maximum of around 3cm. It is not a seahorse but very closely related. Wakatobi Resort, southeast Sulawesi, Indonesia.



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Walea Soft Coral pygmy seahorse (*Hippocampus waleananus*) is very active and swims between different areas of its soft coral host by coiling up the long tail. It was only scientifically described and named in early 2009. Walea Resort, central Sulawesi, Indonesia.

Pontoh's pygmy seahorse (*Hippocampus pontohi*) are often found living in or around clumps of *Halimeda* algae. Wakatobi Resort, southeast Sulawesi, Indonesia.

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Bargibant's pygmy seahorse (*Hippocampus bargibanti*) settle disputes by head butting each other as these two males were doing. Wakatobi Resort, southeast Sulawesi, Indonesia.

Bargibant's pygmy seahorse (*Hippocampus bargibanti*) match their host's colouration and have yellow tubercles when the host's polyps are yellow. Lembah Strait, Indonesia.

A male Denise's pygmy seahorse (*Hippocampus denise*) having just given birth minutes before and showing off his stretch marks. Wakatobi Resort, southeast Sulawesi, Indonesia.

Walea Soft Coral pygmy seahorse (*Hippocampus waleananus*) is found only around the Togian islands of central Sulawesi. Walea Resort, central Sulawesi, Indonesia.



he's so inclined to invest such a great deal of time and energy into raising the brood.

What makes a pygmy a pygmy?

Pygmies are not only tiny seahorses but also differ in morphology and ecology to their larger cousins. There are 35 or so species of seahorses, all of which belong to the genus *Hippocampus*, and seven of these are classed as true pygmy seahorses. I say true pygmy seahorse since there are a few diminutive species that are equally tiny but do not show such extreme adaptations for life at a miniscule scale and are much more like 'normal' seahorses than pygmies. The adaptations found in pygmy seahorses are:

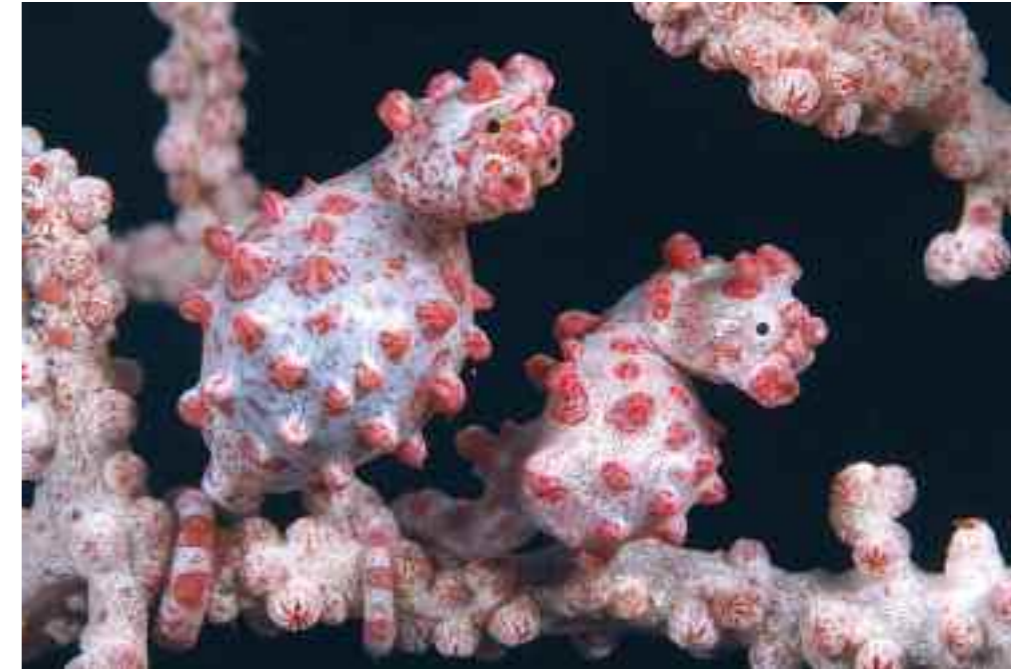
- a single gill opening rather than a pair
- brooding of eggs within the body rather

than a pouch on the tail as is found in other seahorses.

Pygmies range in size from between 14mm to 28mm and as such are amongst the smallest of vertebrates. They are typically found on coral reefs, whereas their larger cousins are most often found in seagrass meadows, mud flats, sandy bays, mangroves and only occasionally on reefs.

How did pygmy seahorses come into being?

It sounds like one of those fancy phrases espoused by scientists to confuse people, but the theory by which pygmy seahorses are thought to have evolved is called 'Size Assortative Mating', which goes something like this:



association with *Muricella* gorgonians, this species is easily identified by large red, pink or yellow bumps that cover the pale body and a short snub shaped snout.

Denise's (2003) – *H. denise*

Along with Bargibant's this is the only other species of pygmy seahorse that lives in association with gorgonian corals. It is much more relaxed about its host coral preference than Bargibant's and can be found on at least three species of gorgonian. Its colour and surface texture are as a result much more variable and range from smooth skinned to exceedingly bumpy and from off-white in colour through red, pink, orange and even polka dot forms depending on the host. It is the two gorgonian-associated species that have been the focus of my doctorate studies at Wakatobi Dive Resort. I've been lucky enough to witness fighting, birth and mating in this species.

Coleman's (2003) – *H. colemani*

This species was discovered at Lord Howe Island off the coast of New South Wales in Australia in a shallow seagrass bed by the eminent naturalist Neville Coleman. It is predominantly off white in colour with red filaments and lines over part of the body. It is very similar in appearance to Pontoh's pygmy and the two may in fact be very closely related if not the same species with the variation observed in Coleman's species explained by its remote geographic location.

Seahorses tend to select a partner of an approximately similar size to themselves as this allows them to produce the most offspring that they are capable of. If their partner is of equal size, the eggs produced by the female will fit perfectly in the male's brood pouch. If this had not happened and a male mated with a larger female than himself, some of her eggs would not fit and therefore go to waste and she will not be fulfilling her reproductive potential. Likewise, if a male was larger than his mate the eggs she produced would not fill his brood pouch and he would not be producing as many offspring as he is able. Passing on of ones genes is a biological imperative so animals strive to pass on their genes as frequently as possible and will have strategies for doing this. For seahorses this means mating with a partner of equal size. Over many generations if small individuals mate with small and large with large the population will split into two size classes. There are obviously other pressures such as predation and size limits to internal organs that will come into play, but this is thought to explain how we have such extraordinarily small pygmy seahorses.

So, what's new in pygmy seahorse biology?

Firstly I should deal with what's not new! Most people who have dived in southeast Asia, New Guinea or even the Solomon Islands and the Great Barrier Reef will have heard of or seen a pygmy seahorse living on a gorgonian coral. There are two species – *Hippocampus bargibanti* and *H. denise* – which live exclusively on certain species of these corals and nowhere else. Their camouflage is extraordinary and finding them is a challenge but at least if you know the types of corals they inhabit you're on the right track. The new group of species are not so easy! Of the seven pygmy seahorses, four live freely on the reef and whilst it's possible to take an educated guess where to look, finding them is mostly luck.

PYGMY SEAHORSE SPECIES

Bargibant's (1970) – *Hippocampus bargibanti*

The original pygmy seahorse accidentally discovered by a scientist collecting gorgonian coral specimens for a New Caledonian museum when he discovered a pair of tiny seahorses. Found only in





Left - Courting Pontoh's pygmy seahorses (*Hippocampus pontohi*). This species varies in colour from pure white to forms such as this with white, yellow and red. Murex Resort, Bangka Island, Indonesia. Pontoh's pygmy seahorse (*Hippocampus pontohi*) feed on small crustaceans. Wakatobi Resort, south east Sulawesi, Indonesia.

Right - This is the most unusual colour form of Denise's pygmy seahorse (*Hippocampus denise*) that I have seen. To a human eye it didn't match the host at all but fish can see different light wavelengths to us. Wakatobi Resort, southeast Sulawesi, Indonesia.

Pontoh's (2008) – *H. pontohi*

One of the recently described pygmies from Indonesia where it is found on rich coral reefs. Its primary colour is white and has varying degrees of yellow, beige or pink on the head and nape. It usually has a single red filament on the head and a pair on the back, which presumably help break up its outline from predators. It can often, but not exclusively, be found living in or around *Halimeda* algae. It is very common at Wakatobi.

Severn's (2008) – *H. severnsi*

This free-living pygmy has a wide geographic range from Indonesia to New Guinea, Solomon Islands, and I even found a small group in Fiji. It can be identified by a primarily brown colouration with patches of orange, red and white. The tail is white with small brilliant white spots along its length and there's also a transparent filament on the head and a pair on the back. It lives in a range of habitats from reef walls to sandy patches in current exposed

channels, where I saw the group in Fiji.

Satomi's (2008) – *H. satomiae*

I've never seen this species unfortunately but it is similar in appearance to the *Walea* soft coral species although unlike that species it is free-living. It is the smallest known pygmy reaching a maximum of 14 mm and is apparently most active during the low light at dusk and dawn, and may well be nocturnal. It is beige in colour and covered in bright white spots. Its distinguishing features are