Part 13
Friend or Foe
The Un-segmented worms - Part 1

PHOTOS BY THE AUTHOR UNLESS OTHERWISE STATED

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What's he playing at you may ask? He's already covered worms in the *Friend or Foe* articles. Well it's certainly true that we have looked at the Polychaete worms of the Phylum Annelida but more "worms" and worm-like animals exist and some may make it into our reef aquaria. The *Friend or Foe* series has tried to treat the major divisions of the Animal Kingdom (or Phyla, to give them their proper term) sequentially from arguably the most primitive such as the forams and flatworms to, perhaps the most evolutionarily advanced, like the tunicates and starfish. The divisions between phyla are decided by taxonomists (who also may be zoologists, botanists or biologists) based on the number of shared characteristics and the probability that the species contained within each phylum had a shared ancestor at some stage in evolution. Thus we can determine that the horseshoe crab *Limulus sp*. is a member of the same phylum as true-crabs, scorpions and even the extinct trilobites (phylum *Arthropoda*, the so called "joint-footed animals"). However, the degree of relation between, for example, spiders and crabs is much less than between spiders and trilobites. This is where sub-divisions of the phyla come into play. We can form further groupings of animals that are closely related to each other, all the time reducing the number of individual species contained in each sub-division.

For example, below is a possible list of groupings for human beings, species *Homo sapiens*.

I have used *Homo sapiens* as an example here because we can all identify with this – we all know ourselves at least to a certain extent, right? What needs to be remembered is that any other species you care to mention can be treated in the same way, sometimes with even narrower assemblages such as sub-species or large groupings like super-families being relevant. Monotypic genera (where only one species is contained in the genus) like *Homo* do exist in the kingdom Animalia but they are rare – most species share their genus with other extant species. All of our generic pals are extinct (e.g. *Homo erectus*) and we know precious little about them due to their poor representation in the fossil record.

So far in the *Friend or Foe* series we have centred on quite large phyla such as the arthropods, molluscs and annelids which all contain many thousands of species. However, smaller phyla do occur and they demonstrate some pretty amazing body forms and sizes. Some phyla may only contain a single discovered extant species. Others may have species which number several hundred but we may be blissfully unaware that they even exist. My idea in this article is to begin summarising some of these smaller groups and, where possible, trying to group them is a non-official assemblage of my own design in order to provide at least the faintest hint of a theme.

Unfortunately, this also means that the *Friend or Foe* series is coming to an end. After this episode I have planned two more articles, one is the second part of this theme, and the final one aims to tie up some loose ends, but the stroll through the wonders of the animal kingdom is not endless, at least in this context. It's strange but since I began writing this series I feel that I could do the whole lot again, but better – and with more specimens to show you (this would actually be quite good because I don't think that it is possible to plagiarise yourself!). However, we have settled on an "update page" (or two!) where I can keep you informed of recent discoveries or perhaps species we have already covered but without a decent image. This way we can keep the format fresh and those people who have been with *Marine World* from the start, or who have acquired the back issues, do not have to suffer reading these articles twice!

The loose assemblage for this article is the un-segmented worms. Several phyla fall into this category but only very few species are ever encountered in a reef situation. Please note that this assemblage does not follow any particular taxonomic criterion but is more of a convenient heading under which I can list species which are superficially worm-like in appearance. Some of the phyla listed here are only very distantly related.

Where possible I have tried to illustrate some phyla which I have not yet

Taxonomic Term	Name of Grouping	Number of living Species present in each grouping (approx)
Phylum	*Chordata*	45,020
Sub-Phylum	*Vertebrata*	42,000
Class	*Mammalia*	5,000
Order	*Primata*	235
Family	*Hominidae*	5
Genus	*Homo*	1
Species	*sapiens*	1

encountered, but might be lurking with a view to invading soon. Un-segmented worms are characterised in the context of this article as any other worm-like entity that isn't an annelid. To state the obvious that we are looking at worms that are not segmented is not actually true. All of these animals are segmented to a degree, that is, that their bodies are not completely uniform. Annelid worms show what we can refer to as segmentation. This term refers to the fact that many segments of annelids are repeated units all carrying much the same thing in the way of sensory equipment and appendages. The worms we will be looking at in this article do not demonstrate this characteristic. Right, enough of trying (and probably failing) to explain myself – let's start looking at the animals.

Phylum Sipunculida
The Peanut Worms

Sipunculans are small innocuous-looking worms that number some 320 described species. Sizes vary from a few millimetres to over 50cm but the vast majority of those we are likely to experience are less than 6cm body length. All species are marine, most are found in shallow water and all are confined to a life in substrate, whether rock, wood or sediments. Peanut worms as they are often called, due to their somewhat tenuous resemblance to shelled kernels of our favourite nuts, are regular imports in base rock and live rock where they are likely to exist for many years without the aquarist noticing them. Barnes (1980) cites population densities of over 700 individuals per square metre in some Hawaiian coralline rocks so it is hardly surprising that some make their way into our aquaria as accidental imports.

Peanut worms can be thought of as a membranous "bag" containing a simple digestive system and muscles to alter the shape of the trunk (see Figure 1 for general external body plan).

The main reason we don't see these creatures is because most individuals present in reef aquaria tend to be tunnel dwellers. Some use previously bored holes and others can bore their own.

From the safety of their rock-lined retreat they extend their long proboscis (correctly termed an introvert) which ends in a plume of tentacles. The tentacles of some species are used to "mop" the rock surface removing algal cells and detritus which are then consumed. The introvert can be as much as ten times the total body length meaning large areas of rockwork can be covered by a single animal without leaving the relative safety of the hole.

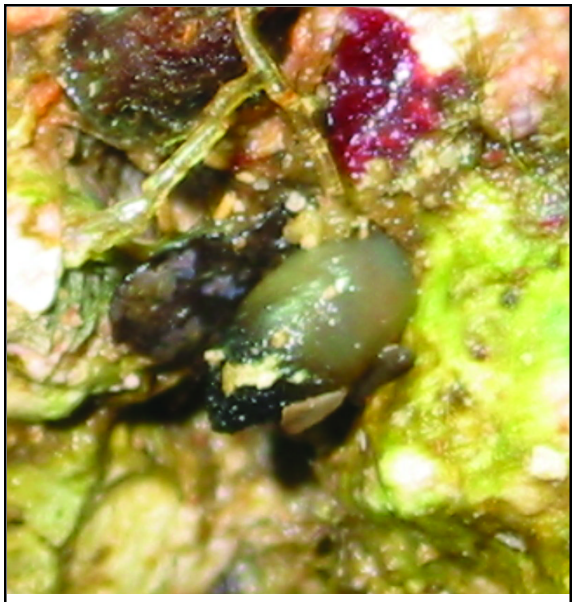


FIGURE 2 A sipunculan peeps out of its hole. It has not expanded its introvert at this stage.

Other sipunculans are suspension feeders and their feeding tentacles may be mistaken for similar structures of annelid tubeworms or possibly sea cucumbers. This is an example of a phenomenon termed convergent evolution which essentially means that similar characters have evolved independently in distantly related species. Another example might be the tail flukes of whales and the fins of fish. They are often similar in shape because they are the most efficient design that the natural world can create (I know they are oriented differently but the form and application are essentially the same)

Rock-boring sipunculans are able to create their tubes in hard substrates by a combination of chemical erosion and mechanical abrasion. The caudal shield of some species has evolved to facilitate the grinding of hard substrates. A caudal shield is shown in **Figure 5**. I like to think of it as

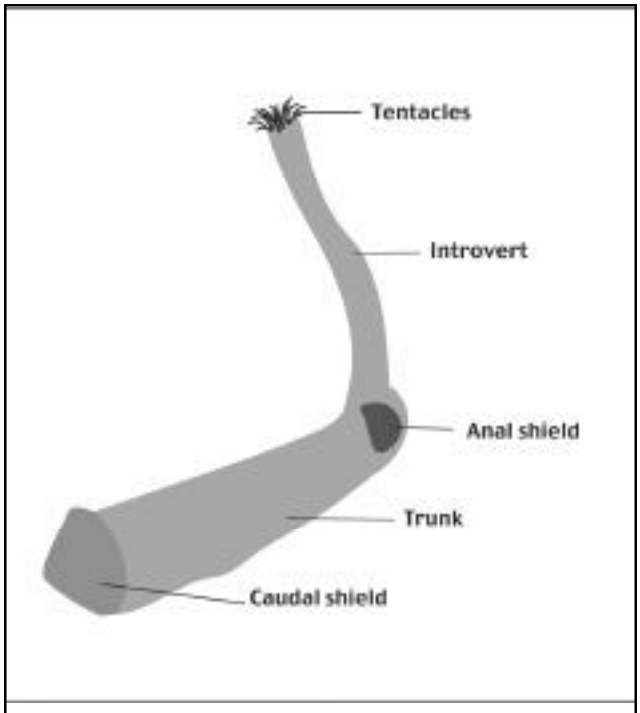


FIGURE 1. A typical tube dwelling sipunculan with the proboscis extended.

FIGURE 3. A tube-dwelling species of Sipunculan. This one does not bore its own holes. The introvert is retracted in this individual.

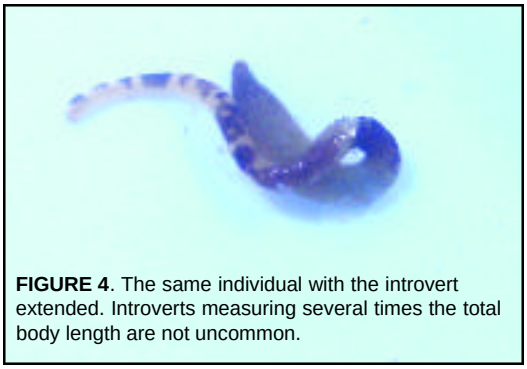


FIGURE 4. The same individual with the introvert extended. Introverts measuring several times the total body length are not uncommon.

one of those huge drill bits used by off-shore oil rigs! Given the abundance of the sipunculans in newly imported live rock it is likely that a good percentage of the holes we see in the rock have been bored by them. We have already covered the rock boring bivalves (**Figure 6**) which create similar holes in a previous article.

Sipunculans that do not bore their own holes are likely to be crevice dwellers although they might occupy holes bored by other peanut worm species, boring molluscs or annelid tubeworms. Such species do not have a caudal shield designed for drilling. The individual shown in **Figure 7** is typical of these species in that it has a uniformly soft body with a tapering tail.

We are unlikely to encounter the sand/mud dwelling or wood boring species of sipunculan although the former would make excellent additions to deep sand beds.

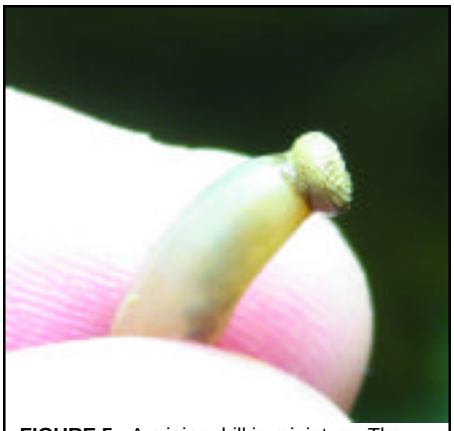
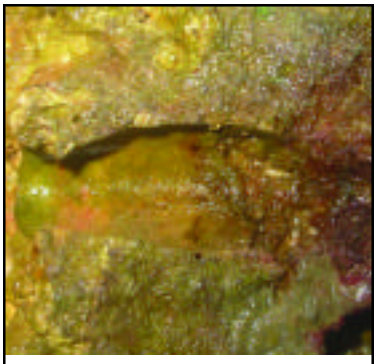


FIGURE 5. A mining drill in miniature. The caudal shield of a rock-boring sipunculan.



A cross-section through a hole bored by a peanut worm. Note the smoothness of the sides of the hole.

Such species act very much like earthworms or lugworms; ingesting the substrate itself then digesting its edible contents.

This brings the first of two articles on the un-segmented worms to a close. They may not be the most inspiring of animals but peanut worms are useful creatures to have in your aquarium. Perhaps one day species will be available for us to stock our aquaria with (you can buy temperate species over the internet) but until then we need to scour our rocks with a beady eye searching for the tell-tale proboscis tipped with tentacles.

FIGURE 6. A rock boring bivalve measuring about 12mm

FIGURE 7. A commonly encountered non-boring sipunculan. The introvert is positioned at the bottom right of the image but its tentacles are not everted. It measures approximately 6cm.

A typical sipunculan. You would be forgiven for thinking that the head is on the right of this image but this structure is in fact the caudal shield which is used in boring holes. The "head" end is on the left of the image but the proboscis is not everted. Note also the absence of segmentation of the body. The disc like structures at the bottom of the image are foraminiferans tests. The black squiggle running along most of its length is the gut which is filled with food.

Bibliography and suggested further reading

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