

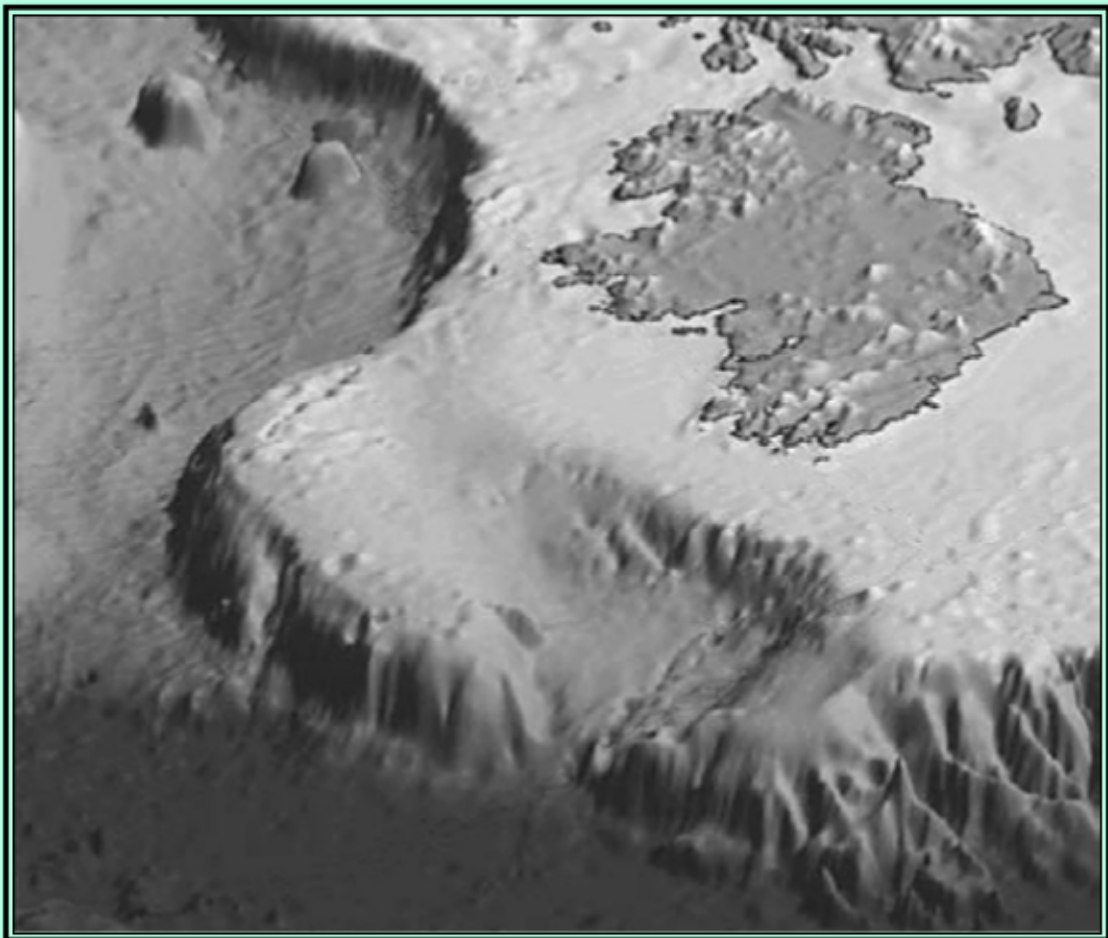
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for participants.

In conclusion I would plea for anyone still with misgivings about the scheme to seek clarification about their issues prior to airing these in a public forum. The scheme endeavours to be open and transparent about its rationale and operation and to communicate as best it can to a wide audience, but cannot be held responsible for misinformed views held by third parties not directly involved with the scheme. The scheme administration does not contravene Restriction of Trade legislation, and procurement procedures practiced by CMAs in relation to tenders requiring QA participation are fully compliant with UK law. The scheme operates within its own financial restrictions and terms of reference set by its sponsoring body – the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG). These may sometimes be at odds with the preferences of some individual participants and any such issues raised with the committee receive due consideration. It should be accepted that no scheme is perfect but the NMBAQC scheme fulfils the purposes for which it was established and is achieving its objectives as defined by HBDSEG.

Some notes on an unusual mollusc, *Serpulorbis arenarius* (Linné, 1767) – The giant worm shell

Peter Barfield and Evelina Capasso



This summer I was snorkelling in about 4 metres of water off Salina, one of the Isole Eolie (Aeolian Islands), in the Tyrrhenian Sea off the north-east coast of Sicily. My first

thought when I saw the large tube plastered to the rock beneath me was, 'wow, that's a big serpulid!'. Understandable I think and of course entirely wrong. That's what you get for shooting from the hip, not even the right Phylum. But then how many of us from more northern climes would have thought, 'hey, nice gastropod!'.

Serpulorbis arenarius is a prosobranch in the order Hypsogastropoda and the family Vermetidae (Gofas, 2009). It is one of those rare things, a sessile gastropod, with an almost unique habit of living attached to hard rocky substrata (Hadfield, 1970, Bouchet & Rocroi 2005, Chemello *et al.*, 2000, Schiapparelli *et al.*, 2006). A characteristic of the family which marks it out as unusual (Schiapparelli and Cattaneo-Vietti, 1999).

The previous name for this species was *Vermetus gigas*, hence it's common name, the giant worm shell, with *verme* in Latin meaning 'worm' and '*gigas*' coming from the Greek for 'giant'. But the current accepted name is *Serpulorbis arenarius* (see the CLEAM – Check List of European Marine Mollusca, website).

So here's an animal which at first glance looks like a tube-worm in the family Serpulidae but in fact is a mollusc in the family Vermetidae. Like the family name the genus, *Serpulorbis* reflects the worm-like appearance. *Serpula* means little serpent or snake and *orbis* means circle, ring or coil, though *Cicero* also used it to mean 'the windings of a serpent' (White, 1917). The species designation '*arenarius*' means of, or pertaining to, sand.

Serpulorbis arenarius is a subtidal sessile solitary species that lives in rocky, often shaded, habitats in relatively calm waters down to depths of 60m (Calvo and Templado, 2005). In the Straits of Gibraltar at Punta Carnero it has also been recorded at the lowest intertidal level (Calvo and Templado, 2005). According to one study the population density is generally very low with less than 15-20 specimens per 100m², although in places it can be higher at approximately 5 specimens per m² (Calvo and Templado, 2005). The tubes can be up to 200mm in length, though the average is half that, while the animal itself has an average length of about 44mm (DORIS, 2008, Calvo

and Templado, 2005). The tube of the animal in the photo was about 150mm.

It is widespread in the Mediterranean Sea and its distribution extends to the nearby Atlantic from southern Portugal to Moroccan coasts (Pasteur-Humbert, 1962) and, because of its restricted range, it may be another good candidate to monitor climate change.

As mentioned, *Serpulorbis arenarius* is a solitary species but some members of the Vermetidae like *Dendropoma petraeum* (Monterosato, 1884) and *Vermetus triquetrus* Bivona Ant., 1832, commonly encountered in the Mediterranean Sea, are reef-building species (Reidl, 1991).

Serpulorbis arenarius is a mucous trap feeder capturing microscopic planktonic organisms and detrital fragments (Bottger, 1930, Morton 1965). It produces strings of mucus from a modified pedal gland. These strings act as 'fly-paper' passively catching food particles thanks to the sticky properties of the mucus (Morton, 1965). Using either the pedal tentacles or the radula the animal then periodically retracts these mucus strings, now loaded with particles, and ingests them (Morton, 1965 and Schiapparelli *et al*, 2006).

In some vermetids water currents are necessary to stimulate the production of mucus threads or nets (Hughes and Lewis 1974). *Serpulorbis squamigerous*, observed in aquaria with no water currents, fail to produce mucus nets even in the presence of food (Hadfield 1970).

In common with other vermetids *Serpulorbis arenarius* can produce temporary calcareous feeding tubes which leave characteristic scars on the shell (Keen, 1961). The scars were once thought to be taxonomically diagnostic but this is not the case (Bieler, 1995). The feeding tubes are essentially explorative structures. Obstacles, such as algae, precipitate the building of these tubes and in the absence of any such interference vermetids do not build feeding tubes (Schiapparelli and Cattaneo-Vietti 1999).

Calvo and Templado (2005) found two neogastropods, *Stramonita haemastoma* (Linné, 1767) and *Buccinulum corneum* (Linnaeus, 1758), feeding on *Serpulorbis arenarius*. Other potential predators (Calvo

and Templado, 2005) include some crabs and starfish such as *Echinaster sepositus* (Retzius, 1783), *Ophidiaster ophidianus* (Lamarck, 1816) and *Marthasterias glacialis* (Linnaeus, 1758). *Ophidiaster ophidianus* was observed in the same area as the *Serpulorbis arenarius* pictured.

Its reproduction is described in Calvo and Templado (2005) studying the south western Mediterranean populations.

Serpulorbis arenarius is a dioecious (Greek for "two households", Wikipedia 2009) species, that means any individual can produce only one type of gamete such that each is distinctly male or female. The sex ratio is significantly biased towards males. The expected sex ratio for dioecious species is 1:1.

The average length of males and females does not differ significantly but the smallest specimens were all males. The remaining size ranges were formed of both sexes.

Serpulorbis arenarius is believed to be a sequential hermaphrodite with alternating sexuality, functioning first as males and then switching to female. The trigger for this change is not clear but once the oogenic cycle has run its course they revert to males.

Because hermaphroditism increases the possibility of finding a mate it is thought to be favoured by species with low population densities and/or low motility. Furthermore sequential hermaphroditism, as opposed to simultaneous hermaphroditism, decreases the possibility of inbreeding among siblings according to gene dispersal models.

Females with egg capsules begin to appear in March and April and last until December with maximum production of capsules containing advanced veligers in June.

No information is available about how many times this sex change occurs in an individual or how long they live.

Vermetids are generally restricted to a very narrow habitat belt with a precision of about 0.5-1m (Shier 1969, Laborel, 1986). They have therefore been considered as one of the most reliable indicators in paleo sea-level reconstruction (Morhange *et al.*, 1998).

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