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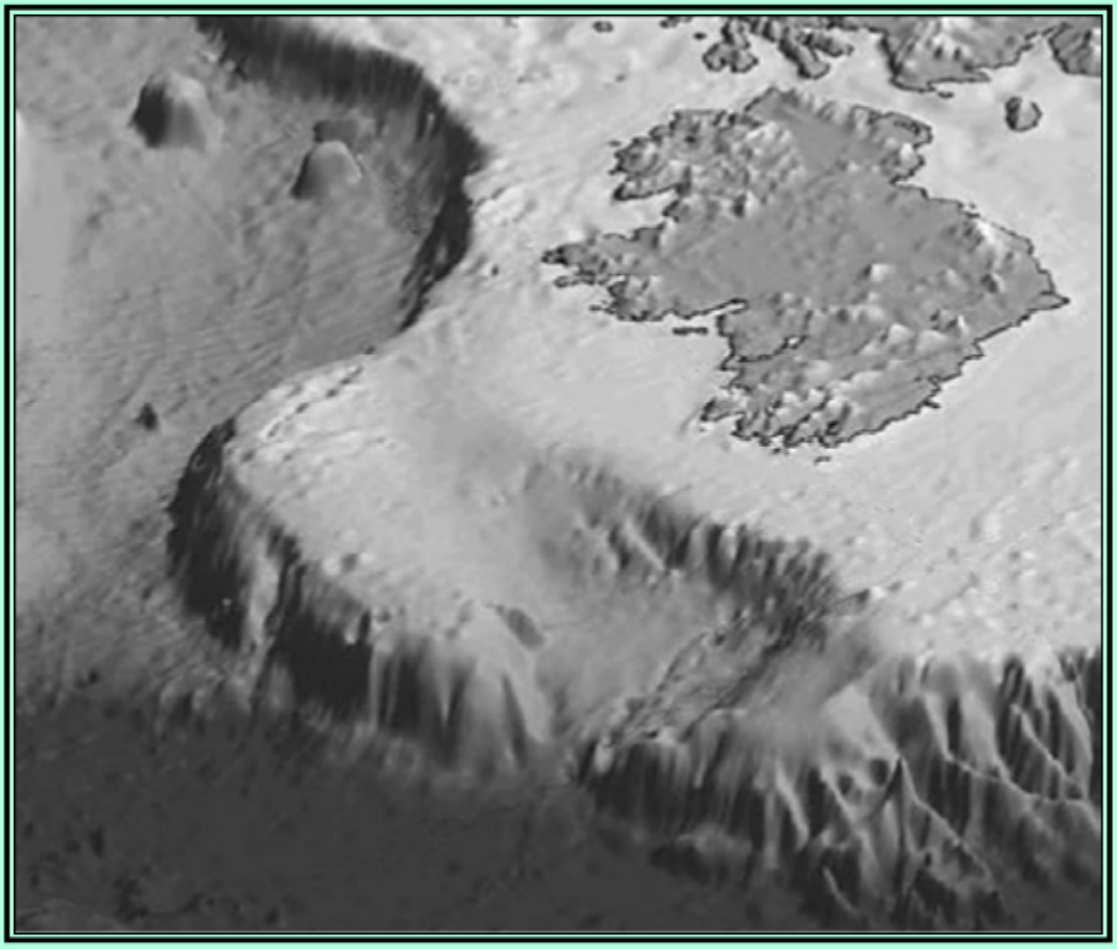

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Notes on the immigrant, *Percnon gibbesi* (H. Milne-Edwards, 1853), in the Mediterranean.

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This summer I went to Sicily for the first time. For part of the time I was there I stayed on the Aeolian island of Salina. The Aeolian islands are just off the north-east coast of Sicily in the Tyrrhenian Sea. It was beautiful and hot and I spent a fair amount of time in the water keeping cool and snorkelling to my heart's content. Bliss, apart from headbutting a small *Pelagia noctiluca*. Anyway, on my first snorkel the most obvious animal I saw was a long-legged, nimblefooted crab with highly distinctive yellow bands on its legs. These colourful and extremely flat crabs were scuttling under practically every rock I floated over. I watched one rapidly tugging algae from the rock with its chelae until it realised something was up and slipped from view.

Being almost entirely ignorant of conspicuous Mediterranean fauna I had no idea what species of crab I was looking at. So later on that day I consulted my copy of the Hamlyn Guide to the Flora and Fauna of the Mediterranean Sea (1982). To my surprise, given the large numbers I had seen on a short snorkel, it was not in the book. But hey it's an old book and maybe I needed something a little more decapod-specific. The other thought was that perhaps it was a non-native species. This second thought was more interesting so that was what I googled around when I got back to the UK. *Percnon gibbesi*, the Sally Lightfoot crab, was first recorded in the Mediterranean in the summer of 1999 at Linosa (Cannicci et al. 2006, Puccio et al. 2006). Linosa is one of the three Pelagie Islands in the Sicily Strait south of Sicily, about half way to Tunisia. At around the same time it was also found from the Balearic Islands off the south-east coast of Spain (Yokes and Galil 2006). This eurythermal, subtropical, subtidal, grapsid crab is now widely distributed in the Mediterranean (Zaouali et al. 2007, Deudero et al. 2005).

The crab's native distribution extends from Chile to California, from Florida to Brazil and from the Gulf of Guinea to the Azores (Cannicci et al. 2006, Galil et al. 2006). The crab lives in narrow, rocky, subtidal zones in the upper infralittoral, commonly in depths of 1-2m (Yokes and Galil 2006). It greatly favours boulders both for their microalgal turf and the protection offered beneath (note the boulders appear naked, lacking macroalgae and macrobenthic colonies, pers. obs., Deudero et al. 2005, Pipitone et al. 2001).

Barriere di scogli (jumbles of rock and concrete blocks placed along the coast as sea defence barriers) and pennelli (similar in function to our groynes) constructed from the same material seemed to be a common sight in Sicily. It was around one such barriere di scogli structure that my first snorkel took me. Unsurprisingly, *Percnon gibbesi* found such man-made structures as these and harbour breakwaters perfect places to colonise (Yokes and Galil 2006). In a Mallorcan report, Deudero *et al.* (2005) found the most frequent carapace length (CL) to be between 21-25mm but ranged from 5-40mm. The sex ratio was two males for every three females and one location might have between 2-14 individuals. The depth range *Percnon gibbesi* was found to inhabit, varied from 0-4m but the majority (84%) were found in 0- 2m. In this study none were found below 8m and the larger crabs (with a CL over 10mm) tended to be found in deeper water (3-4m) than the smaller crabs (<1m). Unsurprisingly Sally Lightfoots are vulnerable to predation by fish and other invertebrates.

On another snorkel just west of the lighthouse near Lingua on Salina, around sunset, I saw many more Sally Lightfoots and they seemed less wary. According to Deudero *et al.* (2005), activity of this species is highest at sunset. Analysis of stomach contents suggesst that *Percnon gibbesi* is a strict herbivore (Puccio *et al.* 2006). This makes it unique among the other large-sized infralittoral Mediterranean crabs. So an abundance of food and a lack of decapod competitors can be added to the list of why this grapsid crab is doing so well in its new home. Of course, other grazers in the upper infralittoral may be in competition with it. Puccio *et al.* (2006) mention two important grazers in this area, the

sea urchin *Paracentrotus lividus* (de Lamarck, 1816) and the black urchin, *Arbacia lixula* (Linnaeus, 1758). It should be noted however that Deudero *et al*. (2005) observed that food selection appeared opportunistic, with algae as well as pagurids and polychaetes taken. Although Puccio *et al*. (2006) argued that, given the scarce occurrence of such items in the stomach, they were not being specifically chosen. He backed up this analysis showing the chelae to be shaped like those of vascular plant eaters. In addition the gastric mill (part of the digestive tract of crustaceans) contained structures which corresponded to those found in grazers not predators.

The consensus of opinion on how *Percnon gibbesi* entered and spread in the Mediterranean seems to be that it was introduced through surface currents and then had its dispersal accelerated by ship borne transport (Yokes and Galil 2006, Pipitone *et al*. 2001, Galil *et al*. 2002). It's likely that *Percnon gibbesi* came through the Strait of Gibraltar as the population in the Mediterranean shares similar morphological characteristics with those found in the Atlantic (Pipitone *et al*. 2001). Conversely Abello *et al*. (2003) suggested its larvae entered with Atlantic currents and then dispersed naturally. However although the crab has a long larval lifespan of up to 6 weeks, data in support of a coastal transport mechanism able to explain its rapid spread is limited (Yokes and Galil 2006). However, no studies have been done to investigate its ability to export larvae over open water (Yokes and Galil 2006). But Zaouali *et al*. (2007) argue the spread has, at the very least, been aided by ship transportation stating quite strongly that, "this vessel-transported plagusiid is the single most invasive decapod species in the sea, spreading within a few years from the Balearic Islands to Turkey, possibly via recreational and fishing vessels".

Because the crab colonises breakwaters and the like with such zeal this propensity may enhance its chance of spread by ship. Its choice of creviculous habitats (Cannicci et al. 2006) and that just a few ovigerous females might be enough to establish a viable population, may also enable the success of this form of dispersal (Yokes and Galil 2006). Puccio *et al*. (2006) indicate *Percnon gibbesi* to be a highly fecund species. While ship borne dispersal of *Percnon gibbesi* may well be significant in the story of its spread through the Mediterranean it should be remembered that natural dispersal will also account for some of its distribution. Thessalou-Legaki *et al*. (2006) in a study of the Sally Lightfoot in Greek waters, notes that while shipping is a possible vector, the larvae may also have ridden currents across the Ionian Sea. The locations inhabited by *Percnon gibbesi* on the Hellenic Arch indicate this is a reasonable assumption. They go onto to suggest that its presence and algivorous feeding habit in the oligotrophic environment here may prove advantageous.

The larvae of *Percnon gibbesi* play another role in its phenomenal success in the Mediterranean (Puccio *et al*. 2006). It produces a very large megalopa and consequently a robust first crab (Paula and Hartnoll, 1989). Needless to say, *Percnon gibbesi* is now considered "established" by CIESM (the Mediterranean Science Commission). This means that there are published records of them from at least two different localities (or in different periods) evidence which indicates the population is self-maintaining. The impact of this new and significant presence in the infralittoral of the Mediterranean on either higher or lower trophic levels has yet to be investigated.

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