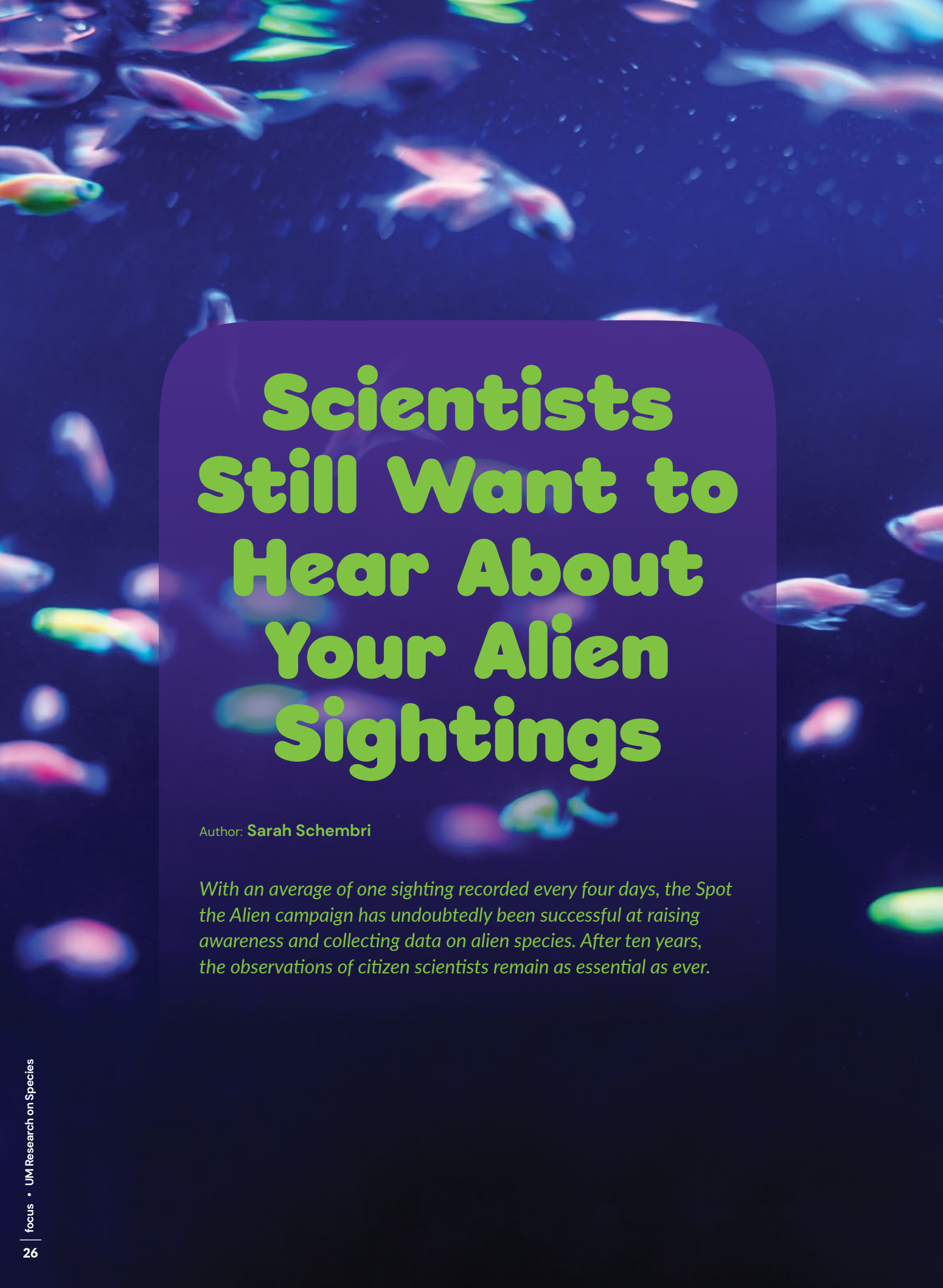




Scientists Still Want to Hear About Your Alien Sightings

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With an average of one sighting recorded every four days, the Spot the Alien campaign has undoubtedly been successful at raising awareness and collecting data on alien species. After ten years, the observations of citizen scientists remain as essential as ever.



It is very important that we keep monitoring the aliens.' This is one of the main messages from my conversation with Prof. Alan Deidun on the Spot the Alien campaign. The campaign has been ongoing since 2015, and after 10 years, it is more important than ever to be constantly on the lookout for alien fish and other alien marine species. (If you were hoping to read about extra-terrestrial aliens, sorry, wrong article.)

MONITORING FOR ALIENS

Thanks in no small part to the Oceanography Malta Research Group's (OMRG) campaigns, the public is generally well aware that, in recent years, several marine species that are not native to our waters – alien species – have been sighted, filmed, captured, and seem to be making themselves at home. The first sighting of an alien species is very important because it indicates a range expansion of the species. First records of a species in a new location are published in a peer-reviewed journal to inform the scientific community. However, continued records of the presence of a species are equally, if not more, important for monitoring purposes. This is why, after ten years, everyone and anyone is still encouraged to inform the Spot the Alien campaign whenever they spot an alien species.

The more observers scientists have, the more information they can glean. From the information scientists get from alien reports,

they can learn about the species' seasonal trends and how established they are in the new habitat, leading to some educated assumptions on how they were introduced to Maltese waters. They can also use the data for innovative research, such as training computer vision algorithms to identify species from photos.

If you are not sure if you've spotted an alien species or not, you can find information online, on social media, through educational videos, and on beach signs, with the sister Spot the Jellyfish campaign including beach signs with alien jellyfish species. You will also get a response for every observation you submit to the campaign.

The alien-spotting campaigns managed by the OMRG are also assisting biologists in North Africa (eastern Libya and western Egypt) to record marine alien species in their waters, thus compensating for the fledgling scientific infrastructure in such a challenging (geopolitically-speaking) region of the Mediterranean. All the citizen science campaigns managed by the OMRG have now been included in the European Citizen Science Association's online database.

ALIEN INVADERS

By definition, alien species are species that have been introduced to a new habitat through human intervention. Some people buy tropical fish and algae for their aquariums and then, accidentally or on purpose,

release those species into the wild. This is likely how the Australian algae *Caulerpa racemosa* and *Caulerpa taxifolia* were introduced to the Maltese coastal habitat years ago. The aquarium trade is also likely to blame for how the tropical lionfish, native to the Indo-Pacific, has spread from the Caribbean to the northwestern Atlantic and recently into the Mediterranean too. The highly invasive and destructive lionfish has been spotted in Sicily and in Tunisia, so it will likely be spotted in Malta very soon – Spot the Alien Fish is implementing an early warning system in this case by giving away a brand-new Go-Pro 12 model to the first person to report it.

The shipping industry is another pathway for the introduction of alien species. Ships take ballast water in one ocean and release it in another; with it, unsuspecting organisms are moved across the globe. Additionally, some marine craft act as a fish aggregating device – if they move slowly, the fish move with them. This might be how two Guinean angelfish (*Holacanthus africanus*), spotted in April 2017 in the Senglea port through the Spot the Alien campaign, are believed to have arrived there. They probably hitched a ride on an oil rig that had just arrived from West Africa – the native habitat of the Guinean angelfish. Several international and European laws have been introduced to control and mitigate the spread, including the International Convention for the Control and Management of Ships

Ballast Water and Sediments by the International Maritime Organisation of the United Nations. However, maritime laws are difficult to implement, and most regulations do not even apply to the recreational boating industry. Although recreational vessels might not have ballast water, marine species can be carried on the biofoul stuck to vessels' undersides (read more in **THINK** Issue 41, p. 68). Even non-sessile species like crabs can be carried for miles in this manner.

In the 1860s, the French engineer and diplomat Ferdinand de Lesseps led the construction of the Suez Canal, opening a new route for shipping while also opening the proverbial floodgates for tropical marine migrants, which started to spread from the Red Sea into the Mediterranean. These species are called Lessepsian migrants, and hundreds of them established themselves in the Eastern Mediterranean around the 1980s, taking up a good proportion of the fish market there. This is a grim portent for us in the Central Mediterranean, as the Lessepsian migrants continue to make their way westward.

It's reasonable to ask: how come Lessepsian migrants only started to be observed in large numbers several decades after the opening of the Suez Canal? The answer is climate change. These tropical species could not overwinter in the Mediterranean and establish viable populations until it started to warm up. As we see more marine heatwaves and milder winters, the Lessepsian migrants can overwinter and reproduce in areas further to the west.

Apart from climate change, alien species generally thrive in stressed environments. This means that pollution, overfishing, and

habitat destruction, such as by boat anchors, prepare the ground for the takeover by the new arrivals.

EXTENT OF THE PROBLEM

Just because a species is introduced to new surroundings does not mean that it will harm the new habitat. Empirically, about 90% of alien species are not invasive. However, the 10% that are invasive can drastically change the ecosystem to the point that, globally, alien species are considered a top threat to the conservation of marine ecosystems.

Usually, invasive species are not fussy eaters, have high fecundity, and have few natural predators. These adaptations allow them to thrive in many different habitats and quickly increase in numbers to outcompete native species. In the process, the newly introduced species can change how the ecosystem functions, disrupt nutrient

and carbon cycles, and in a worst-case scenario, lead to ecosystem breakdown. These ecosystem disruptions impact economic activity and human health by disrupting fisheries and decreasing water quality, for example.

In Malta, impacts on human health have been direct, as some alien species, like silver-cheeked toadfish, are highly toxic. Incidentally, five of this type of pufferfish were caught in Marsamxett harbour in January of this year. The presence of five individuals caught in one place shows that the species is reproducing and increasing in abundance, demonstrating the importance of continuing to report records of alien species. Fishers are familiar with pufferfish and know that it should not be consumed. However, in 2019, two patients were admitted to Mater Dei suffering from neurotoxicity after eating octopus. Almost no octopus have the neurotoxin



Five silver-cheeked toadfish (*Lagocephalus sceleratus*) that were caught in Marsamxett harbour during January of this year
Photo by Alan Gatt



Bluespotted cornetfish (*Fistularia commersonii*) spotted in Ċirkewwa
Photo by Edward Vella

tetrodotoxin, but it is hypothesised that the octopus had eaten a pufferfish, thus poisoning its own consumers via secondary intoxication.

SOLUTION

Controlling the spread of alien species is a difficult and sometimes impossible task. The Environment and Resources Authority has a national strategy for preventing and mitigating the impact of alien species, but efforts so far have been primarily focused on non-marine species. That said, good efforts have

been made to remove invasive crayfish from freshwater habitats (such as Chadwick Lakes) and invasive plants from Comino despite a late start.

In certain cases, such as with some algae, trying to remove them from the environment can aggravate the problem because small bits that fall off can propagate; therefore, efforts to remove the algae can unwittingly spread them. Still, some new arrivals might go through boom-and-bust cycles and eventually become less of a threat, as in the case of the previously

mentioned *C. racemosa* and *C. taxifolia*, which have regressed naturally.

As apex predators, we can lessen the problem of invasive species by eating them. For this reason, Ambjent Malta, Deidun, and RSO Alessio Marrone are working on a recipe book of invasive alien species such as the blue-swimmer crab. Alien species have been with us for so long that five have even been christened with Maltese names: Qawsalla, Trumbettier, Hmar tal-Lvant, Gurbell tal-Port, and Xkall tal-Lvant. According to Deidun, we can prepare to name many more because 'we can expect a quantum increase in the amount of alien species in our waters.'

As usual with big structural problems, an individual is limited in what they can do to help. Ultimately, what can slow down the spread of alien species is making sure that our marine habitat has fewer stressors. For this, we need big structural changes that mitigate climate change and reduce the detrimental impacts of our many marine activities. However, knowing the extent of the problem helps, and any citizen can lend a hand, so keep an eye out for the aliens! 



Two blue-swimmer crabs (*Portunus segnis*) that were caught in Qajjenza
Photo by Reno Tonna