

UltraMarine

Pure Inspiration for Marine Hobbyists



Shop Tour / Product Reviews

We're busier than ever with a visit to Aqua Group's HQ, and two product tests



Intensive Care

ReefNurse **Siobhan Doolin** shares her unique reef-keeping skillset



Visit Report

What does a practicing reef-keeper think of Spain's "largest aquarium in Europe"



Full Spectrum Reefing

We score a double whammy as we get not just the lowdown on a unique reef tank, but also a "fresh take" on reefing generally as **Paul Hughes**, owner of top reef store AAC, shares all the secrets of his personal "slice of ocean"!

PLUS news, reviews... and lots more!

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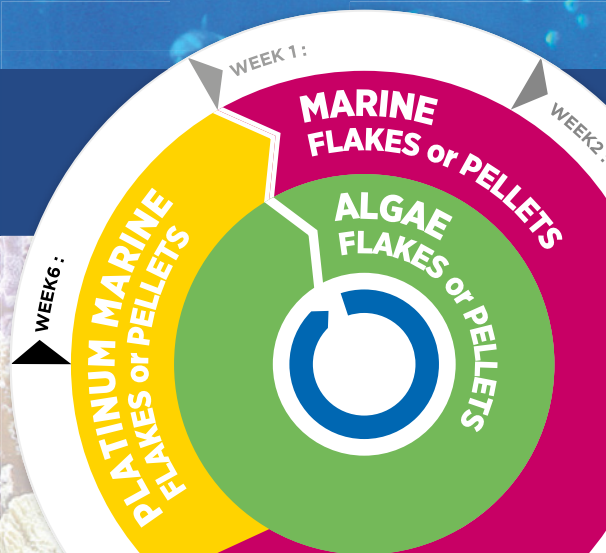
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Welcome

to UltraMarine



Greetings to you,
UltraMarine reader!

This issue has been an enjoyable one to put together, and I hope that comes through in the pages ahead.

Regular readers will know I don't get away from my own reef as often as I'd like, so a recent trip to L'Oceanogràfic in Valencia was a real treat — one of Europe's great public aquariums, and a chance to see reef-keeping (and marine conservation more broadly) done on an entirely different scale. I've written up my visit for this issue, and I think it'll give you plenty of food for thought, whether you're planning your own trip or just fancy living vicariously through mine.

Closer to home, we're paying a visit to Paul Hughes (of top reef UK store AAC), whose reef tank is unlike anything else we've featured in these pages. I won't give too much away here, but I can promise it's the kind of system that makes you want to rethink your own approach from the ground up. It's a genuine privilege to be able to share stories like Paul's with you.

Elsewhere in this issue, Nathan Hill takes a look back at some fifty years of reef-keeping evolution — from the earliest, faintly terrifying setups of the hobby's pioneers through to where we find ourselves today. It's a fascinating read, and a useful reminder of just how far we've come, often thanks to an awful lot of trial and (very expensive) error on the part of those who came before us.

And that's just a taste... buckle-up folks as this issue should keep you busy for a while!

John

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Cover: *Synchiropus splendidus* - image by J Clipperton



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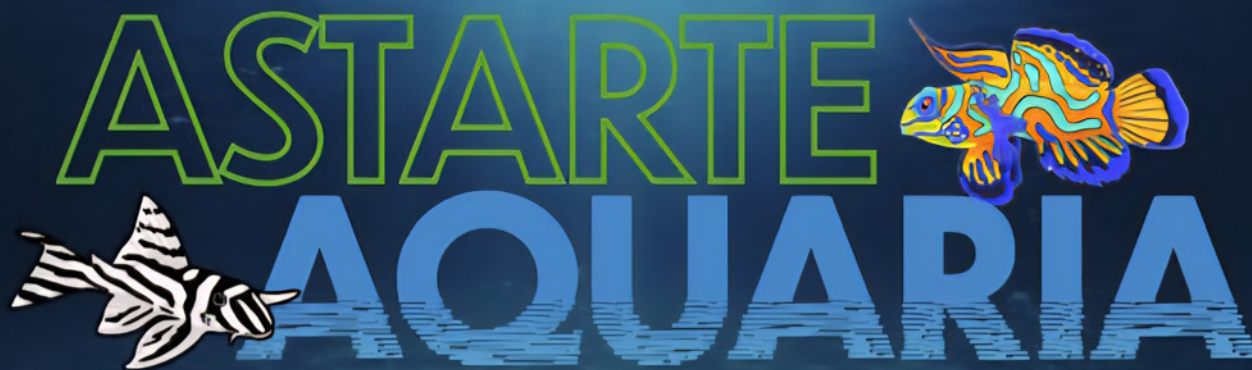
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We visit this famed Spanish public aquarium billed as "the largest in Europe", but does the reality live up to the hype, and is it worth the considerable cost of entry?

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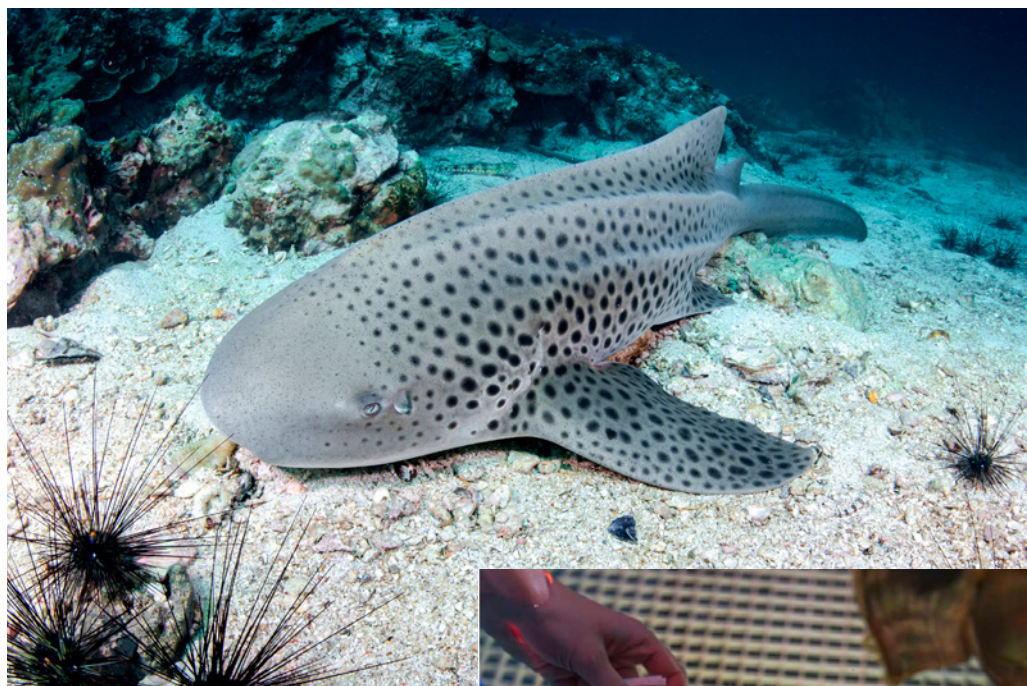
Science & Conservation

Aquarium Sends Shark Eggs To Assist Endangered Species Recovery

Shedd Aquarium has sent four zebra shark eggs to Raja Ampat, Indonesia — its first such shipment — as part of a conservation effort to protect the endangered species.

As a founding partner of ReShark, Shedd has long supported the StAR Project (*Stegostoma tigrinum* Augmentation and Recovery), which uses conservation breeding and translocation to restore dwindling zebra shark (Indo-Pacific Leopard Shark) populations. Local teams will raise the eggs at the Raja Ampat Research and Conservation Center (RARCC). “This first shipment of eggs is a significant step for Shedd’s continued contribution to help save sharks globally,” said Anna Byczynski, supervisor of Shedd’s Wild Reef exhibit. She noted Shedd is among few institutions with expertise in breeding, hatching, and raising zebra shark pups, contributing to genetically diverse populations across zoos and aquariums.

Before shipping, Shedd’s animal care team assessed the eggs’ health, viability, and genetic diversity using candling — shining a light through the shell to observe embryo development. In Indonesia, the eggs are now cared for by the StAR Indonesia aquarist team (“shark nannies”) at the RARCC nursery, built specifically for rearing eggs and juvenile sharks. After hatching, pups



Above: Zebra Shark (*Stegostoma tigrinum*) also known in Thailand as Leopard Shark at Shark point in the Andaman Sea, a popular dive site near Phuket and Krabi, Thailand. image by zephyr_p
Right: Shedd Aquarium animal caretakers shine a light through the casing of a zebra shark egg (also known as an Indo-Pacific leopard shark) to observe the growing embryo. Credit: Shedd Aquarium/ Rachel Mittelstaedt



will be raised in controlled conditions, then moved to a sea pen to adapt to the marine environment and develop foraging skills. Once they meet size, health, and behavioral benchmarks, they’ll be tagged and released into protected Raja Ampat waters, with ongoing monitoring of their movement, survival, and adaptation. StAR Indonesia has released 75 zebra sharks so far. Shedd has previously sent specialists 9,000 miles to the

RARCC nursery to train staff in raising pups, and plans to continue sending eggs as more fertile, genetically viable ones become available.

Zebra sharks play an important ecological role: unlike many shark species, they don’t need to swim constantly to breathe and often rest on reef floors, where they help control populations of bottom-dwelling prey like snails, clams, crabs, shrimp, and small fish. Adults have

spotted skin, while pups are born with striped tails that mimic venomous sea snakes to deter predators. The IUCN lists zebra sharks as endangered, with many populations at risk of extinction worldwide.

“I look forward to following along on the journey of these eggs... I hope the passion and patience behind every small step toward a larger endeavour like this truly comes across,” Byczynski said.

UAVs Discover Teeming Reefs Off West Africa, Previously Presumed Dead

An international marine expedition has completely upended the ecological understanding of West Africa's oceans by rediscovering a massive, thriving deep-water mesophotic coral reef ecosystem along the Benin-Togo continental shelf.

For more than 60 years, this specific underwater region was treated by the scientific community as a dead zone. First flagged during basic maritime mapping surveys in the 1960s, the lack of advanced deep-sea technology at the time meant researchers could not properly inspect the site, eventually leading to a widespread scientific assumption that the habitat had completely degraded due to heavy industrial runoff and regional human impacts.

That narrative was shattered when a collaborative research team, led by marine scientist Gérard Zinzindohoué, launched a modern exploration mission utilising high-resolution side-scan sonar and autonomous underwater drones. Operating at a depth of 50 metres beneath the surface, the drones successfully mapped a continuous, 11.5 kilometre stretch of highly vibrant coral gardens. The video feeds and data sensors revealed that far from being dead, this mesophotic reef is a highly healthy, complex habitat boasting eight distinct species of hard and soft corals that have quietly thrived in the dark for decades.

The discovery is causing a massive stir among marine biologists because of the reef's role as a potential "climate refuge." While shallow-water reefs nearby are actively bleaching and dying from



A picture of the reef taken by Gérard Zinzindohoué

escalating surface ocean heatwaves, this deep-water system is insulated from thermal stress by deeper, cooler offshore currents. The drones captured extensive footage of the reef acting as a crowded biological oasis, teeming with economically and ecologically vital fish species—including golden African snappers, blackbar soldierfish, and Guinean angelfish (*Holacanthus africanus*) proving that the reef

serves as a critical spawning and nursery ground that feeds the wider West African marine ecosystem.

However, the euphoria of the discovery comes with a sense of extreme urgency. Now that scientists have proven this reef exists, they have also realised how vulnerable it is to immediate human destruction. The seafloor surrounding the Benin-Togo shelf is a hotbed for heavy industrial bottom-

trawling and offshore oil and gas exploration, both of which can crush centuries of delicate coral growth in seconds. Armed with this new drone data, an international coalition of marine conservationists is rushing to petition regional governments to grant the site immediate status as a Marine Protected Area (MPA), preserving this newly found genetic backup bank before industrial activity can destroy it.



Holacanthus africanus - image by J Clipperton

Reefing Round-Up - June / July 2026

July saw Florida based store Koral King share a pair of captive-bred Rose Anthias (*Odontanthias katayamai*), sourced from Surge Marine Life's first breeding batch — the world's first captive-bred specimens of this ultra-rare deepwater species. The fish were listed from \$5,999.00, a fraction of the \$17,000–20,000 wild-caught price.

A breakthrough study led by researchers at the Georgia Institute of Technology has successfully isolated tiny, naturally occurring predatory bacteria from within healthy coral microbiomes that can actively track down, kill, and consume flesh-eating pathogens such as *Vibrio coralliilyticus*.

Wrapping up in late July, the 16th International Coral Reef Symposium (ICRS 2026) highlighted that nearly half of all reef-building coral species face extinction, while launching high-resolution, pixel-scale mapping of Pacific corals. In response, the society shifted its focus toward active political and economic lobbying to combat the crisis ahead of the 2030 summit.



Lauren Speare sampling corals in the lab
(Photo courtesy Georgia Tech)

Keep up with the latest developments in “real time”, by following our **social media channels** where we bring you the latest important magazine announcements, plus breaking reef-related stories and discoveries!



Renowned Marine Biologist Killed In Philippines Home Invasion Tragedy

We were shocked and saddened to learn that renowned American marine biologist Dr. Kent Carpenter, 73, was shot and killed on July 12, 2026, during a home invasion in Sibulan, Negros Oriental in the Philippines.

Sources report that three masked men forced their way into Carpenter's residence, shooting him in the head before fleeing with a laptop, cash, and a backpack.

Police launched an immediate investigation, establishing “Task Group Carpenter.” Five suspects have since been arrested and charged with robbery with homicide. Investigators confirmed the attack was a targeted robbery, entirely unrelated to his scientific work.

Dr. Carpenter was a distinguished professor at Old



Dr Kent Carpenter (right) and *Paracheilinus carpenteri*, the Carpenter's Flasher wrasse, just one species that was named in his honour.

Dominion University in Virginia and an adjunct professor at Silliman University. His five decades of pioneering research famously established the central Philippines as the global epicentre of marine shore-fish

biodiversity. Hobbyists will perhaps remember him most fondly through *Paracheilinus carpenteri*, the Carpenter's Flasher Wrasse, which is just one of the species named in his honour.

Colleagues worldwide have expressed deep mourning, remembering him as a brilliant and humble scientist whose work transformed global coral reef conservation.

Our sincere condolences also.

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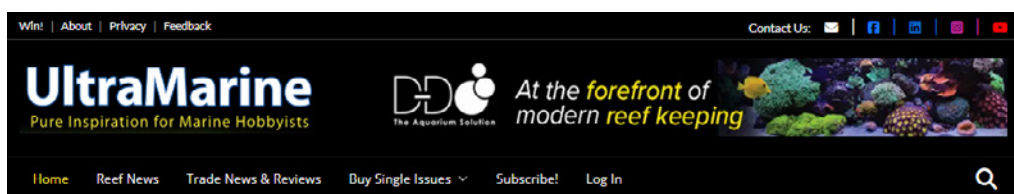
We are pleased to announce that the new, fully interactive digital edition of the magazine is now up and running via the recently revamped UltraMarine website!

This is a change to the previous arrangement, which saw the digital edition delivered through a third-party platform, and we've implemented this change to help improve your overall experience and gain better control of how we deliver each issue.

While there have already been lots of new subscriptions through the website, digital subscribers who still have their issues fulfilled via PocketMags should not see these subscriptions automatically renewed when they come to an end (they will continue to be delivered via that platform until that time of course).

For those current 3rd party subscribers, this means when your digital subscription comes to an end, you will need to visit and set up a new sub to our new web delivered version (see link at the end of this article). You can buy this as a standalone digital subscription (for an even better price!) or get it as part of a premium subscription which also includes the print version of the magazine (UK addresses only). What's more, when you sign up you get immediate access (once your payment is processed) to a back catalogue of recent digital issues, all of which are organised and accessible via your very own library on the website. All you need to do is make a free account and hit "subscribe"!

Some other benefits of the new digital edition include:



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- Better functionality through the state-of-the-art Real3D Flipbook reader
- Enjoy those blue-hued reef fluorescence images to their full effect in the RGB colourspace
- Get each issue as soon as it is uploaded, normally anything from a few days to a week before printed copies

Moving forward, look out for more developments with the digital edition as we continue to expand the UltraMarine website so each compliments the other. If you haven't visited for a while, please drop in on the website as it is now a much-improved experience, and is now fully mobile compliant. There's regular material posted to the website that is unique to that

platform and not included in the magazine, so don't miss out!

So, if you are tired of "doom scrolling" all day long, sign up to the new digital edition NOW and start enjoying a new and positive learning journey that extends well beyond the pages of the magazine, into an enhanced and expanded reef-keeping experience!

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Shop Visit: The Aqua Group

“Fishgate” HQ - Binbrook, Lincolnshire



Although the subject of our shop visit this issue already had a very successful official launch back in late June, I still felt the keen anticipation that comes with visiting a new site perhaps before the wider hobby has properly caught wind of it. That was my feeling on arrival at The Aqua Group’s “Fishgate” HQ, tucked into the former RAF Binbrook site in the Lincolnshire Wolds, a location with a scale that, frankly, no UK aquatics retailer has attempted before.

I’d been to this site already of course (way back in October 2023, issue 102), when The Aqua Group was then

operating out of a considerably smaller building elsewhere on the same former airfield. Even then, in that first iteration of the store (then as “Reef Aquatics”), it was clear this was a team with genuine ambition and an eye for doing things differently. That visit was enough to leave a lasting impression and make this return one I’d been looking forward to, but seeing what’s grown from that starting point was still a surprise. Where most shop visits involve navigating a modest retail unit and a handful of display tanks, this one meant walking into a former airfield redevelopment measuring close to 35,000 square feet, of which the aquatics and pet operation is just one component (alongside

a distribution centre, warehousing, and an emerging garden/Japanese koi centre). It’s an ambitious footprint for sure, and on this evidence it would be easy to assume that this ambition is purely about volume (more tanks, more stock, more square footage translates simply into more sales right?). Well, spend a few hours and talk to the people running the marine side of the business, and a different picture emerges. This is a company using scale not as an end in itself, but as infrastructure aimed at solving a problem the UK marine trade has quietly lived with for decades: inconsistent livestock quality arriving through opaque, multi-handler supply chains. More on that shortly.

The Site and the Company

The Aqua Group describes itself as being “founded by hobbyists, for hobbyists” which is a common enough claim in this trade, but one that felt more substantiated than usual once inside. The company has been building out a presence across UK aquatics retail with a focus on marine and freshwater livestock, reptiles, and the equipment and consumables that support all three (this is also the team behind the AQUA-H trade shows in case you didn’t know). Fishgate (the name the site has been given due to its previous use as a frozen fish packaging centre) represents a consolidation and expansion of that ambition.



Rather than a single retail outlet, it's being developed as a central hub combining distribution, warehousing, and a large-format aquatics and pet shop, with a koi/garden centre element also under development on site.

Practically, this means the retail floor doesn't feel like a shop bolted onto a warehouse. Instead, it feels like the visible tip of a much larger logistics and livestock-holding operation, which I think is precisely the point. Being able to walk from the shop floor into holding and quarantine facilities of a genuinely industrial scale, rather than a back room with a couple of tanks, changes what's possible in terms of stock turnover, disease control, and the sheer breadth of species that can be held and conditioned at any one time. On this, Chief Technology Officer Mackenzie Briggs, who was kind enough to give me an extensive tour of the facility (both completed areas, and many areas which are waiting in the wings for development) explained, "What we are building at Fishgate is a modern, streamlined

operation that brings together exceptional animal welfare, sound commercial practice and the capacity to house an unrivalled breadth of marine livestock. Our long-term ambition is to create a living library of healthy, carefully managed and pest-free fish.

Our quarantine programme has been developed around three key priorities. First, protecting our livestock portfolio at scale. Second, improving animal welfare by reducing avoidable losses, disease outbreaks and mortalities. Third, strengthening customer trust, retention and long-term success by giving aquarists the healthiest possible starting point when purchasing livestock.

Many facilities that offer quarantine remain understandably guarded about their methods. At Aqua Group, we have chosen a different approach. We believe that transparency and education are essential, which is why we openly discuss our Custom Hybrid Tank Transfer Method and invite customers into our quarantine rooms to see the process first-hand.

Since moving into the new Fishgate facility, every marine fish we import passes through a structured, multi-stage quarantine

process before becoming available for sale. Customers are able to see the systems, understand the reasoning behind each stage and learn more about the work required to manage marine livestock responsibly at scale.

However, transparency also means being realistic about what quarantine can and cannot achieve. We always explain that, regardless of the lengths we take to ensure the fish within our facility have completed a comprehensive quarantine process, no retailer can guarantee that a fish will remain pest-free once it enters an established aquarium.

If a quarantined fish is introduced into a system that has been running for many years, or

contains livestock, corals, invertebrates or equipment sourced from multiple suppliers, it may be exposed to pathogens already present within that environment. Quarantine significantly reduces risk, but it cannot control what happens after a fish leaves our care.

From a commercial perspective, the primary purpose of our quarantine programme is to protect Aqua Group's own livestock portfolio as the business grows. We currently operate 48 livestock racks, with plans to expand beyond 200 racks across Fishgate and our wider network of retail locations.

At that scale, a single disease outbreak could have serious consequences for animal welfare, stock availability and the wider





operation. Our quarantine process is therefore not simply an added service or marketing claim. It is a fundamental part of how we intend to grow Aqua Group responsibly, sustainably and with animal welfare at the centre of every commercial decision."

I must say this is a refreshingly unromantic way to frame animal welfare, and arguably a more durable one. A system built because it makes commercial sense is a system that's likely to survive contact with the pressures of running a large business, in a way that good intentions alone sometimes don't.

The Marine Side: What Sits Behind the Glass

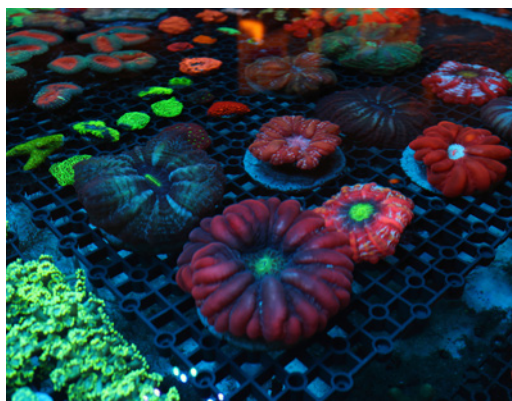
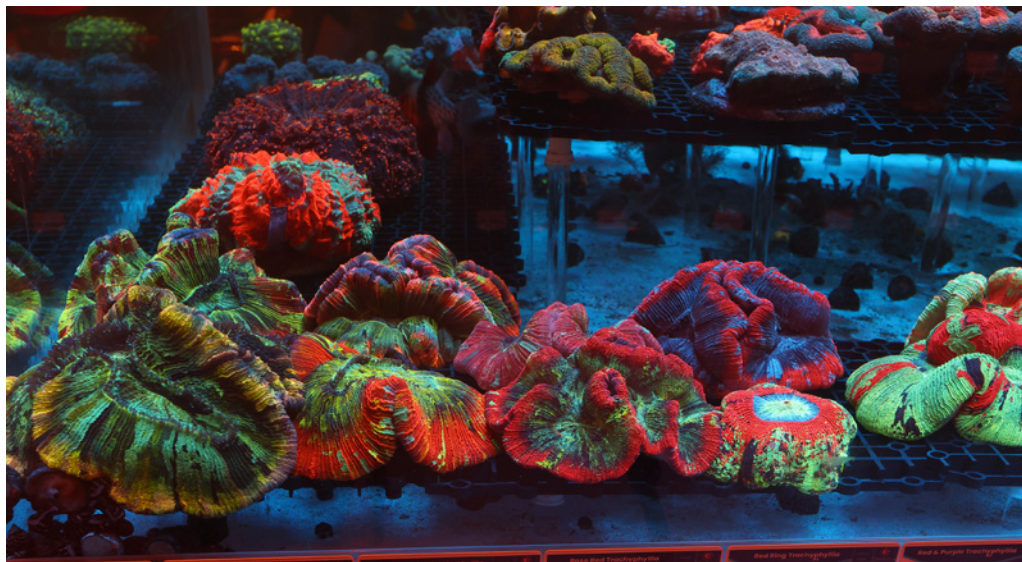
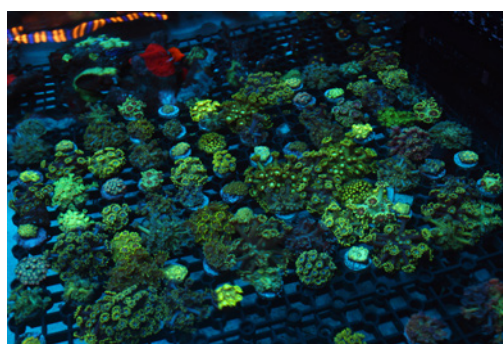
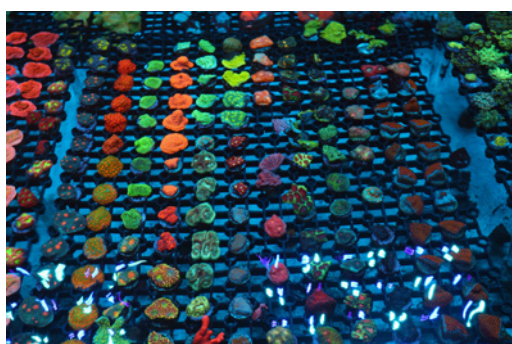
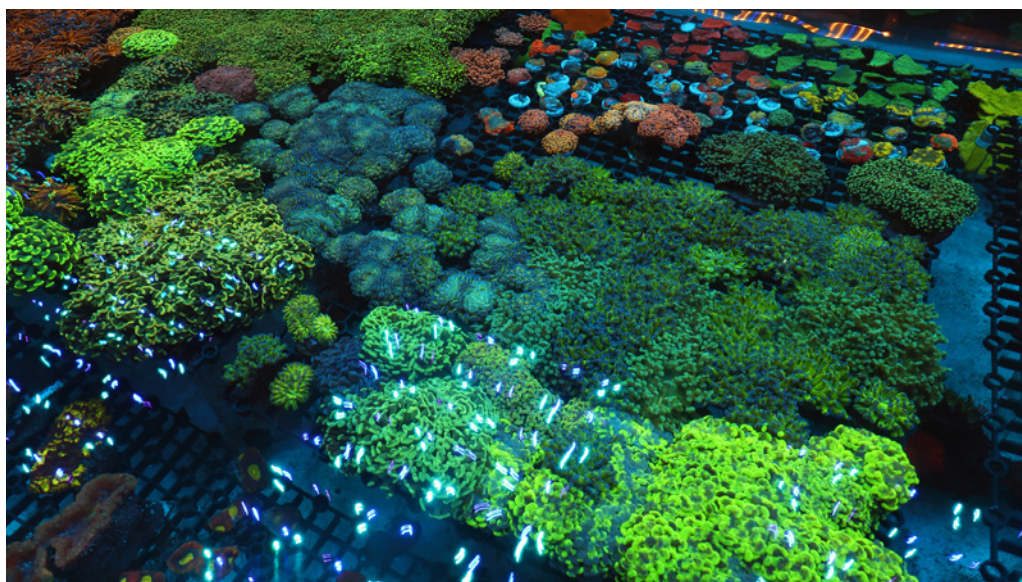
Walking the floor, the breadth of the operation is immediately apparent. The Aqua Group is not positioning itself as a specialist marine-only outlet in the mould of some of the smaller, well-regarded reef-focused

shops I've visited around the country. Instead, it's building a full-spectrum aquatics and exotics destination that could already provide a full day out especially if you keep a mixture of aquaria/vivaria etc. Case in point, under the auspices

of Freshwater Manager Alan Ashby, freshwater species are superbly represented here, with a vast range of both community and specialist stock. Similarly, run by Marine Manager Scott Hardcastle, the marine section presents all

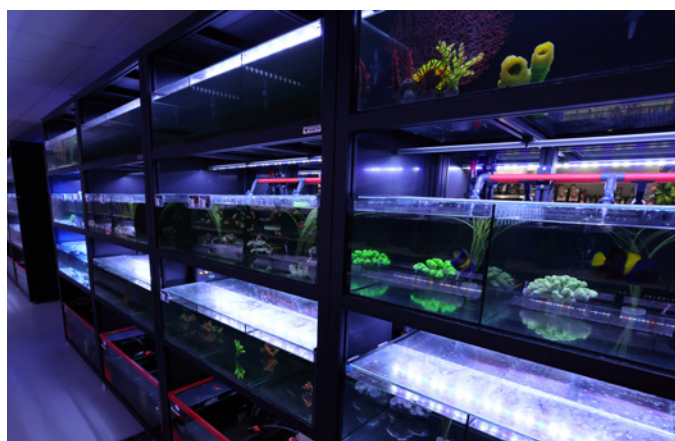
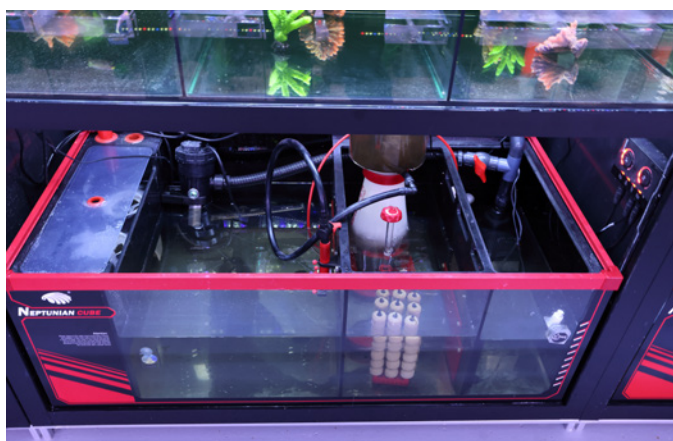
you'd expect from a serious, large scale, well-funded operation. Specifically, there's already a massive 10ft long coral bay absolutely jam-packed with corals, including everything from showstopping centrepiece LPS corals (running





at up to £1500 a pop), to rows and rows of frags, some for less than £20. There's also a second similar coral system that should soon be stocked up with SPS corals once lighting is installed (in the meantime it's a spacious home for a gorgeous baby Port Jackson shark named "Michael Jackson"). Add to this multiple spanking new Neptunian Cube fish retail units (each one consisting of multiple tanks), and we've bolted on a selection of marine fish that encompasses all the popular genera, plus specialist and rarer species mixed in. Complimenting the coral selection this all adds up to one of the most extensive offerings I've ever visited. Beyond that it's clean, well-lit, clearly well-maintained and state-of-the-art. Highly impressive!

But the real point of differentiation isn't necessarily on the shop floor. It's through a door most casual visitors probably wouldn't even register, into what Mackenzie, who talked me through the operation in detail, describes as the beating heart of the marine strategy: a dedicated quarantine facility occupying its own large room, entirely separate from the display and sales floor. Let's be clear here, this isn't a couple of holding tanks in a back corner. It's a purpose-built space running a three-tiered quarantine system, with serried rows of tanks operating in parallel to allow different batches, species groups, and stages of the quarantine process to be kept strictly isolated from one another. The tiered structure allows fish to be moved progressively through stages of observation and treatment rather than sitting static in a single tank for the duration thus reducing the risk of a single point of contamination compromising an entire batch, and allowing staff to track individual groups



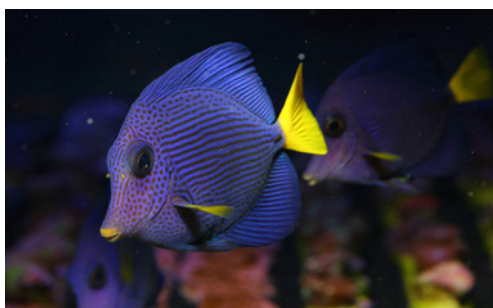
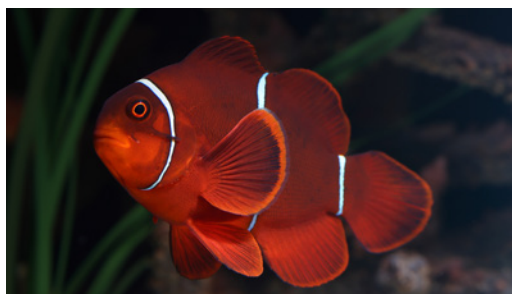
of fish through a defined and repeatable process rather than an ad hoc one.

Central to how fish are moved through that tiered system is a strict tank-transfer methodology. Rather than fish sitting in one system for the full quarantine period, they are transferred at set intervals between bare, sterilised systems. This interrupts the reproductive cycle of the parasites most likely to be riding in on new marine fish, denying them the substrate and downtime they need to re-infect the same fish repeatedly. It's an approach borrowed and scaled up from

methodology more commonly discussed among serious hobbyists and public aquarium quarantine protocols than typically seen in UK retail, and seeing it running at genuine commercial scale with multiple systems in simultaneous rotation was one of the more striking parts of the visit. Alongside the tank-transfer protocol, the quarantine process incorporates targeted bath treatments and chemical dosing regimes aimed specifically at the parasites that cause the most heartbreak in the marine hobby: *Uronema*, *Brooklynella*, whitespot (ich), and flukes. Rather than a

single blanket treatment applied indiscriminately, the approach is geared toward addressing each of these threats through appropriate, targeted intervention as part of the staged process, treating fish according to what they actually need rather than a one-size-fits-all prophylactic dose. For anyone who has lost stock to a *Brooklynella* outbreak within days of introduction, or watched Ich work through a display tank that a single "quarantined" fish was meant to have cleared (yes, I've been there myself!), the value of this kind of rigour is hard to overstate. It's worth

pausing on what this actually means in practical terms for a customer buying a fish here. Livestock sold through the marine department isn't simply landed and shelved. Instead, it has passed through a defined, multi-stage process specifically engineered to break disease cycles before the fish ever reaches a display tank, let alone a customer's home system. That's a meaningfully different value proposition to buying a fish that has, at best, spent a short and unstructured stint in a holding system before sale. It's worth reiterating here that Aqua Group import all of their fish direct from hand-



picked collectors in far flung regions of the globe so they haven't been through the hand of existing major UK importers. This also means that there are species here that are a little different to the usual fayre in the hobby.

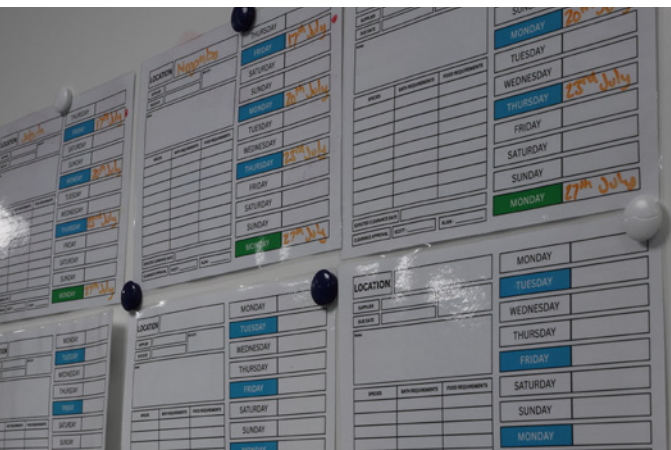
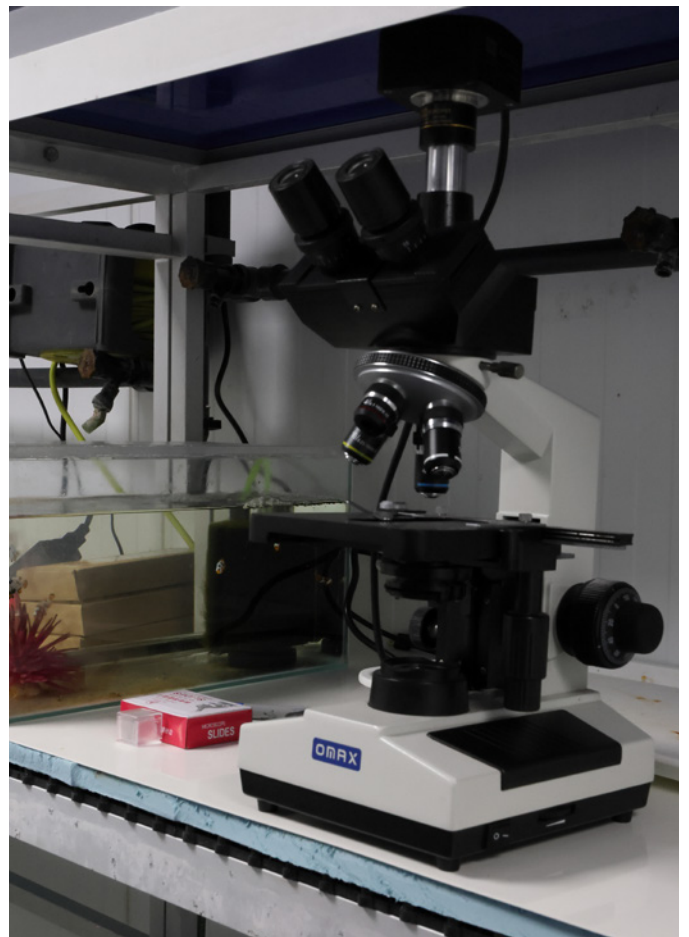
Phase 1: Building a New Force in the Hobby

What ties all of this together, the scale of the site, the investment in the quarantine facility, the discipline of the tank-transfer protocol, is what Mackenzie describes as "Phase 1" of the wider marine strategy: perfecting the direct import of marine fish from hand-picked collectors. This is a significant statement of intent. Much of the UK marine trade still relies on livestock moving through several intermediary handlers before it reaches a retail shop floor and each additional link in that chain introduces another opportunity for stress, poor husbandry, and disease transmission before a fish ever gets the chance to properly acclimatise. By focusing Phase 1 on establishing direct relationships with hand-selected collectors, The Aqua Group is aiming to shorten that chain considerably, taking greater control over sourcing standards, collection methods, and the condition in which fish begin their journey before the in-house quarantine process takes over responsibility for the rest.

It's a strategy that only really makes sense at this kind of scale. Direct import relationships with hand-picked collectors require volume and consistency of demand to be viable, and a quarantine infrastructure capable of processing that volume properly requires exactly the kind of dedicated, purpose-built space seen at Fishgate. In other words, the sprawling site and the meticulous quarantine room



If The Aqua Group can hold this standard as it scales, Fishgate has the look of a site that could meaningfully shift expectations of what UK marine retail can be.



aren't separate investments, they're two halves of the same strategic bet: that if you control sourcing at one end and disease management at the other, you can offer a standard of marine livestock health that the rest of the trade, working through longer and less accountable supply chains, simply can't match consistently.

Whether "Phase 1" delivers on that ambition at scale over time will be worth watching closely. Sourcing relationships and quarantine protocols are one thing to establish and another to maintain rigorously as volume grows. But on the evidence of this visit, the intent is serious, the infrastructure is genuinely there, and the thinking behind it is more considered than a lot of the "biggest shop in the UK" framing might suggest at first glance. If The Aqua Group can hold this standard as it scales, Fishgate has the look of a site that could meaningfully shift expectations of what UK marine retail can be.

Right and opposite page lower: Central to Phase 1 of the shop development, the quarantine facility is seriously impressive, being designed to handle direct imports from around the World and to reduce losses from common ailments or poor handling to an unprecedented level.

Final Thoughts

The Aqua Group's Fishgate "Phase 1" site is easy to be impressed by on square footage alone, but the more interesting story is what's happening in a room most visitors may not appreciate: a quarantine system built with the kind of rigour usually associated with specialist marine wholesalers or public aquaria, rather than retail. Pair that with a stated ambition to control the supply chain right back to hand-picked collectors, and this starts to look less like marketing language and more like a genuine attempt to

reset the baseline for livestock health in UK marine retail.

Thinking back to that first, much smaller building I visited in 2023, the scale of what's been built here is hard to overstate, and by the team's own admission, Phase 1 is only the beginning. Whatever the case, I've already been invited back to see the next stages take shape, and excitingly this looks set to include a dedicated coral quarantine room, an in-house coral spawning facility, more stock systems, and a phytoplankton farm to support it all. What's also particularly striking is how much of this is being

designed for visitors to actually see rather than simply take on trust. Indeed, many of these areas will be viewable through hatches set into the walls, letting customers watch the working labs in action rather than just hearing about them second-hand. I found it hard not to think of the scene in the original Jurassic Park movie, where visitors are able to watch scientists work on dinosaur eggs in a lab. It all points to a business where, to borrow Sir Richard Attenborough's famous line from that scene, they've certainly "spared no expense".



Aqua Group

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Website - aquagroup.co.uk
Facebook - Aqua Group
Instagram - woldsaquagroup

Opening Times (please double check before travelling)

Sunday 10am - 4.30pm
Monday 9am - 5pm
Tuesday 9am - 5.30pm
Wednesday Closed
Thursday 10am - 7pm
Friday and Saturday 10am - 6pm

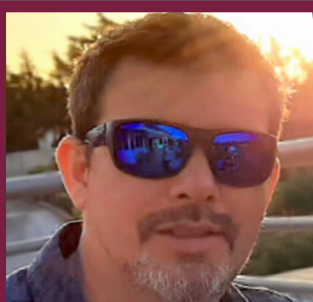


Let's be honest, there are "showier" fish in the hobby. There are more colourful ones, more expensive ones, more "Instagrammable" ones. However, few are as interesting to keep and observe as the watchman gobies. Indeed, these fascinating little fishes are equal parts sentinel, landscaper, and often times comedian, and have been a fixture of reef tanks for longer than most of us have been keeping them.

Reef Icons

No.45

By John Clipperton



An award-winning photographer and lifelong aquarist, John has worked with numerous top marine retailers, publishers and manufacturers on a freelance basis over the last 20 years. He has also collaborated on a range of projects with experts in the field, and supported organisations such as zoos, public aquaria, conservation initiatives and educational establishments. He has been Editor of UltraMarine since October 2015. Read more about John at: ultramarinemagazine.co.uk/contributors/

If you've never kept a watchman, the appeal might not be obvious at first glance. Watchman gobies, also known as Shrimp or Prawn gobies (most commonly species from the genera *Cryptocentrus*, *Amblyeleotris* and *Stonogobiops*) are all modestly sized, bottom-dwelling, and fairly plain in terms of colouration. Spend five minutes watching one at the mouth of its burrow, though, tail flicking, fins fanned, eyes locked on every shadow that crosses the sand, and you'll understand why they've earned a permanent place on the "essential reef fish" list.

The Burrow Business

Watchman gobies are diggers by nature. In the wild they excavate and maintain burrow systems in sand and rubble substrate, and in the aquarium they'll do exactly the same thing given half a chance. This is worth knowing before you buy one, because a determined goby can rearrange your aquascape overnight. Give them a decent bed of fine-to-medium sand, at least 2-3 inches where possible, and they'll set about creating a home almost immediately. Left to their own devices, a watchman goby will happily maintain a single burrow entrance for months. It's a role they take seriously — sand gets shifted, tunnels get reinforced, and the fish itself rarely strays more than a body length or two from the entrance, hovering just above it, ready to bolt at the first sign of trouble. They aren't suited to bare bottom tanks, becoming stressed and reclusive if they can't hide away when needed.

The Famous Partnership

No feature on watchman gobies would be complete without the double act they're best known for: their symbiosis



There's not much that can beat the fascination of watching a goby and shrimp team at work... in this case an *Amblyeleotris diagonalis* goby and an *Alpheus randalli* shrimp.

with pistol shrimp (genus *Alpheistes*, most commonly *Alpheus randalli* or *A. bellulus* in the trade).

It's one of the most genuinely remarkable relationships in the marine world, and it plays out just as vividly in a home aquarium as it does on the reef. The shrimp — functionally blind, or close to it — does the heavy engineering: digging and maintaining the burrow, shifting sand grains one claw-load at a time. The goby, in return, stands watch. Physical contact is maintained almost constantly via the shrimp's antennae resting against the goby's tail or flank, and the moment the goby signals danger with a flick or dart, the shrimp bolts back underground, dragging its bodyguard down after it.

Watching this pair work together for the first time is one of those moments that tends to convert casual observers into properly obsessed

reefers. It's patient theatre — nothing happens quickly, but everything that does happen matters to both parties.

A few practical notes if you're planning to add a pairing:

- **Buy them together if possible.** Tank-bred or wild pairs sold as a bonded unit will settle far faster than introducing them separately and hoping for the best.
- **If unbonded, give it time.** Gobies and shrimp introduced separately will often find each other within days if compatible, but it can take longer — patience is the key ingredient here, not intervention.
- **One goby, one shrimp, generally.** Most watchman species will only tolerate a single symbiotic partner at a time, and territorial disputes between rival gobies over one shrimp are common if you overstock.

Compatibility and Tank Considerations

Watchman gobies are, on the whole, peaceful and reef-safe — they'll leave corals and inverts alone, and their sand-sifting habits can actually be a benefit, helping to keep detritus turned over in the substrate. They're not entirely bombproof though, and a few things are worth bearing in mind:

- **Jumpers.** Like most gobies, they're prone to jumping when startled, so a well-fitted lid or overflow cover is essential rather than optional.
- **Substrate matters.** Bare-bottom or heavily rockscaped tanks with no sand bed simply won't work — without somewhere to burrow, a watchman goby (and certainly its shrimp partner) will spend its life stressed and exposed.
- **Tankmate temperament.** They generally do best with



There are plenty of interesting Watchmen to chose from. Above left: The iconic *Amblyeleotris randalli* Above right: The less well-known *Ctenogobius tangaroai* Below: One of several very similar *Cryptocentrus* species. This one is (I think) a *C. cyanotaenia*.



In terms of partner shrimps, team larger, robust goby species with an *Alpheus bellulus* (above)... and smaller, more delicate goby species with *A. randalli*, right. Be sure that the shrimp is a commensal species as there are some pistol shrimps that aren't (*Alpheus soror* for example)



calm to moderately active tankmates. Overly boisterous fish, particularly other bottom-dwellers competing for burrow space, can cause ongoing stress.

- **Feeding.** Most watchman species do well on a varied diet of quality frozen foods — mysis, brine, and finely chopped meaty fare — offered a few times a week. They're not fussy, but consistent feeding helps keep them confident enough to stay visible rather than retreating permanently underground.

Why They Earn the "Icon" Tag

It would be easy to overlook watchman gobies in favour of flashier fish, but that would miss the point of what makes a reef tank genuinely alive. There's real, observable behaviour here — a partnership playing out in real time, a fish doing an actual job rather than just decorating the water column. For anyone who's spent a quiet ten minutes watching a goby and shrimp go about their business, it's easy to see why this unassuming little fish has held its place in the hobby for decades, and shows no sign of losing it.

Species Worth Knowing

The “watchman goby” label covers a fair spread of species, and it’s worth knowing your options:

Amblyeleotris guttata
(Orange-Spotted Goby)

The Orange-Spotted Watchman Goby (*Amblyeleotris guttata*) is a peaceful marine fish native to the sandy reef flats of the tropical Indo-Pacific Ocean, where it grows to a maximum length of about 9cm. Easily recognised by its cream-coloured body decorated with bright orange or red spots, this bottom-dwelling species requires a home aquarium of at least 20 gallons with a deep, sandy substrate and a carnivorous diet of frozen marine foods. It is famous for its mutualistic partnership with alpheid pistol shrimp, acting as a lookout while the shrimp digs a shared burrow; the goby uses a system of tail-flicks—ranging from mild twitches for minor alerts to rapid shakes for immediate danger—to signal to the nearly blind shrimp when it is safe to work outside. It isn’t exactly “common” in the trade but you should be able to source one with some persistence.

Amblyeleotris guttata



Cryptocentrus cinctus
(Yellow / Sulphur Watchman Goby)

The Yellow Watchman Goby (*Cryptocentrus cinctus*) is a hardy reef fish widely distributed across the coastal lagoons of the Indo-West Pacific, growing to around 10cm in length. It is unique for its ability to shift colour phases, changing from its signature bright Sulphur yellow to a banded grey or white due to age, social dominance, or environmental stress. Thriving in home aquariums of at least 20 to 30 gallons, this popular fish forms an instant bond with digging pistol shrimp, keeping watch at the burrow entrance and utilising specialised tail-flicking frequencies to guide the shrimp’s movements and trigger immediate, synchronised retreats when predators approach. This species may even be available as captive-bred individuals occasionally.



Cryptocentrus cinctus
Grey form above, yellow below



Stonogobiops nematodes



Stonogobiops nematodes
(Blackray Goby)

The Blackray Watchman Goby (*Stonogobiops nematodes*), also known as the Hi-Fin Red Banded Goby, is a striking, smaller fish native to the deep sand slopes of the Western Pacific that reaches a maximum size of just 5cm. It stands out for its high-contrast pattern of dark diagonal stripes on a white body, a bright yellow face, and a dramatically elongated first dorsal spine that it raises and lowers like an antenna. Ideal for nano aquariums of 10 to 15 gallons, this somewhat delicate species forms a close bond with small pistol shrimp, most notably *A. randalli* (Randall's Pistol Shrimp) using its unique dorsal spine movements alongside subtle tail twitches to communicate threat levels to its burrowing partner.

Lotilia klausewitzi (Whitecap Goby)

The Whitecap Shrimp Goby is a highly prized and exceptionally rare nano-sized marine fish native to deep sand slopes stretching from the Red Sea across the Indo-West Pacific Ocean. Reaching a maximum length of just 5cm, it is instantly recognisable by its dark brown or black body topped with a stark white blaze that runs from its snout to its dorsal fin. This incredibly shy and peaceful species is best housed in mature nano aquariums of 10 to 20 gallons with a secure lid and a carnivore diet of finely chopped marine proteins. It relies heavily on a symbiotic partnership—most naturally with the Red-Spotted Pistol Shrimp (*Alpheus rubromaculatus*). The species was known as *L. graciliosa* until around 2012 when it was officially separated. While *L. klausewitzi* comes from West Pacific, *L. graciliosa* is restricted to the Red Sea and Indian Ocean and thus much rarer.



Lotilia graciliosa

Users of the new Interactive digital edition (delivered through the website) click or touch this banner to view more watchman species on the UltraMarine website. If you don't have the access to this version, visit www.ultramarinemagazine.co.uk/subscribe and get signed up today for bonus content!





Full Spectrum Reefing: “The Harlow Gorg Reef”



by Paul Hughes

"We've never had better equipment, greater knowledge at our fingertips, or access to such incredible captive-grown corals. Yet, I sometimes wonder if our pursuit of perfection has distanced us a little from the true essence of the reef."



When I was asked to write this article about my personal reef aquarium for Ultramarine Magazine, it came as a bit of a surprise.

Most people know me through Advanced Aquarium Consultancy (AAC) in sunny Essex. AAC is a marine store like many others, stocked with everything a modern reef keeper expects to find. My work aquariums brim with colourful soft corals, magnificent SPS colonies, and eye-catching LPS, all illuminated by the familiar royal blue lighting synonymous with today's contemporary reef keeping.

Modern reef aquariums can be breathtaking, and there's no denying the incredible progress we've made over the past two decades. Equipment is better than ever, captive propagation and aquaculture have exploded, and the average hobbyist now

has access to livestock we could only dream of owning years ago.

However, I sometimes wonder if we've become so fixated on chasing 'names' and colour that we've forgotten what initially inspired many of us to keep a reef aquarium.

Today, it's often more important that a coral fluoresces brilliantly under heavy blue lighting than understanding its origins, natural habitat, or even its scientific name. Sadly, lineage can sometimes become more significant than biology. Growth is sometimes measured by how quickly a frag can be cut and sold rather than by observing a colony mature naturally over several years. I'm not suggesting that's wrong. It's simply not the direction I wanted to take with this new project at home.

In many ways, I craved something completely different – something calmer,

more natural looking and, if I'm honest, something that reminded me why I fell in love with reef keeping in the first place: the actual coral reef!

That's where The Harlow Gorg Reef began.

A Different Direction

This aquarium was born from a simple idea. I wanted to create something that felt more like a living reef than a collection of coral "Pokémon cards".

This wasn't because modern reef aquariums are flawed in my mind, but because I'd spent decades building exactly those sort of systems for myself and others. After a full day in the coral farm or serving customers in the shop, I didn't want to come home and continue tweaking dosing pumps, chasing ICP results, or wondering if alkalinity had

shifted by 0.2 dKH overnight

There's also the argument that I shouldn't even own another aquarium considering how much I travel and work, so if I was going to build one at home again, it had to fit around my lifestyle and health.

It also had to inspire me and push my knowledge further and 'look right' naturally.

For years, my instinct would have been to build another high-end SPS-dominated display. Instead, I deliberately chose to step away from that path and challenge myself with something I'd always admired but never fully explored

Keeping Things Simple

One of the first decisions I made was to omit the sump altogether.

This wasn't because sumps don't work – they clearly do

– but after more than thirty years in the trade, I've probably spent more time kneeling on customers' and shop floors than I care to remember.

Eventually, your knees, back, and hands start reminding you that you're not twenty-five anymore.

This aquarium wasn't going to become just another days work. I wanted equipment I could reach easily, maintain quickly, and actually enjoy using. Sometimes, simple really is better.

Building From Living Foundations

There was one non-negotiable: live rock. If quality live rock hadn't become available when it did, I honestly don't think this aquarium would have been built. Of course, beautiful reef aquariums can be created using dry rock, something I've built

myself, if you have the patience.

However, this project was always about building an ecosystem rather than simply constructing an aquascape. I wanted genuine biological foundations as close to nature as possible. From the outset, I wanted to encourage biodiversity, including bacteria, sponges, worms, tiny crustaceans, filter feeders, and all the unseen life that makes mature live rock such an extraordinary biological engine.

Perhaps "re-wilding" the live rock is the best way to describe it.

I wanted the aquarium to become more alive with each passing month, not less, even if that meant enduring the inevitable 'pests' from live rock. This biodiversity, both at a micro and macro-biological level, was paramount.

Knowledge Before Equipment

Recycling equipment became another key aspect of the philosophy. I wanted to instil in beginners and to remind those longer-standing reef keepers to realise that building an exceptional reef aquarium doesn't necessarily require spending thousands of pounds. Knowledge almost always trumps expensive equipment.

The aquarium sits on an old Red Sea Reefer 500 peninsula cabinet I already had knocking about, with a simple custom glass aquarium built to fit. No holes were drilled and no weirs were added – no complexities.

Could I have asked a manufacturer to supply a new complete aquarium? Probably. However, I deliberately wanted to approach this project as a hobbyist, not a retailer with access to every new product on

the market and tax-deductible benefits. I built this system as though I was on the other side of the counter, just like you reading this article.

Immediately, the project became considerably less expensive than buying a brand-new premium system. I made use of what I had.

Rethinking Light

Lighting became one of the most enjoyable aspects of the project. Rather than chasing maximum fluorescence, I wanted something that reminded me of standing beside a shallow reef on a sunny day.

This system combines AI Blade Freshwater lighting, an AI Blade Glo (Blue), and a single Kessil pendant. The result isn't an intensely blue aquarium; quite the opposite, and it's what I had laying about. The freshwater Blade provides a broad daylight spectrum, while the Kessil produces those recognisable glitter lines reminiscent of the metal halide era and sunlight on a reef. Royal blue channels are remarkably low, relying instead on a broad balanced spectrum with plenty of white light and high UV where needed to mimic sunlight. Ironically, many visitors find the aquarium looks more natural while still allowing corals to display excellent colour. That was always the intention.

So What Do I Mean by Full Spectrum Reefing?

People will naturally assume this phrase that I've coined refers only to lighting. However, it doesn't. For me, Full Spectrum Reefing is a philosophy. It's about taking a full-spectrum approach to every aspect of reef keeping, understanding the biology, physiology, nutrition, biodiversity, microbiology, water movement, natural lighting, and long-term stability of the animals. It's about building an ecosystem





and GFO while simultaneously adding internal circulation. I much prefer this approach to relying solely on sump-based reactors in a system of this size.

Finally, there's what I still consider one of the finest compact skimmers ever made – the Tunze 9004. For its footprint, performance, and reliability, it's hard to beat.

Flow – The Real Secret

The majority of the circulation comes from five Tunze 6040 stream pumps. Together, they create the constantly changing chaotic flow this type of aquarium demands.

Interestingly, as I write this, I actually believe I still don't have enough flow.

I'm learning quickly that this aquarium requires considerably more circulation than even a typical SPS-dominated reef. Many gorgonians and non-photosynthetic soft corals have evolved to thrive in environments with far stronger water movement than many of the SPS corals we traditionally think of as "high-flow" animals. In reality, they often need substantially more.

By the time you read this, I

first, allowing beautiful corals to become the natural consequence of getting everything else right.

Technology still plays an important role, with automation and modern testing being crucial. However, none of this should ever replace understanding the 'reef' itself. Perhaps that's what Full Spectrum Reefing truly means: not recreating every colour found on the reef, but trying to recreate the reef itself. And if that means rediscovering some old ideas along the way, perhaps that's no bad thing after all.

The Hardware Behind the Reef

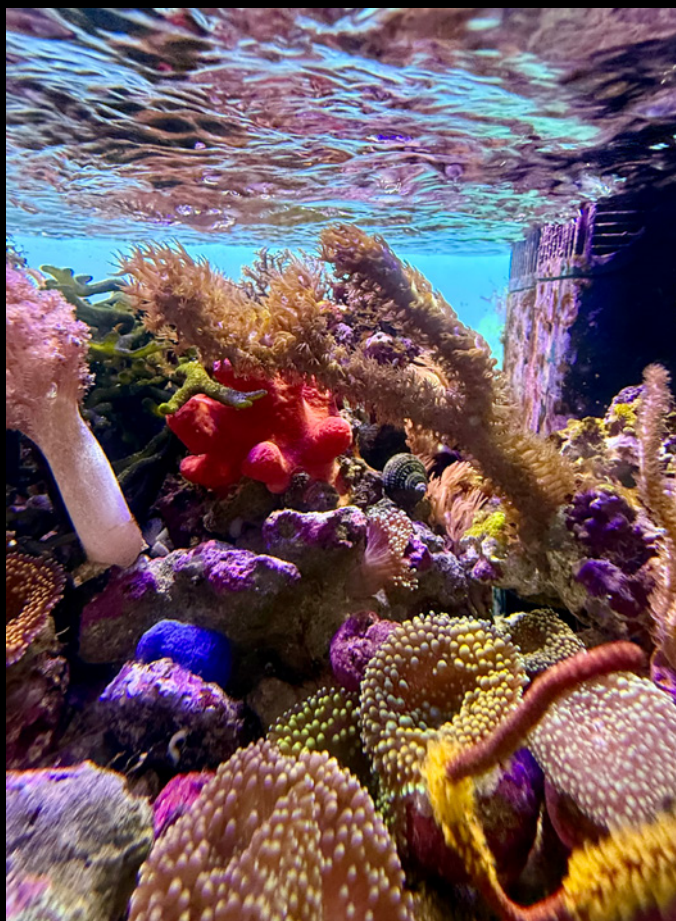
Now, let's delve into the specifics of the system and, more importantly, why it was designed the way it was.

Waves

A Tunze Comline Wavebox was an absolute no-brainer. A healthy gorgonian reef thrives on movement, and I wanted those sea fans gently rocking back and forth and a natural surge rather than being blasted from one direction.

The Wavebox is accompanied by a pair of Tunze Comline Filters. These allow me to run catalytic carbon, poly filters,





wouldn't be surprised if I've added a gyre-style pump to supplement the existing circulation.

Remember, much of this aquarium is an ongoing experiment, and that's part of what makes it so exciting, even with my years of experience working within the trade. This aquarium has certainly caught me off guard regarding flow rate requirements. If you're considering building a dedicated gorgonian aquarium or even a mixed photosynthetic/NPS system, my biggest piece of advice would be not to underestimate flow.

Choose your livestock carefully and design the circulation around their needs rather than around the equipment you already own or can afford.

Many gorgonians, tunicates, and other non-photosynthetic coral species regularly produce mucus coatings that need to be shed. On some days, the

existing circulation appears perfectly adequate, but when these animals begin producing mucus, they may suddenly require twice the flow to wash it away effectively.

I'm becoming increasingly convinced that future NPS aquariums will discover that water movement is actually the limiting factor for many species — perhaps even more so than the food itself. After all, flow is what delivers the food too.

Of course, if your ambitions are different from mine and your aquarium is predominantly LPS and photosynthetic soft corals, you could almost certainly achieve excellent results with considerably less circulation than I'm using here. It's simply that species I'm keeping such as *Paraminabea* and many of the NPS gorgonians are so dependent on a constant supply of suspended food passing across their polyps and therefore adequate circulation to facilitate

that is vital to their long-term care.

Lighting and Design

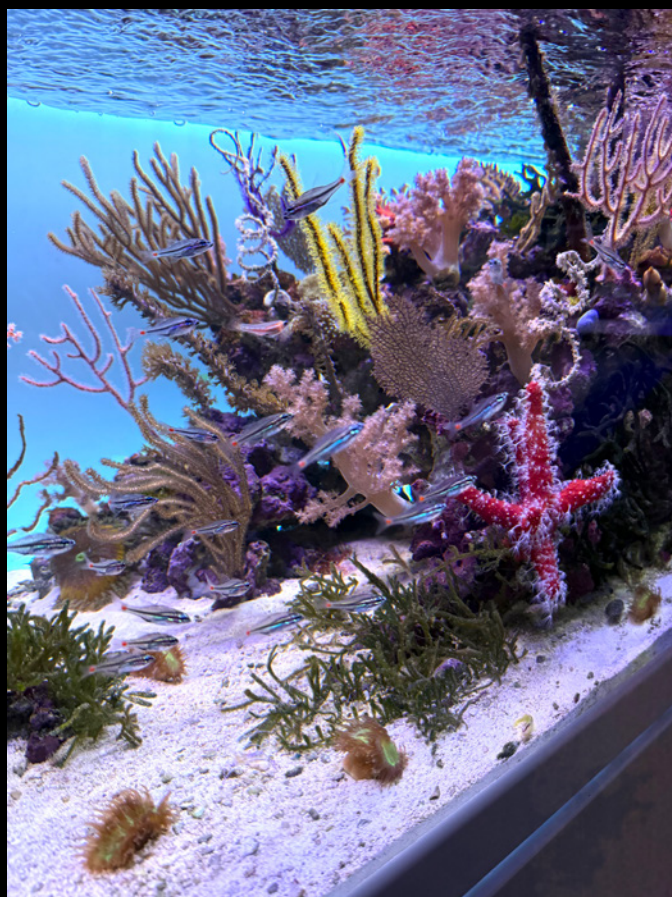
We've already discussed lighting earlier, so I won't dwell on it again here. Even the photosynthetic gorgonians, macroalgae, and Ricordea within this system require only moderate light intensity.

However, one design feature I was particularly keen to incorporate was a large LED backlit backdrop. These have become quite common in high-end freshwater aquascaping but remain surprisingly rare in marine aquariums. This is where my good friend Joe Chambers from Aquarium Composition came into his own. Joe helped turn some of my more ambitious ideas into reality. The first was the custom-

built illuminated backdrop, which adds an incredible sense of depth and realism to the aquarium. The second was arguably even more important: a fully automated water-change system which Joe provided the necessary programming on the Apex Neptune system.

From the outset, I knew this aquarium would consume large quantities of liquid-based foods, and with that comes nutrient escalation in the form of phosphates and nitrates. Daily water changes were always going to be part of the plan, and currently, the system exchanges around 10 litres every single day just to help keep this little "phosphate factory" stable. Thanks to Joe's engineering, the entire process is automated, allowing me to travel without constantly worrying about the aquarium.





Feeding

Keeping an aquarium like this requires an astonishing amount of food.

Thankfully, modern reef keeping offers us a huge range of exceptionally well-developed coral foods covering almost every particle size imaginable. My current feeding regime includes products from Reef Nutrition, Two Little Fishies Marine Snow, and Benepets, all fed at several times the manufacturers' recommended doses and rotated throughout the week.

In addition, the aquarium receives generous feedings of live *Artemia* nauplii twice weekly to satisfy many of the predatory micro-polyped species.

I'd like to get the feeding all automated too at some stage should I continue to be successful with this very testing aquarium. Time will tell.

The real challenge for the future, however, isn't how much food I can add. It's

how little I can get away with, while still sustaining a thriving mixed photosynthetic/non-photosynthetic reef.

The more food we introduce, the more nutrients inevitably accumulate. Before long, this type of aquarium can become a constant game of cat and mouse, chasing phosphate and nitrate levels with water changes, chemical media, and nutrient export in an attempt to stay ahead of the organics.

As I've said throughout this article, this aquarium remains an experiment. At only 14–15 months old, only time will tell whether the long-term balance can be maintained. So far, though, the non-photosynthetic corals are doing remarkably well.

That's also why I deliberately included a selection of photosynthetic species. If my enthusiasm for maintaining a heavily NPS system ever fades, or if nutrient management eventually proves too demanding, the aquarium can still evolve into a beautiful mixed

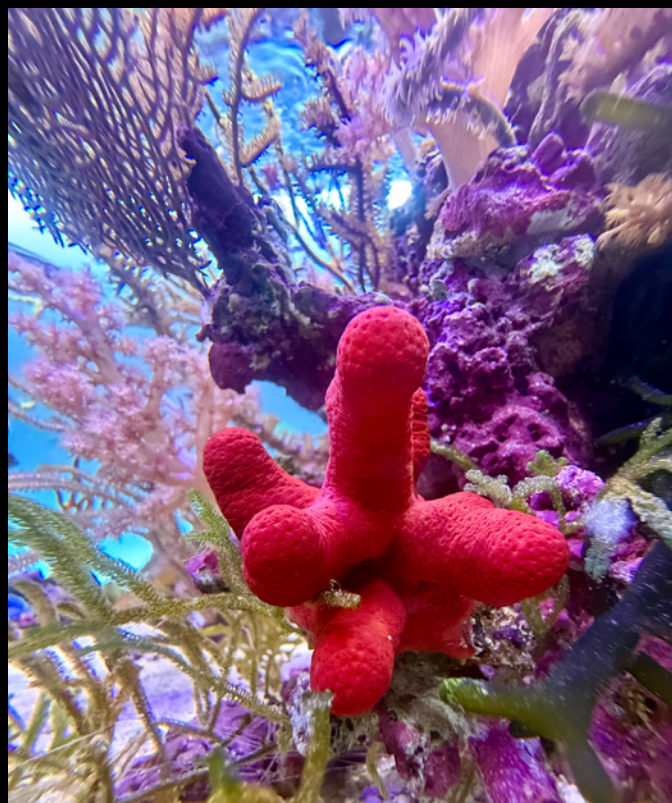


reef without starting again from scratch.

I've always enjoyed pushing the boundaries and trying something a little different. If you've ever visited AAC, or followed what we've done over the years, you'll probably recognise that mindset in my business.

I genuinely believe that this idea of "full spectrum reefing" has applications far beyond dedicated NPS systems. As our understanding of these

animals continues to grow, I can see many of these concepts influencing future SPS and LPS displays too. Perhaps we'll begin keeping corals again less as collectables and more as fascinating living animals whose natural history shapes the way we build our reefs — very much how many of us used to look at these wonderful animals before the hobby became so dominated by fluorescence and heavy blue lighting.

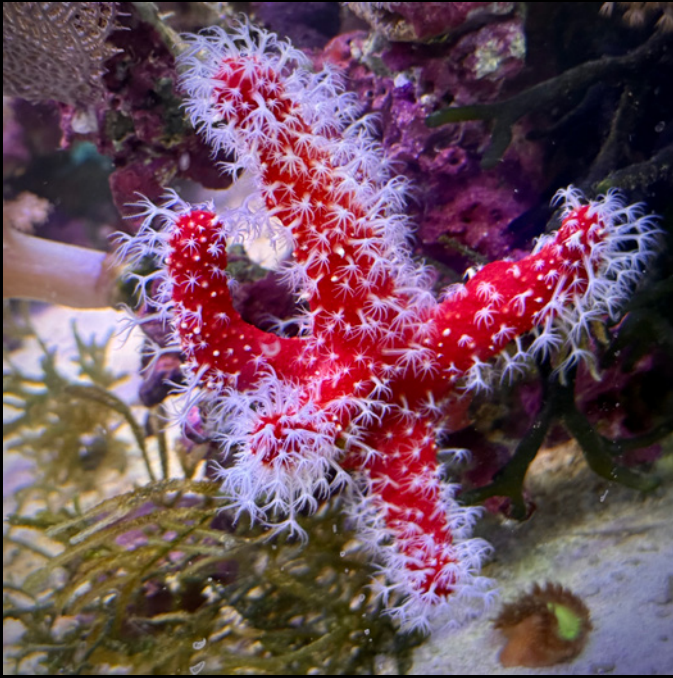


The Harlow Gorg Reef – At a Glance

- Aquarium dimensions: 125cm L x 55cm W x 45cm T
- Display volume: 300 Ltrs approx
- Filtration: Live Rock (biological) GFO, Polyfilter, Carbon (chemical) Internal Protein Skimmer.
- Gorgonian species: Photosynthetic species includes; *Gorgonia ventalina*, *Antillogorgia elisabethae*, *Plexaura flexuosa*, *Eunicea mammosa*, *Muricea elongata*, *Plexaurella nutans*, *Briareum asbestinum*, *Muricea laxa*.
- Non Photosynthetic gorgonians include *Menella* sp. and *Diodogorgia nodulifera*, *Cirrhopathes* sp. and various other unknown species.
- Non-photosynthetic corals: *Paraminabea rubeusa*, *Scleronephthya* and various unknown species.
- Stony corals -some micro population of *Tubastrea* species growing wild and on live rocks and a small group of 'walking dendros' (*Heteropsammia* sp.) that were introduced as the only stony coral species.
- Photosynthetic soft corals; *Ricordea florida*, Koji Wada Pink *Nephthea* (*Stereonephthya*)
- Fish: Cuban Basslet (*Gramma dejongi*)- Red Spot Tail Cardinal Fish (*Ostorhinchus parvulus*)- Pink Streak Cardinal Fish (*Pseudocheilinus atenia*)
- Macroalgae: Several failed attempts at many species but successful currently with *Botryocladia*, *Codium*, *Caulerpa cupressoides* and always attempting new species.



I hope you've enjoyed reading about my little salty box of water outside of AAC. More than anything, I hope this aquarium encourages you to look at your reefs a little differently. Not simply as collections of colourful corals, but as extraordinary living ecosystems, where every animal has evolved for a reason and every piece of the puzzle matters. If just a little of the philosophy behind Full Spectrum Reefing finds its way into your own aquarium, then writing this article will have been more than worthwhile.

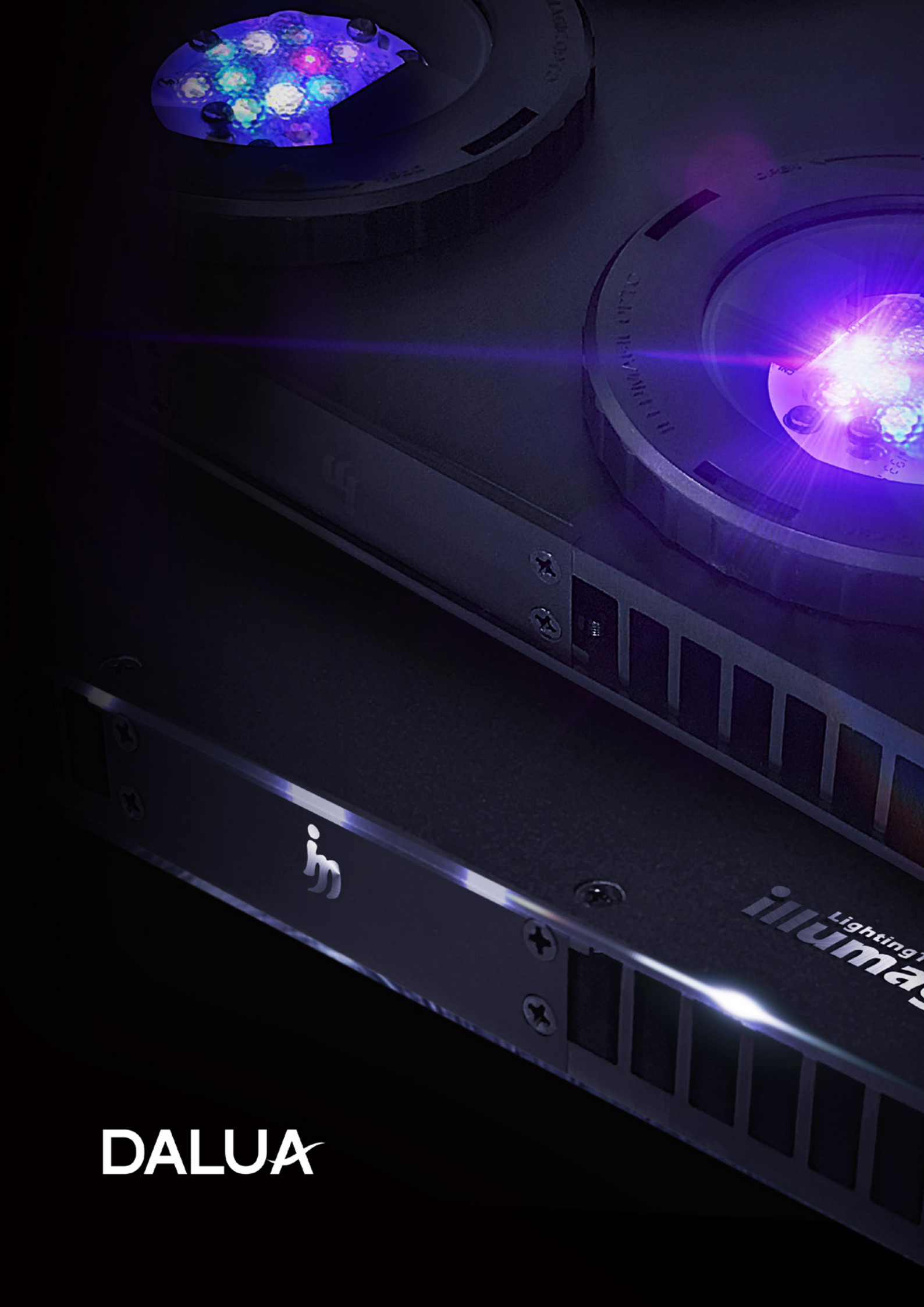


"I wanted a natural looking, biodiversity-led reef aquarium designed to recreate the movement, ecology and atmosphere of a living coral reef through the principles of Full Spectrum Reefing."





Massive thanks to Paul for sharing this unique reef aquarium.
Don't forget to get in touch if you fancy sharing your own tank! - editor@ultramarinemagazine.co.uk



DALI

DALUA

A close-up, low-angle shot of a mechanical watch movement, likely a Rolex Caliber 3255, viewed through a transparent case back. The movement is illuminated by a bright blue light source, creating a strong lens flare that streaks across the frame. The intricate gears, jewels, and the 'Rolex' and 'Superlative Chronometer' inscriptions are visible on the movement's plates.

Ilumagic X4

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INTENSIVE CARE



WITH "REEFNURSE", SIOBHAN DOOLIN

When people discover that I am both a veterinary nurse and a reef-keeper, they often assume that the two passions are completely unrelated. On the surface, caring for dogs and cats might seem worlds apart from maintaining a miniature slice of the ocean inside a glass box. However, throughout my journey, I have come to realise that the principles that guide me as a veterinary nurse are very similar to those that have helped me become a more thoughtful and successful reef-keeper.



In many ways, my career and my hobby compliment one another perfectly. Both require patience, attention to detail, a willingness to continue learning and above all, a deep respect for animal welfare. Working in veterinary medicine has not only influenced the way I manage my aquarium but has fundamentally shaped the way I view the animals under my care. My reef tank is far more than a decorative feature; it is a living ecosystem whose inhabitants deserve the same dedication and compassion that I strive for to provide to every patient I encounter in practice.

Discovering a Passion for Veterinary Nursing

My love for animals has always been the centre of everything that I do. Choosing a career in veterinary nursing has allowed me to turn that passion into something meaningful. Working as a surgical veterinary nurse in a specialist veterinary referral hospital demands empathy, resilience, and an unwavering commitment to the wellbeing of animals. It was perhaps inevitable that my fascination with animals would eventually extend beyond the walls of the veterinary practice. Reef-keeping offered something entirely different from my day-to-day work, yet it appealed to the same sense of curiosity and responsibility. The incredible diversity of marine life, from colourful reef fish to delicate

coral and countless microscopic organisms, quickly captured my imagination.

What began as a little girl following her dad around an aquatic store, soon developed into a lifelong passion for aquatic life. However, unlike other hobbies, reef-keeping involves the care of living creatures that depend entirely on us for their wellbeing. This responsibility resonated strongly with me because it mirrored the values that had already become deeply ingrained through my work as a veterinary nurse.

Prevention Rather Than Cure

One of the most important lessons veterinary medicine teaches is that prevention is always preferable to treatment. During my working day, I see first-hand what happens when preventative healthcare is not followed. In general practice, much of what we do revolves around preventative healthcare. Vaccinations, routine health checks, nutritional advice, and client education.

This philosophy has profoundly influenced the way I approach reef-keeping.

Rather than waiting for the problems to arise, I have learnt to focus on creating conditions that minimise the likelihood of diseases and stress. Stable water chemistry, high-quality nutrition, regular maintenance, and careful stocking decisions are all forms of preventative medicine within a reef tank. Perhaps nowhere is this



mindset more evident than in my approach to isolation. Introducing a new fish directly into a display tank can be tempting, particularly when excitement takes over after a new fish purchase. However, my veterinary background has taught me that appearances can be deceiving. Animals may harbour disease without showing obvious symptoms, and fish are no exception. By isolating new arrivals, I give them time to settle, observe their behaviour, and identify any potential health concerns

before they enter the main display. This extra step requires patience, but it reflects the same principles we apply daily in veterinary practice. Preventing disease outbreaks is infinitely easier than managing them once they have become established.

The Importance of Observation

One of the skills that veterinary nursing develops more than any other is observation. Animals cannot tell us how

they feel or when something is wrong. Instead, they communicate through behaviour, position, appetite, and subtle physical changes. Learning to recognise these signs is essential in providing effective patient care.

Reef-keeping has reinforced this skill further for me. Many problems within the reef tank begin with subtle changes. A fish shying away during feeding, a coral that remains closed for longer than usual, or slight increase in respiratory rate or effort can

all be early signs of a problem. To the casual observer, these changes might go unnoticed but my veterinary experience has taught me to appreciate the importance of seemingly minor details.

Daily observation has become one of my favourite parts of reef-keeping. Spending time simply watching the tank allows me to appreciate the natural behaviours of its inhabitants while simultaneously assessing their health.

Some of the most significant issues I have encountered



have been identified not through test kits but through careful observation. Catching a problem early often means the difference between a straightforward solution and a crisis.

Understanding Stress and Its Effects

In veterinary practice, stress plays a major role in health and disease. Hospitalisation, surgery, environmental changes, and social factors can all influence an animal's physical wellbeing. Stress suppresses the immune system and can increase susceptibility to illness.

The same principles apply to reefing.

Fish may experience stress due to aggression, overcrowding, poor water quality, or frequent environmental changes.

Although fish express stress differently from mammals, its effects are no less significant. My nursing background has made me particularly conscious of these factors. Rather than simply considering whether a fish is physically fit inside the tank, I think carefully about compatibility, territory, and behavioural needs.

Creating an environment that minimises stress has become one of my priorities. Providing adequate natural hiding places in the form of caves and dense rockwork, introducing fish in a suitable order from least to most aggressive, maintaining stable water parameters, and avoiding unnecessary disturbances all contribute to a healthier reef tank.

Understanding the relationship between stress and disease has also shaped my approach to managing illnesses. While stress does not cause parasites, it can influence how severely fish are affected. Maintaining strong overall health gives fish a better chance of coping with challenges and recovering successfully.



Patience Is Essential

Both veterinary nursing and reef-keeping have taught me the importance of patience. Modern society often encourages instant gratification, but biology rarely works according to our schedules. Healing, growth and recovery takes time.

I regularly support veterinary patients throughout major surgeries and prolonged recoveries. Progress is slow, and setbacks occur, but rushing the process rarely leads to good outcomes.

Reef tanks are no different. One of the main lessons I have learnt is that there are very few shortcuts in reef-keeping. New tanks require time to mature. Biological filtration develops

gradually. Corals grow slowly. Stability cannot be forced. Like many hobbyists, I have occasionally fallen into the trap of wanting things to move faster. However, experience has consistently reinforced the value of patience. Often, doing less is more beneficial than constantly adjusting. Allowing nature to establish balance has become one of the most rewarding aspects of the hobby.

A Commitment to Lifelong Learning

Veterinary medicine is constantly evolving. New treatments, research findings, and best practices emerge every year. Remaining up to date with evidence-based practices require a commitment

to continued professional development and a willingness to apply change.

This mindset has transferred seamlessly into reef keeping. Reef tanks are wonderful complex ecosystems and no one ever truly stops learning. Advances in lighting technology, filtration methods, nutrition, and disease management continue to shape our hobby.

One of the aspects I enjoy most is that there is always something new to discover. Whether learning about coral biology, understanding microbial communities, or refining husbandry techniques, reef-keeping continuously challenges me to expand my knowledge.

Veterinary nursing especially

in a specialist referral practice has taught me not to become complacent. Just because something has always been done a certain way does not necessarily mean it is the best approach. Evidence-based thinking and openness to new information are equally valuable in both fields.

Appreciating Animal Welfare

Working in veterinary medicine inevitably fosters a heightened awareness of animal welfare. Increasingly contemporary welfare science has moved beyond the traditional five core animal welfare needs and encompasses both physical health and emotional experiences.

This philosophy extends fully





into my reef tank.

Marine fish are sometimes viewed merely as ornamental animals, but I believe they deserve the same consideration we give to more traditional pets. They experience stress, require appropriate nutrition, and depend entirely upon their environment being maintained correctly. This perspective has influenced many decisions throughout my reef-keeping journey. I have become increasingly selective about species I choose to keep. Researching their needs thoroughly, ensuring suitable housing and avoiding impulse purchases have become essential parts of responsible reef-keeping.

Animal welfare is not simply keeping animals alive; it is about enabling them to thrive.

Observing fish display natural behaviours, witnessing healthy coral growth, and maintaining a stable ecosystem provides a sense of satisfaction that goes far beyond aesthetics.

The Value of Critical Care Thinking

One aspect of veterinary nursing that has had a particularly profound influence on my approach to reef-keeping is the mindset developed through critical care. In a specialist veterinary practice, successful patient management often depends upon recognising trends rather than reacting to isolated values. A single blood pressure reading, heart rate, or blood glucose concentration provides only a snapshot in time. meaningful

clinical decisions arise from understanding patterns and considering the patient as a whole.

I have found this approach equally applicable within reef-keeping.

It is easy to become preoccupied with individual test results or to react impulsively to minor deviations in water chemistry. However, just as a clinician would not alter a treatment protocol based upon one isolated parameter, experienced aquarists learn that trends are often more informative than individual numbers. Gradual increases in nutrient concentrations, declining alkalinity consumption, subtle changes in coral growth can provide valuable insights into the overall health and

development of a system. This perspective has encouraged me to avoid unnecessary interventions. Rather than pursuing perfection, I have learnt to interpret data within a broader context and appreciate that biological systems possess a degree of resilience and adaptability. In both veterinary medicine and reef-keeping, overcorrection can sometimes prove more detrimental than the original problem.

Building Resilience

My experience as a surgical veterinary nurse has taught me that setbacks should be approached not with self-reproach, but with reflection and a commitment to continual improvement. Medicine is,

by its nature, a profession of lifelong learning, and mistakes are often powerful teachers. Some of the most valuable lessons I have learnt have emerged from failures rather than successes. Coral losses, algae outbreaks, and periods of instability have all contributed to a deeper understanding of ecosystem dynamics and reinforced the importance of patience and adaptability. Ultimately, resilience is not defined by the absence of failure, but by the willingness to continue learning and striving for better outcomes.

The Science and Art of Husbandry

Perhaps the greatest similarity between veterinary medicine and reef-keeping lies in the recognition that neither discipline can be reduced solely to formulas, protocols, or numerical values.

Science undoubtedly provides the foundation. Physiology, microbiology, pharmacology, chemistry, and ecology all contribute to our understanding of living systems. Yet experience teaches that successful outcomes often require something less easily quantified. Good husbandry is also an art. It involves intuition developed through observation, an appreciation of subtle changes, and the humility to acknowledge that biology rarely conforms perfectly to expectations. Two patients with identical diagnoses may respond differently to treatment, just as two aquariums with similar parameters may exhibit markedly different characteristics.

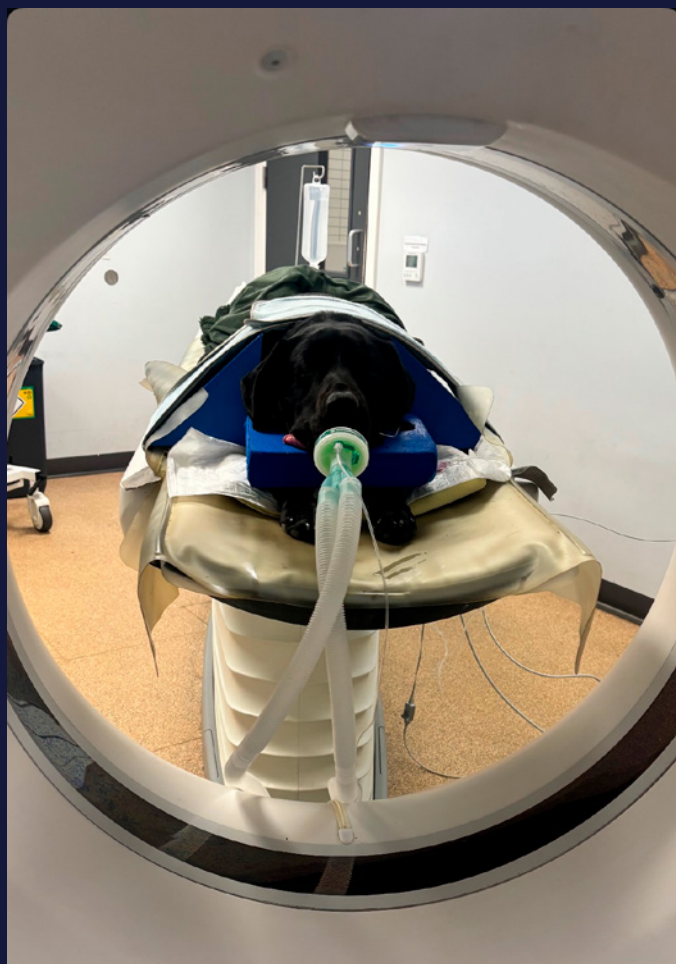
This unpredictability is not a weakness but rather a reflection of the extraordinary complexity of life itself.

Veterinary nursing in a specialist practice has taught me to embrace the uncertainty rather than resist it. Perfection is rarely attainable, and attempts to exert excessive control



frequently produce unintended consequences. Instead, the most successful outcomes are often achieved through consistency, thoughtful intervention, and a willingness to work with natural processes rather than against them.

In many respects, reef-keeping serves as a constant reminder of this principle. Beneath the shimmering surface of a reef tank lies an intricate network of biological interactions that continues to challenge and fascinate us. No matter how much knowledge we acquire, there is always more to learn. Perhaps that is why both veterinary medicine and reef-keeping remain such rewarding pursuits. They demand scientific understanding, but they also cultivate patience, curiosity, and respect for the remarkable complexity of life





Conclusion

Reflecting upon my journey, it is difficult to separate the veterinary nurse from the aquarist, because the values that define one have inevitably shaped the other. Observation, preventative care, evidence-based practice, patience, and a commitment to animal welfare have become guiding principles in both aspects of my life.

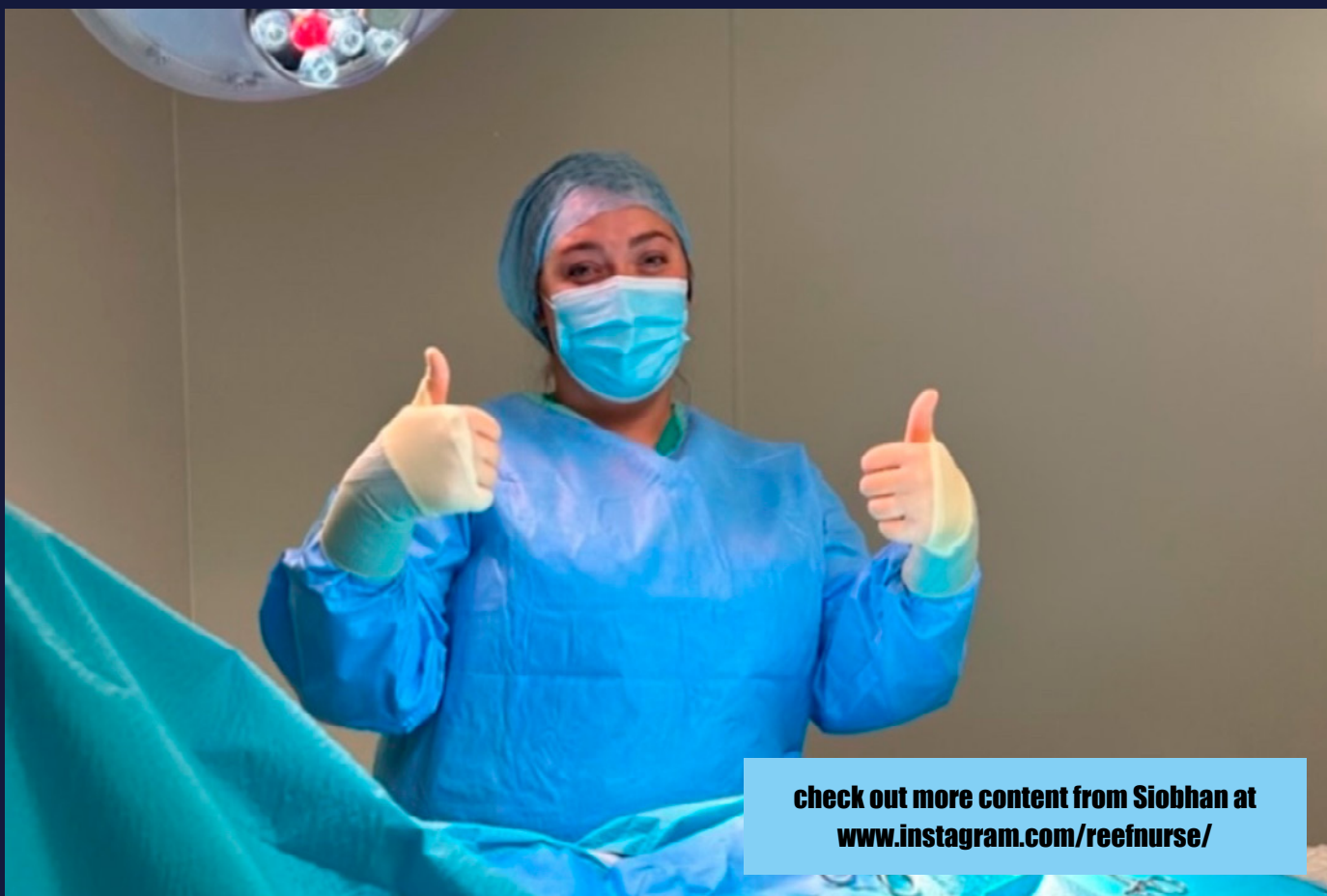
What began as two seemingly unrelated pursuits has gradually revealed itself to be a shared philosophy centred upon stewardship and responsibility. Whether caring for a critically ill patient or nurturing a thriving reef ecosystem, the objective remains fundamentally the same: to create conditions in which life can flourish.

That may be the greatest lesson veterinary nursing has imparted to my reefing journey. Success is not measured solely by growth rates, vibrant colours, or the absence of disease. Rather, it is found in the quiet satisfaction

that comes from understanding, respecting, and caring for the extraordinary organisms entrusted to us.

In an age increasingly characterised by immediacy and constant intervention, both veterinary medicine and reef-keeping remind us of the enduring value of patience. They teach us that health is rarely achieved through dramatic actions, but through countless small decisions made consistently over time.

Ultimately both disciplines have deepened my appreciation for the privilege of caring for living systems. They have taught me that husbandry is far more than maintenance; it is an expression of compassion, curiosity, and respect. And although one takes place in a clinical environment and the other beneath the blue glow in my bedroom, both continue to reinforce the same enduring truth: that the care of life, in all its forms, is both a profound responsibility and a remarkable privilege.



**check out more content from Siobhan at
www.instagram.com/reefnurse/**

PRODUCT REVIEW

D-D FUNKTION WAVE

STREAM PUMP RANGE





While I've used all kinds of stream pumps over the last 25 years or so (on around a dozen different reef aquaria), I'm always interested in new offerings as technology steadily pushes forward. Having seen D-D's new Funktion Wave range at AQUA-H last year I was keen to give this seemingly "too good to be true" range a real-world test to see if the low price perhaps belied some compromise in performance. Thankfully, the advent of a new test tank set-up gave me the ideal opportunity for this and to my sincere gratitude, D-D were happy to provide a couple of units for evaluation purposes. So, let's dive straight in as there's quite a bit more going on here than the marketing blurb lets on.

The range itself

So, there are four models to choose from in this range, the FPW3000, FPW4000, FPW10000, and FPW13000. As suggested by the model names, these cover flow rates from 3,000lph right up to 13,000lph which seems a sensible spread that should cater for tanks of all sizes. The smaller units run on 12V and sip as little as 7.5W, while the bigger ones step up to 24V and 20-30W for when you need serious turnover in a large mixed reef or SPS dominated system. Dimensions scale up

accordingly too, from a neat 57×48mm for the entry model to 82×63mm for the flagship, and they're rated for glass thicknesses up to 10mm on the smaller pumps and 19mm on the biggest — so thick rimless tanks aren't a problem. A particular note with these is that the outer magnet is also quite small (but still powerful) compared to other pumps I've used. On the 10000 models I fitted on my test tank, these outer magnets only protruded around 10mm too, so very "low profile". While being very secure, they are also easy to slide to another location

temporarily (while cleaning the glass for example).

Design

It's easy to dismiss "compact design" as marketing fluff, but with wavemakers it genuinely counts. A lot of older-style pumps have that chunky, angular housing that sticks out like a sore thumb in an aquascape, especially in a nano or peninsula tank where sightlines matter. Not so the case here though as the Funktion's puck shape sits low and unobtrusive, and the magnetic mount with angle

adjustment means you can actually tuck it into a corner or behind rockwork and still aim the flow exactly where you want it. On this, the range of adjustment isn't especially large, but it's certainly enough to generate some surface agitation (if you like "glitter lines" for example) without having the pump too close to the surface (which can result in surface air being sucked in with some similar pumps). There are no moving parts in this to fail either.

Build quality

Ceramic shafts and bearings are standard now for anything decent in this bracket, and D-D haven't cut corners here. The 4-pole low-voltage motors run cool, quiet and a rear anemone guard comes included as standard. This is genuinely useful if you keep bubble-tip or carpet anemones that have a habit of finding their way into intakes. A quick dry disassemble didn't throw up any issues indeed, for cleaning, the propeller guard removed with a nice and easy twist/click... I can't tell you the amount of pumps I've had that have been a nightmare to separate when they've been in a tank for a few weeks and developed a coating of slime/algae etc. Going on this, there shouldn't be such issues here.

The controller

Backlit colour LCD, touch controls, four flow modes, all adjustable between 30-100% power:

- **Pump mode** – constant, steady flow. Good baseline circulation.
- **Wave mode** – sine-wave ramp with adjustable frequency. Gentle, rolling current, ideal for LPS.
- **Pulse mode** – adjustable interval timing, effectively a standing wave. Good for SPS chasing reef-crest turbulence.
- **Storm mode** – fully randomised, chaotic flow. Great for stirring detritus before a filter sock change.

My only gripe here is that that buttons themselves aren't backlit which, in my

case anyway, made operation a literal "stab in the dark" at times. To be fair, familiarity should overcome this issue in no time (or just mount the controllers in a location that is well lit).

Noise and safety

Sine wave DC technology keeps these quiet, on par with the better DC pumps out there. Even running at full power on pulse mode I couldn't detect noise from the pumps until I got my ear with a foot or two of the glass. At this level, on my system anyway, there are other items that drown out any sound from these pumps. Also worth knowing is that

run-dry detection (with auto shutdown) and a feed mode are both included across the range. Excellent!

How they stack up against the competition

This is where the Funktion Wave range really makes its case.

- **EcoTech Marine VorTech (MP10/MP40/MP60)** – The VorTech is the benchmark a lot of reefers measure everything against, and fair enough, it's a superb pump with genuinely magnetically-coupled wet/dry side separation and Reef Link/app integration. But it comes at a serious premium, and EcoTech only offer a 1-year warranty on gear at





that price point (which feels rather stingy given what you're paying!). The Funktion Wave undercuts it substantially while still giving you four flow modes and full app-free controller adjustment.

- **MaxSpect Gyre** – The Gyre's crossflow technology is genuinely different tech and does a great job of pushing a huge volume of water across a tank with minimal dead spots, particularly in long or oddly-shaped systems. It's also one of the priciest options on the market. If you've got an unusual tank geometry the Gyre might still be the better tool for the job, but for a standard rectangular reef, the Funktion Wave gets you 90% of the flow benefit for a fraction of the outlay.

- **Other own-brand DC pumps (Jebao, Jecod etc.)**

– These tend to undercut D-D on price, but the build quality and controller interfaces are noticeably less polished, and ceramic

shaft longevity is more hit-or-miss based on what I've seen reported across various groups/forums etc. D-D's engineering pedigree shows through here.

Bottom line

Starting at £84.99, the Funktion Wave range sits comfortably below the EcoTech and MaxSpect price points while still offering four proper flow modes, a colour touch controller, and solid build quality. You're not just paying for a brand name here, you're paying for genuinely sensible engineering — and for most standard reef setups, that's the smarter buy. Unless you've got a specific reason to go crossflow (Gyre) or you're fully bought into an EcoTech ecosystem already, the Funktion Wave range gives you the vast majority of what those premium pumps offer, at a noticeably friendlier price. Well worth serious consideration if you're setting up new or replacing tired AC powerheads.



Bottom: Two 10,000 models seem to be doing a fine job in the 200 litre office test tank. Top: control units mounted on the test tank inner door.

POSITIVELY WORRYING



Dr Matthew Bond

OATA's Chief Executive Dr Matthew Bond takes a look at why campaigns that promote the adoption of positive lists for some pets should concern reef-keepers



There is a spectre that's been looming for a while in the world of aquatic keeping, one that threatens to fundamentally dismantle our hobby and the global conservation efforts we support. This threat is the 'positive list'—also known as a permitted or white list. Under such a regime, the Government dictates a list of species you are "allowed" to keep; if a fish isn't on that list, it is effectively banned from trade, breeding, and ownership. While anti-keeping

groups frame this as a welfare measure, it is, in reality, a pet ban by another name. For marine keepers, the implications could be catastrophic. Some anti-trade groups have suggested that the future of pet-keeping should be restricted to just 20 to 30 pet species total – that's not just fish but ALL pets. In a hobby that thrives on the incredible biodiversity of coral reefs, such a restriction would not only kill the industry but also silence some of the very people doing the most to

understand and protect these species.

Anti-pet-keeping campaigns often use deliberately misleading labels, characterising marine fish as "wild animals" to imply they are dangerous or unsuitable for the home. This is frankly nonsense. A Clownfish or a Royal Gramma in a well-maintained reef tank is not a "wild animal" in the sense these groups suggest; they are part of a highly regulated, responsible hobby where keepers frequently meet and

exceed the welfare needs of their animals. After all, if cared for properly, pet fish are likely to live a lot longer in your home than in the sea.

Furthermore, the "science" used to justify these lists is often jaw-droppingly bad. Proponents frequently rely on flawed official datasets, like the EU's TRACES system, which is riddled with errors. For instance, official data has previously identified Spain as one of the largest exporters of marine aquarium fish, despite the country having no



“A Clownfish or a Royal Gramma in a well-maintained reef tank is not a “wild animal” in the sense these groups suggest”

significant marine ornamental export industry. Other reports rely on outdated mortality statistics from 20 years ago, ignoring the fact that modern legal trade, governed by IATA (International Air Transport Association) standards, maintains incredibly low mortality rates—often less than 1% at the UK Border. Perhaps most insulting are the narratives pushed by campaigns like “Don’t Pet Me” in Scotland (organised by the Scottish SPCA, OneKind and Born Free Foundation). This campaign’s report characterised exotic pet keepers as being of “low socio-economic status,” “irresponsible,” or “addictive,” even suggesting

that neurodivergence was a potential marker for poor animal welfare. This is a direct attack on a community where neurodivergent individuals often find immense peace, focus, and purpose through the meticulous care and “hyper-focus” required to maintain a complex marine ecosystem.

Beyond the personal insults, positive lists are disastrous for conservation. History shows that advancements in husbandry and breeding almost always come from private keepers, not academia. Banning these species halts scientific progress and leaves conservation solely to under-resourced public institutions. We must also consider the





vulnerable communities at the other end of the supply chain. In regions like the Maldives, ornamental fish are valued at \$590,000 per tonne—372 times the value by weight of food fish. Sustainable wild-collection projects, such as the LINI foundation in Indonesia, provide high-value, low-impact livelihoods that incentivise local communities to protect their reefs rather than turning to destructive alternatives like coral mining or benthic trawl fishing. Removing this market doesn't "save" the fish; it destroys the environment they live in by removing the economic incentive to protect it.

Finally, positive lists fail at their primary goal: improving welfare. Every time a pet ban is imposed, ownership simply goes underground. When you drive a hobby into

the shadows, you silence the support network. Keepers become afraid to visit vets or seek advice on social media for fear of prosecution, leading to worse welfare outcomes and a rehoming crisis that charities are unequipped to handle.

The way forward is not through heavy-handed, unenforceable bans, but through better education and enforcement of the robust regulations we already have. Keepers and the trade are a community of passionate, animal-centric people who have pioneered the very technologies that now help restore reefs. It is time we stand up against these prejudiced and unscientific proposals. If we don't, the vibrant "slice of nature" in our homes may soon be a thing of the past.

PROTECT YOUR PETS FROM POSITIVE LISTS

Protect your pets – say NO to harmful positive lists

11,121

Verified signatures

Sign this petition

First name

Last name

Email

Ellesmere Port, CH65 United Kingdom

☐ Yes! Tell me if this petition wins, and how I can help other relevant petitions

☐ No. I don't want to hear about this petition's progress or other relevant petitions.

Sign petition

☐ Do not display my name on this petition

Petition progress

Gaining momentum in Government and Politics

Shares **10,375**

Comments **69**

If you're concerned, then we would urge you to support our Say No To Pet Bans campaign.

Sign the petition at www.change.org/p/protect-your-pets-say-no-to-harmful-positive-lists
Write to your local representative (e.g. MP, MSP, MS) asking where they stand on the issue of positive/permitted lists for some pets like your fish.

Quick Look: FishScooper



As a practicing reef-keeper, I'm always interested in the latest gizmos and gadgets, and they don't necessarily have to be expensive or complicated to get my attention. This was the case for the item I am looking at in this review... the FishScooper!

While not being entirely convincing at first glance, this tool promises to be an innovative replacement for traditional mesh aquarium nets and is specifically designed to minimise stress and prevent physical injury to delicate marine livestock. For a reef tank owner, there's no denying it effectively solves the age-old problem of fish getting their fins, gills, or venomous spines tangled in traditional mesh. In order to achieve this (in case it isn't obvious), the tool is a crystal-clear, one-piece

moulded plastic scoop that, instead of removing a fish from the water, captures them along with their surrounding water. As well as avoiding the entanglement issues mentioned, it also eliminates air exposure and thus protects the fish's delicate slime coat damage during transfers.

OK, now I'm interested, but does it really work?

Well, its performance in the aquarium takes a little practice (as, to be fair, a net also would) and relies on understanding the subtle design features. First, because the plastic is transparent, fish do not perceive it as an immediate threat as they do a dark, moving mesh net, and with some persistence then can even be coaxed inside the scoop using a small amount of food. The front lip features a square, flat edge that seals flush against the tank glass,



making it simple to trap fast-moving wrasses or gobies hiding in corners. Standard nets often require fast, frantic movements that can break fragile coral colonies, but

this scoop is designed for slow, calculated movements where the fish naturally swims downward into the scoop as you lift it.

Beyond catching livestock,

WHY SWITCH TO FISHSCOOPER?

FOR OUR LOVE OF FISH,
WE MADE IT SAFER.



**NO TANGLING OR FIN DAMAGE,
"NET SHOCK" OR
STARTLED REACTIONS**

Protects fish. Prevents stress.



**PEACE OF MIND DURING
LIVESTOCK TRANSFERS
CONTROLLED & SMOOTH**

Safer for fish. Easier for you.



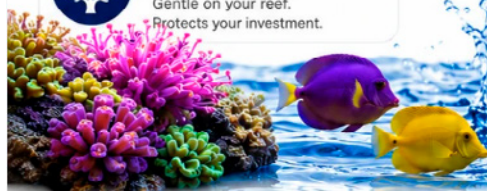
**SELF-STANDING DESIGN
FLOATING CAPABILITY**

Convenient. Hands-free.
Built to work with you.



**NO SNAGGING OR ACCIDENTAL
DAMAGE TO CORALS OR ROCKS**

Gentle on your reef.
Protects your investment.



SAFE

Protects fish.
Protects your tank.



CLEAN

Easy to rinse.
Built to last.



PRECISE

Engineered for
accuracy and control.



MADE WITH CARE

Thoughtful design
for healthier fish.



**NO NETS.
NO STRESS.**



**JUST
SMART
HANDLING.**



rambunctious for the scoop entirely (don't be tempted to try this and use your hand to cover the scoop as you could damage both yourself and the fish!)

Ultimately, the FishScoop is a cheap, handy tool for your cabinet, especially if you frequently need to move smallish fishes or even invertebrates. While it won't fully replace a dedicated acrylic trap for large, wily fish species hiding deep inside your aquascape, it completely eliminates the physical trauma associated with catching and moving fish for quarantine, acclimation, or photo inspections. Fish stores in particular could benefit from this use of such a tool and if you are a customer, this means less chance of your new purchase being damaged during capture.

Finally, if all else fails you could just repurpose it as a novelty way to drink beer!

the tool offers excellent multi-purpose utility around a reef system. The hollow handle allows the scoop to float seamlessly on the surface of your water, making it a highly convenient floating isolation box or temporary holding area during tank maintenance. It also easily replaces disposable deli cups and specimen boxes, standing upright on your counter thanks to its flat base, or floating inside the tank for easy drip acclimation. Furthermore, the curved clear plastic acts as a minor magnifying lens, which allows you to inspect your fish closely for pests, flukes, or scale damage before introducing them to the display tank. Very clever!

While the FishScoop has many advantages, it does come with a few caveats to consider before purchasing. On

the positive side, it is entirely reef-safe, and practically guarantees zero torn fins, tangled spines or stripped slime coats. On the negative side, the solid plastic design is bulkier than a flexible

net, making it harder to manoeuvre inside tight, dense rockwork. It also requires more patience because you must lure fish rather than quickly swiping at them, and large specimens may be too big or

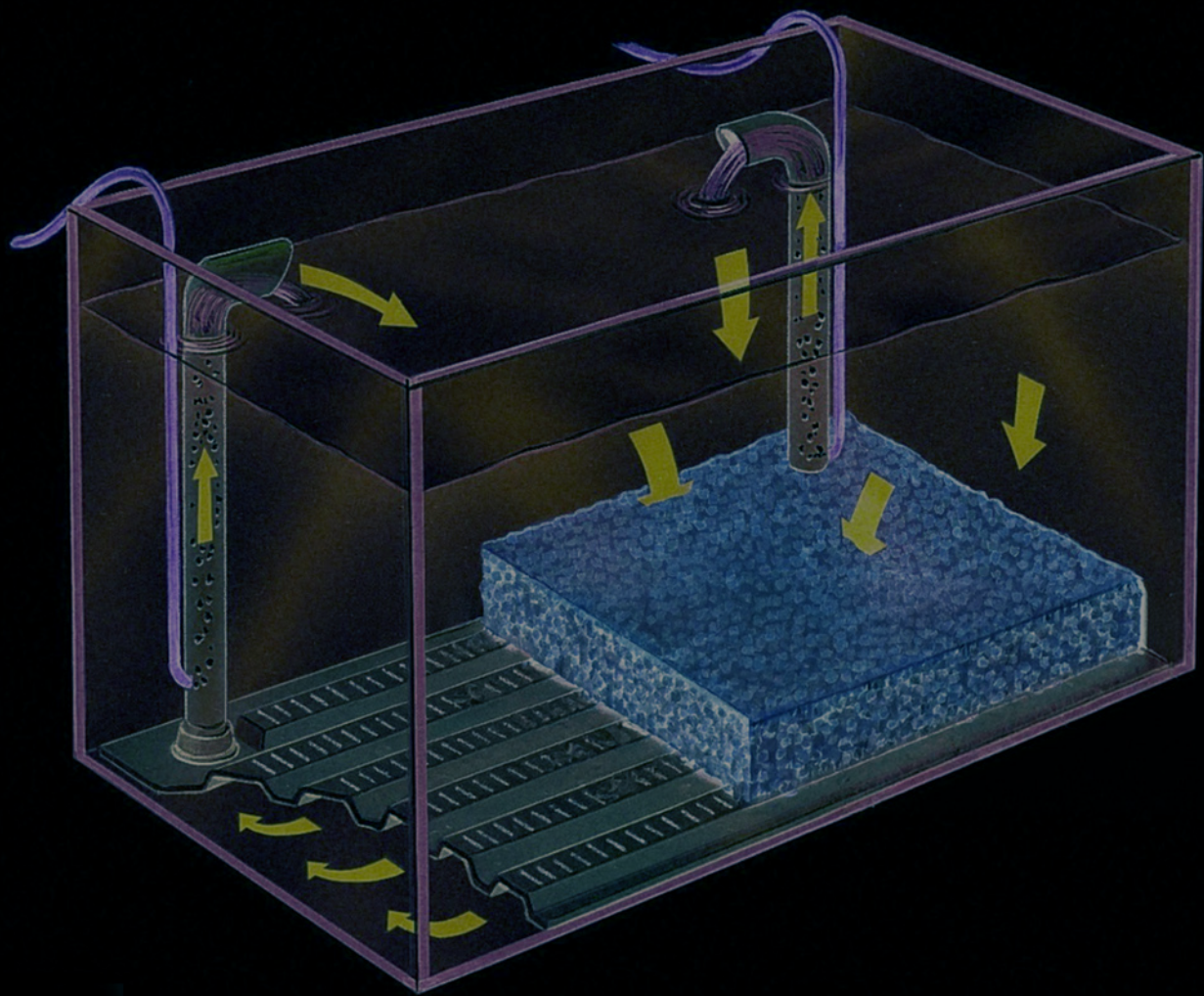
Many thanks to Nick at Finest Aquatics for providing me with this item for testing purposes. Time as of writing is £29.99 and you can buy one from them via their website (digital users click/touch here).

See more info at:
www.fishscooper.com

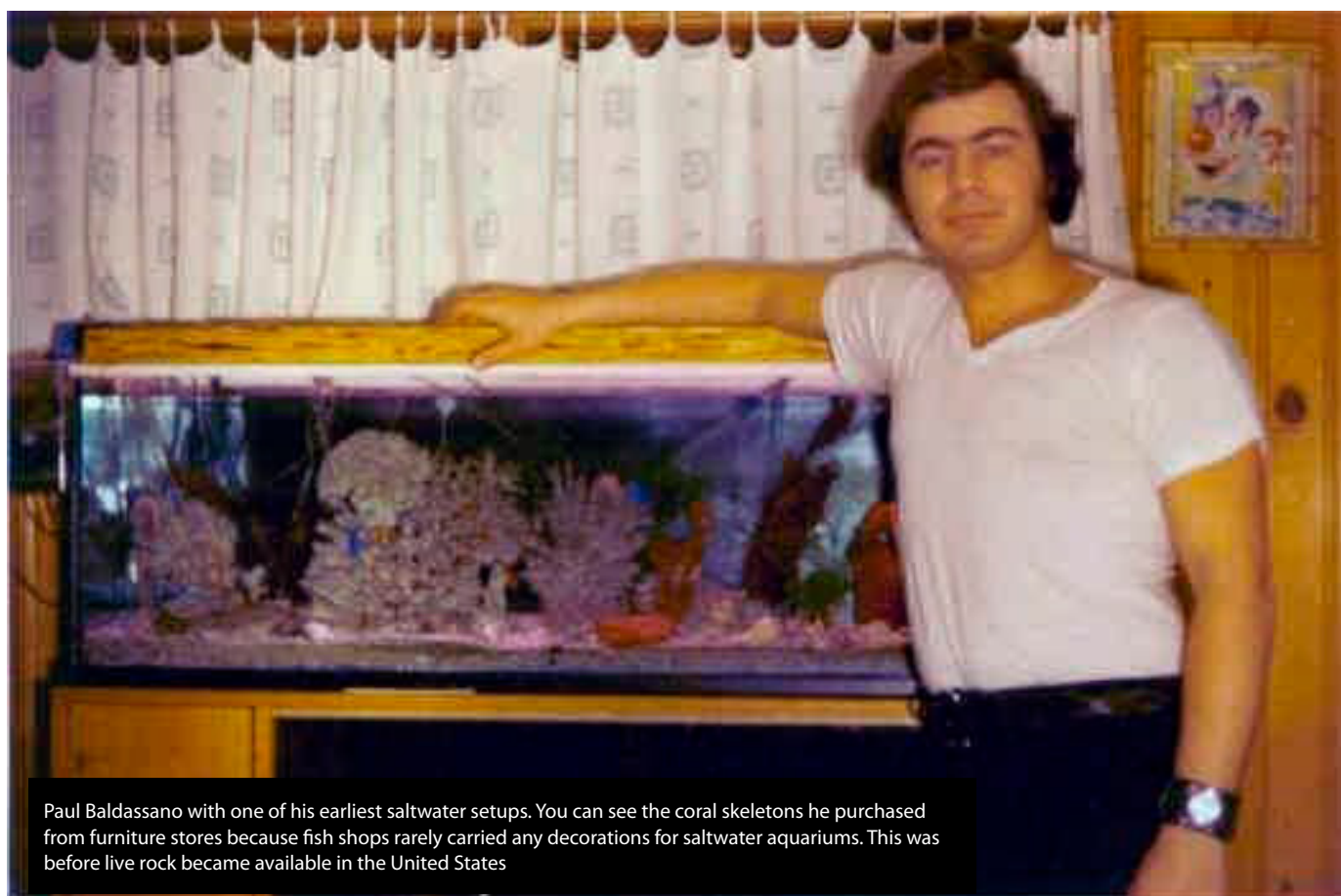


It only took 2 minutes to catch this yellow goby out of the office test tank with the FishScoop.

A Brief History of Reef-Keeping



Nathan Smith is an English teacher with a passion for fishkeeping and writing. When he's not in the classroom, you'll find him on Goldfish Street in Hong Kong, right across the border from his home in Shenzhen, China. His favorite fish is the maroon clownfish.



Paul Baldassano with one of his earliest saltwater setups. You can see the coral skeletons he purchased from furniture stores because fish shops rarely carried any decorations for saltwater aquariums. This was before live rock became available in the United States

Amongst the glory of the 1970s—back when McDonald's had ashtrays and everyone owned a set of lawn darts—we find the humble beginnings of our beloved hobby and a veritable Wild West of fish-keeping.

When you survey your aquarium under the glow of its LED lights, you might struggle to imagine a time when the art of reefkeeping hadn't yet been perfected. Yet such a time existed—an age when you could purchase sea turtles from your local fish shop, and you had to oil your air pump. Today, we'll trace the peculiar roots of reefkeeping, from plucky Victorians to modern home aquaria.

The Fish Only Era

Fifty years ago, the general consensus was that coral yearned for the grave and that we might as well not bother trying to keep it alive. Most hobbyists kept only fish in

fluorescent-lit tanks decorated with bleached coral skeletons. These early aquariums achieved varying degrees of success because what seems obvious today bordered on witchcraft in the 1970s.

We see an example of this in the recollections of Paul Baldassano, author of *The Avant-Garde Marine Aquarist*, who agreed to provide photographs from the early days of the hobby and be consulted for this article. In one piece reflecting on those years he describes the first time saltwater fish began arriving in the United States.

The next time I went back there they had fish I had never seen before. Blue devils. I thought they were fake as I

had never seen such colorful creatures," Baldassano writes. These blue devils, a common fish today, proved difficult to keep and promptly fell ill with ich. "I didn't know what I was doing," he continues, "but neither did anyone else."

This was the state of the hobby. In Baldassano's words, "there were no cell phones, credit cards, MP3 players, Lady Gaga, controllers, digital watches, artificial saltwater, or test kits so it was all by experience and mostly luck." To care for his sick blue devils, he consulted Robert Straughn's *The Salt Water Aquarium in the Home*, which recommended treating the disease with pennies.

This lack of information may

be the greatest difference between us and the fish keepers of yesteryear. Today we have shelves of books, online forums, scientific papers, and artificial intelligence that can help diagnose a sick fish in seconds. The pioneers of the hobby had little more than a handful of manuals, conversations at the local fish store, and whatever they could learn through trial and error.

Since those uncertain early days, Baldassano has become one of the hobby's great success stories. Today he maintains what may be one of the oldest continuously operating reef aquariums in the United States. Recently celebrating its fifty-fifth anniversary, the aquarium still



The Blue Devil Paul mentions in the quote when they first became available in the United States.

runs on a reverse undergravel filter—a reminder that while technology has transformed reefkeeping, good husbandry has always mattered most.

The Balanced Home Aquarium

A balanced aquarium had been the dream of fish keepers since the Victorian Era. Unfortunately, most hobbyists didn't quite grasp the nitrogen cycle. And without protein skimmers (those would come later), many fish died before hobbyists figured out they needed more than saltwater and good intentions.

Another struggle these early pioneers faced was a lack of live rock. In fact, fishkeeping hadn't changed much since the days of Philip Henry Gosse

Gosse, a 19th-century English naturalist, popularized the marine aquarium in the 1850s—he coined the term “aquarium,” created the first public marine aquarium at



This was before live rock became available in the United States

London Zoo in 1853, and sparked a craze with his book *The Aquarium: An Unveiling of the Wonders of the Deep Sea*. These early hobbyists—our spiritual ancestors—relied on basic glass tanks, manual water changes, and decorative dead

coral skeletons or basic rock, often purchased from furniture stores.

True live rock—that beautiful, porous reef material teeming with beneficial bacteria, coralline algae, sponges, and microfauna that drives natural

biological filtration—didn't become widely available to American hobbyists until the 1980s (pioneered by figures like Georg Smit and Alf Nilsen). And so the tanks of the 1970s basically ran on Victorian-era hardware.

The European Revolution

While American hobbyists struggled, a quiet revolution unfolded across the Atlantic. In Germany and the Netherlands a handful of aquarists began asking a question that most considered absurd: what if corals did not, in fact, want to die? Thus entered the Berlin Method.

The Berlin Method is one of those rare ideas that seems obvious in hindsight. Today, nearly every reef tank borrows something from it, yet when it first emerged in the late 1970s and early 1980s, it was revolutionary.

For decades, hobbyists believed the answer to dirty water was more filtration. The problem was that the waste never really disappeared. It simply collected in the filter, where it continued to break down and release nitrate. Reef aquariums, especially those filled with delicate corals, demanded something cleaner

The Berlin Method proposed a radical alternative. Instead of trying to trap waste, let nature process it.

Instead of relying on dead coral skeletons, undergravel filters, and frequent water changes alone, they experimented with porous pieces of living reef rock imported from the tropics. This “live rock” arrived covered in coralline algae, tiny worms, sponges, crustaceans, bacteria, and countless other organisms. Far from being a nuisance, these hitchhikers became the engine that powered the aquarium. While live rock has largely gone out of fashion today, it provided a much-needed foundation for modern reef-keeping.

Among the pioneers was Dutch aquarist Georg Smit, whose observations demonstrated that live rock could provide remarkable biological filtration while supporting an astonishing diversity of life. Norwegian



While live rock has largely gone out of fashion today, it provided a much-needed foundation for modern reef-keeping



Here is a photo of one of Paul's old soft coral setups from when corals first became available in the United States. He collected the urchin, barnacles, and rocks from the sea in New York

author Alf Nilsen helped spread these ideas through books and articles that reached hobbyists well beyond Europe, while German aquarist Peter Wilkens documented successful coral husbandry at a time when many still believed it impossible. Their work challenged decades of hodgepodge aquarium-shop hearsay.

European Ideas Cross the Pond

The spread of these ideas seems almost quaint by modern standards. There were no YouTube tutorials or online forums. Instead, discoveries traveled through printed magazines, translated books, aquarium society newsletters, and conversations at fish club meetings. A technique developed in Hamburg might take years to reach a hobbyist

in Chicago.

Yet it spread. By the early 1980s, American aquarists began importing not only European equipment but also European ideas. The goal was no longer simply to keep saltwater fish alive. For the first time, ordinary hobbyists believed they could recreate a living coral reef in their own homes. Thus these ideas transformed reefkeeping forever.

Of course, at the center of the system there were piles of live rock. Oxygen-rich water flowing across the rock fed one group of microbes that converted toxic ammonia into nitrite and then nitrate. Deep inside, where oxygen was scarce, another community of bacteria completed the job by converting nitrate into harmless nitrogen gas, which quietly escaped into the atmosphere. The rock itself

became the filter.

The second pillar of the method was the protein skimmer. While bacteria dealt with dissolved nitrogen compounds, the skimmer attacked the problem before it began. By filling a chamber with countless tiny bubbles, it attracted dissolved organic compounds that clung to the bubbles' surfaces and accumulated as a foul-smelling foam. Removing it prevented much of the waste from ever entering the nitrogen cycle.

Strong water movement completed the picture. Earlier aquariums often relied on gentle aeration from air stones but reefs are anything but still. Constant circulation delivered oxygen to the bacteria living within the rock, swept waste into the skimmer, and ensured corals received a steady supply of nutrients. The goal was no longer simply to keep the

water moving. It was to imitate the restless surge of the ocean itself.

However, the equipment available to reef-keepers of this era might seem primitive to modern hobbyists. Paul Baldassano reflects, "virtually everything for aquariums was built for freshwater. Lights were made out of aluminum, as were powerheads, which were not submersible. At least not on purpose."

Regardless, the beauty of the Berlin Method lay in its simplicity. There were fewer filter pads to rinse, fewer cartridges to replace, and fewer complicated gadgets to maintain. Success depended less on forcing the aquarium to stay clean and more on creating the conditions for a miniature ecosystem to clean itself.



old powerheads from back when they were made of metal and would rust



Let There Be Light

If live rock formed the biological heart of the modern reef aquarium, lighting became its sun.

For much of aquarium history light existed for one purpose: to help the aquarist see the fish. Incandescent bulbs produced little usable light for photosynthetic animals, generated enormous amounts of heat, and consumed electricity with all the efficiency of a space heater. That hardly mattered when the goal was keeping a goldfish alive. Corals, on the other hand, are of course a bit more choosy.

The first breakthrough came with fluorescent lighting. Standard fluorescent tubes illuminated aquariums more evenly than incandescent bulbs, but they still lacked the intensity required by most reef-building corals. A handful of hardy soft corals survived, though thriving remained another matter entirely.

The real revolution arrived with metal halide lamps during the 1980s and 1990s. For the first time, ordinary hobbyists could reproduce something approaching tropical sunlight above their aquariums. These powerful bulbs penetrated deep tanks and produced the shimmering ripples that many reefkeepers still associate with the golden age of the hobby. They also transformed living rooms into saunas. Keeping a reef often meant running noise; cooling fans—or, if you were especially ambitious, installing a water chiller, now an almost completely obsolete relic.

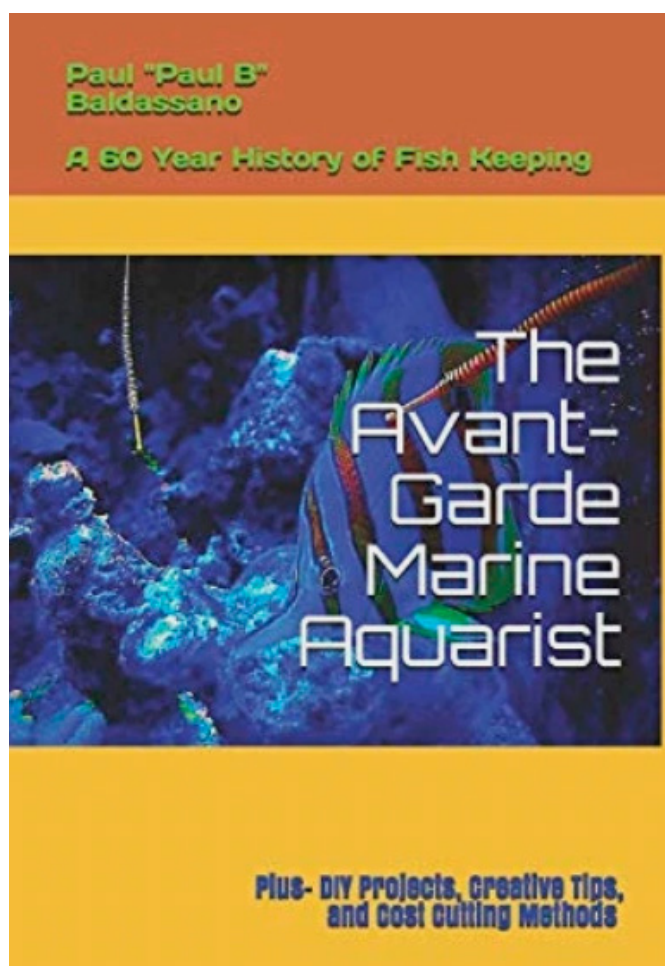
Even so, the results were astonishing. Stony corals once considered impossible began growing steadily in captivity. Acropora, Montipora, giant clams, and other demanding species could finally flourish beneath carefully chosen bulbs. The prevailing wisdom shifted almost overnight. Corals no longer merely survived. They grew.

The next leap came with T5 high-output fluorescent lighting. Unlike metal halides, which created intense hotspots, T5 fixtures spread light evenly across the aquarium. Hobbyists discovered they could mix different bulb colors to emphasize coral fluorescence while maintaining healthy growth. For many aquarists, the combination of metal halides and T5 supplementation became the gold standard.

Today, LEDs dominate the hobby. Modern fixtures allow reefkeepers to adjust intensity, spectrum, and daily lighting schedules from a smartphone. Sunrise and sunset occur automatically. Clouds drift across the tank at the touch of a button. Some systems even simulate the lunar cycle.

Ironically, this abundance of control has introduced new challenges. Early reefkeepers struggled because they lacked enough light. Modern hobbyists often struggle because they have too many options. Entire online communities debate spectrum graphs, PAR values, and photoperiods with a fervor once reserved for theology, but at least today's corals stand a fighting chance.

“The next leap came with T5 high-output fluorescent lighting. Unlike metal halides, which created intense hotspots, T5 fixtures spread light evenly across the aquarium.”



The Next Reef

Looking back over the past fifty years, one lesson emerges again and again: reefkeeping advances whenever hobbyists become better students of nature rather than better masters of it.

The future already points in that direction.

Wild-harvested live rock has largely disappeared, replaced by sustainably produced alternatives that become colonized over

time. Coral aquaculture has transformed once-rare species into readily available captive-grown specimens, reducing pressure on natural reefs while producing healthier, hardier animals. Increasing numbers of fish are now bred entirely in captivity—a feat that would have sounded like science fiction to aquarists in the 1970s.

Technology continues its relentless march. Automated testing systems monitor water chemistry throughout the day.

Dosing pumps make minute adjustments with remarkable precision. Aquarium controller coordinate lights, pumps, heaters, and leak detectors while sending alerts to a hobbyist's phone halfway around the world. Artificial intelligence is beginning to identify coral diseases, recognise nuisance algae, and recommend corrective actions before problems become disasters.

Yet the future of reef-keeping will likely depend less on

smarter gadgets than on smarter stewardship.

As climate change, pollution, and habitat destruction continue to threaten wild reefs, home aquariums increasingly serve another purpose. Public aquariums, universities, coral farms, and even private hobbyists now contribute to captive breeding programs, genetic preservation, and coral restoration efforts. The line between hobbyist and conservationist grows thinner each year.

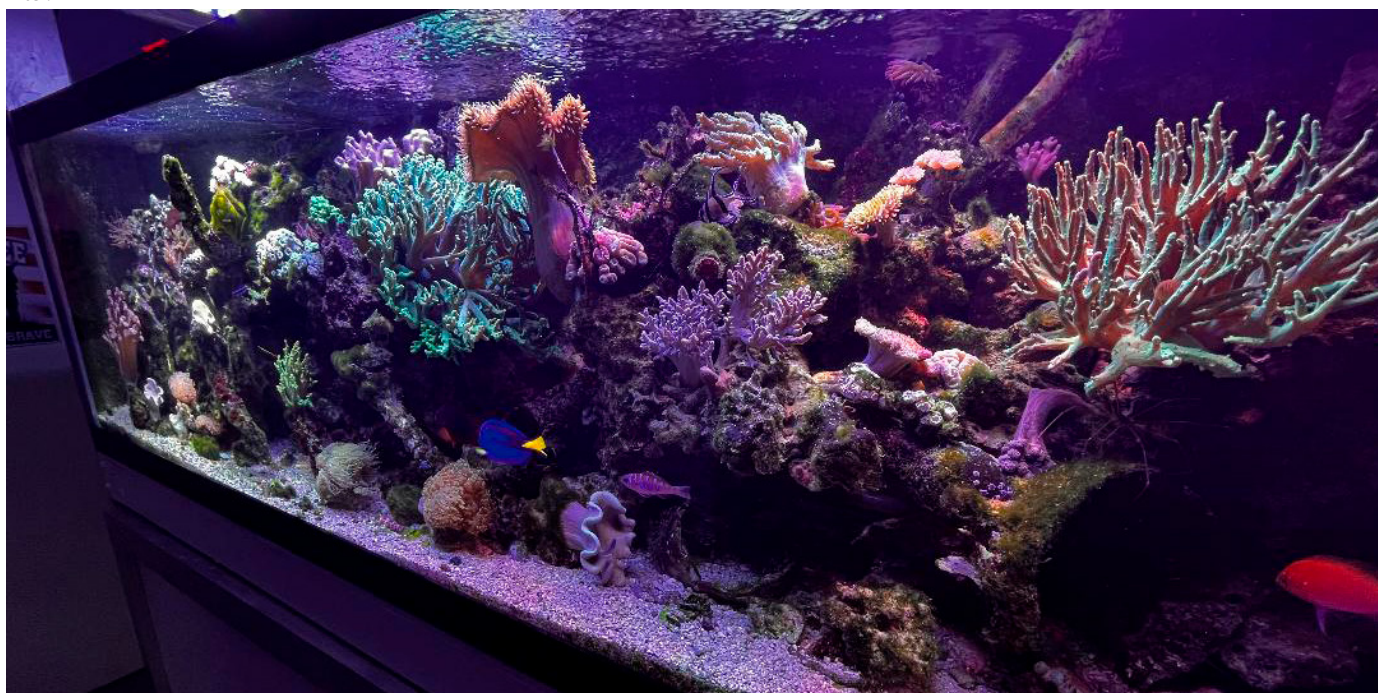
The reef aquarium of tomorrow may look very different from the one sitting in your living room today. It may rely on cultured live rock, laboratory-propagated corals, automated chemistry, and equipment we have yet to imagine. But its central challenge will remain unchanged from the days when Paul Baldassano stared in amazement at his first blue devils.

Our task has never been to conquer the reef.

It has always been to understand it a little better than we did yesterday.



A modern photo of Paul's oldest aquarium. It has been thriving for over 50 years and runs on a reverse undergravel filter.



Another angle on Paul's 55 year old reef tank.



image by J Clipperton

Did You Know?

Believe it or not, these brainless-looking blobs are actually your long-lost evolutionary cousins! As free-swimming larvae, tunicates boast a primitive spinal cord and a tiny brain, making them card-carrying members of our chordate family tree. But once they pick a nice rock to settle down on, they undergo a wild metamorphosis, and literally digest their own brains!

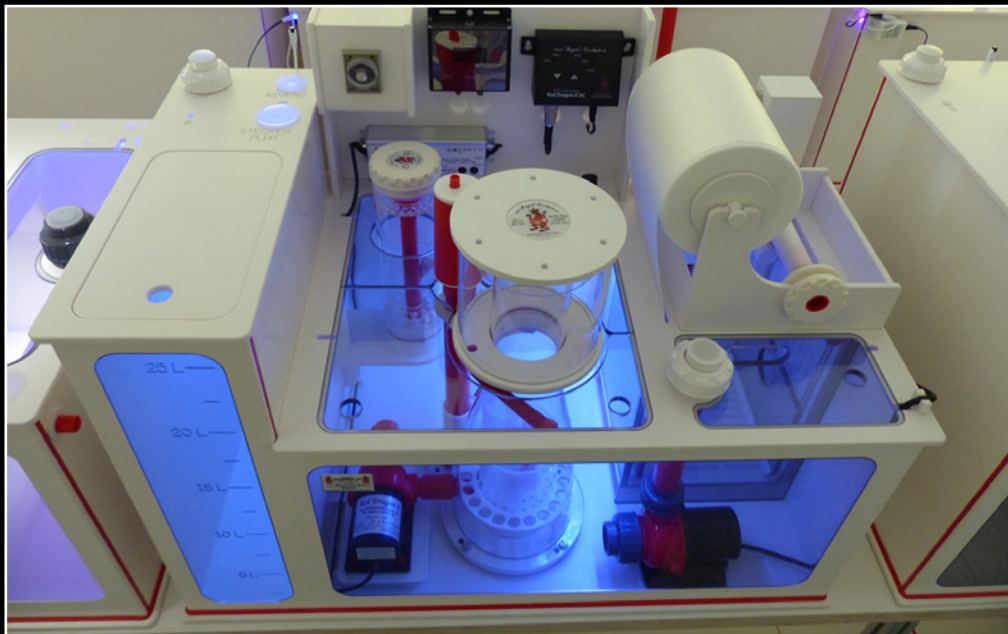


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Lettuce Coral of Yolanda Reef, Red Sea

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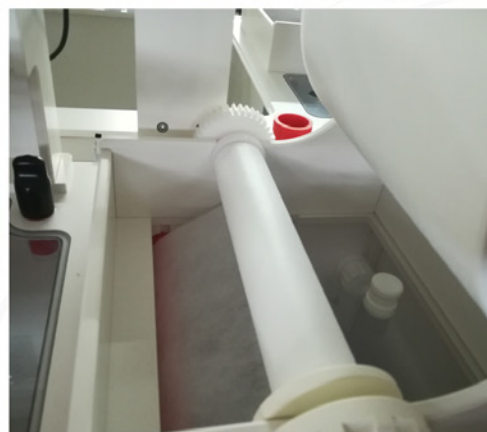
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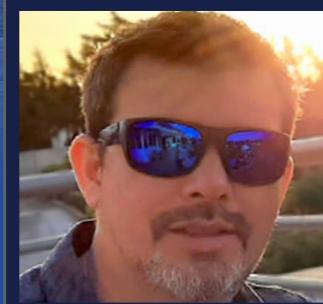
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An award-winning photographer and lifelong aquarist, John has worked with numerous top marine retailers, publishers and manufacturers on a freelance basis over the last 20 years. He has also collaborated on a range of projects with experts in the field, and supported organisations such as zoos, public aquaria, conservation initiatives and educational establishments. He has been Editor of UltraMarine since October 2015. Read more about John at: ultramarinemagazine.co.uk/contributors/

Now that both my kids have now passed an age where pretty much the last thing on Earth they'd want to do is go on holiday with their parents, my wife and I found ourselves with some unexpected freedom when it came to choosing our next break. Given that we didn't have to book something based around keeping the kids happy this time, a whole new realm of possibilities suddenly presented itself and as such we decided we'd love to go on a short city break to get things started. After lots of research, Spain's Valencia immediately stood out as it offered plenty in the way of attractions, a short flight time, and plenty of sun to boot. In the course of my research, I noticed it also happened to be the location of what is billed as "the largest aquarium in Europe" – what a coincidence! ;)

Visit Report

A bit of background

Getting straight into it, L'Oceanogràfic sits within the incredible City of Arts and Sciences complex, designed by architect Félix Candela with structural engineers Alberto Domingo and Carlos Lázaro, and opened on 14 February 2003. It's the largest complex of its type in Europe, spanning 110,000 square metres and holding a capacity of 42 million litres of water. These numbers are hard to picture until you're actually walking round the site and realise just how much ground it covers. The whole complex is divided into distinct zones: the Mediterranean, Wetlands, Temperate and Tropical Seas, Oceans, Antarctic, Arctic, Islands, and the Red Sea, plus the Dolphinarium. This isn't a single aquarium building like most of the UK aquaria, it's more like a marine theme park with each habitat given its own architecture. It's absolutely massive but whether the "the largest aquarium in Europe" claim is true I can't say... Nausicaa in France also claims this, and it largely depends on how you quantify it (and to be honest, it really doesn't matter than much to me personally).

The scale of the tanks — this is the headline act

Having said that, this is where L'Oceanogràfic earns its reputation, and it's the main reason I'd recommend it to anyone in the hobby. The main Oceans building alone houses a jawdropping 7-million-litre aquarium with a 70-metre underwater tunnel, tall and wide enough to give a 360-degree view as sharks and rays pass overhead and around you. The acrylic panels forming the tunnel walls are up to 33cm thick to withstand the water pressure, which gives you a sense of just how seriously the engineering side



Above: Oceanographic is just one of several buildings that form the City of Arts & Sciences. It's an amazing complex which contrasts against the numerous historic attractions in Valencia's Old Town area.



of this place was taken.

The Dolphinarium is even more staggering in scale consisting of a 26-million-litre pool, described as one of the largest of its kind in Europe, with a depth reaching 10.5 metres to allow the dolphins room for genuine acrobatics. The stand seats around 1,500 people, and even if you're not fussed about the show itself, the sheer volume of water on display is worth seeing in its

own right.

Species-wise, the "you won't see this anywhere else" claim holds up... largely. Indeed, as of 2024, four beluga whales — Yulka, Kylu, Plombir and Miranda — call the aquarium home, and it's currently the only place in Europe you'll find belugas. Two of the four, Plombir and Miranda, have a genuinely remarkable backstory as they were rescued from the NEMO Dolphinarium

in Kharkiv during the war in Ukraine, travelling overland through Odesa and Moldova before flying into Spain and arriving via a midnight landing on 19 June 2024. Kylu, meanwhile, is the first beluga calf ever born in Europe. This is unquestionably unique, and worth the visit for that alone if you're into marine mammals. On a personal note, my wife and I didn't really know how to feel about seeing creatures

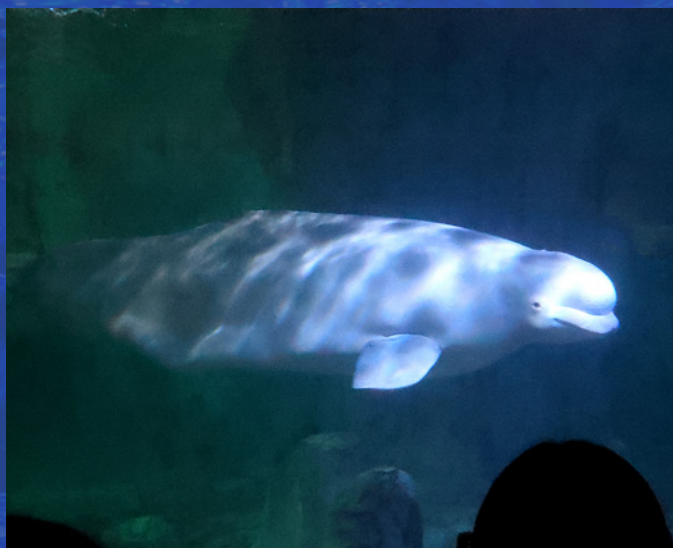
like this in captivity. There are arguments to be made for and against it. I have to say though, something about seeing throngs of selfie-obsessed visitors vying to get a shot and then moving on while these majestic creatures are permanently confined to a minute fraction of their natural range made us feel quite uneasy. If large species in confined quarters upsets you (no matter how well they may be cared for), beware.

Moving on, the Ocean Pavilion promised one of the rarer sights in any aquarium:

an ocean sunfish, notable for its flat body shape and size of up to 3 metres and 1,000kg, a species that's genuinely difficult to keep in captivity. Sadly, this species wasn't evident though and some subsequent research suggests it is sadly now deceased. While there was no sign of any Napoleon wrasses either, there were impressive sized pelagic species of all kinds including plenty of sharks and rays. If there's a particular creature you are hoping to see I'd definitely double check to make sure it's actually there.

Next we came to the "tropicales" zone and I think this is what most UltraMarine readers will be drawn to as this zone is dedicated the world's warmest marine environments, focusing heavily on the Indo-Pacific and Caribbean regions. Consisting of five distinct aquariums, each is meticulously designed to replicate different micro-environments of tropical seas. And Wow, these tanks are massive. I was particularly impressed by the "Oval Room", where two huge tanks stretched from the floor to high

ceiling for around 25m, each leading to a spectacular coral reef aquarium at the end of the room. These flanking tanks contained many species that will be familiar to hobbyists... Rabbitfishes, Angelfishes, Surgeonfishes etc and many were absolute monsters! It really makes one appreciate the growth potential of such species. The reef aquarium (or "corales vivos") was equally as imposing, crammed with coral colonies of truly gigantic proportions and very naturalistic in appearance. There were some nice smaller



reef fish species in here too and, although it was a trial to get near the tank through the throng of onlookers, the combination of spectacles in this room alone made the visit worth it for me. Sadly I did experience another “no show” in this area though as I couldn’t find any seadragons anywhere despite them being listed on the roster. Maybe I missed them somehow (I did look in other areas too).



The “corales vivos” tank is probably what will interest UltraMarine readers the most. It spans about 5m, is around 2.5m front to back and is around 1.5m deep. It’s festooned with massive corals, albeit fairly “common” varieties. You may need your elbows out to view it and don’t expect to be able to stand back and appreciate it as a whole.



Photography is a real challenge in public aquaria generally, and this was no different. A lot of the tanks are very deep and, even though I believe natural sunlight is used to supplement artificial light here, many tanks seemed very dimly lit, even for viewing purposes (and I don't believe brighter light would stress the inhabitants of those systems).



The noise and crowds

Now for the less glamorous side. This is genuinely one of the busiest attractions in Valencia, and it shows the moment you walk through the gates. Because it draws such a broad mix of visitors; school groups, families, cruise-ship day-trippers, and tourists working through the City of Arts and Sciences checklist, the noise levels in the busier pavilions can get overwhelming. The Ocean Pavilion tunnel, unsurprisingly the single most photographed spot in the whole complex, is also the worst offender for congestion. Expect to be shuffling along shoulder-to-shoulder during peak hours, typically morning and lunchtime rather than getting the contemplative, slow-paced experience you might want if you're there to actually study the animals. Children shriek and smear their hands on the aquarium walls, people trip and barge... really not great fun.

The Dolphinarium show compounds this. It's undeniably impressive in scale, but it's also loud and touristy. The stone step seating of the stands crams in 1,500 people and it's often standing room only outside of that, with amplified commentary, music, and a crowd that's there for entertainment rather than quiet observation. If you're after a more meditative aquarium experience akin to visiting a smaller, specialist reef centre back home, this isn't really it — it's built and run as a major leisure attraction first, education and conservation second.

Practically speaking, you'll also want to budget properly for how much ground there is to cover. Most guidance suggests three to four hours minimum for a visit, longer again if you want to catch a dolphin show, and honestly

even that felt tight given how sprawling the site is. Also bear in mind it's likely to be scorching hot unless you are visiting early or late in the year, and drinks aren't the cheapest.

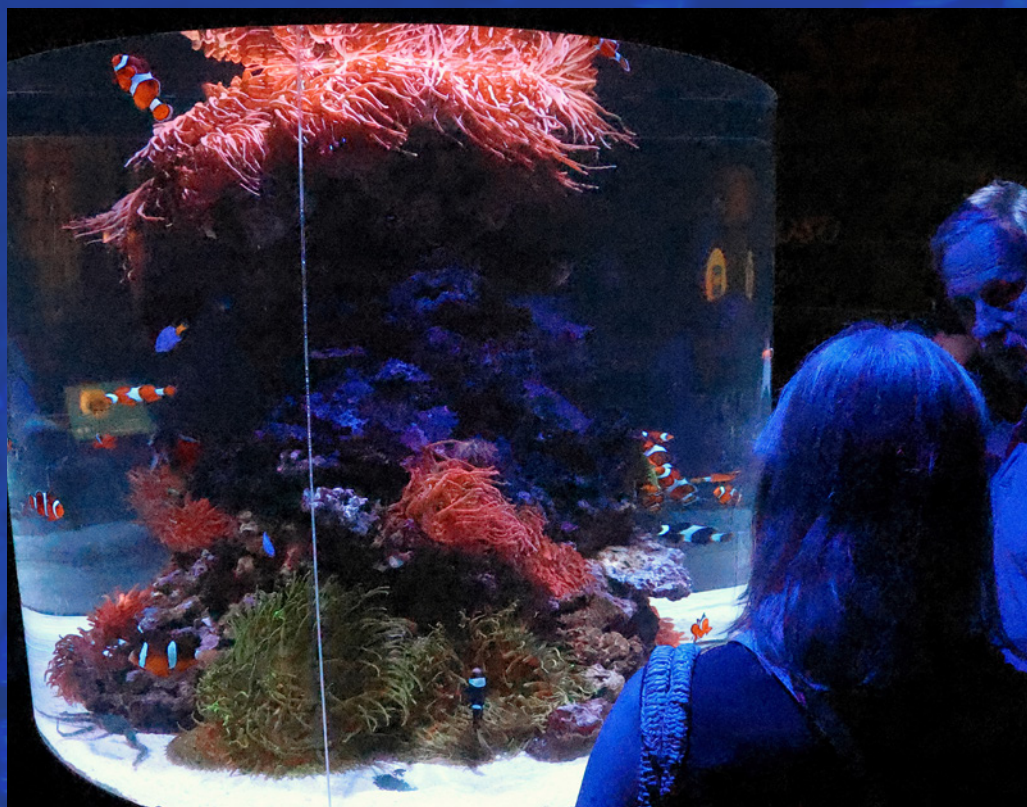
The language issue

This is probably the thing that will catch out most UK and international visitors, and it's worth being upfront about it. Valencia is a proudly Valencian- and Spanish-speaking city, and L'Oceanogràfic reflects that in its signage and interpretation. While the major zones do carry some English information, a lot of the more detailed species information panels, safety announcements, and notably the dolphin show commentary lean heavily towards Spanish. If your Spanish is patchy or non-existent, you'll likely miss a fair chunk of the more interesting scientific detail that's presumably being conveyed to Spanish-speaking visitors around you, and following the dolphin show narration in particular can feel like watching a really impressive spectacle without quite following the plot. A translation app or a bit of pre-visit Spanish revision goes a long way here. We experienced the same with the aviary tour and despite making it known we were English when asked, seemed to be completely ignored afterwards. Having said that, there were hardly any birds in the massive globe shaped facility which was really quite bizarre (we ended up leaving early, disappointed).

Practical notes

A few things worth knowing if you're planning your own visit (please double check this before visiting):

- **Getting there:** the site is reachable via Metro (Alameda station), bus routes 15, 25 and 95, or the Metrovalencia Line 10



tram, which has its own Oceanogràfic stop.

- **Tickets:** adult entry runs around €36, with reduced pricing for children aged 4-12, over-65s and disabled visitors at roughly €26.50, and free entry for under-4s — book ahead online, as queues on the day can be lengthy given how popular the site is.
- **Food:** there's more variety

than you might expect, including the Submarino underwater restaurant, the Océanos restaurant with its outdoor terrace, La Lonja near the dolphinarium, and a scattering of smaller cafés and pizzerias around the site. The underwater restaurant in particular is worth a mention on its own — it sits in the centre of the lake across

two levels, with the lower level surrounded by a full aquarium, and it's a genuinely memorable spot to eat even if the food itself is fairly standard tourist-restaurant fare.

- **Accessibility:** the main pavilions, including the underwater tunnel, are fitted with ramps and are fully accessible for visitors with limited mobility.



Bottom line

L'Oceanogràfic is definitely worth the visit, and for anyone with a serious interest in marine life it's arguably unmissable while you're in Valencia. The scale of the tanks, the underwater tunnel, and species you simply won't encounter in UK aquariums (belugas especially) make it a standout. Just go in with realistic expectations: it's busy, it's loud, and unless your Spanish is solid you'll be missing some of the finer detail on the information panels and show commentary. Go early, book ahead, budget a full half-day at minimum, and treat the crowds as the price of admission for seeing animals at a scale you won't find anywhere else in Europe. Also, if there's something you specifically want to see, maybe just check it's actually on display before you book!



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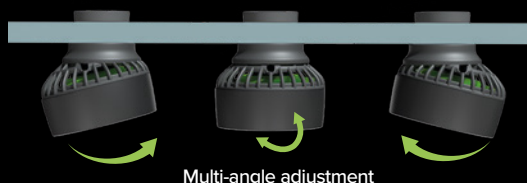
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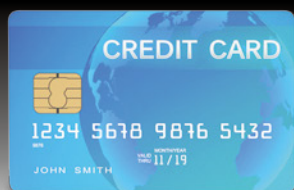
- Controllable high flow pumps, with compact dimensions
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- Optional fish and anemone guard included
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Multi-angle adjustment

Controller Features

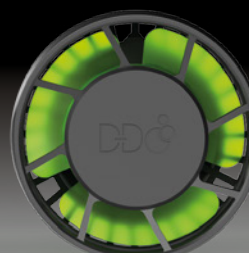
- Unique multi-function digital touch-button controller
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- Feed mode and on/off functions
- Run-dry detection with shut-off



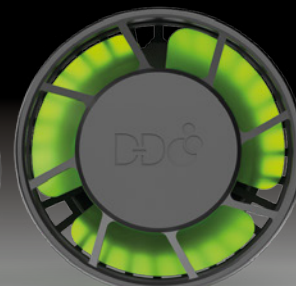
FPW3000
3,000LPH



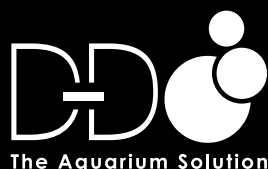
FPW4000
4,000LPH



FPW10000
10,000LPH



FPW13000
13,000LPH



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