

How to Create an Organic Aquarium

*The Beginner's Guide to Soil-Based
Freshwater Aquariums*

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WHAT TYPE OF AQUARIUM SHOULD I GET?

CHOOSING THE RIGHT MATERIAL

When purchasing your first aquarium, you'll need to decide between glass and acrylic. While both can support a healthy organic system, glass is generally the better choice.

Glass is more expensive than acrylic, but it is more scratch-resistant, easier to clean, and maintains its clarity. Cleaning tools like plastic bank or gift cards or razor blade scrapers can be used safely on glass, but even gentle cleaning can leave marks on acrylic.

Make sure that your tank has a foam layer underneath. Tanks are often supplied with these attached, but if not, you will need to source one to match your aquarium's size. The foam layer is essential as it distributes the weight of the aquarium evenly and prevents any pressure points from cracking the bottom of the tank.

CHOOSING THE RIGHT SIZE

The 'correct' aquarium size depends on your space, budget, and how you want to engage with your system. If you rent your home, check with your landlord to see if there are aquarium size limits in place – that may make the decision for you.

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NANO AND SMALL TANKS: UNDER 20 GALLONS

From a practical standpoint, nano tanks (under 10 gallons) and small tanks (under 20 gallons) are more accessible. They take up little room, making them a great option for apartments, student housing, or home offices.

Tanks under 20 gallons are also much more affordable. The tank is cheaper, but you also use less substrate, fewer plants, and the general upkeep can be done quickly with minimal equipment. If a problem arises, it's easier to respond fast; for example, a 50% water change takes just a bucket and 10 minutes of your time.

That said, smaller doesn't always mean easier. While some maintenance is reduced, plant growth needs more frequent attention – trimming, thinning, and replanting schedules are more tightly packed.

Tank size also limits the number of animals you can keep. In an organic aquarium under 10 gallons, you'll need to stock lightly, typically a shrimp-only setup. Larger species or mixed communities will exceed the system's ability to process waste.

The limited water volume in smaller tanks also means parameters fluctuate faster in response to feeding, evaporation, or changes in temperature and water chemistry. This quickly builds an understanding of aquarium dynamics, but it also means the system is less forgiving. A small mistake, like overfeeding or inconsistent lighting, can cause visible imbalances, and without regular attention, your aquarium's water parameters could swing out of control.

Small tanks reward attentiveness. They suit people who enjoy frequent interaction and want to develop their skills through trial, error, and close observation.

MEDIUM AND LARGE TANKS: 20 GALLONS AND OVER

Larger tanks require more space and upfront investment (especially when sourcing enough plants), but they offer greater stability once

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established. With a larger volume of water, fluctuations in temperature, pH, nutrients, or waste are more gradually absorbed and processed by the system. This reduces the likelihood of sudden ammonia spikes or algae blooms. For example, an accidental overfeeding is much less likely to disrupt a 40-gallon tank than a 10 gallon one.

A larger organic aquarium will also be able to function as a community tank, with multiple species living together in balance. Bigger tanks offer more ecological headroom, making it easier to support a variety of fish, shrimp, and snails without disrupting stability.

They take longer to mature, but once established, they can run with relatively little intervention. Plant maintenance tends to be less frequent, as space slows crowding. This makes them well suited to aquarists who want to step back, observe broader ecological patterns, and enjoy a more hands-off, big-picture rhythm.

CHOOSING THE RIGHT SHAPE

A tank's shape affects its habitat. Just as shallow wetlands and deep pools support different ecologies, your aquarium's proportions shape how light penetrates, how gases are exchanged, how nutrients move, and how your fish experience their world.

LIGHT

In long, shallow tanks, light is distributed more evenly through the water column, allowing plants throughout the system to photosynthesise efficiently. This supports consistent ammonia uptake, oxygen production, and water clarity across the tank. Tall, deep tanks, while visually striking, tend to cast the lower zones into shade – limiting plant activity and reducing their contribution to filtration.

GAS EXCHANGE

A broader water surface allows more efficient diffusion of oxygen into

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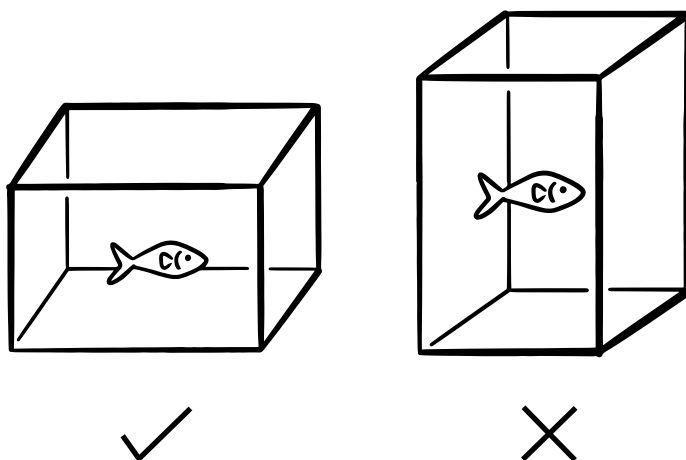
the tank and carbon dioxide out of it. Whilst we want to avoid losing too much carbon dioxide through gas exchange, narrow tanks with a smaller water surface area can cause it to accumulate to a dangerous level. This leads to a decrease in oxygen that will stress livestock if not managed.

WATER MOVEMENT

In a shallow, long tank, gentle horizontal flow patterns tend to distribute nutrients, oxygen, and waste evenly, supporting microbial and plant activity throughout. In a narrow deep tank, movement is unevenly distributed, leaving some regions untouched unless circulation is deliberately redirected.

ANIMAL BEHAVIOUR

Many of the small schooling fish best suited to organic aquariums (e.g. danios, rasboras, and white clouds) thrive in horizontal space. Fish interpret their surroundings by swimming room, not volume. A longer footprint allows for more natural movement, social interaction, and healthy territorial behaviour, even in relatively modest volumes.



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Altogether, tanks with more width than height provide the best support for plant health, water stability, and fish welfare in an organic system. They offer better light access and more surface area for gas exchange, and encourage steady, natural flow.

A note on open-top tanks

Most organic aquariums are kept open-topped. This setup allows more light to reach the water and makes it easy to access the tank for quick maintenance tasks. More importantly, it gives floating and emergent plants direct access to atmospheric carbon dioxide (we'll explore this more in the Plants chapter).

Open tanks do come with trade-offs. You'll need to regularly top up the water to compensate for evaporation, and certain fish species (especially those prone to jumping) are not suitable¹³. Still, for an organic setup focused on plant growth and natural ecological processes, these compromises are worth it.

HOW TO DECIDE

There is no universally 'correct' tank size or shape, only the setup that best suits your goals and the method's constraints.

If you enjoy tinkering and hands-on learning, nano tanks are compact, affordable, and give fast feedback. A 5–10 gallon setup would be the perfect responsive environment for you to learn in. If space is limited, but you want stability, a 20 gallon offers a great balance. If you want a resilient, slowly evolving ecosystem, large tanks offer stability, less frequent maintenance, and a more forgiving environment. A 40-gallon setup can provide a deeply rewarding space to observe and enjoy a maturing ecosystem. When choosing between two tanks of similar volume, opt for the one with a broader, shallower layout.

If you're curious and eager to learn through experimentation, consider starting with two small tanks rather than one large one. It is an affordable

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and revealing way to deepen your understanding. You will quickly learn how different soils, caps, plants, or animals affect an ecosystem when you can compare them side-by-side. And if (when) you fall in love with the hobby, plants from a small tank can be propagated to start a larger one, reducing costs.

Lastly, if you're unsure where to start, start small. Mistakes are part of learning, and it's far less stressful (and less expensive) to restart a 5-gallon shrimp tank than a 50-gallon community tank.

HOW DO I LIGHT MY AQUARIUM?

We light the system to match the pace of photosynthesis with the natural availability of carbon dioxide and nutrients. When plants grow in sync with what the system can provide, the tank stays balanced.

This distinction is important. In high-tech aquariums, strong lighting is paired with injected carbon dioxide and synthetic fertilisers to push fast, dense growth. In an organic aquarium, we take a slower approach: moderate lighting is calibrated to the system's natural rhythms, specifically, the slow release of carbon dioxide from soil and decomposition.

This principle is known as Liebig's Law of the Minimum: plant growth is limited by the scarcest resource in the system. In most organic aquariums, that limiting factor is carbon dioxide. No matter how intense your lighting is, plants can only grow as fast as the available carbon dioxide allows. When there is too much light and not enough carbon, the excess energy is left unused – creating ideal conditions for algae to take over.

CHOOSING A LIGHT FOR YOUR AQUARIUM

As we do not need fast, dense growth, specialist aquarium lighting is not required. A simple adjustable desk lamp – also known as an anglepoise or architect lamp – works perfectly for an organic setup. Affordable models like the IKEA Tertil accept standard bulbs and the adjustable arm makes it easy to experiment with lighting height and intensity¹⁴. If your aquarium

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is longer than 50 cm you will need more than one lamp. Alternatively, there are plenty of good quality, affordable LED aquarium lights on the market. Though try to find one with an adjustable mount so you can control the height of the light source. The takeaway here is that you don't need to purchase a high-end aquarium light to grow healthy plants.

For bulbs, start with a 6500K 'daylight' compact fluorescent (CFL) in the 15–23-watt range. These offer excellent light quality for plant growth while remaining energy efficient and inexpensive.

Start with the lamp positioned between 15–20 cm above the top of the tank. Observe for a week or two. If plants appear pale or stretched, lower the lamp slightly. If algae develops or leaves begin to brown, raise it a little. This responsive, observational approach suits the slower rhythms of organic aquariums and helps keep plant growth in balance with nutrient and carbon dioxide availability.

Some aquarists also experiment with natural sunlight instead of a lamp, placing their tanks near a window. While sunlight provides free, full-spectrum light, it can be difficult to control. Its intensity varies throughout the day and across seasons, which may lead to overheating, algae blooms, or erratic plant growth – especially in small tanks. For systems that are experimental in nature, this can be a workable option provided the aquarium can be easily moved or veiled from light. This gives you some control over light exposure and allows you to respond if sunlight becomes too strong. For most aquarists, however, artificial lighting remains the more predictable and manageable choice, offering consistent results with fewer variables to troubleshoot.

LIGHT DURATION

If given extended periods to photosynthesise (e.g. 12 hours of constant light), plants in an organic aquarium will deplete the available carbon dioxide. With time, this slows growth and creates an imbalance between light and carbon availability, giving algae an opportunity.

To prevent this, we use a siesta schedule. This split lighting method

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builds in a midday pause, allowing carbon dioxide levels to replenish naturally. While plants pause photosynthesis during the break, microbes continue producing carbon dioxide through decomposition¹⁵. When the lights come back on, plants start photosynthesising again and have more fuel for growth.

Importantly, this schedule disrupts algae. Unlike plants, algae require long, uninterrupted exposure to light to thrive. By breaking the lighting period in two, we limit algae's ability to photosynthesise, effectively giving plants the advantage¹⁶.

Use a basic plug-in timer to implement this schedule:

- 4 hours of light in the morning
- 4-hour break (lights off)
- 4 more hours of light in the afternoon.

These lighting periods can then be adjusted based on how the ecosystem responds. Slow plant growth? Try 5:4:5. More algae appears? Try 4:5:4.

HOW DO I KEEP THE WATER MOVING?

An undersized internal filter (find the filter suited to your tank volume then get the size below it) or a small submersible water pump with adjustable flow is important for tanks larger than 20 gallons. Position the outlet below the water line to create slow, even movement without excessively disturbing plants or the water's surface.

To reduce maintenance and avoid redundancy, remove any media designed to trap small particles from your filter. These clog quickly and require frequent cleaning. By removing them, you allow the aquarium's decentralised filter (the plants, soil, and detritus crew) to do the work without interference. Keep the coarser filter media in to prevent waste from damaging the motor.

It's also worth considering what kind of microbial activity your filter encourages. Filters packed with high-surface-area media are designed to support nitrifying bacteria. While this is ideal in a conventional aquarium,

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in an organic system we want ammonia to remain available to plants. When nitrifying bacteria dominate, they convert ammonia into nitrate before plants can access it. This forces plants to work inefficiently, converting nitrate back into ammonia before they use it¹⁷.

In tanks under 20 gallons, especially those that are densely planted and lightly stocked (e.g. shrimp jars), mechanical circulation is not necessary. In these systems, animal life and natural convection currents can provide enough movement to distribute nutrients and oxygen throughout the water column. However, passive systems require close observation. If detritus accumulates, or if plant growth slows, you may need to gently stir the water or perform more frequent water changes to prevent stagnation. A no-filter approach can work beautifully in small, balanced systems, but it depends on consistent care and careful observation.

DO I NEED TO HEAT IT?

If the room your aquarium is in holds a steady temperature, within the tolerance range of your fish and plants, then your system does not require a heater. However, if you plan to keep tropical species that require warmer conditions, and your room drops below that range at night or seasonally, a heater becomes essential.

Match your temperature to your fish and plant choices, and ensure it stays stable. A system that holds steadily at 24°C is healthier than one that swings between 20°C and 28°C – even if both fall within the general tolerance range of your fish and plants.

Cold stress can reduce microbial activity and weaken fish immunity. In water under 20°C plants can become dormant, meaning they stop producing new growth, halting the active removal of ammonia from the water. When these functions decline, your ecosystem becomes vulnerable.

Tanks under 20 gallons are particularly susceptible to temperature swings. Their low water volume changes temperature rapidly. In these setups, even hardy temperate species benefit from gentle heating to avoid disruptive fluctuations.

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If you need to use a heater, preset models matched to your aquarium size are often sufficient. They are cost effective, easily sourced, and user friendly. By holding a consistent temperature, they maintain a steady environment for all the living components of your system.

In addition to heating your aquarium, you must be able to reliably monitor the temperature. A good-quality, glass thermometer placed inside the aquarium is an essential piece of equipment.

CAN I DECORATE IT WITH ROCKS OR DRIFTWOOD... OR A DINOSAUR SKULL?

Rocks, driftwood, and decorative items are all part of your hardscape. When used thoughtfully, it creates depth, texture, and structure while supporting plant growth, water flow, and animal behaviour.

But decorate in moderation: every piece of hardscape takes up space that could be used by plants, and some materials can alter your water chemistry.

CHEMICAL CONSIDERATIONS

We will explore water chemistry in more depth in the next chapter, but for the time being it is important to note that hardscape can affect your water.

Some rocks, like Seiryu stone, release minerals that raise water hardness. This is helpful if you have soft tap water but use sparingly. Once built into your aquascape, hardscape is difficult to remove, and excess mineral release will shift parameters too far over time.

Driftwood, on the other hand, can soften water and make it more acidic (lower its pH). Microbes also colonise the surface area of the submerged wood, but not always in a way that helps your system. The fungi and bacteria that grow on submerged driftwood consume nutrients from the water column. This reduces nutrient availability to plants, which slows their growth and can tip the system out of balance.

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When adding hardscape to an organic aquarium, less is more. A modest piece provides shelter and interest without tipping the system out of balance.

STRUCTURAL CONSIDERATIONS

Before adding driftwood, soak it for several days to remove excess tannins (compounds in the wood that make your aquarium tea-coloured) and help it sink. If it still floats or feels unstable, glue it to a rock to weigh it down.

If you are using very large, heavy, or angular pieces of rock, there is the risk that a pressure point could break the glass. To mitigate this risk, cut a piece of egg crate diffuser (a plastic grid structure) and position the rock on that. Do this before adding the substrate to your aquarium. This will distribute the weight of the rock over a larger surface area and prevent any point loads on the glass bottom. Add all other types of hardscape after the substrate is in place.

Once your hardscape is in place, gently tap each piece. If anything wobbles, secure it to a smaller rock using aquarium-safe superglue (cyanoacrylate gel is aquarium safe). A small piece of scrunched tissue between elements can increase surface area and help the glue bond more securely. Unstable hardscape can fall and break aquarium glass, so make sure everything is firmly in place.

RECOMMENDED HARDSCAPE MATERIALS

For your first aquarium, it is best to buy from reputable aquarium suppliers. This reduces the risk of introducing contaminants and pests. Always rinse your hardscape thoroughly before placing it in your tank.

Lava rock is especially useful as it easily broken into smaller pieces. If you're breaking rock apart, wrap it in a towel first, place it on a firm surface, wear eye protection, and strike carefully with a hammer. This controls flying fragments and keeps the process safe.

And yes, you can absolutely add a dinosaur skull. This is your aquarium. If you want a treasure chest, a shipwreck, or a miniature castle, include it.

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There's nothing wrong with it if it makes you smile. Just make sure any decorative items are labelled as aquarium safe.

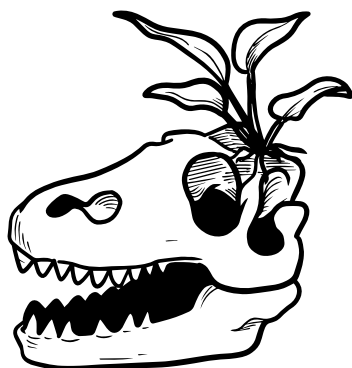
For rocks and driftwood, here are some common options to start you off:

ROCKS

- **Seiryu Stone:** Textured and mineral rich. Raises hardness. Use sparingly.
- **Dragon Stone (Ohko Stone):** Lightweight, earthy, and great for detail work.
- **Lava Rock:** Porous and versatile. Easy to break into smaller pieces.
- **River Stone:** Smooth and neutral. Good for base structure or accents.

WOOD

- **Manzanita Wood:** Hard, smooth, and low in tannins. Stable and ideal for plant attachment.
- **Spider Wood:** Branchy and striking.
- **Red Moor Wood:** Sculptural and lightweight.
- **Mopani Wood:** Dense and dark. Releases significant tannins.



WHAT DO I NEED TO KEEP MY AQUARIUM CLEAN?

Maintenance can be divided into three simple tasks: plant pruning, cleaning the glass, and changing the water.

PLANT PRUNING

Pruning prevents overcrowding and helps control nutrient levels. As plants absorb nutrients from the water, trimming and removing surplus growth exports spent nutrients from the system, and encourages new growth.

A pair of long aquascaping scissors with a curved tip are helpful for pruning densely planted or small tanks, where precision is important. As you delve deeper into the hobby, a pair of aquascaping tweezers can make propagating cut stems and planting in tight spaces much easier. When building your first aquarium, however, you can simply plant by hand or with a pair of chopsticks (metal works best as there is less friction when you withdraw after planting). A small net is also useful for removing debris from the water's surface.

Prune every 2–4 weeks, depending on how quickly your plants grow. Trim back dying leaves and thin out areas that are becoming too dense. This helps with water flow and light penetration, and prevents too much detritus from accumulating at once.

If you don't wish to propagate your cut stems, you can offer them to local hobbyists through online aquarium groups or donate them to a local fish shop (sometimes in exchange for shop credit). Otherwise, remove the cuttings from your tank and set them aside to dry (at least 24 hours), then seal them in a bag before throwing them away. This prevents the accidental release of potentially invasive species into local waterways. When you keep an aquarium, you must be responsible for the nature within it, and protect the nature beyond it.

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CLEANING THE GLASS

Algae or biofilm buildup on the aquarium glass is normal and easy to manage. Your clean-up crew will reduce the maintenance needed. Snails are excellent workers when it comes to removing algae and biofilm from surfaces. They graze throughout the day, keeping glass, hardscape, and plant leaves clean, and contribute to the detritus food web by shredding and cycling organic waste.

To clean the stubborn areas that your clean-up crew is ignoring, gently scrape the inside of the tank using a plastic card, or a razor blade scraper (only for glass tanks, and always with care). A new toothbrush can be used to clean hard-to-reach spots and to scrub hardscape. Never use household cleaning tools or soaps, as these can introduce harmful contaminants.

WATER CHANGES

Organic aquariums require fewer water changes than conventional setups, but they are still needed to replenish minerals and remove built-up waste products like nitrate.

In nature, aquatic ecosystems are constantly refreshed by rainfall, springs, and groundwater. These sources provide a steady supply of new water that helps maintain balance¹⁸. In your closed system, replacing evaporated water and the occasional water change serve the same role.

You'll need a clean bucket used only for aquarium tasks and a length of plastic tubing to siphon water out gently. In a stable system, a weekly top up to account for evaporation and a 10–25% water change every 3–6 months is usually enough. Larger water changes are needed if your water parameters swing out of a healthy range. Aquariums under 20 gallons or without water circulation can benefit from more frequent water changes. Always dechlorinate your tap water (more on this in the next chapter) and use your aquarium thermometer to match the temperature of the new water to the water in your tank.

WHERE DO I GET EVERYTHING FROM?

There are many ways to source equipment, plants, and animals for your aquarium. Your choice will depend on your budget, location, and whether you're looking for new gear or open to second-hand finds. Here's where to start:

LOCAL AQUARIUM SHOPS AND GARDEN CENTRES

Independent aquarium shops and pet shops are a reliable place to buy nearly everything required for an organic aquarium. Garden centres are the best place to source the soil and the cap for your substrate. While prices may be slightly higher than online alternatives, the ability to ask questions and see equipment before purchase can be worth the cost, especially when starting out.

The benefit of purchasing plants from your local aquarium shop is that you can inspect them in person and ask questions about care. Look for tanks with good lighting, healthy leaves, and minimal algae. Prices may be higher than hobbyist sources, but the ability to hand-pick healthy plants is worth it.

When choosing fish, sourcing healthy animals from trusted sources will prevent a lot of issues later. While experienced aquarists often use a separate quarantine tank to isolate new arrivals, this isn't always practical for beginners. If you only have one tank, your best safeguard is choosing a local shop that already quarantines and treats its fish for common diseases before sale. Look for clear water, active fish, and employees who can answer questions about care, compatibility, and water conditions.

Be cautious of chain pet shops. Whilst there are some first-rate locations out there, you will typically find more knowledgeable – and passionate – staff in an independent shop.

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ONLINE AQUARIUM SHOPS

Many online aquarium retailers offer a wider range of equipment, plants, and animals than physical shops, with the added convenience of online shopping. They're a great option if you want access to species not available locally. Make sure to choose retailers with good customer reviews, clear shipping policies, and a reputation for healthy, well-packaged plants and animals.

ONLINE MARKETPLACES

Amazon is a useful source for simple, affordable gear like thermometers, buckets, adjustable desk lamps, and power strips. While prices are competitive, quality can vary so always look for verified reviews, choose well-rated products, and avoid overly cheap items with no safety certifications.

Websites like eBay, Gumtree, and Facebook Marketplace often list second-hand tanks, lights, or full aquarium setups at a discount (and even for free). This can be a great way to build your system on a budget. Just be sure to inspect items carefully. Avoid tanks with deep scratches or warped frames, and if possible, request proof that the tank is watertight.

Many hobbyists often list plant bundles too. These can be excellent value, especially for fast-growing species like stem plants or floating plants. However, since you won't be seeing the plants in person, it's important to be cautious. Ask the seller for a recent photo of the actual plants you'll be receiving, not just a stock image. This gives you a better sense of the size, health, and cleanliness of what you're buying.

LOCAL HOBBYIST GROUPS

Aquarium clubs and local online groups (on platforms like Facebook or Reddit) are fantastic places to ask for recommendations, source second-hand gear, or borrow tools. Many aquarists generously share plant cuttings and fry from prolific breeders like endlers, cherry shrimp, and snails. This

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is easily the most cost-effective way to build your tank.

If you are sourcing animals from a local aquarist, be sure to ask questions about how the animals were kept and request a photo of the aquarium they are coming from. If a supplier is vague or evasive, it's best to look elsewhere.