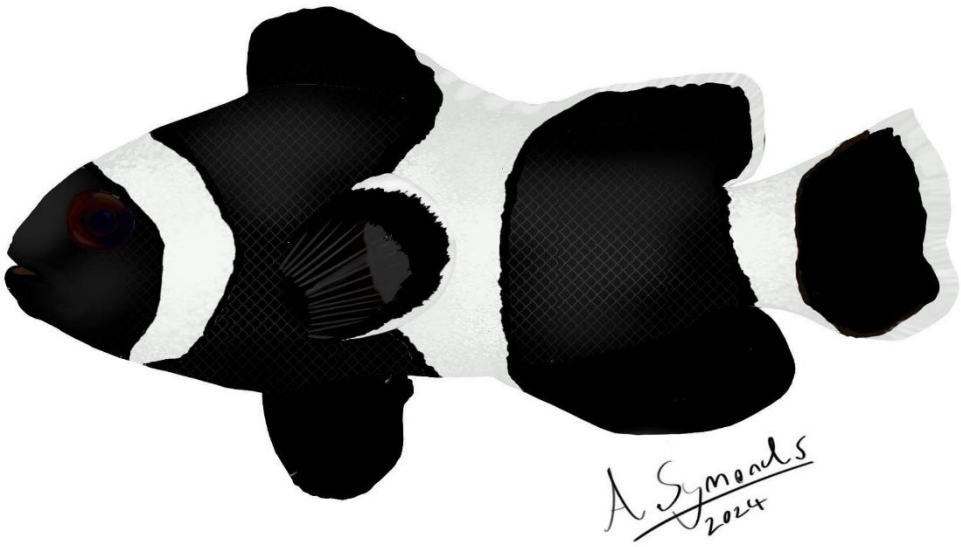
Captive Husbandry Manual of the Western Anemonefish



Amphiprion ocellaris

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TERRITORY Wildlife Park DARWIN

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Introduction

This Husbandry manual is intended to be used as a guide only. All facilities have different environments and procedures in place, this guide is designed to be used as a reference based off the experience of aquarists at The Territory Wildlife Park. Other facilities in differing regions will experience different husbandry challenges. Please take care when using this guide to consider your own specific needs and animals.

1. Description

The Western Anemonefish *(Amphiprion ocellaris)* is a widespread reef fish found throughout much of the Indo-pacific. There are records of this species as far north as Taiwan, with the southern end of their range almost extending to Broome, Western Australia[1]. Within Australia, they are restricted to the North-West, and could easily be confused with the Eastern Anemonefish *(Amphiprion percula)* of the east coast. The two similar species can often be distinguished by thick black margins surrounding the white bands in *A. percula* which is often absent in *A. ocellaris*. The number of dorsal spines also differs, with 10 present in *A. percula* as opposed to 11 in *A. ocellaris.* Females are the larger of the sexes and can reach up to 8cm total length (TL). This species can often be found near host anemones and take part in the symbiosis that anemonefish are well known for. *Amphiprion ocellaris* ranges from a dull brownish to a vibrant orange colour, however Darwin Harbor is home to a black form, which is found nowhere else in the world.

History in Captivity

Anemonefish are deemed favorable by hobbyist aquarists worldwide and are amongst the most kept marine fishes. Their striking colours, symbiotic behavior and relatively tough nature to a range of water qualities quickly cemented them as a staple in reef tanks across the globe. The first documented case of the successful breeding of *A. ocellaris* in captivity occurred in 1973 by aquarist Martin A. Moe. A huge spike in anemonefish interest was created in 2003, after the release of Disney's 'Finding Nemo'. This led to overfishing in many areas and caused a reduction in wild numbers. In recent years, many aquarists have been successfully breeding anemonefish for the captive trade, which will hopefully ease the demand of wild specimens. It is estimated that 75% of anemonefish in the captive trade are still collected from the wild.[19]

2.Taxonomy

2.1 Nomenclature

Class - Actinopterygii – Ray-finned fishes

Order - Perciformes – Perches and allies

Family - Pomacentridae – Damselfishes

Genus – Amphiprion

Species – ocellaris (Cuvier, 1830)

2.2 Sub-species

ocellaris anemonefish do not have any subspecies. As of this writing, the Darwin population of *ocellaris* are the same species as the orange individuals throughout the rest of their range, however this may change in the future.

2.3 Recent synonyms

Amphiprion bicolor Castelnau, 1873
Amphiprion melanurus Cuvier, 1830

2.4 Other common names

Western clownfish

Black clownfish

Common clownfish

Clownfish

Ocellaris clownfish

False clown anemonefish

Ocellaris anemonefish

Anemonefish

Nemo

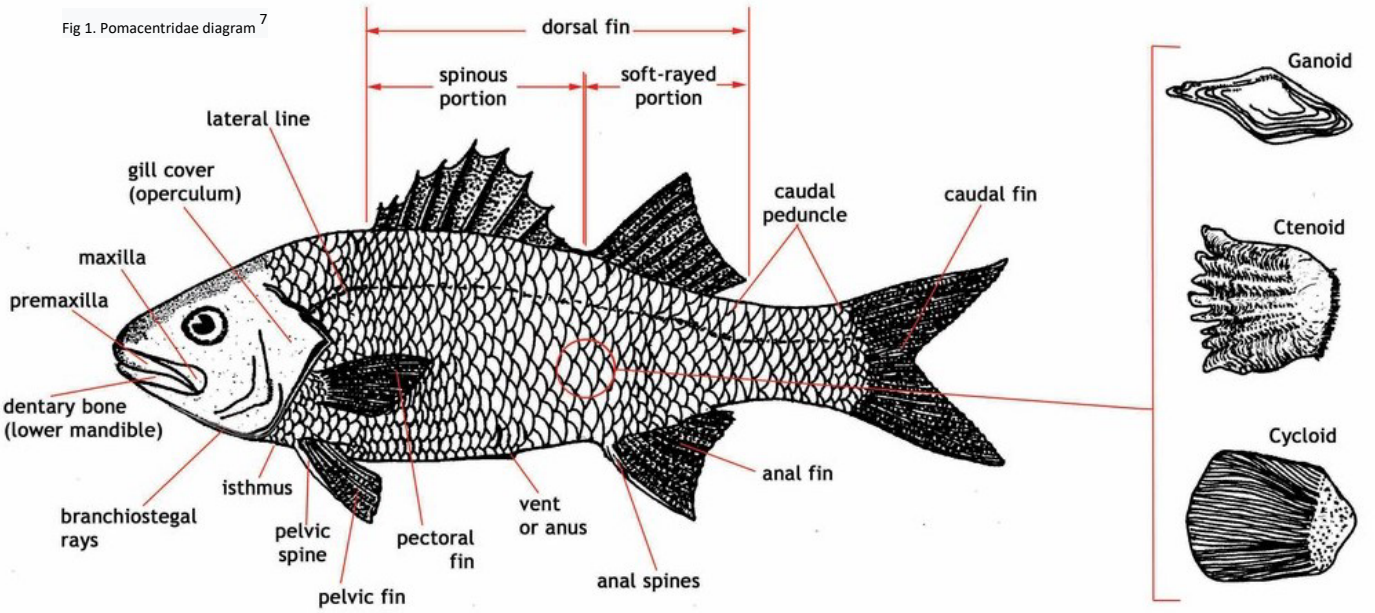
3 Natural History

Pomacentridae is a family of ray-finned fish, comprising the damselfishes and anemonefishes. Members of the genus *Amphiprion* and *Premnas* are commonly referred to as Anemonefish or Clownfish. This family consists of primarily marine species, with a few brackish and freshwater species present. The members of this family are classified in four subfamilies: Amphiprioninae, Chrominae, Lepidozyginae, and Pomacentrinae.[4] They are generally a colourful group of fishes, causing them to be extremely popular in hobbyist and public aquaria settings. This family is well known for its engagement in symbiotic relationship with cleaner gobies of genus Elacatinus, allowing the gobies to feed on ectoparasites on their bodies.[5] Anemonefish also have mutualistic relationships with anemones.[6] The anemone protects the anemonefish while the fish rids parasites and provides food.

3.1.1 Morphometrics

Pomacentridae bodies tend to be high, oval, and laterally compressed, with the lateral line interrupted. The single, continuous dorsal fin has eight to seventeen spines and ten to eighteen soft rays, the anal fin usually has two spines (occasionally three), and the caudal fin is typically forked. See fig. 1

Fig 1. Pomacentridae diagram [7]



3.1.2 Mass and Basic Body Measurements

Anemonefish range in size, with the largest *(Premnas biaculeatus)* reaching a TL of up to 17cm and the smallest *(Amphiprion percula)* reaching only 7-8cm. Western anemonefish *(Amphiprion ocellaris)* are one of the smaller species, reaching a maximum TL of 8-8.5cm.

3.1.3 Sexual Dimorphism

Females are the larger of the sexes and will over double the size of the breeding male at times. All anemonefishes undergo protandrous hermaphroditism, with the dominant female being the largest individual in the colony. This hermaphroditism is intricately linked to their social structure, and only the dominant male will change his sex if the breeding female is removed.

Fig 2. To the right – Territory Wildlife Parks most successful breeding pair (Female on left)

3.1.4 Distinguishing Features

Distinguishable from most other fish due to the thick white bands present along the body. *A. ocellaris* can look almost identical to *A. percula* but will often lack the thick black edging surrounding the bands as seen in the latter. As there is always variation in individuals, location is often used to split the two species.

3.2 Distribution and Habitat

A. ocellaris lives in the warmer waters of the Indian and Pacific Oceans. these fish are found in the Indo-Malaysian region from the Ryukyu Islands, Japan throughout southeast Asia to northwest Australia. see fig. 3

Fig 3. Distribution of *A. ocellaris* [8]

(Mark McGrouther – 2019)

3.3 Conservation Status

Western Anemonefish *(Amphiprion ocellaris)* has most recently been assessed for *The IUCN Red List of Threatened Species* in 2021. *Amphiprion ocellaris* is listed as Least Concern[3]. Though clownfish are not highly threatened, their populations have decreased in some areas. This is because they make up 43% of the global marine ornamental trade, with 75% of these fish captured from the wild. This means, in exploited areas, there is reduced population density[2]. Black anemonefish found in Darwin, NT are at special risk of overfishing and population decline, due to their unique colour form isolated to that location. This colour has proven desirable in the hobby, with many wild specimens removed from surrounding reefs. Due to captive breeding amongst aquarists, and the ease of finding captive specimens with the internet, there is hope that wild populations of anemonefish can recover their lost numbers. Coral reef destruction due to ocean warming and acidification is a concern for anemonefish.

3.4 Longevity

3.4.1 In the Wild

Wild anemonefishes are incredibly long-lived compared to other teleost fish of similar sizes. A study of *A. percula* done on wild and captive populations estimated that the lifespan of females reaches an average of 30 years (Buston, PM. Garcia, MB. 2007)[9]. A recent study of *A. ocellaris* and *A. melanopus* estimates that the longevity of wild females exceeds 20 years (Sahm et el. 2019).[10]

3.4.2 In Captivity

A. ocellaris have a similar captive lifespan to their longevity in the wild. This is due to the low wild attrition rate amongst adult individuals. Studies have found a link between exceptional longevity of vertebrate species under low predation due to chemical protection (Hossie, TJ, et al.) [11]

3.4.3 Techniques Used to Determine Age in Adults

Determination of age is almost impossible in adult individuals. This task is further hindered by the complex social structure that will directly affect the size of mature, dominant fish. This challenge highlights the importance of accurate record keeping in a captive setting.

4 Housing Requirements

4.1 Exhibit/Enclosure Design

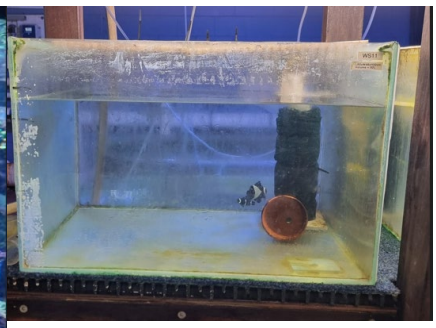
A. ocellaris do well in a range of aquaria, and much of the design is dependent on the desired outcome of the aquarists. *A. ocellaris* are a relatively calm species, making it suitable for mixed reef tanks and large displays. The Territory Wildlife Park has *A. ocellaris* in multiple aquaria including a large display reef tank, an off-display coral pond, and a standard "breeding tank" holding a water volume of 92L fig 4c. Anemones are not necessarily essential for these fish but are appreciated and allow individuals to exhibit natural behaviour. The addition of live rock is often beneficial, especially if an anemone is present, it can also improve water quality due to the increased surface area to house beneficial bacteria and micro-organisms. If using live rock that has not been thoroughly quarantined, aquarists must take care to identify and remove pest species often 'hitchhiking' on the rock. Substrate varies depending on the display and is not particularly important. Sand or gravel is often used, and coral sand can be beneficial to hold desired water parameters. In off display and breeding tanks, bare bottom is generally preferred as it makes maintenance tasks much easier. These fish do not require an overly bright light; however, this will change depending on if host anemones and corals are present.

fig. 4a, 4b, 4c Different examples of *A. ocellaris* housing at the Territory Wildlife Park

Fig. 4a

Fig. 4b

Fig. 4c



4.2 Holding Area Design

Individuals may need to be moved out of aquaria from time to time, this is especially the case in smaller set ups. Most general maintenance can be completed around the fish, which will minimise stress and cause little disturbance. If removal for a short period of time is required, a bucket of tank water is generally sufficient as a holding area. If the fish will be removed from their aquarium for an extended amount of time, a smaller tank can be set up with aeration and filtration.

The use of breeder boxes or floating tubs can be incredibly useful when separating individuals, as it allows you to keep them in the required water parameters, without having access to each other. see fig. 5.

Fig. 5 – Juv. *A. ocellaris* in a floating breeder box

4.3 Spatial Requirements

An adult pair of *A. ocellaris* should be kept in an aquarium that holds at least 80L. They do well in larger setups and community tanks but will stay close to their host anemone and do not venture far from the safety of their tentacles.

4.4 Position of Enclosures

Enclosures should not be set up in direct sunlight, this can cause excessive heat leading to fish stress. Direct sunlight can also lead to an increased amount of algae. Care should also be taken to ensure the aquarium is not in direct line of a draft or air conditioner, as this can lead to unstable water temperatures or large fluctuations. The Territory Wildlife Park does not have issues with low temperatures, but this can be a real concern in colder climates. If raising fry, the enclosure should be placed in an area with reduced foot traffic to minimise stress.

4.5 Weather Protection

Aquaria should be covered and protected from the elements. Exposure to weather can lead to unstable water conditions in most regions. These fish can be kept outside in some parts of Australia, however heavy rainfall can quickly reduce salinity to an unsafe level.

4.6 Temperature Requirements

A. ocellaris exhibit an optimum thermal range from 27 to 32 °C, with a final preferred temperature of 30.3 °C. [12] (Velasco-Blanco, G., Re, A.D., Díaz, F. *et al)*

4.7 Substrate

A wide range of substrates are suitable for this species,

Crushed Coral

Dolomite

Coarse Sand

Pea Gravel

Shells

Some substrates are favourable to achieve different results and adjust water quality. Aquarists should take care to assess their desired outcome and use substrate accordingly.

4.8 Filtration

Various filtration methods work for this species. The Territory Wildlife Park primarily uses large trickle bio filters with filter wool to catch particulates Fig 6. Water is also re directed through a chiller system and large protein skimmer. Smaller breeding tanks are supported by air powered bio filters, along with a daily 10%-20% water change.

Fig 6.

4.9 Water Parameters

Temperature - 27 - 32 °C

Salinity – 30 36‰

pH - 8.00 - 8.40

Ammonia – nil

Nitrite – nil

Nitrate - ≤ 10 mg/L

Carbonate Hardness – 7 – 12 dKH

(Other water parameters will change depending on the aquarium. Please take note of Cnidarian requirements if present)

4.10 Enclosure Furnishings

Ideal enclosure furnishings include:

Rocks

Live rocks

Live coral, replicas, and skeletons

Live plants, replica plants and living marine algae

5 General Husbandry

5.1 Hygiene and Cleaning

Aquarists must make sure they always follow proper hygiene and cleaning techniques and schedules to minimise the risk of poor health and unnecessary stress. Proper hygiene will help maintain a healthy collection and ensure effective quarantine. Aside from standard water changes, exhibits should be disinfected between uses and species if possible. Bleach is safe to use for disinfecting and cleaning aquarium glass, furnishings, and equipment. Care must be taken to ensure any chemicals are used in proper doses and concentrations to remain safe. Many reoccurring hygiene and cleaning tasks can be planned and split into four main timelines, daily, weekly, monthly, or annually. Preplanning, and following a routine is helpful to ensure keepers do not forget about certain tasks.

5.1.2 Water Changes

A 10% - 20% water change should be done weekly for general maintenance. This may increase depending on individual circumstances, water quality and aquarium size.

5.2 Record Keeping

Record keeping is incredibly important for any captive animal facility. Daily reports are used at the Territory Wildlife Park, these reports include each individual exhibit, species, sexes, numbers, identifications, and daily keeper notes to record anything of interest. All information is collected daily and recorded on ZIMS (Zoological Information Management System) See Fig 7.

Some of the standard information that is recorded includes:

Changes in behaviour

Changes in diet

Weight loss/ill health

Death/births

Numbers and sexes of the animals

Movements within and between institutions

Treatments or veterinary examinations

Fig 7. Example of Daily Report below

108	**EXHIBIT 19**									
109		0.0.1	Flowerpot coral	*Alveopora sp.*	ALVE19		EX 19			
110		0.0.2	Daisy coral	*Duncanopsammia axifuga*	DUAX19		EX 19			
111		0.0.11	Branching hammer/torch coral	*Euphyllia sp.*	EUAN19		EX 19			
112		0.0.6	Moon coral	*Favia sp.*	FAVI19		EX 19			
113		0.0.6	Plate coral	*Fungia sp.*	FUNGIA19		EX 19			
114		0.0.2	Galaxy coral	*Galaxea sp.*	GAFA19		EX 19			
115		0.0.11	Golf ball coral	*Goniopora sp.*	GONI19		EX 19			
116		0.0.2	Seafan coral	*Gorgonion sp.*	ALCY19		EX 19			
117		0.0.4	Long tentacled plate coral	*Heliofungia actiniformis*	HEAC19		EX 19			
118		0.0.2	Tongue coral	*Herpolitha limax*	HELI19		EX 19			
119		0.0.2	Stone leaf coral	*Lithophyllon sp.*	LITH19		EX 19			
120		0.0.3	Lobed coral	*Lobophyllia sp.*	LOBO19		EX 19			
121		0.0.5	Moseleya coral	*Moseleya sp.*	MOLA19		EX 19			
122		0.0.3	Maze brain coral	*Platygyra sp.*	PLAT19		EX 19			
123		0.0.2	Open brain coral	*Symphyllia sp.*	SYMP19		EX 19			
124		0.0.2	Cup coral	*Turbinaria sp.*	TUPE19		EX 19			
125		0.0.4	Pulsing xenia coral	*Xenia sp.*	XENIA19		EX 19			
126		0.0.1	Green eye cup coral	*Mycedium sp.*	MYCE19		EX 19			
127		0.0.1	Magnificent Anemone	*Heteractis magnifica*	HEMAG19		Ex 19			
128										
129		0.0.1	Wilson's Dottyback	*Pseudochromis wilsoni*	PSWI19		EX 19			
130		1.1.37	Western Clown Fish	*Amphiprion ocellaris*	AMOC19		EX 19			
131		0.0.1	Carpet Anemone	*Stichodactyla mertensii*	STME19		EX 19			
132		0.0.1	Scribbled Angelfish	*Chaetodontoplus duboulayi*	CHDU19		EX 19			
133		0.0.1	Bubblefin Wrasse	*Halichoeres nigrescens*	HANI19		EX 19			
134		0.0.2	Mullers Butterflyfish	*Chelmon muelleri*	CHMU19		EX 19			
135		0.0.1	Dusky Surgeonfish	*Acanthurus nigrofuscus*	ACNI19	Slim Dusky	EX 19			
136		0.0.2	Yellowfin Surgeonfish	*Acanthurus xanthopterus*	ACXA19		EX 19			
137		0.0.1	Yellow Fangblenny	*Meiacanthus luteus*	MELU19		EX 19			
138		0.0.2	Banded Blenny	*Salarias fasciatus*	SAFA19		EX 19			
139		0.0.2	Ornate Goby	*Istigobius ornatus*	ISOR19		EX 19			
140	**EXHIBIT 20**								**Enclosure maintenance:**	
141		0.0.1	Fimbriated Moray	*Gymnothorax Fimbriatus*	C10025		EX 20			
142		0.0.1	Stonefish	*Synanceia horrida*	C20000		EX 20			
143		0.0.1	Painted Scorpionfish	*Parascorpaena picta*	PAPI20		EX 20			

5.3 Methods of Identification

Individual identification can usually be achieved by size and markings. Within a pair of *A. ocellaris* sexual dimorphism makes identification relatively easy. Smaller, immature individuals often have slight variation in markings. The use of photographic aid often proves useful when identifying individual fish.

6 Feeding Requirements

6.1 In The Wild

Wild *A. ocellaris* are opportunistic omnivores that will eat a wide range of food items including zooplankton, phytoplankton, algae, worms, and small crustaceans.

6.2 In Captivity

Captive anemonefish eat a wide range of food items. They take readily to commercial pellets and frozen food, as well as live food items such as copepods, amphipods, mysid shrimp and artemia [See fig 8]. A varied diet will result in healthier fish and if using commercially made food, finding a high-quality product is important. Larvae and immature individuals require specific food items, and breeding this species is almost impossible without access to rotifers for the first 7-10 days. (More information on rotifer cultivation and breeding of *A. ocellaris* will follow in a breeding manual in the near future 02/24)

6.3 Feeding Schedule

Adults in captive animal settings should be fed daily. Larvae and immature individuals require more frequent feeding, up to 3-5 small feeds per day.

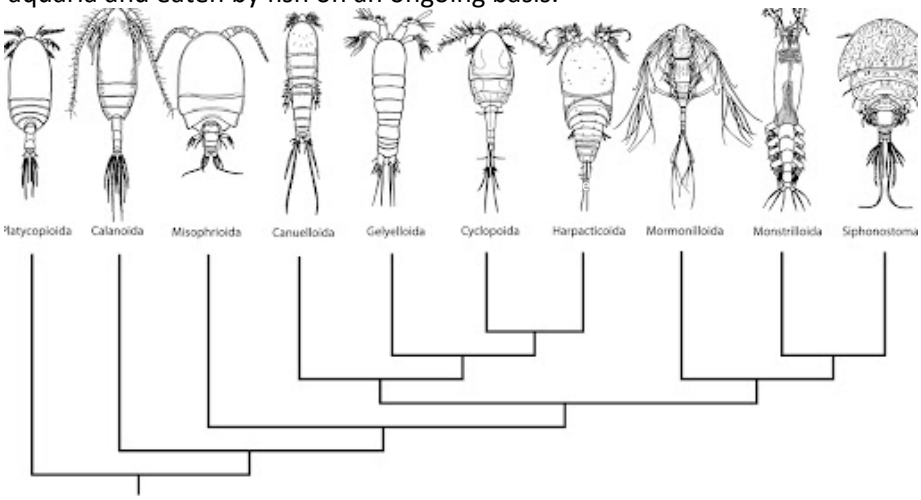
6.4 Supplements

If fed a proper diet, supplements are not generally necessary. If your fish are lacking nutrients, consult your facilities veterinarian.

6.5 Presentation of Food

Food placed directly in the water is generally readily taken. The amount should not exceed what can be consumed within a minute, excess food should be removed to preserve water quality. Live foods can be added to allow natural hunting behaviour and enrichment. If a food source is not available for live food species, do not feed out more than can be eaten to avoid deaths of invertebrates fouling the water. Some food items such as copepods are beneficial to a reef tank and are part of a healthy ecosystem, these can be introduced to aquaria and eaten by fish on an ongoing basis.

Fig 8. Examples of common marine invertebrates



7. Handling and Transport

7.1 Timing of Capture and Handling

Captures and movements should be planned to occur at a time that causes the least stress and disturbance. The reason and longevity of the capture will play a big part on the plan of movement. A quick movement to a new tank is relatively stress free compared to a movement to a new facility. Climatic conditions are an important consideration when transporting individuals. The use of heat packs or ice bricks if often needed in certain environments. Animals should be left undisturbed until a movement is ready to take place, to avoid unnecessary restraint resulting in stress. Fish are susceptible to ammonia poisoning and oxygen deprivation if not moved correctly. Please assess each capture, restraint, and movement individually to achieve the best outcomes for your individual animals and facility.

7.2 Capture and Restraint Techniques

The most common capture method for small Anemonefishes is by using a small, soft, fish net to gently scoop up the individual. Nets should be in good working condition and free of any damage that may lead to abrasions or injury. Individuals should be gently scooped up from below, with care taken to avoid 'chasing' the fish around the aquarium, causing unnecessary stress. Once captured, individuals can be moved to a smaller holding tank, a bucket, or if transport is required, securely placed in a bag. If restraining fish in bags, they must be fit for purpose, good quality and tied by an aquarist confident in ensuring it is leak proof and will hold, polyethylene bags are most suitable. The use of rubber bands often proves useful for extra security. Depending on the length of restraint aquarists will often add air lines to a small aquarium or bucket to ensure adequate oxygen is available. Chemical sedation may be used in some instances; however, this should be done under vet supervision and direction. Tricaine methane sulphonate (MS – 222) and benzocaine are commonly used. Other products such as 'stress coat' and 'ammonia block' are common form of chemical treatment that will ease the stress of fishes during a prolonged move.

7.2.2 Weighing and Examination

Examination of *A. ocellaris* is generally done visually. Weights are stressful to obtain and are not practical as routine checks. Learning to body score different species to gain an understanding of their overall health is an important part of maintaining a healthy collection of fishes. Fish that are underweight will usually look sunken in, especially in the areas behind the head, and belly.

7.3 Release

When releasing fish into their new aquarium, care must be taken to closely match the water temperature and parameters they are currently in. pH and temperature are the main parameters that will quickly cause shock upon release. If bags were used during transport, they can be floated in the new exhibit to match water temperature. After approximately ten minutes, a cup full of new tank water can be added to the bag. Existing water used during transport should not be allowed to enter the new exhibit, to uphold proper quarantine procedures. This step can be repeated multiple times until you are ready to release the fish. This process should not exceed thirty minutes. If left for too long a toxic build-up of ammonia can prove fatal.

Another common method of short-term restraint is to hold fish in a bucket. If a bucket is being used to move fish, they can be acclimated using the drip method. An airline is used to slowly add new tank water to the bucket until the parameters closely match. A knot can be tied in the line to reduce water amount if required. This method should also not exceed thirty minutes to reduce stress.

Once acclimation is completed, the fish can be gently caught out of the bag, or the bucket using a net and placed into the new aquarium.

7.4 Transport Requirements

These transport requirements are in line with IATA Live Animals Regulations[13].

Preparations before dispatch

The inner bag must be filled with water to approximately 1/3 of its capacity. The remaining 2/3 of the container is to be filled with oxygen. Use of ice cubes or chemicals such as methylene blue, volume of water and the number of fish in the container are the shipper's responsibility. Carriers will not re-oxygenate fish shipments unless by special prearranged agreement.

Shippers must pack fish to survive unattended for at least 48 hours from time of acceptance by the airline. The shipper must clearly mark on the container the local time and the date at which the animals were packed. The shipper must indicate the acceptable temperature range (in Celsius and Fahrenheit) on the outside of the box in which the animals can be stored.

General care and loading

Animals must be held in areas where the ambient air temperature reduces the heat transfer to the absolute minimum.

No consignment of fish must be accepted if the planned journey exceeds 48 hours. Consignments of live fish must be treated as perishable items and handled accordingly.

For providing life support for aquatic species during transport, a cylinder containing oxygen (compressed), UN identification no. 1072, packed in accordance with the IATA Dangerous Goods Regulations, may be carried to oxygenate the water with the approval of the appropriate authority of the States origin, destination and of the operator.

Note: *States may require the physical inspection of the contents of shipments tendered by shippers meeting a specific state mandated criteria as determined by the transporting carrier.*

Transportation of Fish

The following points should be taken into consideration for the transportation of live fish:

1. Transit time must be minimized wherever possible
2. Only healthy individuals should be selected for transportation
3. Packaging must be adequate
4. Individuals should be packed with compatible animals if required.

7.4.2 Box Design

As per IATA Live Animals Regulations

Container construction

Materials Water - resistant fibreboard, insulating material, plastic, or wood, expanded polystyrene or Styrofoam.

Principles of Design

The following principles of design must be met in addition to the General Container Requirements outlined at the beginning of this chapter.

Outer Container

The outer container can be constructed of fibreboard, wood, wood products, or any plastic material of adequate strength. Purpose-built containers made of expanded polystyrene or Styrofoam must be of adequate strength. (see figure 9)

Care must be taken to ensure no sharp edges or stapled closing on the outer container punctures the inner plastic bag, which expands from change in altitude.

Inner Container

Strong plastic (polyethylene) bag.

The bag is fastened by twisting the top and folding the twisted part so that it can be sealed with elastic bands. The bags may also be heat sealed. (see figure 9)

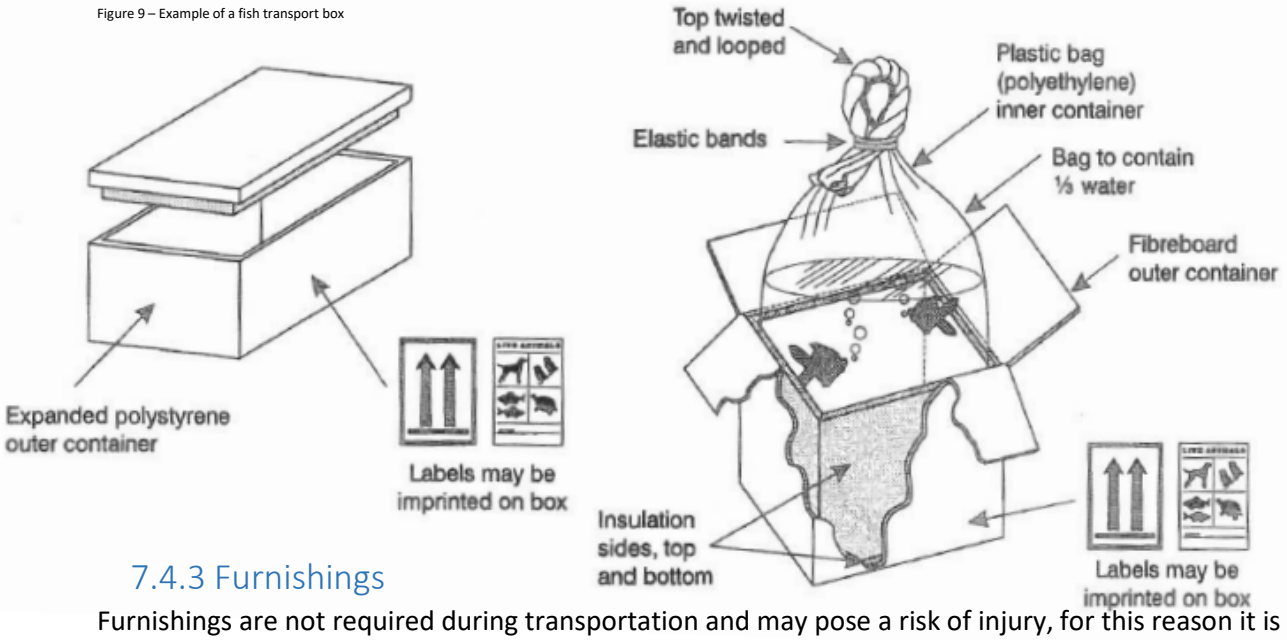
Warning: Heat-sealed bags cannot be re-oxygenated in the event of the consignment being delayed. It is preferable that each bag is placed in an outer bag of similar size to prevent leakage of water.

Insulation/Cushioning

Expanding polystyrene or expanded polystyrene sheets on all sides including top and bottom is recommended. Alternatively, compressed newspaper wood, wool or approximately 0.6cm (1/4 in) thickness of newspaper or other fibrous material sandwiched between two sheets of craft paper.

EXAMPLE:

Figure 9 – Example of a fish transport box



7.4.3 Furnishings

Furnishings are not required during transportation and may pose a risk of injury, for this reason it is beneficial to move fish without any furnishings in the bag. If being house in a temporary set-up for holding, *A. ocellaris* will benefit from having a secure place to hide to minimise stress. A piece of PVC pipe serves this purpose well in a temporary, off display setting.

7.4.4 Food and Water

Food and water are not required during transportation journeys. These needs may change with species doing large international trips. However, this is unlikely to occur with *A. ocellaris* located within Australia.

7.4.5 Animals Per Box

There must be one species per bag. (as per IATA Live Animals Regulations)

It is safer to have fewer individuals per bag rather than packing too many individuals into larger bags. It is often recommended that fish are packed into individual bags, as many will exude toxins due to stress during transport. The system is particularly helpful should an individual die in transit. (Koldewey, 2005 p.17)[13] Some things to consider when deciding how to pack Anemonefishes include.

1. Transit time

2. The size of the fish

3. The sensitivity of the species

4. Temperature fluctuation (if any) that are expected

5. Changes in transference between transit vehicles

6. Type of transit vehicle

7. Water quality parameters at loading

8. Water quality parameters at destination (transit time can be substantially longer due to acclimation time at destination)

9. Whether individuals are captive bred, caught directly from the wild, or have been recently transferred through various export/importers

7.4. Timing of Transportation

As per ZAA Guidelines on Animal Transport:

Ensure that the route and timing of transport is selected in such a way as to:

Minimise transport time.

Minimise the potential for unplanned delays.

Schedule travel during appropriate climatic conditions.

8. Health Requirements

8.1 Daily Health Checks

All individuals should be visually examined daily. Times of cleaning and feeding will often present the best behavioural displays.

A healthy Anemonefish should:

Have a vibrant colour.

Look bright and alert.

Show immediate interest in food.

Erect fins without tears and damage.

A healthy, intact slime coat,

Be free of any bumps, lesions, or abrasions.

If individuals are showing signs of ill health, it is important to determine the cause of the issue prior to treatment. Environmental stressors causing problems will often not require treatment or medications, and more harm can be caused by 'over medicating'. It is possible that certain tank mates will not always be compatible in every circumstance. Aquarists should learn the signs of intraspecific and interspecific competition and aggression.

8.2 Detailed Physical Examination

More detailed examinations may be required periodically and may require sedation if a problem is present. Please consult with veterinary staff and follow your facilities plan should this be necessary. Many fish species are extremely sensitive and over handling can lead to injury or death.

8.3 Routine Treatments

Many of the routine treatments that are standard practice in captive animal facilities are not practical, or particularly helpful with most fish species. It is not common practice to treat aquatic animals with routine preventatives such as flea, worm, and vaccination treatment as you would other species. Treating fishes if they do not require treatment often causes more harm than good. Instead of conventional preventative treatment fish species can be kept healthy by:

Routine water changes,

Cleaning substrate regularly,

Checking life support systems and maintaining properly,

Regularly checking and adjusting water parameters such as salinity, pH, temperature etc.

8.4 Potential Health Problems

Marine Velvet Disease *(Amyloodinium ocellatum)*

Description –

Marine velvet disease is one of the most common diseases that affects marine aquarium fish. It is known by a variety of names, including amyloodiniosis, marine oodinium disease, oodiniosis, and gold dust disease. The scientific name of the infecting organism is *Amyloodinium ocellatum*. *Amyloodinium* is a one-celled organism called a dinoflagellate because it has whip-like structures (flagella), which help it move. It is highly adapted to parasitism. There are many free-living dinoflagellates present in most aquatic environments, but this species is one of the few that will cause disease in fish. This disease is widespread and can cause serious illness and death in aquarium fish if not recognized and treated quickly and properly.

Cause –

Amyloodinium ocellatum is present in most aquatic environments in the form of a dinospore, this form of the parasite is generally harmless and unable to affect fish due to their immune system. Outbreaks occur during times of stress, which naturally reduces the immune system of a fish.

Signs/symptoms –

This parasite affects the skin and gills of the fish. Mild infections can easily go unnoticed and allowed to worsen. Inflamed and bleeding gills are a common symptom of a worsening infection, as well as lethargy and rapid breathing. Attachment sites of the parasite will often display as small gold-coloured spots, as these increase, fish will take on the ‘velvet’ appearance associated with the diseases name. By the time the individual is display signs of the ‘velvet’ skin, the disease is often too severe to treat affectively. Many individuals die prior to signs of these skin changes.

Treatment –

Generally treated with copper-based medications. This parasite is immune to treatment during certain stages of its life cycle, treatment must be completed for at least two weeks to prove effective.

Prevention –

UV/Ozone treatment

Correct quarantine

Maintaining low stress environments

Adequate filtration

Suitable water parameters

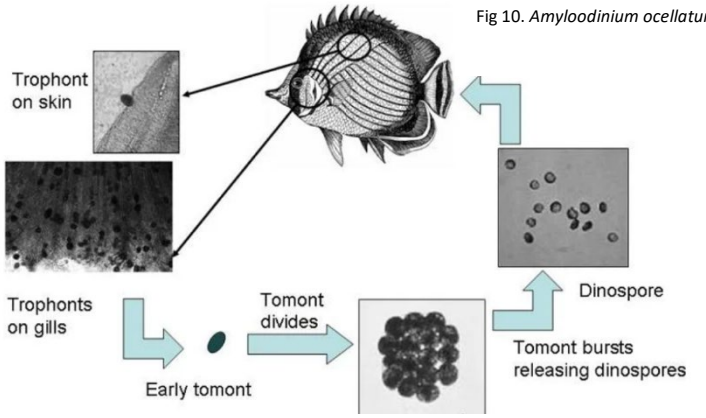


Fig 10. *Amyloodinium ocellatum* life cycle

Ich *(Cryptocaryon irritans)*

Description –

Marine ich or also known as marine white spot disease is a disease caused by a protozoan parasite called *Cryptocaryon irritans*. This condition affects saltwater fish.

Marine ich is different from freshwater ich which is caused by *Ichthyophthirius multifiliis*. It's important to remember that the method of treating ich in freshwater differs from that used in marine environments.

But these two ich parasites are similar in a way that they both go through a life cycle and are vulnerable to medication at a certain point of this cycle. [14]

Cause –

Marine ich is thought to be always present in aquarium water. As with many other diseases, a healthy fish can usually combat the parasite and stop it from taking hold. Marine ich generally displays and becomes a problem on stressed and unhealthy individuals.

Signs/symptoms –

Small white spots spread around the entire body (may be difficult to see in certain areas).

Reduced appetite

Clamped fins

Lethargy

Fading body colours

Rapid gill movement

Erratic swimming and scratching on tank furnishings

Treatment –

Generally treated with copper-based medications. This parasite is immune to treatment during certain stages of its life cycle, treatment must be completed for at least two weeks to prove effective. This should be completed in a smaller treatment tank as copper is toxic to many marine species.

Prevention –

Correct quarantine

Maintaining low stress environments

Adequate filtration

Suitable water parameters

Black Ich (Turbellarians)

Description –

Black ich is a parasitic flatworm *(Parvortex)* that will attach itself to the fish. Most commonly affects Tangs *(Acanthurus sp.)* but can infect other species. Generally, not considered as serious and life threatening as other parasites, however treatment is still required. *Parvotex* worms deposit cysts into the aquarium substrate, once hatched, they are free swimming and will locate a host, burrowing into their skin.

Cause –

Poor quarantine resulting in the introduction of *Parvotex* flatworms into the aquarium.

Signs/symptoms –

Small, raised black dots present on host

Rubbing and scratching

Loss of colour

Loss of appetite

Lethargy

Treatment –

Formalin baths

Freshwater dips

Praziquantel

Prevention –

Proper quarantine

Regular gravel vacuuming to remove cysts.

Piscicolidae Worm

Description –

The *Piscicolidae* are a family of jawless leeches in the order *Rhynchobdellida* that are parasitic on fish. They occur in both freshwater and seawater, have cylindrical bodies, and typically have a large, bell-shaped, anterior sucker with which they cling to their host. Some of the leeches in this family have external gills, outgrowths of the body wall projecting laterally, the only group of leeches to exchange gases in this way.

Worldwide, around 60 genera and 100 species of leeches are in this family, all parasitic on the blood of marine, estuarine, and freshwater fishes. These leeches are less common in the tropics, and more abundant in temperate and polar waters. [15]

These leeches are not of any real concern at the Territory Wildlife Park in our tropical climate. However, they may be present in colder climate, becoming more likely in a larger aquaculture setting.

Cause –

Introduction from new fish or crustaceans, substrate, or live rocks.

Signs/symptoms –

Small, black leeches present on the body.

Treatment –

Formalin dips.

Prevention –

Proper quarantine of fish and furnishings

Proper treatment and filtration of new water

Dactylogyrus trematodes

Description –

A type of gill fluke not overly common in a captive setting but likely to cause problems if present. This species is more common in larger freshwater pond fish, but some species can infect saltwater individuals. More likely to occur in outside pond settings over inside aquaria.

Cause –

Introduction of the parasite to the captive setting. Likely present in many settings, poor water quality, low immune system and fish stress can all allow the parasites to take hold.

Signs/symptoms –

Inflamed gills

Rapid breathing

Excessive mucous

Lethargic

Loss of appetite

Scratching of gills on tank furnishings

Treatment –

Praziquantel

Formalin baths

Organophosphates

Fenbendazole

Albendazole

Potassium permanganate [16]

Prevention –

Proper quarantine

Poor water quality

Stress of individuals can make them more susceptible to infection

Brooklynella

Description –

Brooklynella hostilis is a fatal disease that is highly contagious, and it's caused by a marine parasite found in fish that can also be present in farmed fish and aquarium fish. The parasite attacks the gills, making it impossible to breathe. It is deadly to fish and can kill them in a matter of hours to days. While *Brooklynella* can affect any species of fish, it is most closely and commonly associated with the subfamily *Amphiprioninae*, members of the Damselfish family, and therefore is typically referred to as clownfish disease. Treatment must be provided as quickly as possible to be effective. If your fish display any symptoms like gasping for air at the waterline, mucous on their bodies, skin lesions, or scraping themselves against objects in the tank, help should be sought immediately from an aquatic veterinarian. [17]

It is worth noting that *Brooklynella* parasites reproduce A-sexually through binary-fission. This reproductive technique allows it to reproduce incredibly quickly, this disease can cause death within a matter of hours in severe cases. If aquarists suspect *Brooklynella* is present, please do not hesitate to consult your veterinarian for skin scrapes.

Cause –

Poor quarantine resulting in introduction from infected individuals

Contaminated water being introduced into aquaria

Poor husbandry

Fig 11. *Amphiprion ocellaris* suffering from *Brooklynella*

Signs/symptoms –

White, cloudy skin

Thick mucus buildup

Rapid breathing

Gasping at the surface

Infected individuals scraping against tank furnishings

Skin lesions

Secondary infection also common

Treatment –

Formalin baths

Freshwater dips will not cure the disease, but may provide temporarily relief

Prevention –

Proper quarantine is the most effective way to prevent *Brooklynella* from infiltrating aquaria

Bacterial Infection

Description –

Most common bacterial infections aquarists will encounter in a captive setting include Fin Rot (usually *Pseudomonas fluorescens* or *Aeromonas hydrophila*), Dropsy and *Pseudomonas (Pseudomonas aeruginosa).* Many bacterial infections are secondary problems, resulting from other issues.

Cause –

Poor water quality

Stress

Inadequate husbandry

Overcrowding

Incompatibility with tankmates

Improper diet

Existing injury

Signs/symptoms –

Fin damage

Changed in appearance (colour, ulcers, spots etc.)

Swelling or bloating

Breathing difficulties

Lethargy

Loss of appetite

Abnormal behaviour

Treatment –

There are a wide range of treatment options available. These will change depending on what bacterial infection is present. Treatments are too broad to effectively cover here, please consult veterinarian staff at your facility to develop a treatment plan that will work for your individual case.

Prevention –

Proper husbandry

Maintain correct water parameters

Provide a suitable diet

Correct quarantine

Correct housing conditions (stock levels, species compatibility etc.)

Popeye – Infection/Injury

Description –

Popeye, also known as exophthalmos or exophthalmia, is more a condition than it is a disease. In saltwater fish it may affect one or both eyes, appearing as if the eye has air or fluid trapped inside, around or behind it, causing the eye to enlarge and bulge out of its socket, as if under pressure. Duration of this condition can be anywhere from several days to several weeks.

A variety of physical injuries or non-infectious and infectious diseases can lead to this clinical condition. Typically, popeye is not contagious to other fishes in the community.

Cause –

Usually caused by eye trauma. This can be caused by fighting, injury during capture or injury from tank furnishings. Can also be a symptom of bacterial or fungal infections.

Signs/symptoms –

Protrusion of one or both eyeballs

Stretching of the eye socket

Discoloration or blood in the eyeball

Rupture of the eyeball

Cloudiness of the eyeball

Treatment –

In minor cases that are a result of minor eye trauma, symptoms will generally clear up with a good diet and proper husbandry, moving fish during this time can often cause more stress that can prolong the healing period, this may not always be possible in aquarium display tanks, if movement is required take extra care to move the individual with care and reduce stress as much as possible. If popeye is a secondary symptom of another infection or injury, please consult with veterinarian staff to develop a treatment plan that will work for your individual case.

Prevention –

Proper husbandry and aquarium design

A complete diet

Proper quarantine to reduce the chance of fungal and bacterial infections causing pop-eye

Correct water parameters

Lymphocystis

Description –

Lymphocystis in fish is a common disease that causes pink or white bumps to appear anywhere on a fish's body. It's caused by *Lymphocystivirus*, a member of the *Iridoviridae* family, and it's common in both saltwater and freshwater fish systems.[1] These viruses are found throughout the animal kingdom, including amphibians, invertebrates, and both freshwater and marine fish. They are related to *megalocytivirus*, which are also members of the iridoviruses.

The pink or white nodules that occur in lymphocystis are made up of infected cells that become enlarged as the virus replicates, eventually stopping replication and causing the cell to burst. Bumps on the skin are visible because the cell is enlarged from 50,000 to 100,000 times the size of a normal, healthy cell.[18]

Cause –

Lymphocysttivirus is the virus responsible for causing lymphocystis. Outbreaks often occur because of poor husbandry and stress, resulting in a weakened immune system.

Signs/symptoms –

White, grey, or pink spots present on the body

Thin film can be present on infected individuals

Treatment –

There is no effective treatment for lymphocystis other than improving husbandry conditions. The virus is rarely of major concern and will generally run its course over approximately six weeks. Although lymphocystis is rarely a serious problem, individuals are susceptible to secondary infection during this period of increased stress.

Prevention –

Good quarantine practises

Properly husbandry conditions

Correct water parameters

Internal parasites

Description –

Internal parasites in fish are organisms that live within the body of the fish, feeding on its nutrients and causing a variety of health issues. These parasites can be of various types, including protozoans, helminths, or crustaceans, each with its own set of symptoms.

Cause –

Generally introduced by infected fish, food, or tank furnishings

Signs/symptoms –

Weight loss (despite normal food intake)

Lethargy

Abnormal faeces

Loss of appetite

Visible worms

Bloating

Treatment –

Treatment will vary depending on the cause, and species of parasite present. Please consult with veterinarian staff at your facility to develop a treatment plan that will work for your individual case.

Prevention –

Correct quarantine

Use of high quality, safe foods

Correct husbandry conditions

Correct water parameters

Hyper-Melanisation

Description –

Hyper-Melanisation is common in Anemonefish. It is generally nothing of concern and should correct as the individual grows accustomed to its new host.

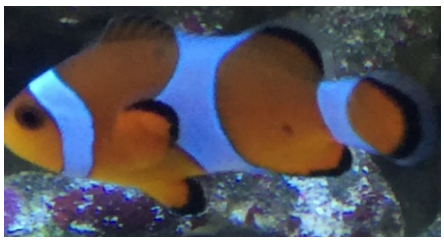


Fig. 12 *A. ocellaris* with Hyper-Melanisation

Cause –

Contact on the skin from a new host coral or anemones sting

Signs/symptoms –

Small, dark markings present on the skin where the contact has occurred

Treatment –

No treatment generally required, should self-correct as individuals grow accustomed to their new host

Prevention –

N/A

Prolapse

Description –

Protrusion of internal organs such as intestine or anus from the vent of the fish.

Cause –

Constipation

Straining

Parasitic infection

Overfeeding

Signs/symptoms –

Protruding anus or intestines

Treatment –

There are various treatments around for prolapses. Many are 'at home' fixes and if done incorrectly can further damage the fish. Please consult with your facilities veterinarian staff to develop a plan.

Prevention –

Suitable diet

Suitable breeding site to reduce strain due to poor egg laying sites

Avoidance of over feeding

Suitable water parameters

8.5 Quarantine Requirements

Any new animals coming into the collection require a quarantine period. This period allows aquarists to identify and treat any health concerns prior to introduction into the collection. These tanks should be smaller in size to aid in treatment and observations. Fish in quarantine should be separated from all other established collection animals and should be using their own life support system. All furnishings and items used for the quarantine tank must not be used with any other aquaria to stop the potential spread of disease. A bare bottom quarantine tank is generally best as it allows aquarists to easily remove all uneaten food and waste. Water quality is very important when quarantining new fish, new fish being moved into collection will already be experiencing levels of stress, making them more susceptible to health issues or disease. Care needs to be taken to make sure quarantined individuals are in correct water parameters, and stress is kept to a minimum. All items used during quarantine must be sterilised prior to reuse.

9. Behaviour

9.1 Activity

Amphiprion ocellaris are a diurnal species and are found in depths between 3 – 15m. They are often found within close proximity to their host anemones of choice; *Heteractis magnifica, Stichodactyla gigantea, Stichodactyla mertensii* and *Stoichactis kenti.*

9.2 Social Behaviour

Amphiprion ocellaris have a complex social structure comprising of one dominant male and female pair, with small non-breeding males also present. Only one pair within a community to anemonefish will breed. This structure will change with the death or removal of one of the dominant individuals. Should the female die, the dominant male with change sexes, with the largest non-breeding male becoming her new mate. The breeding pair are territorial of their host anemone, and it is not recommended to introduce more dominant animals from other pairings. The best way to introduce more anemonefish to a colony is in the form of adding young, immature individuals. They hold small territories, and do not venture far from their host anemone.

9.3 Reproductive Behaviour

When a pair are ready to breed, they will begin to search for a suitable breeding area. This breeding area will not be far from the protection of the anemone and will most often be located on the rocks below the protection of the stinging tentacles. The pair will then begin preparing and cleaning the area in preparation. Morphological changes are also present during this time, with the female growing plump around the abdomen, indicating egg development. In captivity *Amphiprion ocellaris* will breed year-round.

9.4 Behavioural Problems

This species generally does not display any behavioural problems which are hard to manage. If placed with suitable tank mates there may be some aggression during the process of developing territories, this is usually short lived and will resolve itself promptly. Some problems I have encountered personally with larger species of anemonefish *(Amphiprion rubrocinctus)* and *(Premnas biaculeatus)* include aggression towards aquarists during tank maintenance. If a hand wanders too close to their host, they will often make contact with impressive strength. This is manageable, though aquarists should be aware of sharp cheek spines present in some species. This on at least one occasion has ended with an individual throwing itself out of the tank. Care must be taken with these species to ensure they are protected from harming themselves should they be housed with other species.

Public exhibits should be set up to ensure only staff have access to the aquarium to remove the risk of the public causing stress or injury to the inhabitants.

9.5Behavioural Enrichment

Tank Furniture

Environmental enrichment can be provided in the form of a suitable aquarium setup. Live rock, closely mimicking their reef habitat will allow *A. ocellaris* to display natural behaviours. The use of coral and anemones are not required but will allow a more enriching environment if possible.

Live food

The use of live food is arguably the best source of enrichment for captive fish. This can be offered in the form of live cultured foods such as Artemia and Mysis Shrimp. This allows individuals to hunt. In a healthy, multi-species reef tank, a healthy population of marine invertebrates will be present within the system. This will allow fish to hunt any copepods in a natural setting, improving overall health and welfare.

Pair Bonds

Where possible, *A. ocellaris* should be housed in pairs. They are a monogamous species, and this will allow them to display their natural courtship behaviour. This is not necessarily always required, and individuals who have lost a partner will not reintroduce to another colony well.

9.6 Intraspecific Compatibility

Western Anemonefish can be housed in larger groups, however as mentioned above, there is a complex social hierarchy. For this reason, only young, immature individuals should be introduced back into an existing colony. Keepers may witness some intraspecific aggression during this time, it is generally short lived and will resolve itself. In larger aquaria, it is possible to house multiple mature pairs together. This can be done if there is enough room to establish multiple territories on differing sides of the aquarium. If this is attempted, aquarists should watch closely for signs of aggression that could pose a risk to the health and safety of individuals.

9.7 Interspecific Compatibility

Western Anemonefish are a compatible reef fish that can be housed with many other species. At the Territory Wildlife Park, a colony of *A. ocellaris* are kept in a reef aquarium with various species of Tang, Gobies, Angelfish and Wrase. As with all animals, aquarists should closely monitor the introduction of new species. Even 'compatible' species may not work in every situation.

9.8 Suitability to Captivity

Western Anemonefish are extremely well suited to captivity and do not exhibit any specific behavioural or health problems associated with a captive setting. When acquiring new specimens, please consider the ethical considerations related to new fish. A. ocellaris are well established in captivity, and there is often little need for wild caught specimens.

10. Breeding

10.1 Mating System

Anemonefish are external fertilisers; the male will fertilise the eggs shortly after they are laid. To breed Anemonefish successfully correct conditions must first be met. A good diet and ideal water conditions will trigger Anemonefish to begin their breeding cycle. *A. ocellaris* is a monogamous species, pairs will not mate with multiple individuals.

Once conditions are suitable to breed, the male will begin swimming near the female, to gauge the female's receptiveness, he may try to touch her, while making up and down motions with his body. If receptive to mating, the female may gently bite to male, to signal she is ready to mate. This process may continue for multiple hours.

Once ready, the female Anemonefish will deposit her eggs in a suitable location. In captivity, small, terracotta plant pots work well and are readily accepted. Females can lay anywhere between 100 – 1500 eggs, depending on size and overall health. After the eggs have been deposited, the male will follow to externally fertilise them. After fertilisation, the male takes over the sole care of the eggs. He will tirelessly guard them, as well as constantly fanning fresh oxygenated water over the brood. During this period, males will often eat any eggs that are unhealthy. This is normal, and aquarists should not be too concerned at the removal of several eggs by the male. Anemonefish eggs are often lost to fungal infections, and males remove these eggs to prevent the spread.

10.2 Ease of Breeding

Anemonefish are considered a relatively easy marine fish to breed. If healthy and kept in an appropriate environment, breeding often occurs without any interference from aquarists. There are certain challenges that occur when trying to raise young. These will be covered in more detail in a breeding guide, following the completion of this document [02/2024].

10.3 Techniques Used to Control Breeding

Any unwanted eggs can simply be removed from the aquarium to prevent breeding. Similarly, any unnecessary eggs can be left to hatch in a large reef tank if, allowing the larvae to become food for other fish present. Trying to prevent the breeding cycle from occurring can result in unnecessary stress on your fish. It is preferred to allow them to lay their eggs when they are ready, and then remove them.

10.4 Occurrence of Hybrids

Hybrids can occur within the *Amphiprioninae* family. While some breeders may actively try to cross species, it is not a practice we should be encouraging within the captive animal industry. There have also been a few cases of accidental hybridizing in a captive setting because of aquaria sharing a life support system, with sperm from one species crossing into another aquarium resulting in fertilisation of eggs. This is extremely rare and not likely to occur.

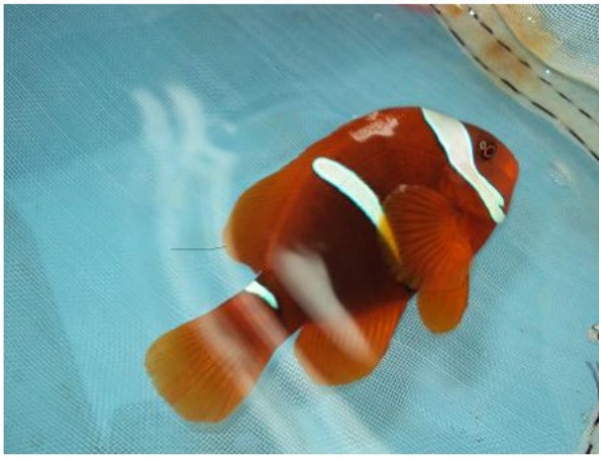


Fig. 13 A tomato x maroon clownfish hybrid which may have been accidentally hybridized. Photo by Aqua Terra Distributors.

10.5 Timing of Breeding

Captive Anemonefish can breed year-round, depending on your specific water conditions. Once bonded, a pair of *A. ocellaris* can lay every ten to fourteen days.

10.6 Age of Breeding

Dominant Anemonefish mature at around eighteen months to two years. This is also heavily influenced by current social structure within your colony.

10.7 Breeding Diet

A specific breeding diet is generally not needed. If your fish are getting a healthy, nutritious diet, they should have the body condition needed for breeding when the time is right. Some popular foods high in nutrition that may aid in breeding are,

Larval and adult brine shrimp
Copepods
Crab and shrimp larvae
Bloodworms
Bristle worms
Fish flakes and pellets
Spirulina (supplement)
Mysis shrimp
Ghost shrimp (frozen and chopped)
Feeder fish (frozen and chopped)
Krill (frozen and chopped)
Isopods
Spinach (treat)

Anemonefish larvae are more challenging to feed, due to their specific needs for microscopic food. Rotifers are a necessary part of clownfish breeding and will be explained in more detail in a breeding document following this manual.

10.8 Gestation Period

Eggs hatch within seven to ten days, depending on water temperature. Warmer water will result in the eggs hatching slightly quicker. Eggs will hatch within two hours of the aquarium lights turning off.

10.9 Removal of Young

All Anemonefish young are precocial and receive no care from their parents. Larvae should be removed from the aquarium as soon as possible to reduce predation and damage from life support systems. At the Territory Wildlife Park, eggs are removed from the adults prior to hatching.

10.10 Growth and Development

Anemonefish larvae are small and transparent, approximately 3mm in length, making them very difficult to see for the first few days, they are often only identifiable by their small eyes. Rotifers are the main source of food offered for the first few days, during this time it can be difficult to gauge the health of your offspring. Numbers will reduce through natural attrition, even when all conditions are perfect. The larvae grow quickly and will be able to take day old brine shrimp by day seven to ten, after metamorphosis. When brine shrimp are introduced, it is ideal to also add a small amount of high-quality flake or pellet to the aquarium, as this will condition the young to commercial food, easing the transition off live only prey.

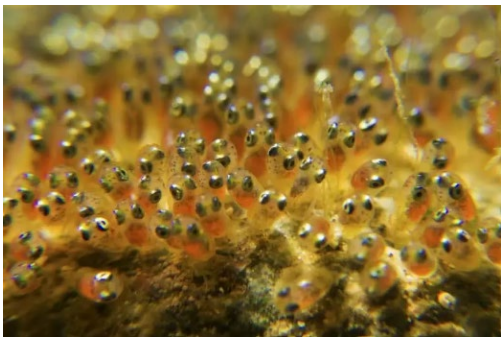


Fig 15. Anemonefish eggs

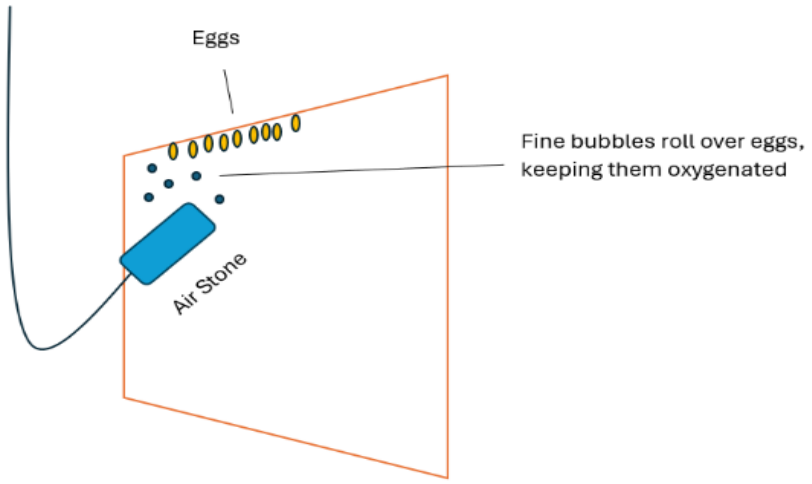
Fig 14. 2-day old Anemonefish larvae

11. Artificial Rearing

11.1 Incubator Type

The best method for raising eggs is to remove them and place them in a separate larval tank. Aeration is a big factor when raising eggs and fungal disease can set in if there is not enough water movement, this constant aeration is the role the male plays when raising eggs. Another good option is to leave the eggs with the adults and time removal to take place a day prior to hatching. This method can be risky if it is mistimed, resulting in larvae lost to predation and filtration. If moved to a larval tank, an aerator can be set up on a slow setting to constantly move air and water over the eggs, reducing the risk of fungal infection.

Fig 16. Method for aerating eggs in a terracotta pot setup



11.2 Incubator Temperature

Eggs should be incubated in water parameters matching that of adults.

11.3 Diet and Feeding of Young

Anemonefish larvae require specific feeding of rotifers. It is usually necessary to set up a rotifer culture to keep up with their dietary requirements. This also includes the cultivation or ability to acquire phytoplankton. Feeding is the most challenging aspect of breeding *A. ocellaris*.

Larvae and young anemonefish require multiple feedings a day. The Territory Wildlife Park has had the best success with using the larvae tanks as the rotifer colony. Phytoplankton is added to the aquarium to feed a constant supply of rotifers for the larvae to eat *ad libitum*. Once brine shrimp nauplii can be accepted, aquarists will be required to hatch multiple batches per day, raising *A. ocellaris* is a time-consuming endeavour, these factors should be considered prior to the attempt to raise.

11.4 Specific Requirements

Anemonefish require specific tank requirements to survive. One of the biggest killers of young larvae is improper filtration. Anemonefish larvae are very delicate and can easily be destroyed by aggressive flow and suction. A simple air powered bio filter is generally the safest option, with daily, gentle vacuum with an air hose.

Sudden water changes can shock the larvae, resulting in death. When conducting a water change, I had the best success with refilling with water from the adults' reef tank. This ensured the water parameters were suitable for the larvae, and was gravity filled via a drip system over the process of a few hours. This eliminated the risk of sudden water changes.

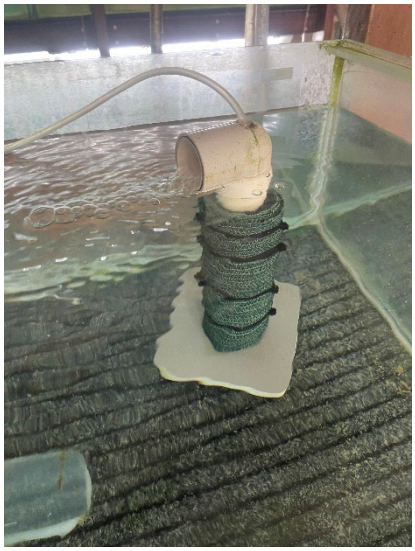


Fig 17. Suitable bio-filter for *Amphiprion* larvae

11.5 Data Recording

Data is paramount to the success of raising *A. ocellaris* as it allows the improvement of techniques going forward, raising success over time. Data such as growth rate, food items and feeding schedules and success rate with different methods will all aid in the future success of your facility.

11.6 Identification Methods

Individual identification of immature *A. ocellaris* is not a practical endeavour.

11.7 Hygiene

Good hygiene practises are of utmost importance when attempting to raise young fish. They are susceptible to any pollutants and water quality. Daily siphoning is required to remove any dead larvae and waste. Aquarists must take care to not siphon any larvae or young fish out of the tank. The preferred method at the Territory Wildlife Park is to carefully vacuum waste with an air hose into a bucket. The bucket can then be checked for young fish prior to disposal. When conducting a water change, a mesh filter with a filtration size of 50µm is placed in front of the air line. This will remove the risk of any larvae being removed, whilst keeping rotifers in the tank for consumption. Rotifers range in size, they are typically between 100µm - 200µm.

11.8 Weaning

Weaning is not applicable to *A. ocellaris.* They are precocial and do not require adult care.

12. References

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Fig 12 – Fish Disease Index – Pictorial Guide, Reef2Reef 01/2017 melypr1985 – Accessed 15/2/24

Fig 13 – Example of Tomato x maroon clownfish hybrid, Aqua Terra Distributors – Accessed 18/2/24

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