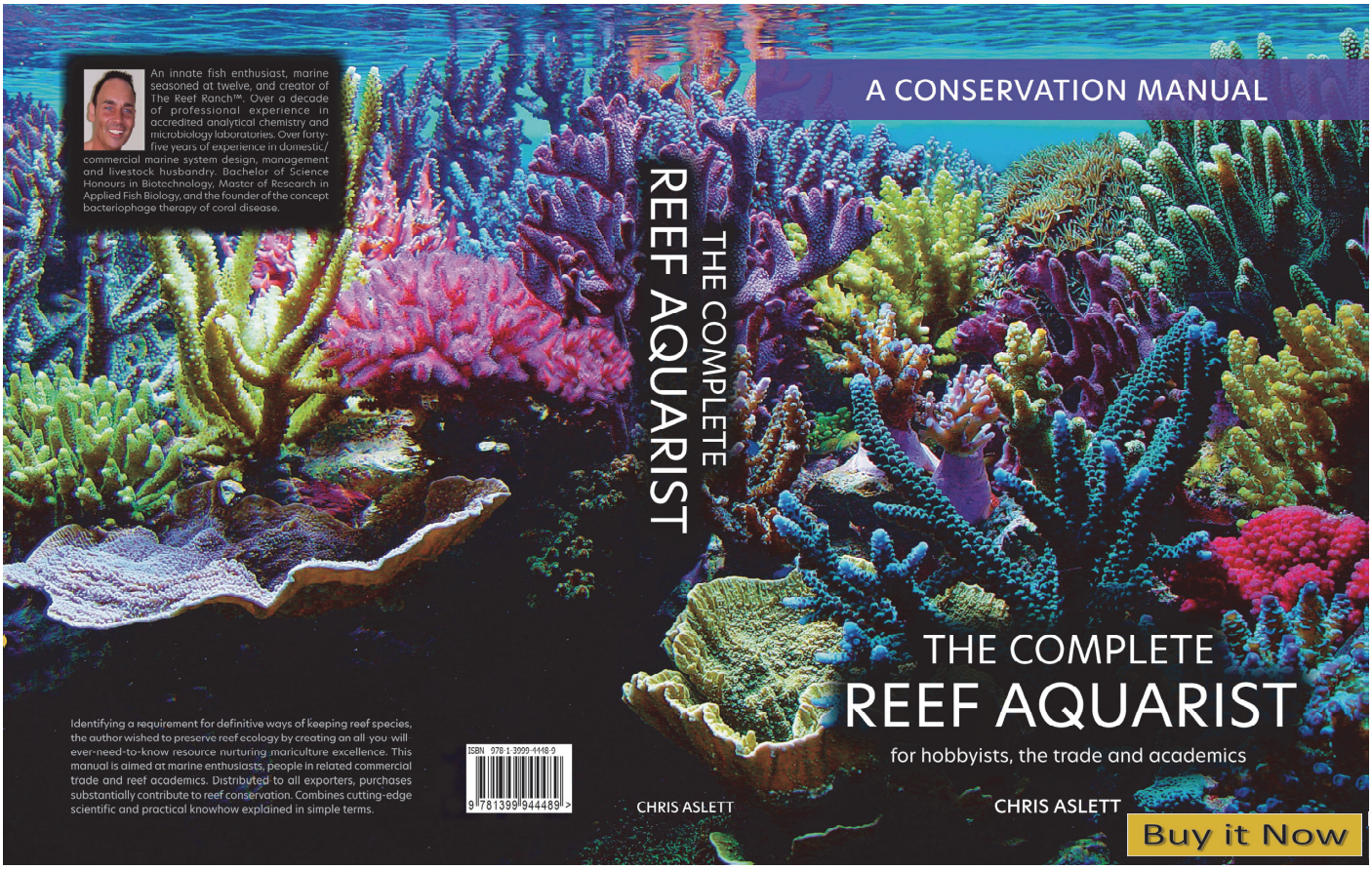

The Complete Reef Aquarist – A Conservation Manual

for the hobbyists, the trade and academics

By
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Chapter 8: Coral Compatibility

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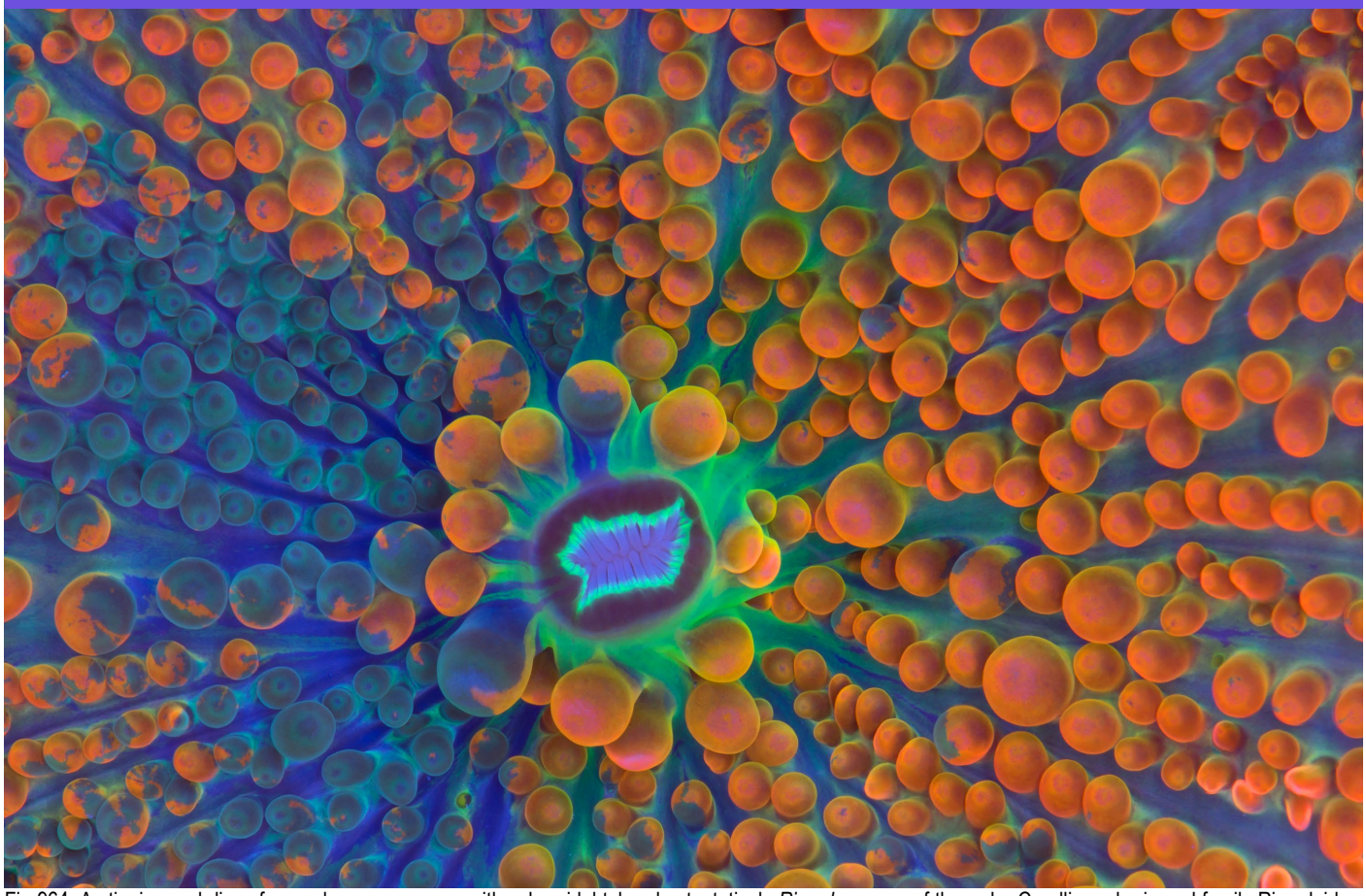


Fig 964. A stinging oral disc of a mushroom anemone with spheroidal tubercles tentatively *Ricordea yuma* of the order Corallimorpharia and family Ricordeidae that can extend on a 4" (10-cm) stalk or discharge digestive mesenterial filaments.

Antagonism peculiar to reef ecosystems exerts constraints and hardships, where many corals are armed with defensive chemicals, digestive mesenterial fibres that extend directly from their mouths or through their ectodermis, or stinging nematocysts at the extremities of feeding and sweeper tentacles or acontial "threads" (Goreau *et al.* 1971; Duros 1973; Paletta & Rader 1992; Hines & Pawlik 2011; Lam *et al.* 2017; Oppen & Blackall 2019).

Coral Aggression Compounds

Allelopathic biochemicals are liberated by hard and "soft" corals which should in theory affect the performance of opposing kinds, but they do little to stem the growth and survival of corals sharing a system (Delbeek & Sprung 2005n). It is necessary to purge or oxidise other coral- and microbial-derived compounds which appears sufficient to keep them in check. Bioactive terpenoids have been isolated from plants for over three decades (Bohlmann & Keeling 2008) which are secondary metabolites accumulated in coral flesh with anti-inflammatory, antimicrobial, and cytotoxic properties. Those amassed by corals of the genera *Lemnalia*, *Litophyton*, and *Sinularia* have been screened for their medicinal properties (Kamel & Slatter 2005; Anjaneyulu & Murthy 2010) whereas recent research suggests terpenoids are upregulated in response to harmful zinc chloride ($ZnCl_2$; Farag *et al.* 2017; Tijssen *et al.* 2017; Wu *et al.* 2018).

Interspecific contact is typically harmful yet many **SPS corals** are relatively benign. Nevertheless, tissue is frequently destroyed when colonies abut species of *Hydnophora* (Merulinidae). Moderate aggression is common between corals of the family Acroporidae which includes the genera *Acropora*, *Alveopora*, *Anacropora*, *Astreopora*, *Enigmopora*, *Isopora*, and *Montipora* (Lang 1973; WoRMS 2020bf).

Fig 965. A remarkable photograph of *Acropora millepora* (Astrocoeniina: Acroporidae) extruding mesenterial filaments during a coral feed which may be an acute nutritional or stress response. Image courtesy of Mike Moll©.

Hydnophora and other SPS hermatypes may also expel

mesenterial filaments, whereas most corals possess **feeding tentacles** capable of stinging their prey, where those of **LPS** colonies are apparent in darkness or during extensive feeds (Fig 965.; Fig 966.; Fig 971.; Fig 973.). Akin to *Acanthastrea*, species of *Lobophyllia* are members of the inimical family Lobophylliidae which engage corals some distance away, while these and others of the suborder Faviina are regarded as some of the most hostile, whose other families include Anthemiphylliidae, Diploastreidae, Euphylliidae, Faviidae (subjective synonym: Mussidae), Meandrinidae, Merulinidae (subjective synonym: Pectiniidae), Montastraeidae, Oculinidae, Oulastreidae, Plesiastreidae, and Rhizangiidae with genera too numerous to include (Lang 1973; NCBI 2019l).

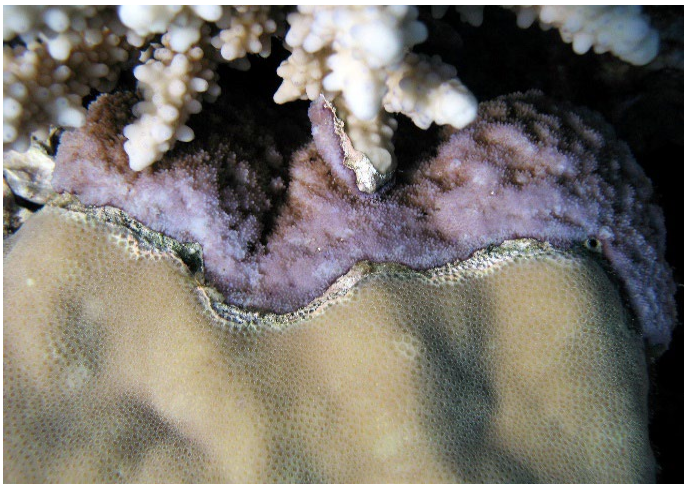
Fig 966. An iconic photograph posted on the Aquarium Advice forum entitled When acans attack! The species of *Acanthastrea* (Faviina: Lobophylliidae) fragment on the left has released mesenterial filaments to digest the "frag" of *Favia* (Faviina: Faviidae) to the right. Courtesy of Jimbo7© 2010.

Fig 967. An atypical LPS fragment insofar as its long feeding tentacles tipped with stinging nematocysts are evident during the day.

LPS corals and **anemones** tend to be the most destructive, which must be surrounded by a margin of exclusion because there is no defined distance that will guarantee safety. However, a reasonable gap is around 4" (10 cm), yet **sweeper tentacles** may be up to 7" (18 cm), whereas mesenterial filaments may reach approximately 5" (12.5 cm). Therefore, an assortment of aggressive and passive examples cannot be housed in nano- or pico-reefs.

"Soft" Coral Defence

"Soft" corals of the class Anthozoa include anemones of the order Actiniaria, star polyps of the subclass Octocorallia, mushroom anemones of the order Corallimorpharia, carnation corals of the order Alcyonacea, and zoanthid polyps of the order Zoantharia. Most corallimorpharians including *Ricordea florida* of the family Ricordeidae, neither sting nor use chemical defence, while toxins are amassed by merely one out of every three strains of the Discosomid, *Rhodactis osculifera*. Anemones and zoanthid polyps use nematocysts or nematocysts and toxins respectively (Hines & Pawlik 2011). See: Reef Lighting, Zoanthid Palytoxin: The Risks.



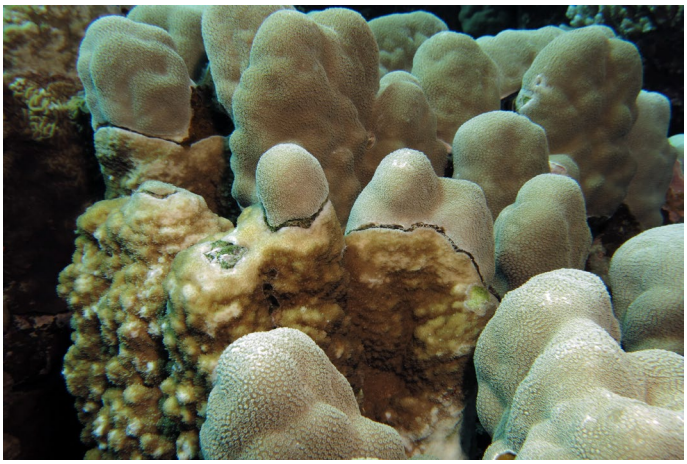


Fig 968. Top - typical competition between SPS encrusting *Montipora* (Acroporidae) and massive *Porites* (Poritidae), and either branching *Acropora* or *Isopora* (Acroporidae). Bottom - antagonistic *Porites* and *Montipora* where encrusting colonies quickly invade and overgrow their neighbours, while their margins suffer mild and discrete tissue demise.

Fig 969. The sweeper tentacles of *Favites pentagona* (Faviina: Merulinidae). Image courtesy of Kamil Owsik©, Warsaw, Mazowieckie, Poland.

Native corallimorpharians, *Rhodactis howesii* (Discosomidae) instigated invasion and overgrowth of Palmyra Atoll's reef in the central Pacific's Line Islands. Corals were described as smothered, while researchers postulated that iron chains from wrecked ships or seacraft, had stimulated their overproliferation, whereas shallow reef diversity has yet to be re-established in the

national wildlife's refuge (Work *et al.* 2018).

Several "soft" corals periodically shed a waxy envelope whose contact proves harmful, although soluble aggression compounds released by numerous, expedite competition with prolific zooxanthellate Scleractinia (Delbeek & Sprung 1994e).

Fig 970. The sweeper tentacles of *Galaxea* (Faviina: Euphylliidae) defending its territory from incursions. Image courtesy of Ria Tan© https://www.wildsingapore.com

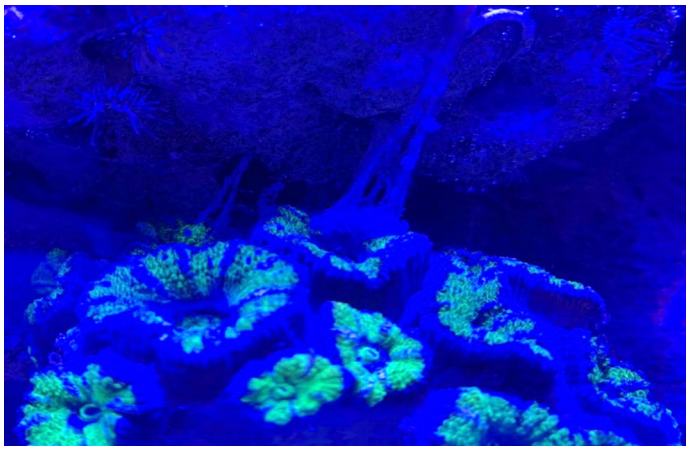


Fig 971. Nocturnal extrusion of mesenterial filaments from *Acanthastrea* (Faviina: Lobophylliidae) towards a perceived threat or prey, which was likely elicited by small anemones on a nearby rock. Image courtesy of Minoldesign©, https://www.UltimateReef.com

Table 7. presents some comparative aggression data (Paletta & Rader 1992) while tables 8., 9., and 10. are coral compatibility charts (Lang 1971; Lang 1973; Sheppard 1979; Agathos 2015). The information is unlikely to be committed to memory, while it is of most use to aquarists with nano- or pico-reefs because a display appears more natural and creates visual impact, when all available space is filled. Small aquaria with solitary hostile colonies rarely appeal.

Extraordinarily injurious chalice or cup corals are also nested in Faviina, whose genera include *Echinomorpha* (Lobophylliidae), *Echinophyllia* (Lobophylliidae), *Echinopora* (Merulinidae), *Mycedium* (Merulinidae), *Oxypora* (Lobophylliidae), *Paraechinophyllia* (Lobophylliidae), *Pectinia* (Merulinidae), and *Physophyllia* (Merulinidae; Adams 2018; Morice 2022).

Fig 972. The coral from figure 971. with retracted filaments during the day. Image courtesy of Minoldesign©, https://www.UltimateReef.com

Fig 973. Despite their shared lineage of the suborder Astrocoeniina and the family Acroporidae, an encrusting *Acropora* discharging mesenterial strands to consume the tissue of a pink *Montipora capricornis*. Image courtesy of John Servedio©.

Fig 974. A coral of the genus cf. *Favia* (Faviina: Faviidae) using tentacles to sting nearby cf. *Palythoa* (Brachycnemina: Sphenopidae). Image courtesy of John Servedio©.

Fig 975. cf. *Favia* (Faviina: Faviidae) revealing an arsenal of tentacles. Image courtesy of John Servedio©.

Fig 976. The consequence of *Blastomussa wellsi*'s (Faviina: Plerogyridae) assault on *Acanthastrea* cf. *echinata* (Faviina: Lobophylliidae). Image courtesy of John Servedio©.

Fig 977. *Micromussa amakusensis* (Faviina: Lobophylliidae) stinging *Acropora austera* (Astrocoeniina: Acroporidae). Image courtesy of John Servedio©.

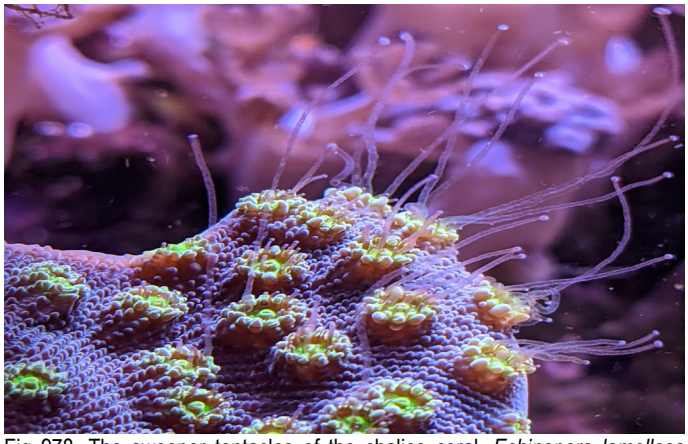


Fig 978. The sweeper tentacles of the chalice coral, *Echinopora lamellosa* (Faviina: Merulinidae). Image courtesy of Jason Hughes©, Austin, Texas, USA.

Fig 979. The chalice coral from figure 978. has destroyed the tissue of adjacent *Stylophora pistillata* (Astrocoeniina: Pocilloporidae). Image courtesy of Jason Hughes©, Austin, Texas, USA.

Most Agressive	
Least Agresive	
Elegance Coral	(*Catalaphyllia jardinei*)
Hammer Coral	(*Fimbriaphyllia ancora)*
Torch coral	(*Euphyllia fimbriata* **undergoing reclassification**)
Frog spawn	(*Euphyllia glabrescens* & *E. cristala*)
Bubble Coral	(*Plerogyra sinuosa*)
Grape Coral	(*Physogyra lichtensteini*)
Mushroom Coral	(*Heliofungia actiniformis*)
Flower Pot Coral	(Goniopora sp.)
Urticina Anemones	(*Urticina felina*)
Open Brain Coral	(*Trachyphyllia geoffroyi*)
Cup Coral	(*Duncanopsammia peltata*)
Moon Coral	(*Galaxea fascicularis*)
Closed Brain Coral	(*Favia* species)
Star Polyps	(*Clavularia* species)
Leather Coral	(*Sarcophyton* species)
Tree Coral	(*Sinularia* species)
Sea Whips	(order: Alcyonacea)
Waving Hand	(*Anthelia* species)
Xenia	(*Xenia* species)
Giant Mushrooms	(*Rhodactis* species)
Zoanthus polyps	(*Zoanthus* species)
Ricordea anemones	(*Ricordea* species)
Mushroom colony	(*Discosoma* species)

Table 7. The relative aggression of routinely imported corals featuring classification corrected data originally published by Paletta & Rader in 1992.

Will kill / Will kill / Will kill / Will acquiesce	*Mussa angulosa*	*Scolymia lacera*	*Isophyllia sinuosa*	*Mycetophyllia ferox*	*Meandrina meandrites*	*Mycetophyllia reesi*	*Mycetophyllia aliciae*	*Mycetophyllia lamarckiana*	*Mycetophyllia danaana*	*Scolymia cubensis*	*Isophyllia rigida*
Mussa angulosa											
Scolymia lacera											
Isophyllia sinuosa											
Mycetophyllia ferox											
Meandrina meandrites											
Mycetophyllia reesi											
Mycetophyllia aliciae											
Mycetophyllia lamarckiana											
Mycetophyllia danaana											
Scolymia cubensis											
Isophyllia rigida											

Table 8. A taxonomically-updated coral compatibility chart comprising data presented by Lang in 1971 and 1973 describing mutual tissue destruction. A yellow or light green square indicates that species, destroys the coral of the opposing colour, whereas dark green indicates peaceful interactions, while red specifies coannihilation.

	Pocillopora verrucosa	*Stylophora pistillata*	*Seriatopora hystrix*	*Isopora palifera*	*Acropora humilis*	*Acropora hyacinthus*	*Astreopora* species	*Montipora* species	*Pavona clavus*	*Pavona varians*	*Gardineroseris planulata*	*Fungia* sp.	*Halomitra pileus*	*Goniopora* species	*Porites lutea*	*Porites cylindrica*	*Dipsastraea favus*	*Goniastrea stelligera*	*Goniastrea pectinata*	*Leptastrea transversa*	*Cyphastrea microphthalma*	*Echinopora lamellosa*	*Galaxea astreata*	*Ctenella chagius*	*Lobophyllia corymbosa*	*Lobophyllia radians*
Pocillopora verrucosa		■			■		■	■	■						■	■				■					■	
Stylophora pistillata			■							■	■				■	■				■				■		
Seriatopora hystrix															■											
Isopora palifera	■	■			■		■	■		■	■				■			■	■	■				■	■	■
Acropora humilis		■					■		■						■					■						
Acropora hyacinthus		■	■						■						■	■				■		■		■		
Astreopora species		■	■					■		■					■											
Montipora species							■				■				■	■		■		■				■		
Pavona clavus																										
Pavona varians							■	■			■				■					■	■					
Gardineroseris planulata															■	■		■		■	■	■			■	
Fungia sp. (**classification reshuffle**)			■			■								■								■	■		■	■
Halomitra pileus			■			■		■						■	■							■	■		■	■
Goniopora species			■		■	■	■	■							■	■		■	■	■	■	■				
Porites lutea																										
Porites cylindrica			■												■											
Dipsastraea favus							■	■			■				■	■				■						
Goniastrea stelligera															■	■						■				
Goniastrea pectinata							■	■							■	■				■						
Leptastrea transversa															■											
Cyphastrea microphthalma								■		■										■						
Echinopora lamellosa		■	■		■	■				■																
Galaxea astreata		■	■	■		■	■	■	■	■	■			■	■		■	■	■			■			■	■
Ctenella chagius	■		■							■	■				■					■						
Lobophyllia corymbosa		■	■			■	■	■							■				■			■				
Lobophyllia radians					■		■	■							■											

Table 9. Corals associated with a black square on the vertical axis will destroy the tissue of the corals above. Presented here as taxonomically-revised data corresponding to the statistics of Sheppard from 1979.

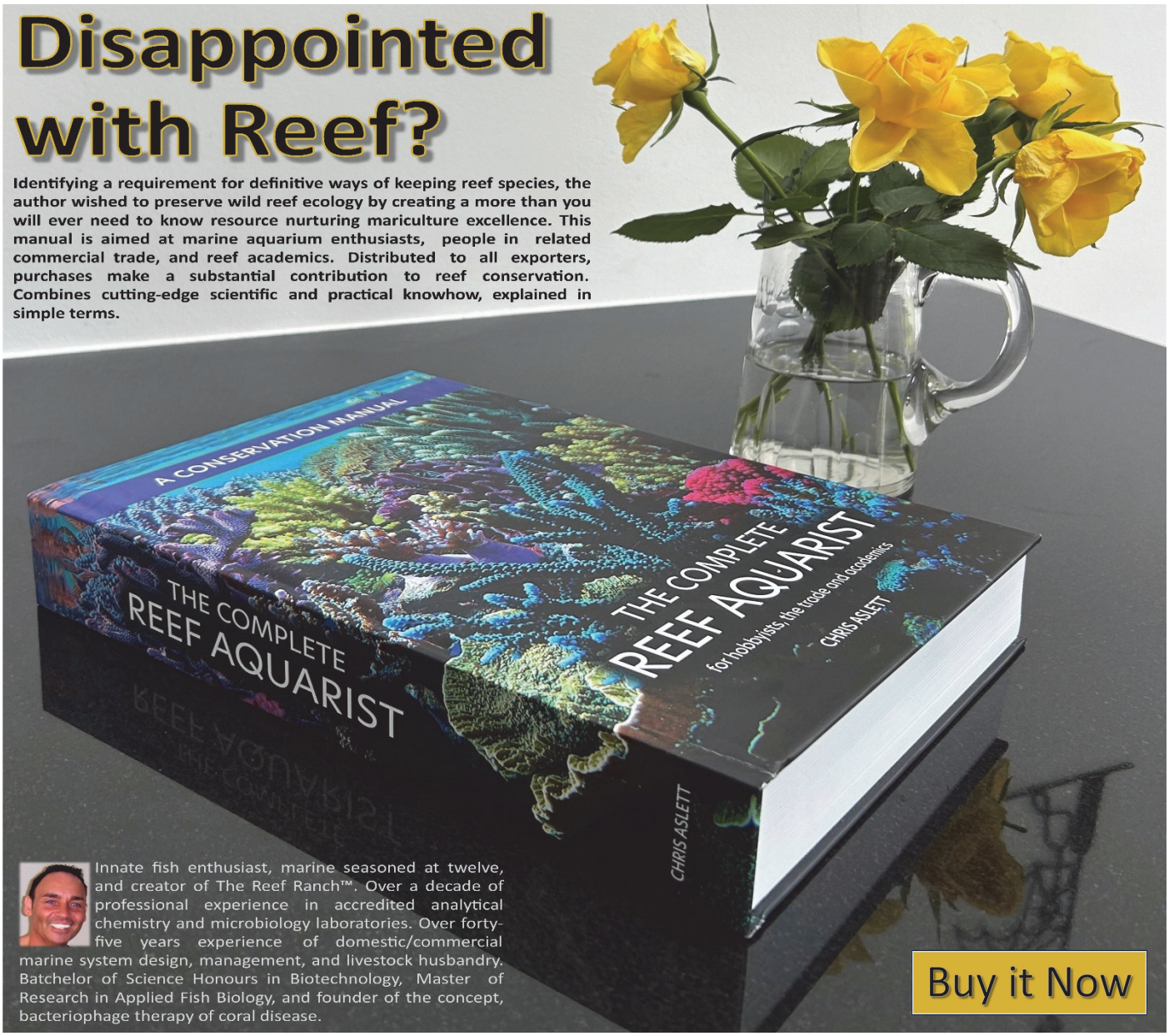
Will kill Name / Will Kill Name / Will Acquiesce	*Acropora* species	*Acropora humilis*	*Acropora millepora*	*Acropora suharsonoi*	*Caulastraea* species	*Caulastraea curvata*	*Caulastraea furcata*	*Cyphastrea* species	"chalice corals"	*Discosoma* species	*Discosoma* "ferrugata"	*Echinopora lamellosa*	*Euphyllia* species	*Fimbriaphyllia divisa*	*Euphyllia glabrescens*	*Favia* species	*Galaxea fascicularis*	*Goniastrea* species	*Leptastrea* species	*Lobophyllia* species	*Montipora* species	*Montipora* var. "*rainbow* "	*Montipora* var. "poker star"	*Montipora australiensis*	*Montipora cactus*	*Montipora capricornis*	*Montipora digitata*	*Montipora setosa*	*Montipora undata*	*Montipora verrucosa*	*Palythoa* species	*Pavona cactus*	*Pavona varians*	*Pocillopora damicornis*	*Rhodactis indosinensis*	*Seriatopora* "Bird of Paradise"	*Seriatopora hystrix*	*Seriatopora guttata*	*Stylophora* species	*Lobophyllia* species	*Xenia* species	*Zoanthus* species
Acropora species																																										
Acropora humilis																																										
Acropora millepora																																										
Acropora suharsonoi																																										
Caulastraea species																																										
Caulastraea curvata																																										
Caulastraea furcata																																										
Cyphastrea species																																										
"chalice corals"																																										
Discosoma species																																										
Discosoma "ferrugata" **Unclassified**																																										
Echinopora lamellosa																																										
Euphyllia species																																										
Fimbriaphyllia divisa																																										
Euphyllia glabrescens																																										
Favia species																																										
Galaxea fascicularis																																										
Goniastrea species																																										
Leptastrea species																																										
Lobophyllia species																																										
Montipora species																																										
Montipora var. "*rainbow* "																																										
Montipora var. "poker star"																																										
Montipora australiensis																																										
Montipora cactus																																										
Montipora capricornis																																										
Montipora digitata																																										
Montipora setosa																																										
Montipora undata																																										
Montipora verrucosa																																										
Palythoa species																																										
Pavona cactus																																										
Pavona varians																																										
Pocillopora damicornis																																										
Rhodactis indosinensis																																										
Seriatopora "Bird of Paradise"																																										
Seriatopora hystrix																																										
Seriatopora guttata																																										
Stylophora species																																										
Lobophyllia species																																										
Xenia species																																										
Zoanthus species																																										

Table 10. A phylogenetically-corrected coral compatibility chart compiled from hobbyist's observations discussed in a thread on the Reef Central forum (Agathos 2015). A yellow or light green square indicates the species corresponding to that colour, will instigate mortality in the coral of the opposing colour, whereas a dark green square specifies corals that will acquiesce.

Fig 980. Polyps of significantly aggressive *Favia* (Faviina: Faviidae).

Disappointed with Reef?

Identifying a requirement for definitive ways of keeping reef species, the author wished to preserve wild reef ecology by creating a more than you will ever need to know resource nurturing mariculture excellence. This manual is aimed at marine aquarium enthusiasts, people in related commercial trade, and reef academics. Distributed to all exporters, purchases make a substantial contribution to reef conservation. Combines cutting-edge scientific and practical knowhow, explained in simple terms.



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