MEDIA MONITORS


The Fish Cleaners

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Two blue streak cleaner wrasse clean the dead skin and parasites off a surgeonfish.

The Fish Cleaners

BY STEPHEN LUNTZ

Not all cleaner fish are trustworthy, so why don't more of them get eaten?

Cleaner fish provide a fascinating insight into the workings of evolution. Dr Lexa Grutter of the University of Queensland's School of Biological Sciences has pioneered research into this vital component of coral reef ecosystems. She has now added these stunning images to her insights, many of which have been reported in *Australasian Science* in the past.

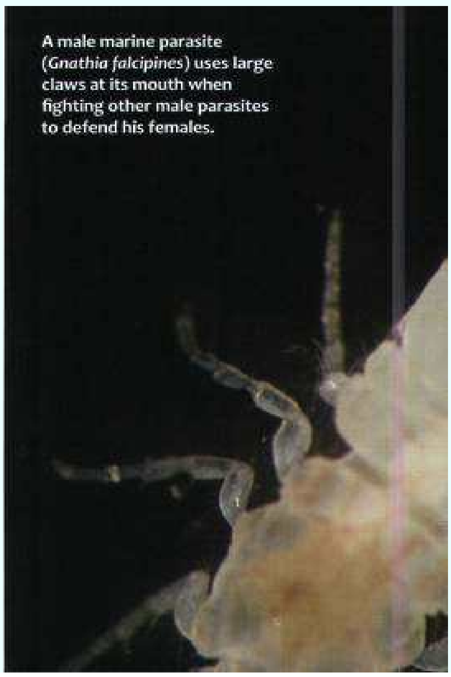
The cleaner fish occupy specific "stations" on the reef where other fish will come when they need to have parasites removed. Grutter has revealed that some fish visit these stations 150 times each day (*AS*, June 1999, p.9), and a single cleaner can eat 1200 parasites a day.

The parasites probably don't kill fish directly, but Grutter has found that larvae infected by parasites have poorer swimming performance and oxygen consumption. In the competitive environment of the reef this can be enough to ensure that a fish does not survive. Some parasites have also been implicated in transmitting blood parasites, much like mosquitoes do with malaria.

While the benefits of being cleaned are large, ensuring that the operation goes smoothly for both sides can be tricky. After all, cleaner fish would make a tasty morsel for species that are used to eating anything they can get their jaws on. It is detrimental for reef fish in general if cleaners get eaten, but no one is quite sure why no species seems to take advantage of the benefits of an easy meal given that the cleaners are not hard to find.

Grutter has shown that cleaner fish use "tactile dances" to establish their credentials with fish that might be tempted to eat them, dancing more when they encounter hungrier fish (*AS*, September 2004, p.8). Some fish act as cleaners when they are young, but as they grow they take up other lifestyles, perhaps because they can't get enough food from cleaning alone.

More recently Grutter demonstrated that some cleaner fish cheat, eating mucus rather than parasites off a client. Unsurprisingly, clients do not appreciate this, and seek out reliable cleaners by watching how cleaners behave with other clients. It


A male marine parasite (*Gnathia falcipines*) uses large claws at its mouth when fighting other male parasites to defend his females.

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A pregnant female marine parasite (*Gnathia aureusmaculosa*) can carry 25–30 eggs inside her.

A cleaner fish swims into the gills of a coral trout to remove even the best-hidden parasites.

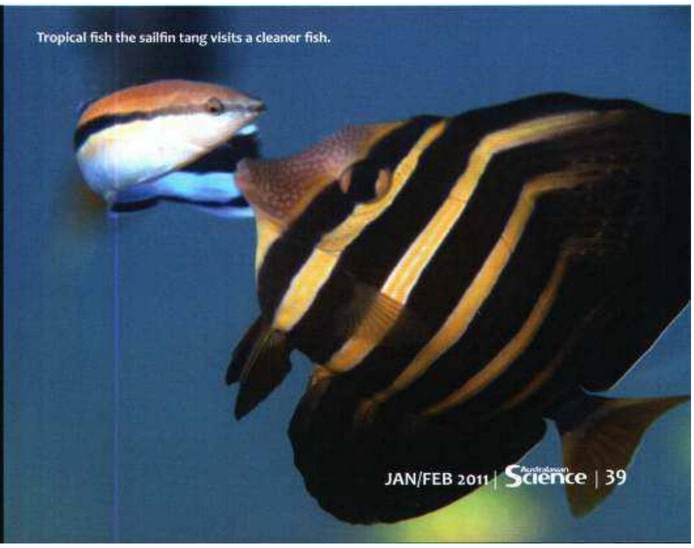
seems that even though cleaner fish prefer mucus to parasites (demonstrated when Grutter offered them both on plates) they will usually stick to eating parasites in order to impress potential clients that may be watching (*AS*, August 2006, p.9)

The bright colours visible in these photographs are no coincidence. Grutter's colleague, Dr Karen Cheney, showed that cleaner fish worldwide are usually blue and yellow, with the exceptions having a black horizontal stripe adjacent to one of those colours along their length. These colours stand out best against coral and water backgrounds, serving as a form of advertising. Cheney found that other fish are more likely to approach a fish-shaped object if it has these colours (*AS*, August 2009, p.11).

The parasites are intriguing in their own right. With hosts visiting cleaning stations frequently, parasites must avoid hanging on too long lest they be eaten. "The longest they stay on for is an hour, and in their entire lifetime they may be on a fish for a maximum of 3 hours," Grutter says. "In some ways they are more like mosquitoes than ticks." Clients may be almost constantly infected with parasites, she has found, but they are different individuals doing the infecting.

Female marine ticks carry their young in a body compartment similar to a marsupial's pouch. "They have about 30 babies in this pouch and, when the mother releases them, all these tinier parasites shoot out and swim out into the ocean wilderness," Grutter says.

Although these particular parasites are less of a problem in the open oceans, others exist, and Grutter says there are reports of cleaners setting up homes among floating debris, to which pelagic fish come for an occasional clean.



Tropical fish the sailfin tang visits a cleaner fish.

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Fish Net Protects Sleeping Fish from Parasites

The Seed for Speciation

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Fish Net Protects Sleeping Fish from Parasites

Dr Lexa Grutter of the University of Queensland's School of Biological Sciences has revolutionised our understanding of cleaner fish (see pp.38–39), and has now revealed what fish do at night when the cleaners are asleep and are not removing gnathiid isopods, which take blood and appear to transmit disease.

"Fish seek cleaner fish to remove these 'marine mosquitoes' during the day," Grutter says. "At night, when cleaner fish sleep, mucous cocoons act like 'mosquito nets', allowing fish to sleep safely without being constantly bitten: a phenomenon new to science."

The remarkable behaviour has been a source of wonderment for some time – guides on night dives like to point out examples of fish in these cocoons sleeping under ledges or in cracks in rocks. It has been suggested this was done to fend off attacks by eels, perhaps because the mucus tastes bad or hides the fish's scent. However, evidence for the idea is weak.

Cleaner wrasse are one species that cocoon themselves, drawing Grutter's attention. Honours student Jennifer Rumney collected coral parrotfish, kept them in tanks overnight and added parasites at midnight. Rumney compared the number of infestations for fish allowed to stay in their cocoon with those that had the mucus removed before the parasites were added.

The results were stark. More than 90% of the fish stripped of their mucus were attacked by gnathiids, as against 10% of those left in peace. The cocoon's importance is revealed by the fact that some of the fish that had the cocoon removed simply made another one, even though the removal was done while they were asleep.

The mass of mucus required increases much more slowly than the size of the fish, so while it represents a significant energy burden on a small fish, production costs fall for larger individuals. On average Grutter estimates that the mucus represents 2.5% of the fish's daily energy budget.

The mucus is produced in a gland below the gills and comes out through the mouth. Grutter thinks it is probably different from the mucus that covers parrotfish during the day, which at the very least is produced by a different gland.

The mucous cocoons used by fish to protect them from parasites at night are so transparent that sand was added to this one to make it visible.
Photo: Lexa Grutter