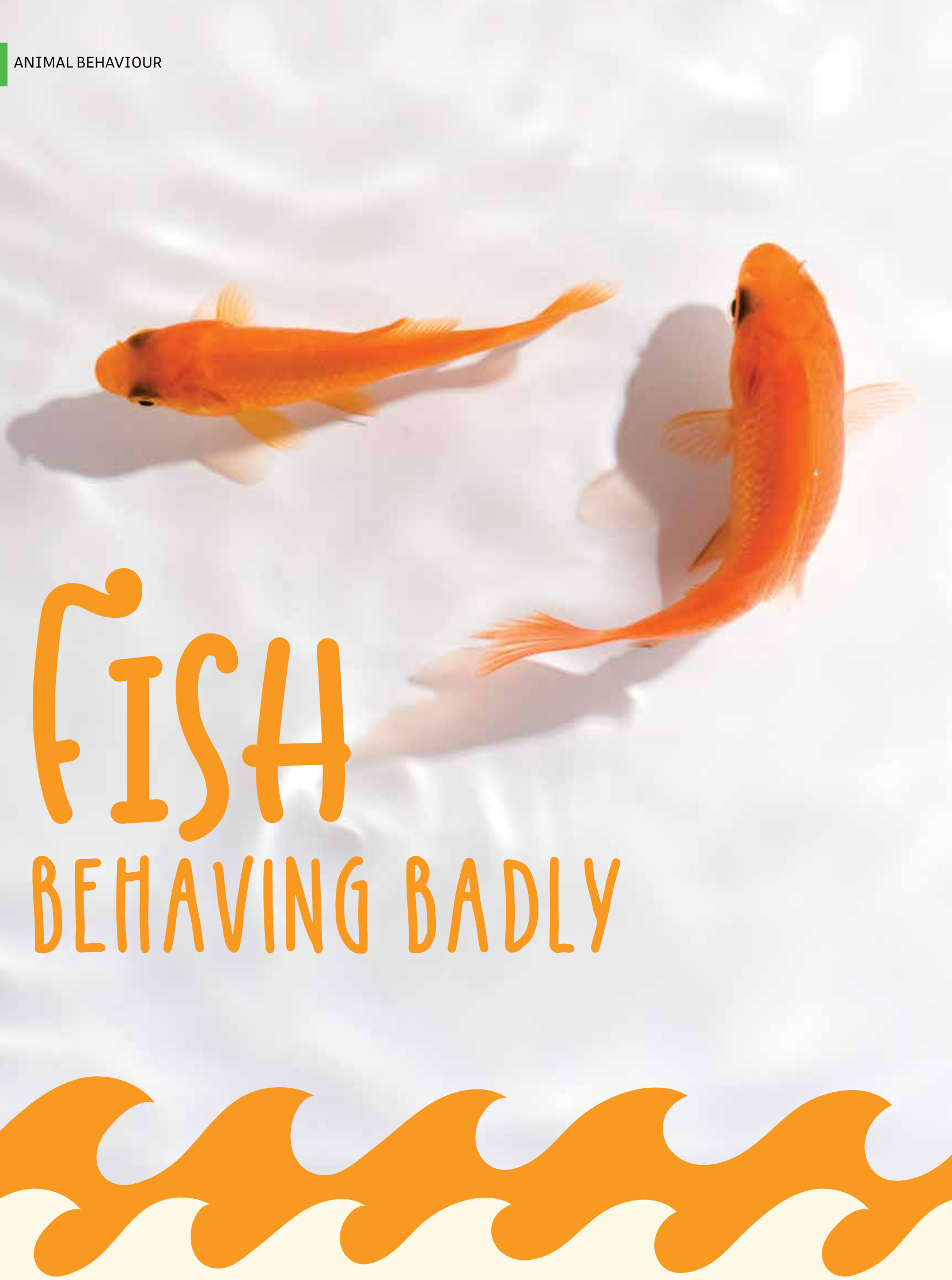

FISH BEHAVING BADLY

AND OTHER WAYS IN WHICH THEY'RE ONLY HUMAN

Goldfish made the news recently when the media claimed that their attention span is longer than that of humans. Supposedly our addiction to our devices has turned us all into airheads. The luckless goldfish was used as a benchmark of slow-wittedness. But journalists had it all wrong.

The truth is that fish are smart – and not too different from us. Some sing and dance and party. Others run businesses that require them having to remember hundreds of other fish and whether those fish are happy customers or not. Sounds like a fishy story? Don't believe a word of it? Read on and MARKtoe! will change the way you see your scaly friends forever.

By Anna Mouton

TAKEN TO THE CLEANERS

As morning dawns on the reef, a long queue forms at the wrasse's valet service. Some fish are locals – this is the only cleaner station in their territory. Others range further afield and therefore have a choice of cleaners. A cleaner wrasse services hundreds of clients every day, removing parasites and tending wounds. Isn't nature wonderful?

Well yes, if you consider underhanded business practices a marvel of evolution. For starters, cleaner wrasses don't provide all with the same levels of service. They give preference to out-of-towners and let the locals wait – seemingly knowing that locals have nowhere else to go. Using the same reasoning, they also take extra care with a client if an out-of-towner is watching them, but not if the next fish in line is a local. Waiting fish will leave if the current client looks dissatisfied and the out-of-towner may never come back.

Cleaner wrasse regularly cheat clients by nibbling bits of healthy tissue instead of sticking to tending wounds and eating parasites.

Cleaner wrasse regularly cheat clients by nibbling bits of healthy tissue instead of sticking to tending wounds and eating parasites. When a client fish notices, it chases the wrasse away aggressively. Wrasse remember angry clients and make sure to give them better service next time. As with humans, it pays to make yourself heard.

FAMILY TIES

Fish are a varied bunch. Some live their whole life in huge shoals and travel the oceans. Others stay at home with their families. Yes, you read that right. Some fish have family lives too. One such is Neolamprologus multifasciatus from Lake Tanganyika. With a name that's longer than its body, the world is a dangerous place and raising a brood can be challenging. So this species gets their family to help out.

Multies, as they're known to their friends, form extended family groups. An adult pair lays eggs and tends the babies in a nest. Older brothers and sisters do their bit by fanning the eggs, cleaning the nest, chasing off predators and generally making themselves useful. Wouldn't it be great if all teenagers were so cooperative?

Fish of the same species might all look the same to us, but individuals can tell each other apart. Fish can recognise friends and family by sight and smell. Researchers have found that certain salmonids can recognise their siblings by odour even when they were separated as eggs. And these scaly friends definitely know who you are – it has been shown that some fish remember a particular human for at least six months.

SCHOOLING FISH

Fish school and it seems that's also how they learn. No, this isn't just a terrible pun. Fish really do watch other fish to gain information. In an experiment with guppies, researchers trained a few fish how to reach a hidden food source. When they introduced new fish into the tank, these learnt to find the food by following those in the know. Scientists call this social learning – sort of like us checking TripAdvisor.

Guppies make decisions about mates based on the behaviour of others. Female guppies usually prefer the most colourful males. But if they see a less good-looking guy hitting it off with a girl they'll rate him higher than a more beautiful rival. Oddly, young female guppies tend to go for males chosen by older females, regardless of colour.

Juvenile fish watch their elders to discover what to eat and what to avoid. Some catfish teach their young by bringing suitable food to their nest. Bet you never imagined fish feeding their babies! Throughout their lives, fish are more likely to eat an unfamiliar food if they see another fish – of the same species – consuming it. Youngsters also learn to escape predators by copying the responses of older fish.

AN EAR FOR TROUBLE

Humans can typically hear sounds in the 20 hertz to 20 kilohertz frequency range. Most of our talking is in the 500 hertz to 8 kilohertz range. Fish hear in the range 50 hertz to 3 kilohertz. So your goldfish is definitely listening to you. Exposure to loud noise has the same effect on your fishy friends as clubbing has on ravers – temporary loss of hearing. Keep that in mind before you turn up the stereo close to the aquarium.

Certain fish can detect sounds with frequencies too high for humans to hear. This helps them outsmart predators like dolphins. Dolphins use high-frequency ultrasound to find fish by echolocation. Shad can hear them from a distance – up to 100 meters away – and then they quickly beat a retreat. Researchers think that fish's hearing evolved to help them to escape predators and to home in on prey.

Fish such as piranhas are attracted by splashing sounds. Indigenous Amazonian peoples hit the surface of the water with sticks to lure piranhas within range of spears and nets. Grilled piranhas make good eating. But should you fall into a river full of piranhas, best try and be quiet about it.

DRUMMING UP A STORM

Scientists think that fish were the first vertebrates that communicated by making sounds. This ability probably evolved around 300 million years ago. Different species of fish may produce grunts, clicks, growls and whistles. Some can make drumming sounds by vibrating their swim bladder. The best-known of these are even called drums and belong to the sciaenid group.

Male fish are usually the ones making the most noise as they try to attract the attention of females. Drums can come together in a chorus during the breeding season, with each male beating his drum as loudly as he can. The guys with the loudest booming seem to get the most girls. The spawning choruses can continue all night – who knew fish were such party animals?

Damselfish males court females with a combination of song and dance. Male damselfish are sort-of the Elvis Presleys of the coral reef. Females rate them on how well they can produce sounds while jumping. Each defends a territory against rivals and can recognise all their nearest neighbours by their sound. They can also tell if an unfamiliar voice is from a male of the same or a different species of damselfish.

A FISHEYE VIEW

Seeing underwater is complicated. Even clear water distorts and absorbs light and many fish live in murky areas. Fish have eyes similar to our own, but they have more types of light-detecting cells in their retinas. This allows them to make sense of the complex light patterns of the underwater environment.

Fish can see in the air about as well as we do underwater without goggles. For those creatures that need access to both worlds, special measures are required. One such is the four-eyed fish from Central America. He swims along the surface and can see above and below water at the same time. Each of his two eyes is divided into an upper half for seeing in the air and a lower half for viewing the underwater world – effectively making four eyes out of two.

We all know that fish are coldblooded. But some top predators can warm parts of their bodies while they hunt. Swordfish hunt by sight and raise the temperature of their eyes and brain by as much as 15 degrees Celsius when chasing prey. This lets them track fleeing fish ten times faster than at normal body temperature.

SEEING RED

Fish see in colour. Goldfish and koi can see all the colours that we do as well as ultraviolet light. In case you wondered, their favourite colour is red. You may have noticed that fish food usually includes red flakes or pellets because fish tend to go for red food. Scientists think it's because these foods contain more carotenoids. Carotenoids are the red and orange pigments found in things like carrots and flamingos. Fish and other animals such as humans need carotenoids to stay healthy.

Their least favourite colours are blue and yellow. In the sea, poisonous creatures use these colours to warn off potential enemies. If this rings a bell, you may have seen the 1983 James Bond movie featuring the venomous blue-ringed octopus. Also, the official uniform of the cleaner wrasse is blue and yellow – maybe to discourage angry clients from swallowing them.

Certain wavelengths of light are absorbed by water. So the deeper you go, the fewer colours are visible. Fish that live in deep water are partially colour blind, but they are able to make the most of dim light. Some have retroflectors in their eyes – a system shared by cats and the eponymous cat's eyes embedded in roads.

IN THE BEST TASTE

Fish are superior to most mammals in their sense of taste. This is especially true of catfish, koi and goldfish. Whereas humans only have taste buds in their mouth, fish have them all over their bodies. As much as 20 percent of the brain of a fish may be devoted to processing information on taste. That is comparable to the area of our brains that we use for vision. We have a mental map of how our environment looks – a fish has the same map based on how it tastes. Think about that next time you want to put off cleaning the fish tank.

Fish have other ways of optimising feeding besides their amazing powers of taste. Goldfish can sort food from other particles inside their oral cavity. They can take in a mouthful of gravel, separate out any bits of fish flake, swallow the flakes and spit out the gravel. If you don't think that's anything special, try it for yourself – but maybe use Smarties rather than fish flakes.

So there you have it. Fish are just as complicated as people. But they also have enough sense to stay away from smartphones!