

Carbon dioxide affecting brains of fish

Rising CO₂ levels may be affecting the brains and central nervous systems of sea fishes with serious consequences for their survival, an international scientific team has found.



Credit: Courtesy Dr Simon Foale, ARC Centre of Excellence for Coral Reef Studies

A research team from the [ARC Centre of Excellence for Coral Reef Studies](#) and James Cook University led by Prof. Philip Munday has found that high CO₂ levels in sea water disrupt a key brain receptor, called GABA-A, in fish, causing marked changes in their behaviour and sensory ability. The researchers have published their findings in the journal *Nature Climate Change*.

‘We’ve now established it isn’t simply the acidification of the oceans that is causing disruption – as is the case with shellfish and plankton with chalky skeletons – but the actual dissolved CO₂ itself is damaging the fishes’ nervous systems,’ says Prof. Munday.

The team began by studying how baby clown and damsel fishes performed alongside their predators in CO₂-enriched water. They found that, while the predators were somewhat affected, the baby fish suffered much higher rates of attrition.

‘Our early work showed that the sense of smell of baby fish was harmed by higher CO₂ in the water – meaning they found it harder to locate a reef to settle on or detect the warning smell of a predator fish,’ continues Prof. Munday

The team then found that the fishes’ sense of hearing was also affected. ‘They were confused and no longer avoided reef sounds during the day. Being attracted to reefs during daylight would make them easy meat for predators.’

Other work showed the fish also tended to lose their natural instinct to turn left or right – an important factor in

schooling behaviour. This also makes them more vulnerable, as lone fish are easily eaten by predators.

According to Prof. Munday, 'all this led us to suspect it wasn't simply damage to their individual senses that was going on – but rather, that higher levels of carbon dioxide were affecting their whole central nervous system'.

The work shows that fish with high oxygen consumption are likely to be most affected, suggesting the effects of high CO₂ may impair some species more than others – possibly including important species targeted by the world's fishing industries.

Source: ARC Centre of Excellence for Coral Reef Studies

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