

Cleaning Symbiosis in Zimbabwean Freshwater Fish

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In animal communities it is common to find groups forming where individuals get together for company or to groom each other to remove parasites and dead skin from their bodies. This is of mutual benefit to each and develops cohesion and bonding amongst family and larger groups. This grooming is noticeable amongst birds, canines and primates, including humans, where it assumes particular importance in our social organization throughout life, although we don't spend too much time cracking lice or nits between our teeth these days!

So-called lower forms of life do not form many noticeable groupings like this, so it came as a surprise when it was reported in oceanic coral reef fishes in the late '50's and early 1960's. Small conspicuous fish occupied a fixed spot in a reef and cleaned parasites and dead skin off larger fish that had adopted a posture advertising their need. Termed cleaner fish at a cleaning station, researchers showed they were key organisms in assemblages of species composing populations of various habitats. The clarity of the water was thought to be a key factor as, apparently, cleaning functions only in daylight. In 1970, cleaning symbiosis was first reported from fresh waters in America, followed two years later by a report from India.

In August 1973 we received a call from CAPCO at Kariba Dam, that a white fish was visible in the stilling pool below the wall. Dale Kenmuir, George Begg and I drove the short distance to the wall and spotted the fish swimming below us in the stilling pool. Being hemmed in by rocks, thus sheltered from turbulence the chance of trapping it was good. We fetched a seine net and container and, with permission, entered the raceways area. Swimming out with the net we corralled the fish. Back at the laboratory we put the adult albino *Tilapia rendalli* (redbreast bream) into a large 2100 l aquarium containing a few small *Labeo cylindricus* (redeye labeos). Unfortunately, netting the fish damaged the skin on some scales and white tufts of *Saprolegnia* fungus quickly grew in the lesions.

A few days later I noticed the bream hanging head downwards, slowly sinking towards the tank bottom and thought it was dying from the infection. As I moved nearer, the fish swam to the surface and fed on lettuce leaves provided as food. The bream then hung head down again and I saw a juvenile *Labeo* approach it and feed on tufts of fungus on its side. I realized cleaning symbiosis was occurring and screened off the aquarium front with hessian to prevent passers-by disrupting the behaviour. A peephole enabled me to study this interaction for a few hours each day over a period of six days. Briefly, this is what I recorded :-

The redbreast swam around in a normal horizontal manner, then slowly assumed a head down position with all fins spread out (except for the spinous half of the dorsal fin) and remained immobile. Five to ten seconds later, a ± 6 cm *Labeo* swam up to the host fish and began nibbling at a fungus patch. While being cleaned, the host gradually sank towards the bottom of the tank, often modifying the head down stance to 60° from horizontal. After two to three minutes the host regained the normal horizontal position, and the cleaner swam away. The bream then swam around slowly before repeating the head down signal. Between cleaning encounters, the *Labeo* sometimes swam around the host fish; occasionally approaching the head closely. However, contact only took place after the head down posture was adopted. The *Labeo* did not display any specific intention signaling to the host that I could recognize.

After six days the white fungal filaments had disappeared and all that remained were red patches on the scales of the host. The incidence of cleaning encounters had decreased from ten to two per hour. In between cleaning encounters the *rendalli* acted normally, fed well on lettuce and pellets and moved about the tank. It did not appear as a sick or dying fish; recovered from the fungus, lived for several more years and bred in the tank. I published this encounter in the Limnological Journal of southern Africa, only in 1985.

The fact that host posing displays are now known to exist in freshwater fish all around the world, indicates

that cleaning symbiosis is far more widespread and important amongst freshwater fishes than has hitherto been suspected. In the sea, it represents one of the primary relationships within communities of fish, easily observable due to the extreme clarity of tropical coral reef waters, thus very well documented. Unfortunately the turbidity of our rivers and streams makes such observations extremely difficult. The only place where I saw a bream assume a head down stance in the presence of *L. cylindricus* was in a pristine pool of the Showe tributary in the Deka River catchment, bordering Botswana. Lions in the vicinity unfortunately aborted my chance of actually watching cleaning taking place in the wild. I am positive that it is of primary importance to all our freshwater communities of fishes.

L. cylindricus is a ubiquitous fish in South, Central and East Africa and the almost immediate reaction to *T. rendalli*'s head down pose suggested that cleaning symbiosis is inherent amongst Africa's lake and river fish populations, helping in the maintenance of healthy fishes by removal of disease organisms. Since the above observation, cleaning symbiosis has been noted in lakes Malawi, Victoria and in the Cape Province.

References

- Minshull, J.L. 1985. Cleaning behaviour between the cichlid fish *Tilapia rendalli rendalli* Boulenger 1896 and the cyprinid, *Labeo cylindricus* Peters 1852. J. Limnol. Soc. sth. Afr. **11**(1), 20-21.
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