J. Grad. Sch. Biosp. Sci.,
Hiroshima Univ. (2003), **42** : 69～70

A study on the foraging behavior of the piscivorous cornetfish, *Fistularia commersonii*

Naoko TAKEUCHI

Graduate school of Biosphere Science, Hiroshima University,
Higashi-Hiroshima 739-8528, Japan

Piscivore that eat other fish play a significant role in the structuring of coral reef communities. Many studies have been made regarding the foraging ecology of piscivore, mainly investigating the food habits by stomach content analyses. However, very few attempts have been made at observing the foraging behavior of piscivore in the field. This study aimed to elucidate the mechanisms of the foraging behavior of a piscivore, the cornetfish *Fistularia commersonii* Rüppell (maximum 1.2 m SL) in the shallow reef waters of Kuchinoerabu-jima Island, southern Japan.

From observations of foraging behavior and by stomach contents analyses, cornetfish were found to forage on two types of fishes that live in different habitats; one type was 'reef fish', such as triplefins and wrasses, that dwelt near or on the substrate, while the other type was 'pelagic fish', such as herrings and jacks, that schooled in water columns. Small individual (< 40 cm SL) cornetfish foraged on the reef fish type of prey, but only with other small cornetfish. However, large individuals (> 40 cm SL) foraged on both reef and pelagic fish types in either solitary or heterospecific group conditions. It is considered that small cornetfish cannot potentially give chase to pelagic fish that escape from their initial attack, or align with heterospecies that are fast swimmers (e.g., green turtle, jack) due to the cornetfishes' inadequate swimming speed. Moreover, small cornetfish might come under high predation pressure, which will prevent them from attempting to forage for pelagic fish in a water column where there are no hiding places.

Large cornetfish, if a school of pelagic fish was not presently near or around, concentrated their solitary searching for reef fish near the substrate. After detecting reef fish, the individual stalked to get near the prey. When positioned for capture, an individual often displayed a series of distinct brown bars on the body and drew the midsection into a modified 'S' shape (as viewed from above). At this point, the individual would suddenly dart forward to engulf the reef fish. Large cornetfish stalked not only in solitary conditions, but also associated with other fishes or animals of various feeding habitats (e.g., herbivorous surgeonfish, carnivorous sea snake). It seems that the use of other species that feed on prey near the substrate would result in a high strike efficiency for a concealed cornetfish.

If a school of pelagic fish was present around a large individual cornetfish, the individual shifted its choice of prey type to the pelagic fish, regardless of the presence or absence of reef fish. An individual would slowly approach a school of pelagic fish from the bottom water. Individuals employed various hunting behaviors against pelagic fish. 1) If the school of pelagic fish was near the bulge substrate on a reef, the individual moved there and waited motionlessly at the site. When the school approached the site, the individual attacked the school from the bottom water. 2) If a group of herbivorous or carnivorous fish fed on prey at the bottom under a school of

pelagic fish, the individual cornetfish approached and attacked the pelagic fish from its position of alignment with the group of the other species. 3) If another individual cornetfish or piscivorous fish (e.g., needlefish, jack, or lizardfish) attacked schooling pelagic fish, the cornetfish would aim at and attack a separated pelagic fish. Other fishes, including other piscivore or carnivore, also use the attacking behavior of the cornetfish against pelagic fish, which they too can capture. 4) Individual cornetfish would chase a school of pelagic fish, and then aligning with another cornetfish or sometimes with other piscivorous fishes. After the school was driven into the surface water, to a rock, or a hollow in the shore, individual cornetfish would start to attack the pelagic fish.

Cornetfish, especially large individuals, are able to efficiency forage against reef and pelagic fish by combining with other foraging animals, e.g. cornetfish, another fish species, or reptiles. Similarly, other species of piscivorous fishes may also gain a chance to attack or for active foraging by combining with foraging cornetfish. The tubular snout of the cornetfish seems to be adapted to suction feeding against cryptic prey in cavities or under the substrate. Cornetfish may also be able to approach close to prey fish especially reef fish, because the prey fish cannot easily see the small end of the long snout of the cornetfish. Schools of pelagic fish in a water column are easy to find, and have a high calorie per fish count; more so than the reef fish on the substrate. By foraging against pelagic fish rather than reef fish, cornetfish seem to attain a high growth rate, demonstrated by their size, and show reproductive success, demonstrated by their survival in this environment.

We conclude that the interactions produced by foraging behavior of other cornetfish or heterospecies are very important for the survival of individual cornetfish. Thus, there might be commensalism or mutualism in the intra-, or interspecific relationships of piscivores. To better elucidate the importance of species diversity, behavioral interactions between various animals need to be investigated in further field surveys.

Key words: Fistularridae, piscivore, foraging behavior, interaction