M.Sc. Final IVth Semester (Zoology)

Paper- II - Fishery Biology - Taxonomy and Ecology of Pisces

Interspecific Inter-Relationships Among fishes:

The character of interspecific connections, as that of intraspecific ones, develops during the process of evolution, as an adaptation to the new living conditions. The formation of new species proceeds by means of the development of adaptations to the abiotic and biotic conditions of the particular geographical zone in which they become established, and usually bears a group character. As a result there develops the so-called faunistic complex, a group of species connected by the generality of their geographical origin, particularly their development in one geographical zone, to the abiotic and biotic conditions of which the species making up the complex are adapted. In the process of the establishment of a faunistic complex regularities become established in the connection between the species making up the complex, namely, a reduction in feeding competition due to the divergence of their dietary spectra, particularly in fishes of mature age, definite adaptations in predators and their prey.

The prey-species evolve the essential fecundity and protective adaptations coloration, thorns, spikes, toxicity - which protect them from predators. It should be realized that protective devices are rarely absolute; they merely cause a relative reduction in the effectiveness of predators. Thus for example the presence of spines on the dorsal fin of Acanthorhodeus reduces its consumption by predators in comparison with the common bitterling, which has no spines. Spines on fishes are not only a form of armature. They increase the size of the fish and make them less available to the predators.

There are certain differences in the nature of the interspecific relationship in faunistic complexes at different latitudes. Thus the faunistic complexes of lower latitudes are characterized by intensive relationships of the type "predator-prey" and there is a corresponding increase in the development of protective adaptations.

Predators of lower latitudes, on mixing with prey species of higher latitudes, which are usually less well protected, start to feed on the latter. It is conversely, considerably more difficult for the predator originating from higher latitudes to start feeding upon the prey species of the lower latitudes.

The nature of the interspecific relationships between fishes is extremely varied; it includes predation, parasitism, commensalism, competitive relationships over food and a number of other connections.

In respect of the "predator → prey" type of relationships, predatory species evolve adaptations for the capture of their food and for its assimilation while the fishes serve as the prey have evolved corresponding protective devices. Protective adaptations are extremely variable. Many fishes have evolved some form of toxicity. Poisonous fishes may be either actively or passively toxic. Actively poisonous fishes are those which have poison glands, usually distributed at the bases of the fin spines or else on the gill-covers. Some times the mucus covering the body of the fish is poisonous.

The poison glands of fishes are epidermal glandular cells, which may or may not be isolated from the rest of the epidermal cells. In its mode of action the poison of these glands is somewhat like that of snakes. The most powerful poison is that of the sea-devil. There are frequent cases of death through being pricked by its spines. Death occurs within 2 hours to a day and is very painful.

Electric organs: Some fishes, both hunters and hunted, can produce electrical discharges. The electric eel, Electrophorus electricus paralyses its prey by discharging its electrical batteries into it. The electrical organs of E. electricus and many other fishes are modified muscular tissues. Columnar cells which develop in the muscles have the property of acting as Leyden jars, accumulating muscular electricity which is discharged arbitrarily by the animal. The force of the electric cell's discharge is upto 300 v and can fell a large animal. Electric eels feed upon small fishes which they first of all paralyse with their electricity and then swallow.

Parasitism: Interspecific parasitism is rather rare among fishes. Two types of parasitism have been observed ① the parasitic fish more or less rapidly kills the its host ② the parasitic fish does not kill its host. In the first type the inter-specific parasitism of the cyclostomes borders on predation. We observe this in the hagfish. The common hagfish, Myxine glutinosa, bores into the bodies of the live fishes, gradually eating the contents and eventually leading to the death of the prey. The deep water eels of the family Simenchelidae also lead a similar mode of life, boring into the bodies of large fishes and feeding on their contents.

The inter-relationship between two species of American sheat-fish is an example of the second type of parasitism. The sheat fish Stegophilus parasitizes the gill cavities of the larger sheat-fish Platystoma and feeds by sucking the blood of its host.

Commensalism: a form of relationship between animals which is beneficial to one side and indifferent to the other, has been observed among fishes. The most characteristic example is the relationship between the sharks and the sucker-fish Echineis naucrates. In the sucker-fish the first dorsal fin is modified to form a sucker lying on the upper side of the head, by means of which this fish attaches itself to sharks and travels along with them, feeding on what the sharks leaves over. The strength of such a sucker may be illustrated by the fact that the aborigines use the sucker-fish for catching turtles. They tie a thin string to the tail of the sucker fish, and when they see a turtle in the water they throw the fish next to it.