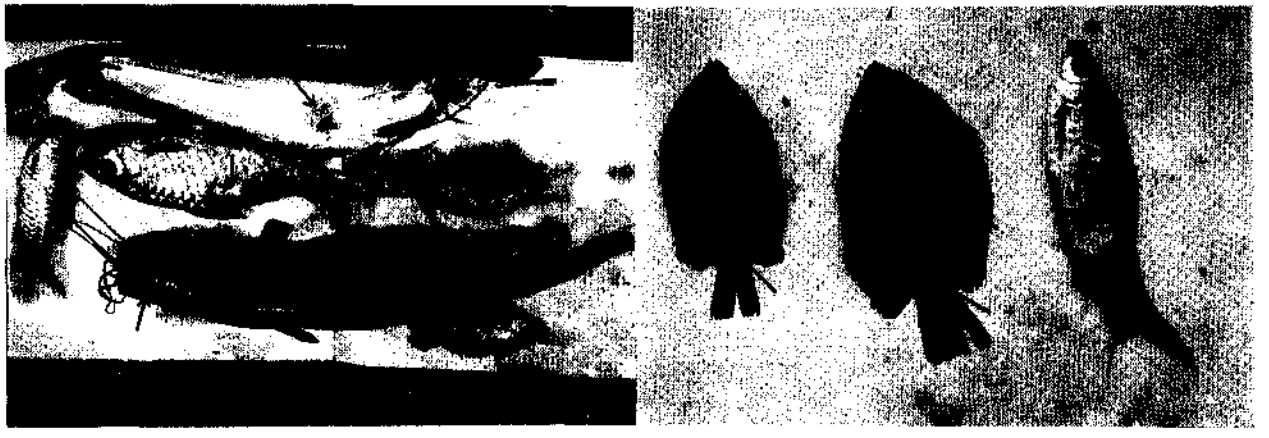
FISH DISEASE OUTBREAK IN KERALA STATE

During the peak south-west monsoon period (July-August, 1991), the outbreak of a severe fish disease was reported from the fresh water fishes of Kerala state. The wide coverage given by local newspapers and national media, caused panic among the public. The fish trade virtually came to a stand still. Scientists of CMFRI at Cochin and Calicut rose to the occasion and started detailed investigation. The nature and spread of the disease indicated that it was similar to 'Epizootic Ulcerative Syndrome (EUS) / Ulcerative Disease Syndrome (UDS) reported from various parts of South-east Asia. The main target of EUS was snake-heads (*Channa/Ophiocephalus* sp.).

The disease first appeared in Thailand in 1980. It had affected the fresh water fisheries of Philippines, Indonesia and other neighbouring countries during 1980-1985. EUS first appeared in north-eastern part of the Indian subcontinent in 1989 and spread westwards and southwards. In 1990, the disease reached Srilanka. In February, 1991, the disease was reported from several parts of Tamil Nadu particularly in the Kaveri delta region. In July, 1991, the disease appeared in the Pookodu lake and Padinjarathara reservoir of Wyanad District. Simultaneously the disease started appearing in various parts of Kuttanadu paddy fields and canals adjoining the Vembanadu lake. The areas affected mainly came in the districts of Kottayam and Alappuzha, in Kerala. The Scientists from the CMFRI visited Shertallai, Mannancherry, Muhamma, Kumarakom, Kottayam, Parippu, Vechoor, Chengulam and Poonamada.

In Kuttanadu, the disease first appeared in paddy fields and spread quickly to fishes of lake, ponds and wells. Everywhere the snakeheads (*Channa striatus*) were the first victims of the disease followed by other bottom dwelling fishes like *Heteropneustes fossils, Wallago attu, Glossogobius giuris, Etroplus suratensis, E. maculatus* and *Puntius filamentosus*. It was observed that the fishes stopped feeding, came to surface and remained vertical. The most remarkable feature of this disease was the formation of deep oozing ulcers all over the body including tail and fins giving an ugly appearance to the fish.

In the areas where the disease surfaced initially, it disappeared from the bottom dwelling fishes within a week, but spread to small pelagic fishes. When the disease showed a declining trend in Kuttanadu, it started appearing in new areas adjoining Kuttanadu and upper reaches of rivers Meenachil, Muvattupuzha and Pamba. It spread to places like Mavelikkara, Thottapally, Kayamkulam etc. In the month of October and November, 1991, the disease was found to affect the same kind of species of fishes in paddy



Fishes affected with EUS. Note the external ulcerations and erosions of skin

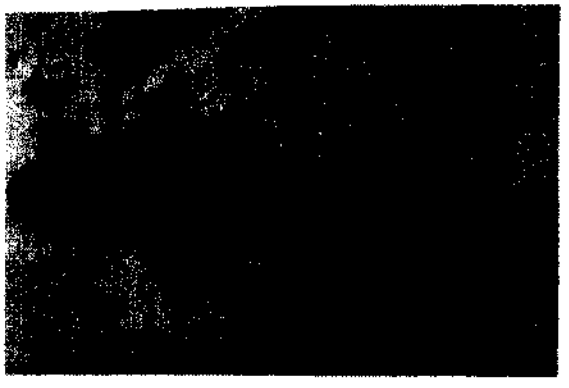
fields of Trichur, Vadakkancherry and moved towards south of district Trichur particularly to places like Mala and Chalakudy. In January, 1992, it reached the Ernakulam district. In this district, the fishes of the area around river Periyar was found affected. During this period the carps maintained at Ambalamughal by FACT Cochin Division were seen infected by the disease.

A detailed examination of apparently affected and unaffected specimens revealed the fact that the disease was septecaemic in nature

Etroplus suratensis having ulcer in tail region

affecting internal organs. It was observed in many instances that the fishes developed only internal lesions and died without developing any external ulcers in body. The empty intestine indicated that the fishes had stopped feeding for some duration. The observed changes in intestine, spleens, peritonium, kidney and other internal organs were indicative of inflammatory reaction.

The symptoms of the disease appeared as red patches on the body surface together with reddening of one or both eyes, which were found



Glosso gobius giuris with deep body ulcers giving an ugly appearance to the fish

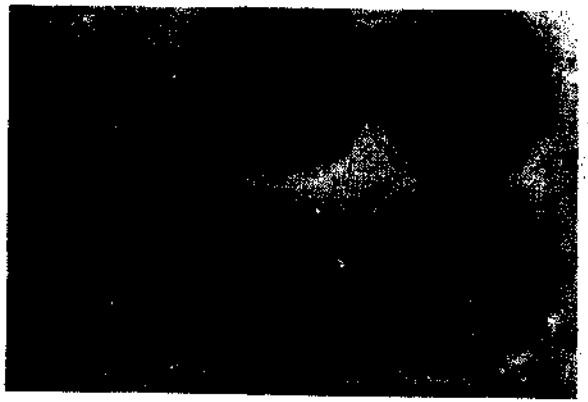
to be due to congestions of blood vessels and haemorrhages. The area of red patches became white or grey due to necrosis of epidermal cells. Erosions and deep ulcers were found developing in later stages. The ulcers reached upto muscular layer and a grey or brownish foul smelling fluid was found oozing out. Most of the necrotic patches and erosions were initially covered with cotton wool like growth of the fungus *Saprolegnia* sp. It was noticed that in many fishes the operculam of one or both sides were lost along with severe ulcerations of gills. In several cases eyes became opaque and bulged out or ulcerated.

The histological studies showed inflammatory, necrotic and proliferative lesions in a number of tissues/organs like intestine, spleen, pancreas,

Experimental innoculation of *A. salmoncida* produced disease symptoms in goldfish. The picture shows skin ulceration and erosions in interadermally innoculated gold fish.

liver, heart etc and varied from individual to individual. Histological studies of ulcers indicated foci of liquifaction of cells with little inflammatory cellular infiltration. However, in the periphery of necrosis, fibrinous exudate and mononuclear cell reactions were noticed.

The Microbiological studies conducted at CMFRI, revealed heavy infection by fungi and gram negative bacteria such as *Aeromonas salmonicida, A. hydrophila* and *Pseudomonas* sp. Among them the role of *A. hydrophila* as a major pathogen is doubtful because of its opportunistic nature. *A. salmonicida* according to earlier reports is the causative agent for the famous



Bacterial cultures obtained from diseased fishes maintained on Tryptone Soya agar plates. The dark coloured plates contained *A. salmonicida* which changed the colour of medium. The white plates contained *A. hydrophila*

'Furunculosis' epidemic in salmonids during the early 20th century. Furunculosis/*A. salmonicida* infection is an ulcerative and septecaemic disease of salmonid fishes, very similar to EUS. Recent information on furunculosis reveals that the infection is confined not to salmonid fishes only but to other fresh water fishes also. This disease is known by different names such as erythrodermatitis, ulcer disease, cutaneous ulcerations etc.

In the present investigation, *A. salmonicida* could be isolated from blood, kidney and spleen of infected fishes exhibiting early signs of the disease. This was confirmed by culturing the isolated organism in the laboratory which exhibited its typical cultural and biochemical characters. This isolation of *A. salmonicida* is a significant achievement.

Further, attempts were made to isolate the crude toxin from culture by growing the culture on the surface of sterile cellophane sheet which was kept over the media. The saline washings of culture were centrifuged to get bacteria free extracellular toxin. The saline extract was injected to experimental fish and it caused instantaneous death of fish.

The presence of antibodies against *A.salmonicida* in the pooled serum of fishes showing advanced lesions and healed ulcers indicated involvement of *A. salmonicida* in the present out break.This aspect was confirmed by "Ouchterlony' sagar gel precipitation test". Interadermal innoculation trials with a saline suspension of *A. salmonicida* induced skin ulcers whereas oral administration of the same caused instant death which may be due to extracellular toxins.

Since EUS is an epidemic affecting the fresh water fishery sector, under the State Committee on Science, Technology and Environment, Trivandrum, an inter-institutional team is investigating into all the aspects of the disease. In this direction the KAU, Trichur has identified a paramyxo virus as the primary causative agent. CMFRI, Cochin has isolated *A. salmonicida* (a bacteria) as the major secondary pathogen, complicating the disease. A full profile of the disease and allied factors including the environmental parameters are being studied by the aforementioned team, which meets periodically to come out with a concrete strategy to contain the disease.