



Note on flavobacterial infections in fish

Pellizer M*

Department of Fisheries and Wildlife, Michigan State University, East Lansing, USA

*Corresponding author. E-mail: pellizermartin@gmail.com

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DESCRIPTION

Flavobacterial diseases in fish are caused by several bacterial species within the family *Flavobacteriaceae* and are the reason for distressing losses in wild and cultivated fish stocks around the world. In calculating to directly striking adverse economic and ecological effects, flavobacterial disease outbreaks are also infamously difficult to stop and control despite nearly 100 years of scientific research. The advent of recent reports involving previously uncharacterized flavobacteria to systemic infections and mortality events in fish stocks of Europe, Africa, South America, North America and Asia, is also of chief concern and has emphasised some of the problems surrounding the diagnosis and chemotherapeutic treatment of flavobacterial fish diseases.

Flavobacterial diseases were first stated by Davis in 1922 and have since been recognized as a serious threat to wild and propagated fish stocks alike. Formerly, these diseases were credited to three bacteria within the family *Flavobacteriaceae* ; specifically, *Flavobacterium psychrophilum*, the etiological agent of bacterial cold water disease and rainbow trout fry syndrome; *Flavobacterium columnare*, the relevant agent of columnaris disease ; and *Flavobacterium branchiophilum*, the putative agent of bacterial gill disease. Others have described additional *Flavobacterium* spp. associated with diseased fish, including *Flavobacterium johnsoniae*, *Flavobacterium succinicans*, *Flavobacterium hydatis* as well as other uncharacterized yellow-pigmented bacteria.

In acute flavobacteriosis, cumulative mortality upwards of 70% can occur among diseased fish stocks, while survivors may suffer deprived growth and spinal defects. In subacute and long-lasting infections, flavobacteriosis provokes lingering deaths that can help to incessant economic losses.

With the present advances in molecular biology and

biotechnology, numerous novel genera within the family *Flavobacteriaceae* have appeared that encompass pathogens of amphibians, fish, reptiles, birds, and mammals, including humans. Among these, *Tenacibaculum* spp. are significant pathogens of marine fishes that have been reviewed elsewhere and will not be discussed further herein.

Research on flavobacteria is important due to their response as important etiological agents of disease and their role in microbial ecology. However, researchers working with these organisms are faced with significant challenges. First, many flavobacteria, particularly those that are pathogenic to fish, are demanding and grow only on nutrient poor media that, under many conditions, must be supplemented with a diversity of antibiotics to prevent overgrowth by other less fastidious bacteria. The ratio and brand of ingredients incorporated into these media, as well as osmotic conditions, can affect the ability to cultivate some flavobacteria. Even when an ideal culture medium for a particular situation is used, the slow generation time of some species and variety in preferred incubation conditions (e.g., temperature, aerobic vs. micro-aerophilic atmosphere) can impede successful culture of all organisms.

CONCLUSION

Flavobacteria generally reside in really diverse habitats, ranging from fresh and marine aquatic environments, foods, soils, beverages and their processing plants, as well as human and veterinary hospitals. Many flavobacteria are pathogenic to a multitude of organisms, including plants, invertebrates, amphibians, reptiles, birds, and mammals, including humans. Because the research presented herein focused on the genera *Flavobacterium* and *Chryseobacterium*, the remainder of this literature review will be comprised of information pertaining to them specifically.