MICROSCOPIC AND ULTRASTRUCTURAL CHARACTERISTICS OF ACUTE GILL LESIONS IN KOI CARP *Cyprinus carpio* FOLLOWING IMMERSION CHALLENGE USING *Flavobacterium columnare*

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Fingerling koi carp, *Cyprinus carpio*, were exposed by immersion challenge to eight different strains of *Flavobacterium columnar*e, the causative agent of columnaris disease. Five strains were considered to be highly virulent, with moribund fish appearing as soon as nine hours post challenge and exhibiting marked gill lesions with ubiquitous white necrotic lesions. Three strains could be classified as low virulent, giving low or no morbidity/mortality. Light microscopic examination of hematoxylin-eosin stained paraffin sections of the gills of fingerlings exposed to highly virulent strains revealed extensive loss of branchial structures. Desquamation and necrosis of gill epithelium with fusion of gill filaments and lamellae were present. Large parts of the filaments had disappeared and the conserved areas were covered with necrotic debris. Massive clusters of *F. columnare* bacteria, enwrapped in an eosinophilic matrix, were inclosed in between necrotic areas. Scanning and transmission electron microscopic observations of the affected gill tissue pictured the presence of long slender bacterial cells of about 0.3 µm wide and up to 10 µm in length, attained in an extracellular matrix and in close contact with the destructed gill tissue. Microscopic examination of the gill tissue of the control fish and of the fingerlings inoculated with the low virulent strains uncovered intact gill filaments without the presence of bacteria. This is the first study in its kind to reveal such severe lesions of the gill tissue at macroscopic, light microscopic and ultrastructural level in koi carp.

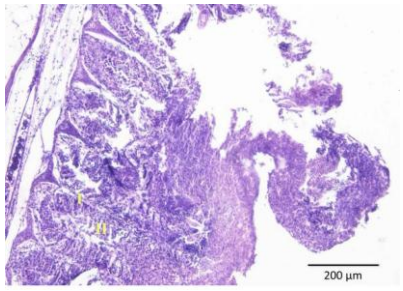

Fig. 1 : Massive necrosis by *F. columnare* of gill filaments (I) and lamellae (II) of a koi carp

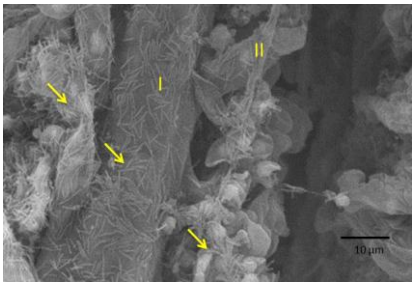

Fig. 2 : Clusters of *F. columnare* bacteria (arrows) gathered on gill filaments (I) and lamellae (II) of a koi carp

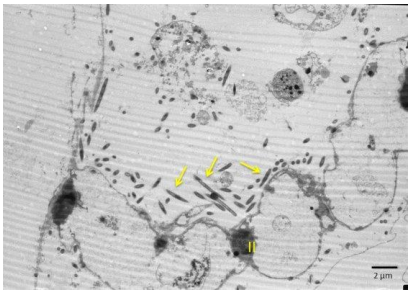

Fig. 3 : *F. columnare* bacteria (arrows) lining up along a degenerated gill lamella (II) in a koi carp

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