Occurrence and significance of atypical Aeromonas salmonicida in non-salmonid and salmonid fish species: A review

Bacterial strains of Aeromonas salmonicida included in the recognized subsp. achromogenes, subsp. masoucida, and subsp. smithia in addition to the large number of strains not included in any of the described subspecies are referred to as atypical A. salmonicida. The atypical strains form a very heterogeneous group with respect to biochemical characteristics, growth conditions, and production of extracellular proteases. Consequently, the present taxonomy of the species A. salmonicida is rather ambiguous. Atypical A. salmonicida has been isolated from a wide range of cultivated and wild fish species, non-salmonids as well as salmonids, inhabiting fresh water, brackish water and marine environments in northern and central Europe, South Africa, North America, Japan and Australia. In non-salmonid fish species, infections with atypical strains often manifest themselves as superficial skin ulcerations. The best known diseases associated with atypical A. salmonicida are carp Cyprinus carpio erythrodermatitis, goldfish Carassius auratus ulcer disease, and ulcer disease of flounder Platichthys flesus, but atypical strains are apparently involved in more disease outbreaks than previously suspected. Macroscopic and microscopic studies of ulcerated fish indicate internal organs are infrequently invaded by atypical A. salmonicida. This view is supported by the fact that atypical strains are irregularly isolated from visceral organs of ulcerated fish. High mortality caused by atypical A. salmonicida has been observed in populations of wild non-salmonids and farmed salmonids, although the association between the mortality in the wild fish stocks and atypical A. salmonicida has not always been properly assessed. In injection experiments the pathogenicity of the atypical strains examined showed large variation. An extracellular A-layer has been detected in different atypical strains, but virulence mechanisms different from those described for (typical) A. salmonicida subsp. salmonicida, for example an extracellular metallo-protease and a different iron utilization mechanism, have been described. Limited information is available about the ecology, spread and survival of atypical strains in water. The commonly used therapeutic methods for the control of diseases in farmed fish caused by atypical A. salmonicida are generally effective against the atypical strains. Resistance to different antibiotics and transferable plasmids encoding multiple drug resistance have been observed in atypical A. salmonicida. Studies aimed at producing a vaccine against atypical strains are in progress.