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## Pseudomoniasis (*P. anguilliseptica*) in farmed fish

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## Susceptible species

Infection caused by *Pseudomonas anguilliseptica* was originally reported in Japanese eel (*Anguilla japonica*; Wakabayashi, *et al.*, 1972). The disease agent seems to have a low host specificity, having been reported in European eel (*Anguilla Anguilla*; Stewart, *et al.*, 1981), black sea bream (*Achanthopagrus schlegeli*; Nakajima, *et al.*, 1983), ayu (*Plecoglossus altivelis*; Nakai, *et al.*, 1985), Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*) whitefish (*Coregonus lavaretus*; Wiklund, and Bylund, 1990), Baltic herring (*Clupea harengus membras*; Lönnstrom, L. *et al.*, 1994), cod (*Gadus morhua*; Ferguson, *et al.*, 2004) gilthead sea bream (*Sparus aurata*), European sea bass (*Dicentrarchus labrax*) turbot (*Scophthalmus maximus*; Berthe, *et al.*, 1995) giant sea perch (*Lates calcarifer*), estuarine grouper (*Epinephelus tauvina*; Nash, *et al.*, 1987). It is mainly reported from marine and brackish water fish species.

## Disease name

Pseudomoniasis, Sekiten-byo or red spot disease of Japanese eel.

## Aetiological agent

Pseudomonads are common bacteria in the aquatic environment. Most are non-pathogenic bacteria or cause only secondary infections in connection to stress or impaired disease resistance. *Pseudomonas anguilliseptica* is the most significant disease agent of the pseudomonads for fish.

## Geographical distribution

Infections caused by *P. anguilliseptica* are reported at least in Japan, Taiwan, Scotland, Finland and France (Wakabayashi, *et al.*, 1972; Stewart, *et al.*, 1983; Wiklund, and Bylund, 1990; Berthe, *et al.*, 1995).

## Associated environmental conditions

There are clear differences in seasonality between different isolates of *P. anguilliseptica*. In Finland disease outbreaks in salmonids are mainly reported during summer when water temperature is over 15°C (Wiklund, and Bylund, 1990). In Spain, disease outbreaks are reported only during winter in temperatures below 12°C (Domenech, *et al.*, 1999).

## Significance

Infections caused by *P. anguilliseptica* cause serious disease in eel farming, but are also reported as a significant pathogen for other fish species in brackish and the marine environment. In cod farming a low mortality rate of 2% occurs but mortalities of up to 50% are reported from salmonids (Ferguson, *et al.*, 2004; Wiklund, and Bylund, 1990).

### Gross clinical signs

Infected fish show signs typical for a septic condition with petechial haemorrhages in the skin of the ventral side of the body, mouth and the area around the vent. Affected rainbow trout also show haemorrhages at the fin bases (Wiklund, and Bylund, 1990). All species have petechial haemorrhages in the peritoneum, liver and adipose tissue. Diseased cod get lethargic and gross lesions consist mainly of eye lesions and fin erosion.

### Control measures and legislation

There are no commercial vaccines available for this disease agent. Treatment with ampicillin or trimethoprim/sulfamethoxazole gives a good response. Infections by *P. anguilliseptica* are not notifiable within the EU and are not listed by OIE.

### Diagnostic methods

*P. anguilliseptica* is a long Gram negative rod that grows slowly on blood or TSA agar. The optimal temperature for growing the bacteria is between 15–20°C. The semi-transparent small (1 mm diameter) colonies appear after 3–4 days of incubation and are easily overgrown by more rapidly dividing bacteria. The bacterium is inactive in biochemical tests but serological and molecular based diagnostic methods are available (Mar Blanco, *et al.*, 2002; Romalde, *et al.*, 2004). Histopathologically, a granulomatous inflammation of connective tissues surrounding the skeleton/cartilage of the head region is observed in cod (Ferguson, *et al.*, 2004). In whitefish and rainbow trout, oedematous lesions are reported in the liver tissue with cloudy swelling of liver cells and focal necrotic areas. Oedematous changes are also seen in kidney glomeruli and tubuli with detachment of tubular epithelium (Wiklund, and Bylund, 1990).

### Key references

- Berthe, F. C. J., Michel, C., and Bernardet, J. F. 1995. Identification of *Pseudomonas anguilliseptica* isolated from several fish species in France. *Diseases of Aquatic Organisms*, 21(2): 151–155.
- Domenech, A., Fernandez-Garayzabal, J. F., Garcia, J. A., Cutuli, M. T., Blanco, M., Gibello, A., Moreno, M. A., and Dominguez, L. 1999. Association of *Pseudomonas anguilliseptica* infection with 'winter disease' in sea bream, *Sparus aurata* L. *Journal of Fish Diseases*, 22(1): 69–71.
- Ferguson, H. W., Collins, R. O., Moore, M., Coles, M., and MacPhee, D. D. 2004. *Pseudomonas anguilliseptica* infection in farmed cod, *Gadus morhua* L. *Journal of Fish Diseases*, 27(4): 249–253.
- Lönnstrom, L., Wiklund, T., and Bylund, G. 1994. *Pseudomonas anguilliseptica* isolated from Baltic herring *Clupea harengus membras* with eye lesions. *Diseases of Aquatic Organisms*, 18: 143–147.
- Mar Blanco, M., Gibello, A., Vela, A. I., Angel Moreno, M., Dominguez, L., and Fernandez-Garayzabal, J. F. 2002. PCR detection and PFGE DNA macro-restriction analyses of clinical isolates of *Pseudomonas anguilliseptica* from winter disease outbreaks in sea bream *Sparus aurata*. *Diseases of Aquatic Organisms*, 50(1): 19–27.
- Nakai, T., Hanada, H., and Muroga, K. 1985. First records of *Pseudomonas anguilliseptica* infection in cultured ayu, *Plecoglossus altivelis*. *Fish Pathology*, 20(4): 481–484.

- Nakajima, K., Muroga, K., and Hancock, R. E. W. 1983. Comparison of fatty acid, protein, and serological properties distinguishing outer membranes of *Pseudomonas anguilliseptica* strains from those of fish pathogens and other pseudomonads. *International Journal of Systematic Bacteriology*, 33(1): 1–8.
- Nash, G., Anderson, I. G., Shariff, M., and Shamsudin, M. N. 1987. Bacteriosis associated with epizootic in the giant sea perch, *Lates calcarifer*, and the estuarine grouper, *Epinephelus tauvina*, cage cultured in Malaysia. *Aquaculture*, 67(12): 105–111.
- Romalde, J. L., Lopez-Romalde, S., Ravelo, C., Magarinos, B., and Toranzo, A. E. 2004. Development and validation of a PCR-based protocol for the detection of *Pseudomonas anguilliseptica*. *Fish Pathology*, 39(1): 33–41.
- Stewart, D. J., Woldemariam, K., Dear, G., and Mochaba, F. M. 1983. An outbreak of 'Sekiten-byo' among cultured European eels, *Anguilla anguilla* L., in Scotland. *Journal of Fish Diseases*, 6(1): 75–76.
- Wakabayashi, H., and Egusa, S. 1972. Characteristics of a *Pseudomonas* sp. from an epizootic of pond-cultured eels (*Anguilla japonica*). *Bulletin of the Japanese Society of Scientific Fisheries*, 38(6): 577–587.
- Wiklund, T., and Bylund, G. 1990. *Pseudomonas anguilliseptica* as a pathogen of salmonids in Finland. *Diseases of Aquatic Organisms*, 8: 13–19.



**Figure 1.** Rainbow trout infected by *Pseudomonas anguilliseptica* with oedema and petechial haemorrhages in the skin of the vent.

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