
RESEARCH NOTE

Bacteriocin-like Substance of *Aeromonas hydrophila*

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The genus *Aeromonas* comprises Gram negative rods found mainly in aquatical environments that may infect humans and animals (JM Janda 1991 *Clin Microbiol Rev* 4: 397-410). In humans, some *Aeromonas* species have been associated with intestinal and extraintestinal infections and enterotoxins, cytotoxins as well as invasive mechanisms have been incriminated in the development of illness in the host (Janda *loc. cit.*). Bacteriocin-like substances (BLS) are protein compounds produced by some bacteria (G Ivanovics 1962 *Bacteriol Rev* 26: 108-118) showing antagonistic activity against their own species (isoinhibitory activity - IA) or other non-related species (heteroinhibitory activity - HA). The use of the expression BLS is recommended to nominate bacterial products showing antagonistic activity though not characterized

(K Sandhu et al. 1983 *J Clin Microbiol* 17: 511-515). These substances have been widespread utilized in epidemiological studies as specific marker properties of bacteria, in the regulation of population dynamics in bacterial ecosystems and clinical treatment (V Fantinato & F Zelante 1991 *Rev Microbiol* 22: 49-51). As BLS have not been currently described in *Aeromonas* species, the purpose of this study was to investigate their production in strains isolated from animal, clinical and environmental sources.

The assays for the production of BLS were performed according to Sandhu et al. (*loc. cit.*). The strains used as BLS producers and BLS indicators are listed in Table. Our results showed that among 32 *Aeromonas* strains, the BLS could be only demonstrated in a strain of *A. hydrophila* isolated from a water tank containing alligators. This strain demonstrated heteroinhibitory activity against four *Staphylococcus aureus* strains (one ATCC 6538 and three methicillin-resistant - MRSA). The heteroinhibitory activity was demonstrated after an incubation of 48 hr at 37°C and not at 25°C, conditions also observed for the BLS production in *Serratia*, *Pseudomonas*, *Leuconostoc* and *Enterococcus* strains (JD Foulds & D Shemin 1969 *J Bacteriol* 99: 655-660, JRW Govan & G Harris 1985 *J Clin Microbiol* 22: 490-494, F Mathleu et al. 1993 *J Appl Bacteriol* 74: 372-379, F Villani 1993 *J Appl Bacteriol* 74: 380-387). The heteroinhibitory activity was demonstrated by inhibitory zones ranging from 17 to 27mm. JR Govan (1986 *Scand J Infec Dis* 49: 31-37) proposed that different inhibition zone diameters may depend on the potency either of BLS action or they may be correlated with the number of receptors for BLS in the bacterial surface. In spite of these results, further research is necessary to better understand the bacteriocin-like activity in *Aeromonas* species as well as to investigate the chemical nature of this substance and its pharmacological usefulness.

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TABLE
Strains used as producers (P) and/or indicators (I) of bacteriocin-like substances (BLS)

Type	Strain / Serotype	Origin / Identification
P / I	<i>Aeromonas hydrophila</i>	CIP 7614
P / I	<i>Aeromonas hydrophila</i>	Fresh water - IM ^a
P / I	<i>Aeromonas hydrophila</i>	Urine - HURJ ^b
P / I	<i>Aeromonas hydrophila</i>	Cutaneous secretion - HURJ
P / I	<i>Aeromonas hydrophila</i> (2)	Diarrheic human - HURJ
P / I	<i>Aeromonas hydrophila</i>	Diarrheic human - HUSM ^c
P / I	<i>Aeromonas hydrophila</i>	Alligator <i>Caiman latirostris</i> (liver)
P / I	<i>Aeromonas hydrophila</i>	Danish bull (seminal vesicles)
P / I	<i>Aeromonas hydrophila</i> (3)	Water tank with alligator <i>Caiman latirostris</i>
P / I	<i>Aeromonas hydrophila</i>	Sewage water
P / I	<i>Aeromonas hydrophila</i>	Newborn bovine (abomasum)
P / I	<i>Aeromonas hydrophila</i>	Chicken (ascitic fluid)
P / I	<i>Aeromonas hydrophila</i>	Water brook
P / I	<i>Aeromonas hydrophila</i>	Water dam
P / I	<i>Aeromonas hydrophila</i>	Water drain of tank with alligators
P / I	<i>Aeromonas caviae</i> (2)	Diarrheic human - HURJ
P / I	<i>Aeromonas caviae</i>	Urine - HURJ
P / I	<i>Aeromonas sobria</i> (2)	Diarrheic human - HURJ
P / I	<i>Aeromonas media</i>	Sewage water
P / I	<i>Aeromonas eucrenophila</i>	Water tank with fish <i>Poecilia reticulata</i>
P / I	<i>Aeromonas</i> sp.	Fish <i>Poecilia reticulata</i> (kidney)
P / I	<i>Aeromonas</i> sp.	Fish <i>Etroplus maculatus</i> (kidney)
P / I	<i>Aeromonas</i> sp.	Water tank with fish <i>Etroplus maculatus</i>
P / I	<i>Aeromonas</i> sp.	Alligator <i>Caiman latirostris</i> (liver)
P / I	<i>Aeromonas</i> sp. (2)	Danish bulls (seminal vesicles)
P / I	<i>Aeromonas</i> sp.	Water brook
I	<i>Citrobacter diversus</i>	Collection culture - UFSM ^d
I	<i>Escherichia coli</i>	ATCC 25922
I	<i>Klebsiella oxytoca</i>	Collection culture - UFSM
I	<i>Proteus mirabilis</i>	Collection culture - UFSM
I	<i>Pseudomonas aeruginosa</i>	ATCC 15422
I	<i>Salmonella cholerae-suis</i>	ATCC 10708
I	<i>Salmonella typhi</i>	ATCC 6539
I	<i>Shigella sonnei</i>	Collection culture - UFSM
I	<i>Shigella boydii</i>	Collection culture - UFSM
I	<i>Staphylococcus aureus</i>	ATCC 6538
I	<i>Staphylococcus aureus</i> MRSA ^e (3)	Nasal cavity - HUSM
I	<i>Yersinia enterocolitica</i> serotype O:5	IP - YE124
I	<i>Yersinia intermedia</i> NAG ^f	White cheese - IM

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