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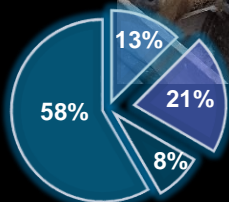
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Microbial symbionts of mammals are interesting from the point of view of environmental adaptation and emergence of defense mechanisms against competitors: antibiotic activity, absence of a cytotoxic effect on host cells, mucosal attachment sites and food sources. Microflora and mucous membranes closely interact, together influencing the health of the mammal.

In this study, samples of nasal mucosa of pigs – Mangalica (Hungarian breed of domestic pig) – were studied. The samples were taken in January 2022 from the noses of one-year-old domestic pigs that had not been seriously ill or treated with antibiotics.



24 culture samples were obtained, including 14 (58%) bacterial strains, 5 (21%) fungal strains, 3 (13%) yeast strains, and 2 (8%) actinomycete strains.

Antibiotic and antagonistic activity screening

In the antagonistic activity test, strain SM-11 showed fluorescent properties. Based on its morphology, strain SM-11 is a gram-negative bacterium of the genus *Pseudomonas*.



And only strain SM-11, after cultivation on a liquid medium, showed activity against *C.albicans* CBS 8837, *B.subtilis* ATCC 6633, *E.coli* ATCC 25922, *E.faecalis* ATCC 29212, *St. aureus* ATCC 25923.

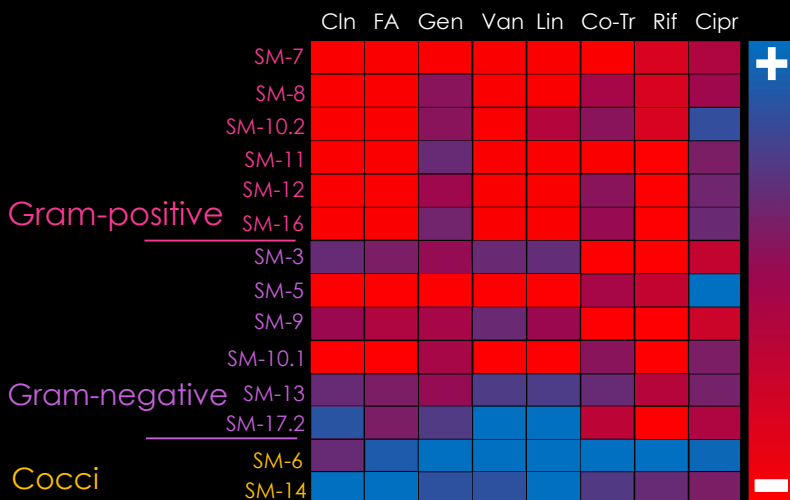
Isolation of the antibiotic

Active compounds were isolated by the butanol extraction method, mass spectral data showed the presence of phenazine-1-carboxylic acid in the extract.



Phenazine-1-carboxylic acid is an aromatic carboxylic acid that is phenazine-substituted at C-1 with a carboxy group. It has a role as an antimicrobial agent, a bacterial metabolite and as an antifungal agent. It is a phenazine, a monocarboxylic acid and an aromatic carboxylic acid.

Resistance of the obtained cultures to main human antibiotics



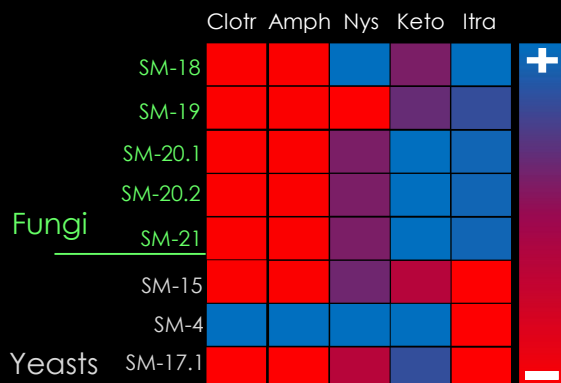
Cln - clindamycin 10 µg/disc; FA - fusidic acid 10 µg/disc; Gen - gentamicin 10 µg/disc; Van - vancomycin 30 µg/disc; Lin - linezolid 30 µg/disc; Co-Tr - trimethoprim/sulfamethoxazole 1.25/23.75 µg/disc; Rif - rifampicin 5 µg/disc; Cipr - ciprofloxacin 5 µg/disc.

* («-») - higher sensitivity to antibiotics; («+») - lower sensitivity to antibiotics.

Gram-negative bacterium SM-7 was found to be resistant to gentamicin and to co-trimoxazole, a combination of two antibiotics, Trimethoprim/sulfamethoxazole.

Strain SM-9 showed sensitivity only to vancomycin, and intermediate sensitivity to clindamycin and fusidic acid.

Cocci are sensitive to all used antibiotics. Strain SM-14 belongs to streptococcus.



Clotr - clotrimazole 10 µg/disc; Amph - amphotericin B 40 µg/disc; Nys - nystatin 80 µg/disc; Keto - ketoconazole 20 µg/disc; Itra - itraconazole 10 µg/disc.

* («-») - higher sensitivity to antibiotics; («+») - lower sensitivity to antibiotics.

Fungal strains were resistant to clotrimazole, amphotericin B, nystatin 80, and were sensitive only to ketoconazole.

Yeast strain SM-17.1 was found to be resistant and only showed intermediate sensitivity to ketoconazole.

Conclusions:

1. Microbial ecology of the nasal mucosa of the Mangalica pig was studied. Most bacteria, both gram-positive and gram-negative, were found to be sensitive to specific antibiotics active against them and resistant to the rest.
2. Fungi were resistant to clotrimazole, amphotericin B, yeasts were resistant to itraconazole.
3. Antibiotic phenazine-1-carboxylic acid was isolated from strain SM-11 *Pseudomonas* sp.