

Biodiversity of prokaryotes from radon springs in Jáchymov

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Introduction

- Mineral water in Jáchymov, CR, is rich in dissolved radon coming up to activities of 20 000 Bq/l^[1]. Radon ²²²Rn itself is a radioactive element belonging to the radium and uranium-238 decay chain^[2].
- Radioactivity, in this case, cause the most damage to living organisms through the hydrolysis of water molecules resulting in the formation of numerous reactive oxygen species^[3].
- To prevent oxidative damage microorganisms developed protective mechanisms such as enzymatic or non-enzymatic antioxidants, pigment, mainly carotenoids, or extremolytes production, high intracellular ratio of Mn:Fe, etc^[4-6].

Aims

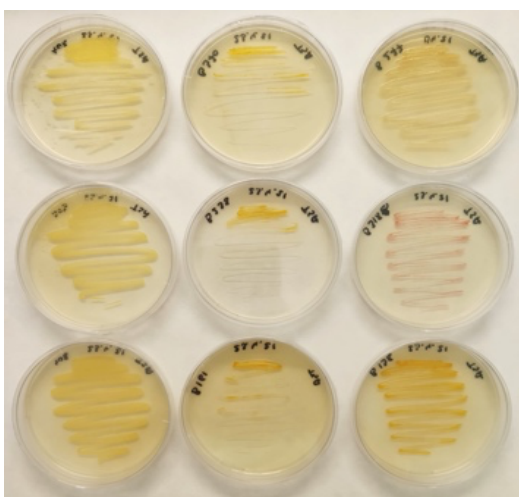
This study is focused on isolation and characterisation of procaryotic microorganisms from water samples obtained from Jáchymov springs.

Methods

- Aerobic cultivation technics using complex media for aquatic microorganisms (R2A, R2B) and general-purpose media (LB, TSB, TSA)
- Evaluation of survival after UV treatment (up to dose of 44 kJ/m²) by culture density measurement
- Evaluation of survival in presence of free radicals (1 – 5 % H₂O₂) by culture density measurement
- DPPH assay for prediction of antioxidant capacity

Isolates

Ten bacterial isolates cultivated on diluted TSA were selected for screening. Pigment production is a common trait of radioresistant MO, so yellow or red coloured colonies were preferred. Bacteria were cultivated in complex half diluted TSB medium aerobically.



Acknowledgments

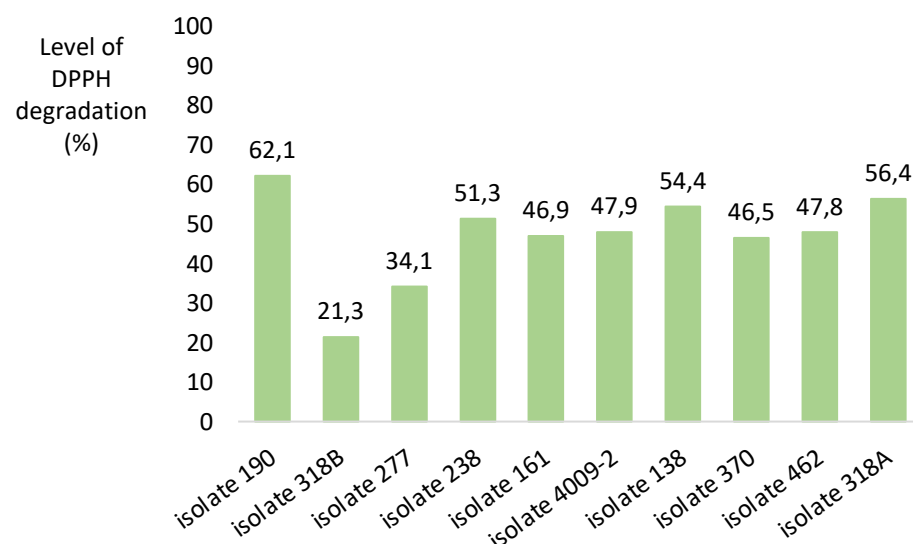
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- 3) Microbial isolates were obtained in collaboration with doc. Ing. Ondřej Uhlík, Ph.D. and Ing. Gabriela Kapinusová

Results

- Several selected isolates showed significant resistance against UV irradiation (up to 22 kJ/m²), only one though was able to grow in presence of H₂O₂ (1 % in culture medium)

Isolate	UV survival	H ₂ O ₂ survival
161	-	-
238	-	-
277	+	-
4009-2	+	-
190	-	-
318B	+	-
318A	-	-
370	+	-
402	-	-
138	++	+

- Antioxidant capacity was moderate in all studied isolates (around 50 % reduction of DPPH) except for isolates number 318B and isolate number 277.



Conclusion

- Half of studied bacterial isolates showed significant vitality after high doses of UV radiation.
- All resistant isolates showed moderate levels of antioxidant activity.
- Further studies of resistance mechanisms will be conducted.

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