



# Novelty Seeking - Characterization and evaluation of novel environmental microbial strains sampled from extreme habitats.



Jürgen Mairhofer\*, Günther Ellersdorfer\*, Katja Sterflinger and Reingard Grabherr  
 Institute of Applied Microbiology, University of Natural Resources and Life Sciences, Muthgasse 18, 1190 Vienna, AUSTRIA  
 \*E-mail: juergen.mairhofer@boku.ac.at; guenther.ellersdorfer@boku.ac.at

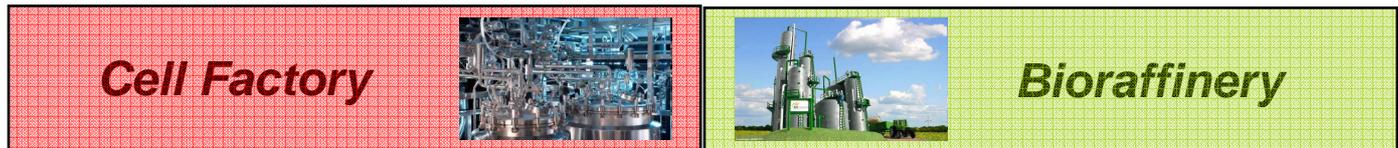
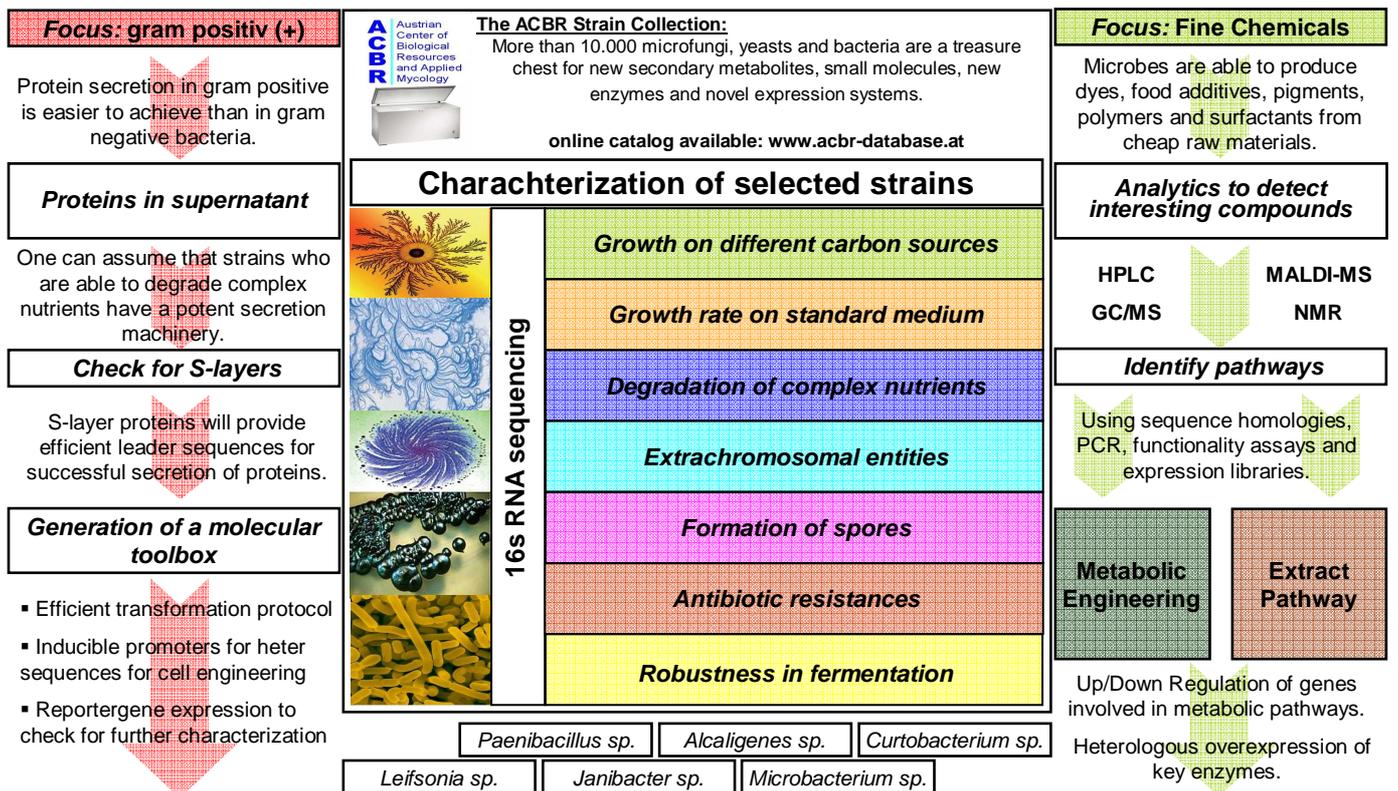


## Background

Advances in molecular biology, genomics and bioinformatics, and cultivation technologies herald a new age of exploration of the microbial world. Prokaryotic life is able to adapt to environments that would prove fatal to most other life forms. The **Austrian Center of Biological Resources and Applied Mycology (ACBR)** harbors over 5000 uncharacterized bacterial and fungal isolates from extreme habitats. This projects aims at screening a sub-group of these, so far uncharacterized isolates, for their biotechnological potential. During this work we plan to establish a screening procedure that allows for the selection of strains that either a) secrete proteins efficiently in the extracellular space or b) that produce compounds with a biotechnological value. Additionally, we try to identify extrachromosomal entities like plasmids or phages that can be applied for the expression of recombinant proteins in the corresponding bacterial species and that allow for the generation of a molecular biology toolbox to modify these strains.

## Establish a screening procedure

To date most recombinant proteins produced in bacteria are based on *Escherichia coli* expression systems. Due to limitations in secretion and folding capacity alternative prokaryotic systems are under investigation, e.g. *Corynebacterium sp.* (Srivastava and Deb 2005), *Streptomyces sp.* (Lussier et al. 2010), *Bacillus sp.* (Chan et al. 2002), *Lactococcus sp.* (Miyoshi et al. 2002), *Lactobacillus sp.* (Savijoki et al. 1997). However, the world of microorganisms comprises a vast diversity of bacteria.



## Selected Examples

<p><b><i>Staphylococcus conhii:</i></b>          posses a mid to high copy number plasmid,          Sequencing currently in progress,          Secretes a number of proteins that have to be characterized</p>	<p><b><i>Trichoderma sp.:</i></b>          production of coconut-aroma, purity analyzed by HPLC  <b><i>Paenibacillus elgii:</i></b>          production of exopolysaccharide and anti-microbials</p>
--	--

**References**  
 Chan A, Chan M, Lo H, Leung Y, Lim B. 2002. A dual protein expression system in *Bacillus subtilis*. Protein Expr Purif 26(3):337-42.  
 Lussier F, Denis F, Shareck F. 2010. Adaptation of the highly productive T7 expression system to *Streptomyces lividans*. Appl Environ Microbiol 76(3):967-70.  
 Miyoshi A, Poquet I, Azevedo V, Commissaire J, Bermudez-Humaran L, Domakova E, Le Loir Y, Oliveira S, Gruss A, Langella P. 2002. Controlled production of stable heterologous proteins in *Lactococcus lactis*. Appl Environ Microbiol 68(6):3141-6.  
 Savijoki K, Kahala M, Palva A. 1997. High level heterologous protein production in *Lactococcus* and *Lactobacillus* using a new secretion system based on the *Lactobacillus brevis* S-layer signals. Gene 186(2):255-62.  
 Srivastava P, Deb J. 2005. Gene expression systems in corynebacteria. Protein Expr Purif 40(2):221-9.