BACTÉRIES DU CUIVRE MINIER

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COMBINING PROBABILISTIC AND COMBINATORIAL METHODS

- Infer gene role from their genomic sequence and context
- Improve tools for expression evaluation
- Explain behavior by proposed regulatory networks



EXPORTS



CHILEAN COPPER MINING

Codelco

67%

NMM

33%

- Codelco: State owned
- BioSigma: Join Venture
 - Codelco, Nippon Mining & Metals
 - Biotechnology for mining
 - Contract 2003-2010
 - Confidentiality

EXTRACT COPPER FROM ORE

- Old Method: heat it
- Expensive
- Highly pollutant



BIOLEACHING

Separate copper from ore using bacteria Less pollution Cheaper Enables mining of low-grade ore Duplicates reservoirs of copper

Currently only

5%

of chilean copper is produced using bioleaching



$Cu_2S + 4Fe^{3+} \rightarrow 2Cu^{2+} + 4Fe^{2+} + S$

Cu²⁺ is soluble



A CONSORTIA OF NEAR 20 SPECIES

The most relevant are: Acidithiobacillus ferrooxidans Acidithiobacillus thiooxidans Leptospirillum ferrooxidans Acidiphilic, chemolitioautotrophic: pH 1.8 Slow growth: weeks/months Gene knock-out unfeasible

ACIDITHIOBACILLUS FERROOXIDANS

- The only with pubic sequence
 - ATCC 23270
 - ATCC 53993
- Private partial sequence: Wenelen (chilean-native word for "the first")
- We worked on it since 2003

OBJECTIVE

- Build a practical regulatory network
 - Develop methods to assign gene roles
- Design arrays and experiment to test it
 - Understand oligoarray behavior
- Validate and complete the network
 - Using BioASP with good questions

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