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參展科別	環境科學科
作品名稱	Microbial diversity in the Mediterranean hypersaline deep-sea lake Tyro
得獎獎項	二等獎

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ABSTRACT OF EXHIBIT

TAIWAN INTERNATIONAL SCIENCE FAIR

1. Purpose of the research

Characterization of bacterial and viral diversity of brine Tyro using molecular methods of identification.

2. Procedures

For bacteria:

1. Amplification or multiplication of 16S rRNA gene (one of the most conservative gene) by polymerase chain reaction (PCR).
2. Agarose gel electrophoresis and purification of PCR product
3. Ligation of purified PCR product into the vector pGEM-T
4. Transformation of plasmids containing an insert into competent cells *E.coli* XB1
5. Blue-white selection (we need white colonies, they contain the insert of interest)
6. Isolation of plasmids containing an insert of interest
7. Sequencing of inserts
8. Bioinformatics analysis: matching homologues from GeneBank database, construction of phylogenetic trees, statistical analysis.

For viruses:

The same methods were used for gp23 gene, which code a major head protein of T-even bacteriophages; to amplify gp23 gene a special set of primers was used, along with a standard cloning protocol described above.

3. Data

- 1) Two libraries of clones were obtained during analysis: lake Tyro (24 operational taxonomic units (OTUs), 10 classes) and sea water (6 OTUs, 2 classes of eubacteria).
- 2) The most abundant classes were: *gamma-*, *delta-*, *epsilon-* *Proteobacteria*, which is in agreement with previous reports about bacteria in brines of Mediterranean Sea.
- 3) The number of clones was not sufficient to obtain stable estimates of diversity, the analysis require additional data.
- 4) The diversity of bacteria was unexpectedly high in brine but not in the seawater, due to higher and more diverse ion composition.
- 5) Most of the detected bacteria in the deep-sea lake belonged to the previously

undescribed (18,75%) bacteria or had unusual metabolism (43,75%).

4. Conclusions

The analysis demonstrated unexpectedly high diversity of halophilic bacteria inhabiting Tyro lake. Most of bacteria presented in brine water had unique and uncommon characteristics based on information about its closest relatives. Therefore, the deep-sea hypersaline lakes of Mediterranean Sea have great potential for further investigations. Preliminary results of diversity of viruses of Tyro lake were obtained during analysis, more complete description is coming soon.

評語

This study investigates and compares the microbial diversity between lake Tyro (high brine) and the sea water. It was found unexpected results of high diversity of bacteria in high brine Lake Tyro. This study is interesting and the outcome is novel. Further study is encouraged.