The Biodegradation of Polystyrene Foam by the Microorganisms from a Landfill

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Is it possible to find the special microbe that would be able to degrade the styrofoam?

Aims of the research
1. To find the microbe that be able to degrade the styrofoam (Polystyrene).
2. To observe the biodegradability of styrofoam.

Methodology
- Microbe sampling from the landfill.
  Seeking for the microbe that might feed on the styrofoam.
- Microbe Screening
  Culture the bacteria from the landfill in the broth that styrofoam is the sole carbon source.
- Community collecting
  The cell suspension were collected from particular cultured broth to compare the community and find the survivor.
- Microbe transferring
  After a months of cultivation we subculture the microbe to the new broth.
- The DNA stuff
  We identify the microbe using their DNA by using DGGE and molecular cloning technique.
- Styrofoam
  The styrofoam that was used as a microbe carbon source was observed by using SEM.

Phylogenetic Tree
We use molecular cloning techniques to isolate the dominant DNA of the bacteria from the consortium, and then sequence the 16S rRNA gene. By using the Neighborhood joining tree to reveal the connection between the microbe, we found that the dominant microbe are Caulobacter segnis, Massilia aerilata, and Herbaspirillum seropedicae.

The survivor Microbe
The DNA stuff was used to determine the changing of microbe population during the cultivation by tracking the same DNA overtime. We found that some microbe are able to survive in the condition and become the dominant specie.

Community Structure
DGGE was used to determine the changing of microbe population during the cultivation by tracking the same DNA overtime. We found that some microbe are able to survive in the condition and become the dominant specie.

Community structure:
- Ochrobactrum rhizosphaerae
- Ochrobactrum haematophilum
- Sinorhizobium fredii NGR234
- Ensifer adhaerens
- Rhizobium alamii
- Phenylobacterium koreense
- Caulobacter segnis ATCC 21756
- Mycoplana bullata
- Brevundimonas nasdae
- Azohydromonas australica
- Azohydromonas lata
- Schlegelella thermodepolymerans
- Methylibium petroleiphilum PM1
- Massilia aerilata
- Naxibacter haematophilus
- Janthinobacterium agaricidamnosum
- Janthinobacterium lividum
- Herminiimonas glaciei
- Collimonas arenae
- Herbaspirillum seropedicae
- Herbaspirillum frisingense
- Herbaspirillum chlorophenolicum

Styrofoam degradation
The trace of the degradation can be clearly found on the surface of the styrofoam that was culture with microbe from the landfill compared to the regular styrofoam and the styrofoam that was in control, the styrofoam with microbe with out bacteria. The attachment of microbe on the styrofoam surface can be found under scanning electron microscope.

Background
Is it possible to find the special microbe that would be able to degrade the styrofoam?

The little step of Pat to chasing his dream.
Full paper is available soon
Follow his projects @www.ppaction.wordpress.com, www.JSTP.ORG

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