

was analyzed. As a result ORF (open reading frame) was 1,824 nucleotides, it encodes a 608 amino acid that was confirmed the formation of protein, molecular weight of 66 kDa. Compared with the nucleotide sequences of PspA gene of *S. pneumoniae* Rx1 (type 2) and *S. pneumoniae* A43 (type 19F) was confirmed highly variable region except the conserved region. These results demonstrate that PspA of *Streptococcus pneumoniae* A43 (type 19F) has antigenic variability from that of streptococcus pneumoniae Rx1 strain (type 2).

**E303**

**Isolation, Purification and  
Identification of New Antibiotics  
Produced by *Streptomyces* 192**

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This study has been tried to develop new antibiotics from microbial sources. S192 strains, isolated from a soil collected in USA, was found to produce antibiotics active against bacteria, algae and fungi in the process of antibiotics screening. The active ingredients were subjected to the measurement of molecular weights,  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^1\text{H}$ - $^1\text{H}$  COSY, HMBC NMR spectra, and it was confirmed that the new antibiotics is actinomycin family according to the NMR data, but the structure is difference between molecular weight by Mass analysis. The results of reference on the basis of the obtained molecular weight by mass analysis was different the known actinomycin and so, the new antibiotics have given a name to actinomycin C<sub>3</sub>.

**E304**

**Genetic and Phenotypic Diversity  
of *Streptococcus pyogenes* Isolated**

from Korea

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A total of 152 strains of *Streptococcus pyogenes* were isolated from patients with pharyngitis, scarlet fever, skin infection, and invasive streptococcal infections in Seoul, Korea from January 1988 to December 1999. All the isolates were epidemiologically characterized to decide phenotypes by T protein serotype and serum opacity factor (OF) detection. To analyze the genetic diversity, prevalence of T serotype strains were attempted to the *emm* gene type (M protein type; PCR-ELISA) and the pulsed-field gel electrophoresis (PFGE). T protein serotype showed 17 kinds in distribution including T12 and T4. Among the total isolates, T type 12 was the most common (40.1% of study strains), followed by T types 4 (19.1%) and 1 (7.9%). When T serotype of *S. pyogenes* isolates were analyzed by *emm* gene type distribution, of the 61 strains of T12 type, 47 strains (77.0%) belonged to the *emm* type 12 (M12) and all of these isolates were OF negative. Of 24 strains of T4 type, 25 strains (86.2%) belonged to the *emm* gene type 4 (M4) and all of these isolates revealed that OF detection were negative. PFGE patterns of genomic DNA for *emm* gene type (*emm12*, *emm4* and *emm1*) showed distinctive differences. These results suggest that genotypic analysis showed more diversity than those of the phenotypes. The used phenotype and genotype analysis were discriminative and appropriate for epidemiological marker of *S. pyogenes*.

**E305**

**The Changes of Phosphate  
Metabolism and Biosynthesis of  
Organic Compounds and  
Accumulation Capacity of Metal**

### Compounds in *Chlorella ellipsoidea*

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*Chlorella ellipsoidea* cultured both in wastewater and in Hg, Cd, Pb-treated wastewater analyzed the heavy metal compounds that were transmitted into the cells. If those components affected the growth of *C. ellipsoidea*, biosynthesis of organic compounds and phosphate metabolism compared with the control. The quantities of heavy metals in the wastewater were decreased significantly to 32.0%, whereas it in cells were increased. Growth showed a decrease to 17.8-31.1% in wastewater; to 47.4% in Hg-treated wastewater; to 59.9% in Cd-treated wastewater; to 76.8% in Pb-treated wastewater was compared with the control. The contents of acid insoluble inorganic poly-P were decreased significantly to compare with the control, in the wastewater and in the treated with the heavy metals according to the duration of culture. In contrast, the contents of acid soluble inorganic poly-P were confirmed an increase to compare with the control, in the wastewater and in wastewater treated with the heavy metals as the duration of culture went up. The contents of RNA-P and DNA-P were showed the increase level throughout the duration of culture. In contrast, it showed an evident inhibition in the wastewater and in the wastewater treated with the heavy metal compounds. The contents of protein bounding phosphate, free amino acid, alkali-labile protein, alkali stable-protein were showed a lower level in the wastewater and in the wastewater treated with the heavy metal compounds to compare with the control throughout the whole duration of culture. The contents of fat-soluble

carbohydrate, PCA soluble, alkali insoluble carbohydrate and were exhibited a change according to the duration of culture, but the contents of the wastewater and the wastewater treated with the heavy metal compounds showed a significantly low level in the late-phase of culture. As the result of above experiment, it is clear that *C. ellipsoidea* actively absorbed heavy metal composition in the wastewater and heavy metals absorbed in the cells prevented normal metabolism, changing the growth, biosynthesis of organic compounds and phosphate metabolism.

### E306

#### Study on DNA damage and Accumulation Capacity of Metal Compounds in *Chlorella ellipsoidea*

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*Chlorella ellipsoidea* were cultured both in wastewater and in wastewater treated with Hg, Cd, and Pb. The heavy metal compounds analyzed that were transmitted into the cells if those components were affected DNA damage of *C. ellipsoidea*. The quantities of heavy metals in the wastewater decreased significantly, whereas it in cells increased. The damage of DNA was analyzed by COMET assay (single cell gell electrophoresis). As the result of this experiment, there no the damage of DNA in the wastewater and Cd-treated wastewater compared with the control. The low level damage was showed in Hg-treated wastewater and the high level damage was found out in Pb-treated wastewater. This result showed that these heavy metals elicited an increase in DNA damage under the studied ranges of concentration.