

## 赴美國研習「抗藥性微生物之相關研究」

生物組

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### 摘要

農業部獸醫研究所於2024年3月23日至4月1日派員赴美國喬治亞州雅典市（Athens, Georgia），參訪家禽研究中心微生物安全及加工研究部門(National Poultry Research Center, Poultry Microbiological Safety and Processing Research Unit, ARS-USDA)，目標是了解全基因序列分析（Whole genome sequencing, WGS）技術在抗藥性微生物分析之應用，如何建立相關的分析系統和實驗室數據庫，以提高細菌抗藥性研究和監測的能力。本次研習主要包括以下活動：精進次世代定序（next generation sequencing, NGS）技術、商用生物資訊軟體及資料庫使用技巧、以及使用Linux系統下的開源軟體建立適用於抗藥性細菌之分析程序。應用本次研習的技術，以本所分離臨床病例之多重抗藥大腸桿菌 (*Escherichia coli*, *E.coli*)共59株序列，分析多位點序列分型（Multilocus sequence typing, MLST）、單核苷酸多型性（Single-nucleotide polymorphism, SNP），菌株之間的遺傳差異及親緣性，以及抗藥性基因等實作，提升實驗室研究和監測抗藥性能力，有助於了解抗藥性機制和趨勢，預警可能出現的抗藥性危機。

# **Study in the U.S. on “Molecular Approach to Antimicrobial Resistance”**

Nan-Ling Kuan

## **Abstract**

This training program, hosted by the National Poultry Research Center's Poultry Microbiological Safety and Processing Research Unit, located in Athens, Georgia, ARS-USDA, from March 23<sup>th</sup> to April 1<sup>st</sup>, 2024, involved in antimicrobial resistance (AMR) research and monitoring. The program aims to upgrade the knowledge and skills to apply whole-genome sequencing (WGS) technology in the analysis of antimicrobial-resistant microorganisms, and learn how to establish related analytical systems and laboratory databases to enhance research and monitoring of AMR. The program includes activities such as refining next-generation sequencing (NGS) technology, using commercial bioinformatics software and databases, and open-source software under Linux to build analytical programs for antimicrobial-resistant bacteria. A total of 59 strains of *Escherichia coli* isolated from clinical cases were analyzed for: multilocus sequence typing (MLST), single-nucleotide polymorphism (SNP), genetic and phylogenetic differences between strains, and AMR genes, using the techniques from this study. The knowledge and skills gained from this training will enhance the laboratory's ability to study and monitor AMR, understand the mechanism and trend of AMR, and provide early warnings of possible AMR crises.