Título de las prácticas/ *Title of the practical*

Evolutionary stasis in an antimicrobial resistance operon: a bioinformatic and experimental approach.

Descripción de las funciones del alumno / *Description of student's tasks*

The evolutionary success of the *strAB* operon is one of the best examples of the One Health concept, the realization that the health of humans, animals and plants are but a continuum. This operon codes for two enzymes of resistance to streptomycin, an antibiotic of limited use in clinical infections but of common application in the agricultural field. Isolated from different pathogens, first of plants, later of humans and animals, the *strAB* operon is present in a multitude of genetic contexts (plasmids, transposons, chromosomes). However, despite this ubiquity, the *strAB* operon exhibits extremely low allelic diversity, a phenomenon still currently not well understood. In this project, you will contribute to a better understanding of the significance of this apparent stasis: do the known alleles represent an evolutionary peak, or are they instead frozen accidents the result of strong bottlenecks? Is there any risk that this gene will evolve to confer resistance to antibiotics for use in humans? To distinguish between both possibilities, the student will carry out 1) bioinformatics studies from the sequences deposited publicly in GenBank 2) experimental evolution in the laboratory and analysis of high-throughput sequencing data.

Requisitos / *Requirements*

Computational Biology Master student with basic bioinformatics skills (alignment software, R, Python...), motivated and curious about exploring fundamental questions in evolutionary genetics. Lab experience will be considered a plus (e.g. basic microbiology and molecular biology techniques), although if needed training will be provided by the host. Good command of scientific English, or good disposition to develop your language skills.

Proyecto formativo / *Training program*

EXTERNAL PRACTICAL module. The fundamental objective of the External Practices is to teach the student to apply in the real world the knowledge that he has previously acquired in a group work environment that reproduces in a realistic way the things that can be found in his future place of work. The student can become familiar with the working world (schedules, responsibility, attitude, organization, etc.), and with the work methodology appropriate to the professional reality, contrasting and applying the academic knowledge acquired.

Actividades a desarrollar en la práctica académica / *Activities to carry out during the academic practical*

You will join a multidisciplinary team with highly motivated, expert mentors that combine experiments with computer analyses to understand fundamental principles in evolutionary genetics and genomics. Taking advantage of this expertise, you will be expected to:

i) Alignment of sequences extracted from online databases.

ii) *In vitro* evolution, including cloning, transformation, mutagenic PCR, sequencing and phenotypic characterization of mutant libraries.

iii) Develop your critical thinking, creativity and scientific communication skills during lab seminars and one-on-one meetings with the Principal Investigator.

Nº de plazas:	**1**
¿El alumno tendrá trato habitual con menores?	**No**
Fecha de inicio:	**15/01/2021**

Fecha de fin:	**30/06/2021**
Horas semanales:	**25**
Horario jornada laboral:	**Flexible**
Importe Ayuda/Bolsa de estudio:	**€/mes**
Tutor académico: Email:	**Jesús Israel Pagán Muñoz** **jesusisrael.pagan@upm.es**
Departamento tutor académico:	**Biotecnología – Biología Vegetal**
Tutor empresa:	**Alejandro Couce**
Email tutor empresa:	**a.couce@upm.es**
Departamento tutor empresa:	**CBGP**
Ubicación de la estancia de las practicas	**Campus de Montegancedo – UPM**
ENTIDAD COLABORADORA:	**UPM**
A cumplimentar por Oficina Prácticas ETSIAAB: **Créditos a reconocer (Nº ECTS)**:	

Enviar por email a: OFICINA DE PRÁCTICAS ACADEMICAS EXTERNAS – ETSIAAB

secretaria.pei.etsiaab@upm.es – Secretarias: Visitación Pérez / Susana Pardo - Tfno: 913363686)