



**POLITÉCNICA**



**E.T.S. DE INGENIERÍA AGRONÓMICA,  
ALIMENTARIA Y DE BIOSISTEMAS**

### **Título de las prácticas/ Title of the practical**

Evolutionary ecology of the conflict between sex and hypermutability

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

Populations facing lethal environmental conditions rely on generating novel genetic variation to avoid extinction. To this end, two dominant strategies in microbes are either engaging in promiscuous horizontal gene transfer (sex) or elevating the spontaneous rate of mutation (hypermutability). However successful, these two strategies are rarely found together, and a large body of theory has tried to understand the genetic and evolutionary conditions that favour one strategy over the other. In this project, you will address this problem by considering a largely underappreciated factor: the importance of ecology. You will take advantage of a genetically tractable laboratory model in which the intensity of sex and hypermutability can be experimentally tuned (see Perron *et al.* 2011, *Proceedings Roy Soc B*). Informed by empirical estimates, you will develop a computer simulation model that captures the basic properties of the experimental system. You will use this model to gain insights into the relative contribution of genetic architecture, ecological opportunity and population structure in resolving the conflict between sex and hypermutability, with the final goal of generating predictions that can be tested in the laboratory.

### **Requisitos / Requirements**

Computational Biology Master student with basic programming skills (R, Python, Matlab...), motivated and curious about creating quantitative models to explore biological questions. Good command of scientific English, or good disposition to develop your language skills. 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.

### **Proyecto formativo / Training program**

EXTERNAL PRACTICAL module. The fundamental objective of the External Practices is to teach the



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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) Develop a computer simulation model mimicking the experimental system described in Perron *et al.* 2011, *Proceedings Roy Soc B*.
- ii) Conduct and analyse highly-replicated computer simulations exploring the genetical, ecological and evolutionary determinants of the conflict between sex and hypermutability.
- iii) Design and perform proof-of-principle experiments in the laboratory to validate the insights gained in the previous sections.
- iv) Develop your critical thinking, creativity and scientific communication skills during lab seminars and one-on-one meetings with the Principal Investigator.

<b>Nº de plazas:</b>	<b>1</b>
<b>¿El alumno tendrá trato habitual con menores?</b>	<b>No</b>
<b>Fecha de inicio:</b>	<b>06/01/2020</b>
<b>Fecha de fin:</b>	<b>30/06/2020</b>



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

Enviar por email a: **OFICINA DE PRÁCTICAS ACADÉMICAS EXTERNAS – ETSIAAB**