

A. Name of the Service

Animal Facility for research in Neurosciences and Associated Services

B. Description

The Animal Facility (SE/9/U - ES410911018009) of Pablo de Olavide University (UPO) is a housing center for mice, rats, and rabbits mainly destined to the study of animal behavior, as well as the neural mechanisms underlying learning and memory processes from both motor and cognitive points of view. The Service is a facility of about 1000 m² and has six housing rooms for animals plus 14 laboratories specialized in different experimental techniques and designs. Experiments are always related to specific aspects of contemporary Neurosciences, particularly for studies carried out in animals under the best physiological conditions.

The Service is attached to the UPO Neuroscience Division (group BIO122 of the Junta de Andalucía). The Neuroscience Division of the UPO is devoted to the study of the neurophysiological bases of animal behavior, from the generation of simple motor responses to the neural control of complex behavioral activities. The experimental approach is comparative and multidisciplinary, including the use of behavioral and learning techniques, as well as electrophysiological, histological, pharmacological, and modeling procedures. Special attention is paid to the study of the adaptive properties of the nervous tissue, mainly those that underlie motor and associative learning, as well as those involved in motivational, emotional, and cognitive processes. An important aspect of the Division's activities is the design (on demand) of specific instrumentation for experimental studies of various types.

C. Needs and/or problems resolved by the Service

The facilities and instrumentation available in the Service, and the excellent training of staff and technical personnel of the Neuroscience Division, enable the carrying out of a wide diversity of studies related to contemporary Neurosciences:

- Basic phenotyping studies, characterization of the motor and cognitive abilities of wild-type and genetically manipulated animals: open field, Y-maze, elevated plus maze, motor ability (Rota-rod, raised bar, elevated wire), passive and active avoidance tests, object recognition, startle reflex response and prepulse inhibition, three-compartment cage for studies of autistic syndrome, etc. The design of other behavioral tests can be carried out upon request.
- One of the tests most used in the study of the neuronal bases of learning is the classical eyeblink conditioning of laboratory animals under physiological conditions. The Service

has the necessary instrumentation to carry out this type of learning for mice, rats, and rabbits. Our experimental designs enable the simultaneous recording (with wires or wireless) and/or stimulation (electrical, chemical) of the neuronal electrical activity of selected brain areas (for details, see Gruart et al., *J. Neurosci.*, 2006; Hasan et al., *Nature Comm.*, 2013; Madroñal et al., *Nature Comm.*, 2016).

- Instrumental conditioning in Skinner-type cages adapted to mice, rats, and rabbits. Programmable instrumentation in the four types of conditioning paradigms with positive (water, food) or negative reinforcement systems. Possibility of performing these tests with unitary, synaptic, and field electrophysiological recordings with wired or wireless recording techniques. Other techniques for electrical (invasive, tDCS, tACS, IFC, etc.), chemical, or viral stimulation/inhibition of specific neuronal areas are also available (Leal-Campanario et al., *PNAS USA*, 2007; Márquez-Ruiz et al., *PNAS USA* 2012; Reus-García et al., *Cereb. Cortex*, 2021)

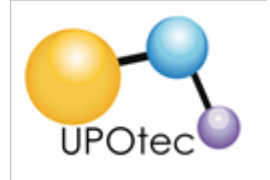
- Specific experimental displays in Skinner cages (modified by our technicians) for the study of the neural bases of cooperative social learning, decision-making processes, and various designs of brain/machine and brain/brain interfaces. This instrumentation is only available for rats (Hernández-González S et al., *J. Neurosci.*, 2017; Conde-Moro et al. *Prog. Neurobiol.*, 2019).

- Studies with genetically manipulated animals, viral vectors, or drugs related to the central nervous system, particularly those that have behavioral or cognitive effects or are aimed at the improvement of memory capabilities. Also, studies with prebiotic food components, as well as studies to determine the effect on the nervous system of hormones and trophic factors. We have extensive experience in this type of study carried out for companies specialized in procognitive drugs, neuroprotectors, and prebiotics. A wide variety of administration procedures are available (p.o., s.c., i.p., intraventricular, slow-release pumps, etc.).

- NOTE: All experiments carried out in this Animal Facility need the prior approval of the local Ethics Committee of the Pablo de Olavide University and the Junta de Andalucía Commission for Animal Studies. In addition, the corresponding permissions for animal studies included in the supporting grants and/or financial institutions have to be provided.

D. Innovative aspects and competitive advantages

The UPO's Central Animal Facility Service has almost unique facilities in Europe for the study of neural activities during the acquisition of the most diverse behavioral and learning tests under physiological conditions. Its various laboratories are intended to cover a wide range of behavioral, neurophysiological, and pharmacological techniques.



Some of the tests available have been developed by our technical services and are patented by the UPO.

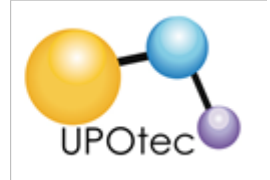
The Service, through the Neuroscience Division, maintains contacts and scientific collaborations with very diverse national and international groups, assisting the updating of its facilities.

The publications and patents generated by our research teams can be consulted on the Division's website (www.divisiondeneurociencias.es).

E. Scientific equipment available

The Service has the following facilities:

- Six rooms for housing mice (4), rats (1), and rabbits (1) for concerted experimentation through scientific cooperation or service provision projects. Animal husbandry and indefinite housing are not allowed. The Service closes the entire month of August for sterilization, and for the repair and updating of the facilities. Additional cleaning, warehouse, and quarantine facilities are also available.
- Two experimental operating rooms for mice, rats and rabbits, equipped with injectable (i.m., i.p.) or gas anesthesia systems, various types of stereotaxic devices, and the necessary equipment for the implantation of all types of intracerebral recording and stimulation systems. The entire surgery process is carried out under the control of the functional condition of the operated animal and for appropriate location of the implanted experimental devices.
- Two laboratories to carry out basic phenotyping, as well as motor and cognitive functional tests of the animals under study. Tests performed without additional recording systems or brain stimulation.
- A laboratory for associative learning tests (classical, instrumental) in awake rabbits under total or restricted freedom. Instrumental conditioning cage developed by our team with stimulation and recording systems. Classical conditioning tests including brain mapping and all kinds of pharmacological studies.
- Three laboratories for studies in wild-type and genetically manipulated mice, fully equipped for in vivo electrophysiological studies (input/output curves, double-pulse facilitation or depression, LTP and LTD of cortical and subcortical synapses) and of all kinds of learning and memory tests with unitary, synaptic, and local field potential recordings, EMG, ECG, EEG, etc.



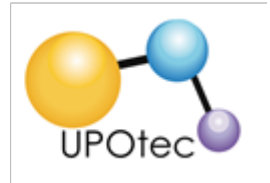
- A laboratory with a hypobaric chamber for the study of motor and cognitive functions at simulated altitudes. The chamber allows conducting electrophysiological and instrumental learning tests inside.
- Three laboratories for studies in rats of social learning (cooperation, decision making, and brain/machine and brain/brain interfaces) using instrumentation developed in part in our Service. The facilities allow the simultaneous recording of brain activities during behavioral tests, with wired or wireless recording systems.
- A perfusion room and extraction of biological samples.
- There are two separate electrical/electronics and metal/carpentry workshops for the design of electronic equipment for stimulation and recording of bioelectric signals and systems for transduction and storage of recorded data. We are specialized in the design of small instrumentation in recording, stimulation, and control systems and of various types of adapters, transducers, brain/machine interfaces, and information storage systems.
- Laboratory of storage, representation, analysis, and modeling of the acquired data. Patented systems for analyzing multi-unit records and potential field locations are also available.

F. Types of interested companies

- Neuroscience institutes and centers lacking type 1 Animal Facilities suitable for conducting experimentation on laboratory animals under physiological conditions.
- Companies in the pharmacological and food sectors, particularly those related to brain pathophysiology, neurodegenerative diseases, aging, learning and memory deficits, other cognitive disabilities, the gut-brain axis, prebiotic factors, etc.
- Centers and Services that need the development of small electrical/electronic instrumentation and carpentry (wood, metal, and plastic materials).

G. Level of development

The availability of the Service will be indicated shortly



H. Technological areas

Animal behavior, Ethology, Phenotyping, Neurophysiology, Psychophysiology, Social Neuroscience, Neurology and Psychiatry, Neuropharmacology, Food techniques, Pharmacology of psychoactive and procognitive products.

I. Research team

- Neuroscience Division (BIO 122 group of the Junta de Andalucía)
- Division website: www.divisiondeneurociencias.es
- Facebook: @divisiondeneurociencias
- Twitter: @DNeuro_UPO

Scientific managers:

- Profa. Agnès Gruart i Massó, Director of the Animal Facility Service, contact: groumas@upo.es
- Prof. José M. Delgado García, Director of the Neuroscience Division, contact: jmdelgar@upo.es

J. Tags

Learning and memory, Animal behavior, classical conditioning, operant conditioning, aging, brain/machine and brain/brain interface, in vivo electrophysiological studies (LTP, ELD, EEG, LFP, etc.), neuropsychopharmacology, food prebiotics, psychopharmaceuticals, ocular motor system, facial motor system.

K. Attached files

- Rates
- Application form
- Contact with the OTRI

Contact the OTRI through the contact form