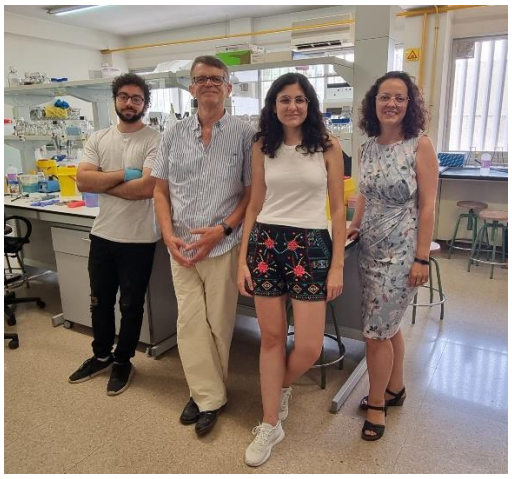
# “Microbial Biotechnology” research group. Universidad de Murcia.



The research of the group focuses on the study of the molecular microbiology of marine bacteria. Currently, our main research interest is the study of the mechanisms of bacterial defense against phages, including the role of CRISPR-Cas systems in that process.

**Group Members:** Antonio Sánchez Amat (P.I.), Patricia Elío Lucas, Christian José Martínez Jiménez, Andrea Martínez Cazorla, Antonio Bernal Soro and Jonatan Cristian Campillo Brocal.

**Research topics:** Isolation and characterization of marine bacteria and phages, role of CRISPR-Cas systems in phage defense, alternative defense mechanisms, use of phages as biocontrol agents of plant pathogenic bacteria, amino acid oxidases as antimicrobial proteins with a quinone cofactor, bacterial melanins, laccases.

**Recent articles:**


1. Lucas-Elío, P., Molina-Quintero, L.R., Xu, H., and Sánchez-Amat, A. (2021) A histidine kinase and a response regulator provide phage resistance to *Marinomonas mediterranea* via CRISPR-Cas regulation. *Sci Rep* **11**: 20564.
2. Lucas-Elio, P., Silas, S., and Sanchez-Amat, A. (2018) Isolation of phages infecting *Marinomonas mediterranea* by an enrichment protocol. *Bio-protocol Bio101* **Bio101: e2921.**: e2921.
3. Mohr, G., Silas, S., Stamos, J.L., Makarova, K.S., Markham, L.M., Yao, J., Lucas-Elío, P., Sanchez-Amat, A., Fire, A.Z., Koonin, E.V., and Lambowitz, A.M. (2018) A reverse transcriptase-Cas1 fusion protein contains a Cas6 domain required for both CRISPR RNA biogenesis and RNA spacer acquisition. *Mol Cell* **72**: 15.
4. Silas, S., Lucas-Elio, P., Jackson, S.A., Aroca-Crevillén, A., Hansen, L.L., Fineran, P.C., Fire, A.Z., and Sánchez-Amat, A. (2018) Correction: Type III CRISPR-Cas systems can provide redundancy to counteract viral escape from type I systems. *Elife* **6**:e27601
5. Silas, S., Mohr, G., Sidote, D.J., Markham, L.M., Sanchez-Amat, A., Bhaya, D., Lambowitz, A.M., and Fire, A.Z. (2016) Direct CRISPR spacer acquisition from RNA by a natural reverse transcriptase-Cas1 fusion protein. *Science* **351**: aad4234.
6. Mamounis, K.J., Ma, Z., Sanchez-Amat, A., and Davidson, V.L. (2019) Characterization of PlGoxB, a flavoprotein required for cysteine tryptophylquinone biosynthesis in glycine oxidase from *Pseudoalteromonas luteoviolacea*. *Arch Biochem Biophys* **674**: 108110.
7. Mamounis, K.J., Caldas Nogueira, M.L., Marchi Salvador, D.P., Andreo-Vidal, A., Sanchez-Amat, A., and Davidson, V.L. (2022) Structural determinants of the specific activities of an L-amino

acid oxidase from *Pseudoalteromonas luteoviolacea* CPMOR-1 with broad substrate specificity. Molecules 27, 4726. https://doi.org/10.3390/ molecules27154726

## Research projects:

Projects in the last ten years:

Bacterial response to phages beyond CRISPR-Cas (2022-25). Spanish Agencia Estatal de Investigación (PID2021-124464NB-I00)

Functional diversity of CRISPR-Cas systems: role of the systems with RT-Cas1 in the defense against phages. (2018-20). Spanish Ministerio de Economía, Industria y Competitividad (BFU2017-85464).

Identification of infective genetic elements targeted by CRISPR-Cas systems (2019-22). Fundación Séneca, Comunidad Autónoma de la Región de Murcia (20883/PI/18)

Mechanism of synthesis and secretion of the antimicrobial protein lysine oxidase in *Marinomonas mediterranea* (2011-3). Spanish Ministerio de Ciencia e Innovación (BIO2010-15226).

Identification of novel genes involved in the expression of L-amino acid oxidases in marine bacteria of the genus *Marinomonas* (2010-4). Fundación Séneca, Comunidad Autónoma de la Región de Murcia (11867/PI/09).

## Doctoral Thesis: 7 Thesis completed and three ongoing.

**Web site: https://www.um.es/biotecmicrob/**