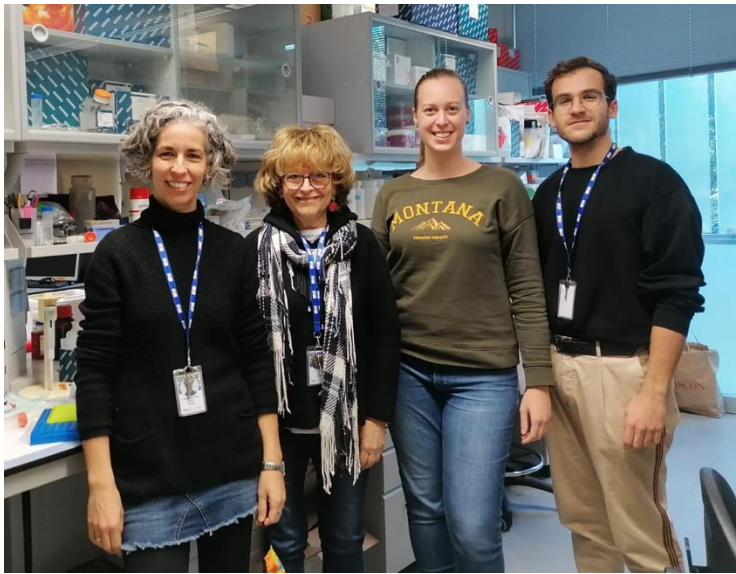


Marine Viral Ecology Group (ICM)

The marine viral ecology group of the marine Science Institute (ICM) led by Dolors Vaqué is involved in the research of viral abundance and activity, virus-host interactions and viral diversity in different marine systems (from the tropic to polar systems). The main research lines are: i) to assess viral abundance and activity (lysis vs lysogeny); II) to identify specific viruses infecting dominant microbial species; III) Environmental factors influencing viral assemblages and activity.

Group Members

Research Scientist: Dolors Vaqué; PhD: Yaiza M. Castillo; PhD student: Xabier López-Alforja; Specialized technician: Elisabet Laia Sà



From left to right: Elisabet Laia Sà, Dolors Vaqué, Yaiza M. Castillo and Xabier López-Alforja

Research topics

Marine viruses in the microbial food web: We aimed to understand i) the role of marine viruses, which are the smallest and most abundant biological entities of the sea, the major players in the biogeochemical cycles of the Ocean, and controllers of the microbial biomass and diversity, throughout the water column, from different marine systems; ii) how all these viral processes are shaped by environmental features and influenced by the climate change.

Host-virus interactions: By using cultured and non-cultured models. In the first case, from isolated virus and hosts we perform phageFISH and virusFISH techniques to identify and follow the dynamics of the viral infection in the culture and later implemented in natural systems. In the second case, from single cells amplified genomes (SAGs) we search and identify viral signatures.

Identification of viral genes in metaviromic and metagenomic fractions. The viral genes obtained from SAG's are used to explore their presence in the world-Ocean data bases. We look for its association in the metagenomic fraction (0.2-3.0mm), or in the free metaviromic fraction ($\leq 0.2 \mu\text{m}$).

Selected Articles (last 4 years)

Sala MM, Peters F, Sebastián M, Cardelús C, Calvo E, Marrasé C, Massana R, Pelejero C, Sala-Coromina J, **Vaqué D**, Gasol JM (2021). COVID-19 lockdown moderately increased oligotrophy at a marine coastal site. STOTEN. Doi: 10.1016/j.scitotenv.2021.151443

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Vaqué D, Boras JA, Arrieta JM, Agustí S, Duarte CM, Sala MM (2021). Enhanced Viral Activity in the Surface Microlayer of the Arctic and Antarctic Oceans. Microorganisms, 9, 317. DOI: 10.3390/microorganisms9020317

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Sotomayor-Garcia A, Sala MM, Ferrera I, Estrada M, Vázquez-Domínguez E, Emelianov M, Cortés P, Marrasé C, Ortega-Retuerta C, Nunes S, **Castillo YM**, Serrano Cuerva M, Sebastián M, Dall'Osto M, Simó R, **Vaqué D** (2020). Life, 10, 107; doi:10.3390/life10070107.

Castillo YM, Mangot JF, Benites F, Logares R, Ogata H, Kuronishi M, Jaillon O, Sebastián M, Massana R, **Vaqué D** (2019). Assessing the viral content of uncultured picoeukaryotes in the Global Ocean by single cell genomics. Mol Ecol. DOI: 10.1111/mec.15210.

Vaqué D, Lara E, Arrieta JM, Holding J, **Sà EL**, Hendriks IE, Coello-Camba A, Alvarez M, Agustí S, Wassmann PF and Duarte CM (2019). Warming and CO2 Enhance Arctic Heterotrophic Microbial Activity. Front Microbiol. 10: 494. doi: 10.3389/fmicb.2019.00494.

Lara E, **Vaqué D**, **Sa E-L**, Bora JA, Gomes A, Borrull E, Diez-Vives C, Teira E, Pernice MC, Garcia FC, Forn I, **Castillo YM**, Peiro A, Salazar G, Moran XAG, Massana R, Catala TS, Luna GM, Agusti S, Estrada Marta, Gasol JM, Duarte CM (2017). Unveiling the role and life strategies of viruses from the surface to the dark ocean. *Sci adv*, 3:e1602565, DOI:10.1126/sciadv.1602565.

Moran XAG, Gasol JM, Pernice M, Mangot JF, Massana R, Lara E, **Vaqué D**, Duarte CM (2017). Temperature regulation of marine heterotrophic prokaryotes increases latitudinally as a breach between bottom-up and top-down controls. *Glob Chang Biol*, 23:3956–3964.

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Recent Projects

2020-2023. **DIVAS**. Temporal trends of planktonic viruses in an oligotrophic coastal system (PID2019-108457RB-I00). Institut de Ciències del Mar (CSIC). 2020-2023. IPs: D. Vaqué and R. Massana. MICYU 210000€

2017. Project from the “Secció de Ciències Biològiques de l’IEC”. Time Series studies in Blanes Bay. PI: M. Estrada and D. Vaqué. Institut de Ciències del Mar (CSIC). IEC. 3200 €

2014-2017. **MEFISTO**: Viral impact on marine microbial by using virus-host models and metagenomic analyses (CTM2013-43767). IP. D. Vaqué. Institut de Ciències del Mar (CSIC). MINECO. 168000€

2015-2016. The role of viruses in structuring the marine environment of the Red Sea (OSR-2015-SEED-2449-02). IP. Christian Voolstra. Sub-Awardee IP. D. Vaqué Institut de Ciències del Mar (CSIC). KAUST (King Abdullah University of Science and Technology, Arabia Saudita). 30000\$

Doctoral Thesis

Xavier Lopez Alforja. Temporal patterns of virus-protists interaction. Director: Dolors Vaqué, co-director: Ramon Massana. Ongoing

Yaiza Mercedes Castillo: Interactions between marine picoeukaryotes and their viruses one cell at a time. Universitat de Barcelona. Inicio abril 2015, defensa: 17 de December de 2019. Director: Dolors Vaqué, co-director: Marta Sebastian

Elena Lara de la Casa: Viruses in the marine environment: community dynamics, phage-host interactions and genomic structure. Universidad Las Palmas de Gran Canaria. Defensa: 21 de marzo de 2014. Director: Dolors Vaqué, co-director: Silvia G. Acinas.