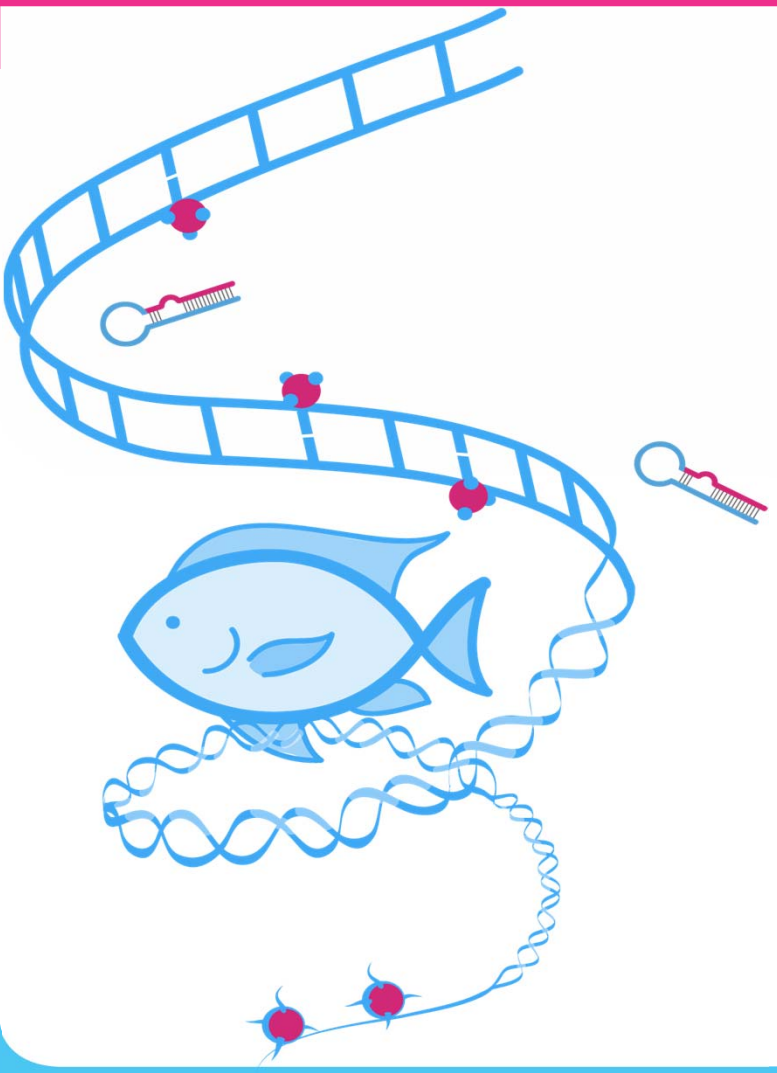

EPIMARK and EPISELECT – My two PoC grants

Jorge Fernandes

Nord University, Norway

8 February 2024

NORD University

European Research Council
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Supporting top researchers from anywhere in the world

EPIMARK ⟺ EPIFISH

Innovative Epigenetic Markers for Fish Domestication

European Research Council
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ERC Consolidator grant
2016-2021

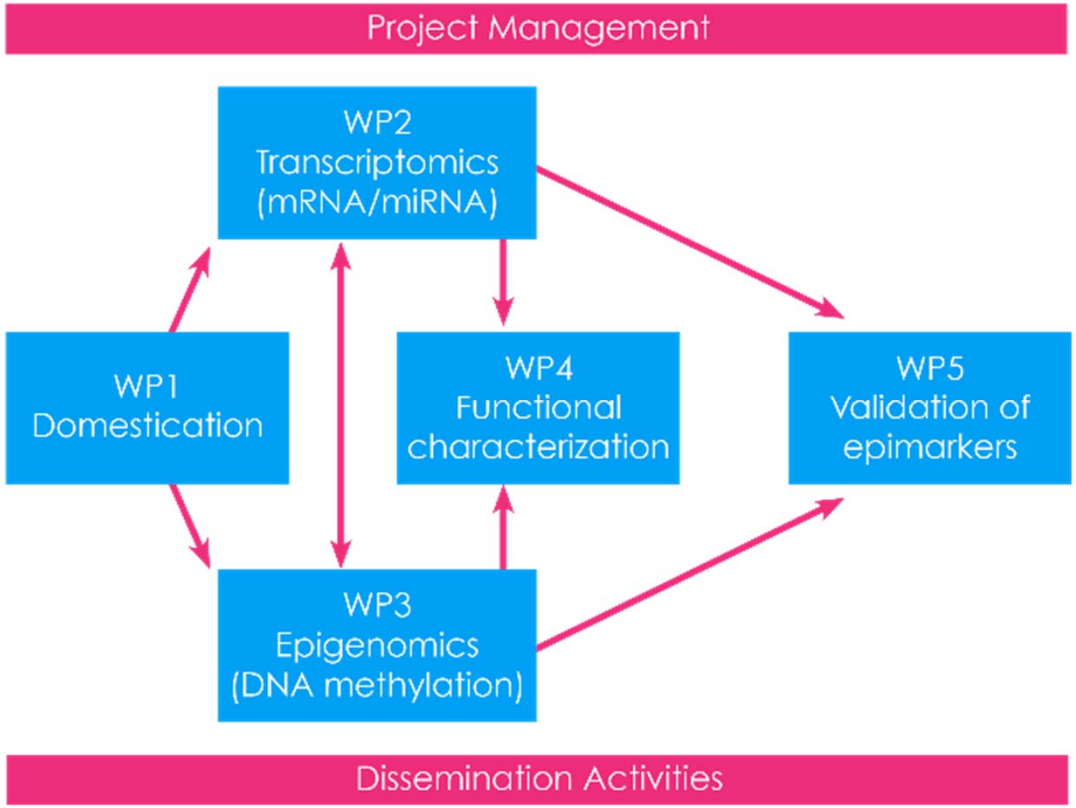
The Research Council of Norway

FRIPRO TOPPFORSK
2016-2021

Jorge Fernandes

EPIFISH

EPIFISH uses a multidisciplinary approach to study domestication at its research frontier



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Collecting wild Nile tilapia in Luxor (Egypt)

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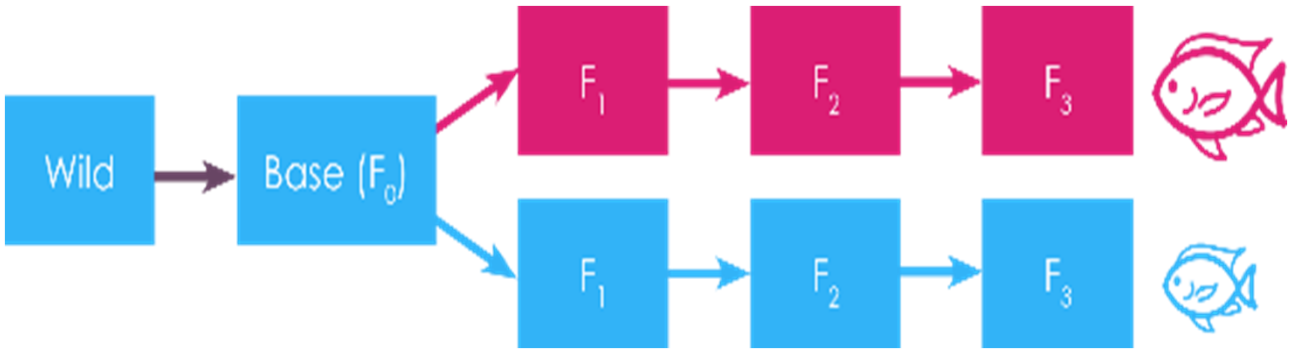
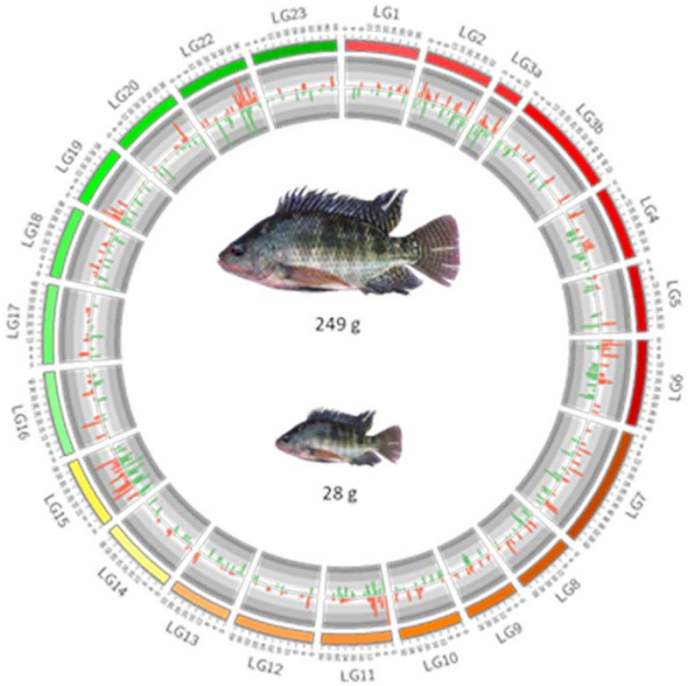
Our small-scale domestication program

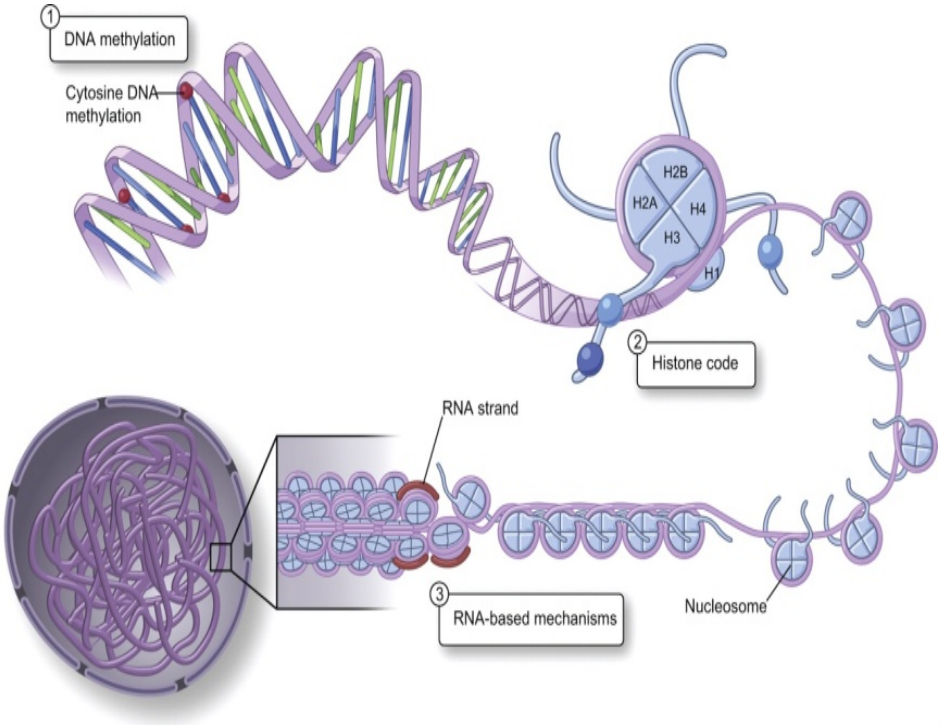


- ✓ Wild tilapia from Egypt were used to establish a base population F_0
- ✓ These families have been selected for improved growth for three generations

EPIFISH has discovered epigenetic changes associated with growth



Differentially methylated cytosines across the Nile tilapia genome between large and small males



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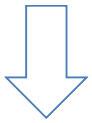
The idea and technology gap underlying my first ERC PoC

- ✓ To date, selective breeding programmes are based exclusively on genetic markers, overlooking the fact that epigenetics may account for a large proportion of the observed phenotypic variation

- ✓ IAM (Nord TTO and Konsert) identified several technology assets with innovation potential



We need to improve the selection of fish in breeding programmes based on growth potential (a commercially relevant trait), thereby increasing the yield of production and leading to more sustainable aquaculture

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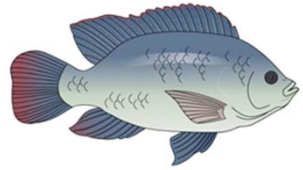
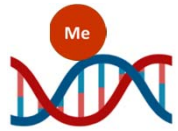
Epigenetic markers

- ✓ An epigenetic biomarker (epimarker) is an epigenetic mark or altered epigenetic mechanism (e.g, DNA methylation) that can be quantified and used to predict or identify a phenotype
- ✓ Epimarkers have the advantage of reflecting past environmental interactions
- ✓ Demonstrated potential in preventive medicine (e.g, cancer, cardiovascular disease and preterm birth)





Gene *X*

Gene *X*

The POC application

- ✓ Exciting to write a proposal for a translational project
- ✓ Clear high-risk/high-gain idea -> develop the first kit of epigenetic marks associated with growth in fish (Nile tilapia)
- ✓ TTO/ Consulting company
- ✓ Industry partners

GenoMar

sparos I&D nutrition in aquaculture

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EPIMARK

Commercial feasibility of a kit for the identification of epigenetic markers in farmed fish

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ERC Proof of Concept

1,500 EUR

2018-2020 (18 months)

Jorge Fernandes

EPIMARK – Plan of activities

Activity	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18
1a - 5mC/5hmC																		
1a - miRNA																		
1b - Web tool																		
1c - SOP																		
2a - IP analysis																		
2b - Patent strategy																		
3 - Commercial feasibility																		
4 - Business development																		

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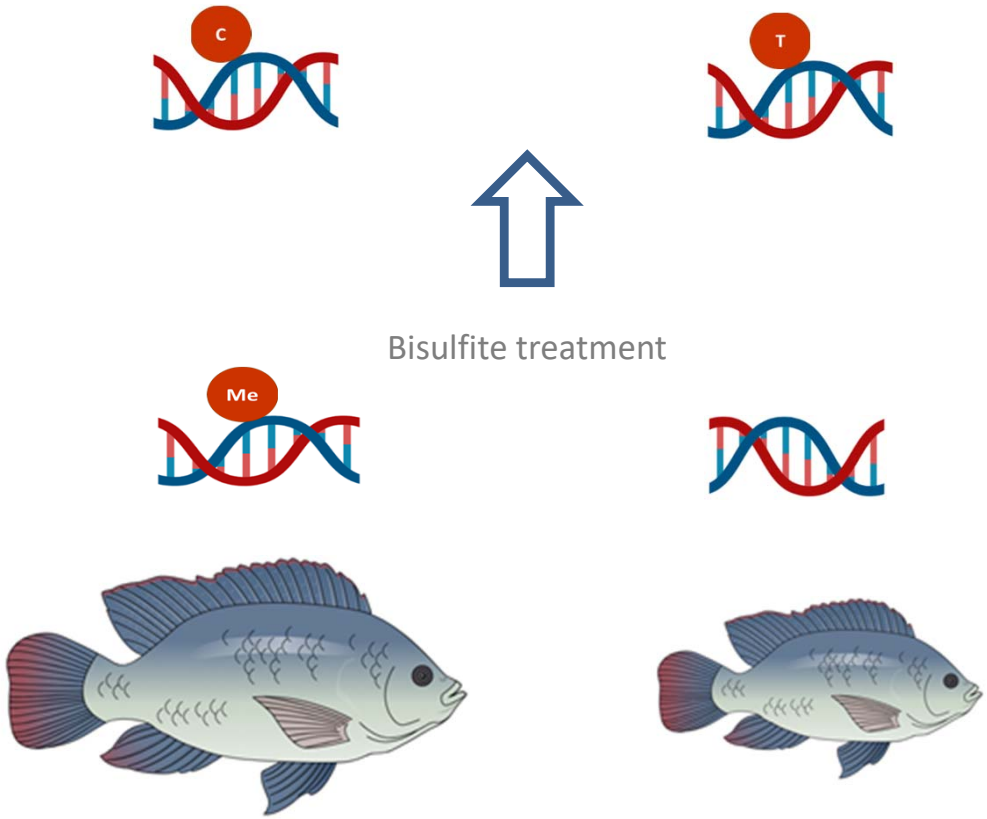
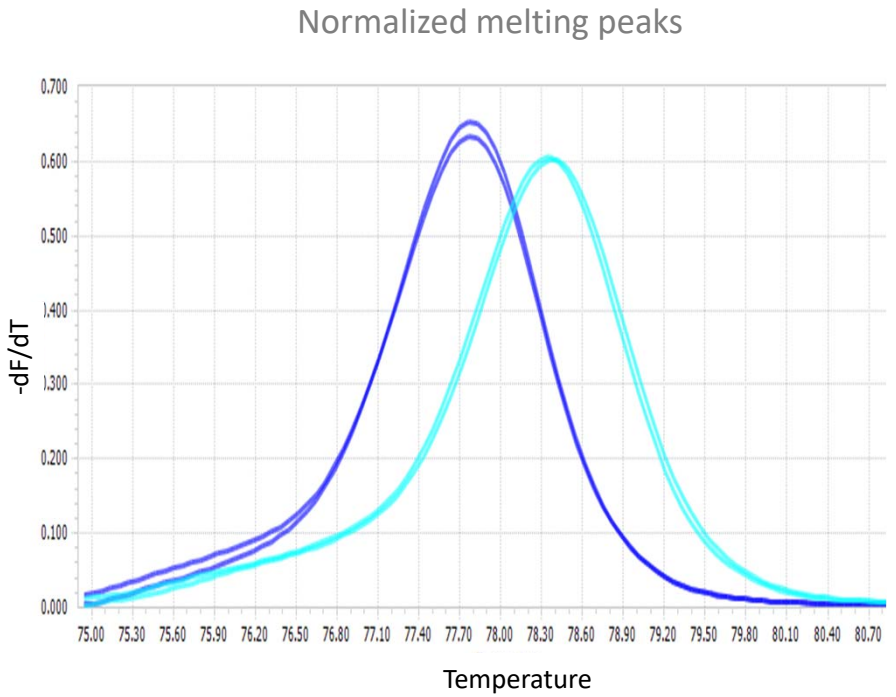
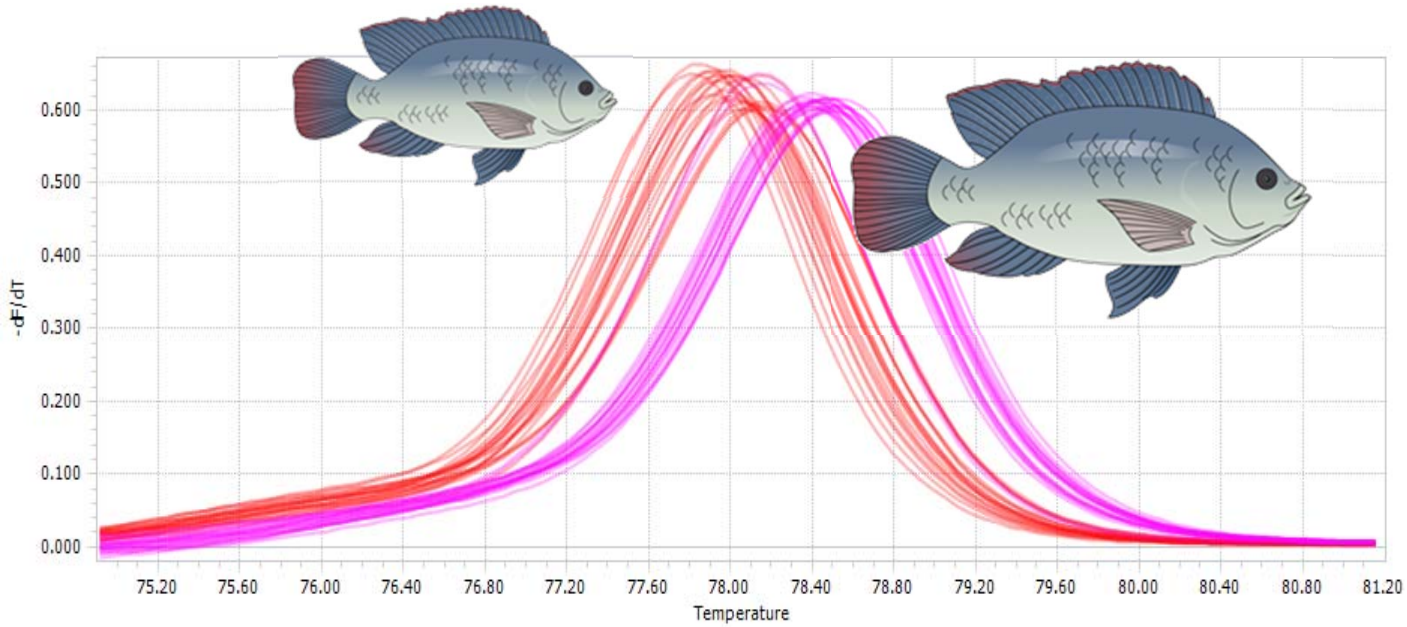
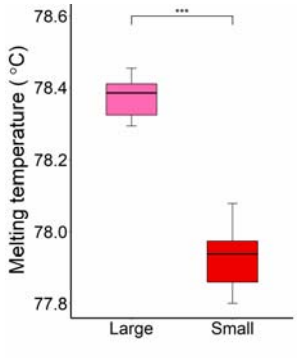
High-resolution melting (HRM) qPCR can be used to quantify methylation levels





Independent validation confirmed differential methylation between slow- and fast-growers





Normalized melting peaks from 40 F2 individuals

The second POC application

- ✓ Further validation of the epigenetic markers (e.g., stability and inheritance)
- ✓ New component -> include an additional type of marker
- ✓ Multi-species application

Institut de Ciències del Mar

EPISELECT

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EPISELECT

Feasibility of a multi-panel of epigenetic markers of fish growth

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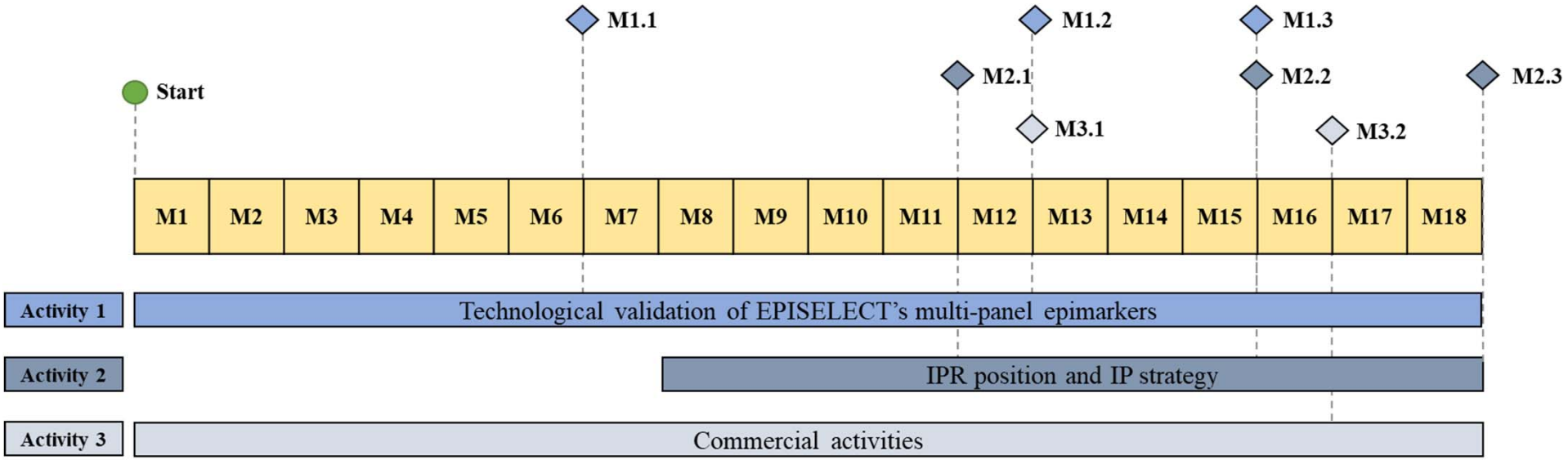
ERC Proof of Concept

1,500 EUR

2023-2024 (18 months)

Jorge Fernandes

EPISELECT timeline



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My experience with the POC applications

- ✓ Very positive experience both with the application and implementation of the project -> administrative assistance fror the ERC
- ✓ Simplified budget
- ✓ Fair and fast evaluation from 5 expert reviewers
- ✓ Excellent opportunity to explore the commercial innovation potential in my ERC CoG

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Acknowledgements

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The Research Council of Norway

NORD University

sparos I&D nutrition in aquaculture

ttopstart
Science and business consultants

GenoMar