



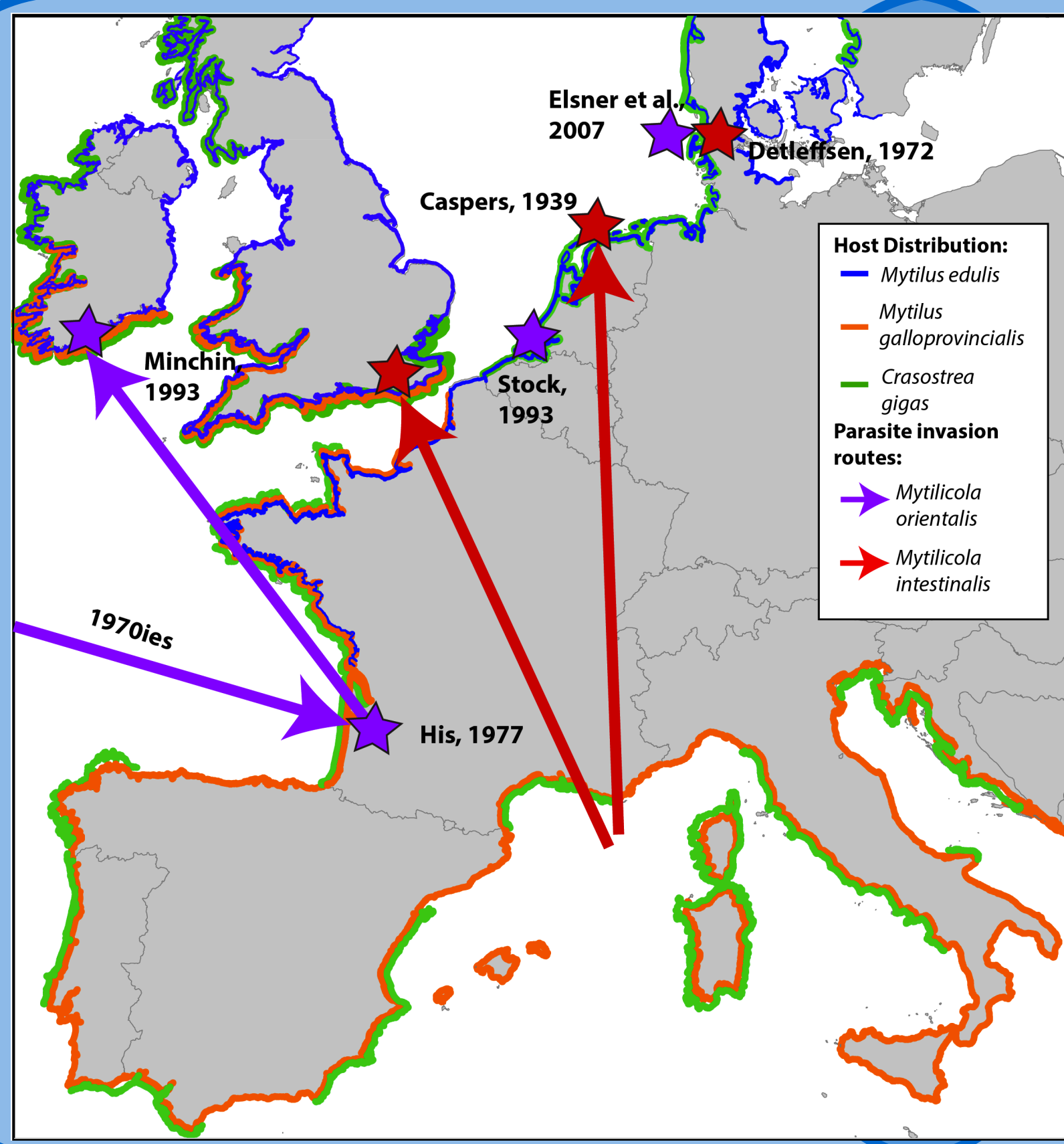
Coevolution of invasive parasites with old and new host species along a gradient of ancient to recent sympatry

Introduction

Biological invasions of parasites and their hosts are ideal to study coevolution in nature. Taking hosts and parasites along the route of invasion – along a gradient from ancient to recent sympatry – and exposing the different combinations to each other will give insights in coevolutionary responses of hosts and parasites.

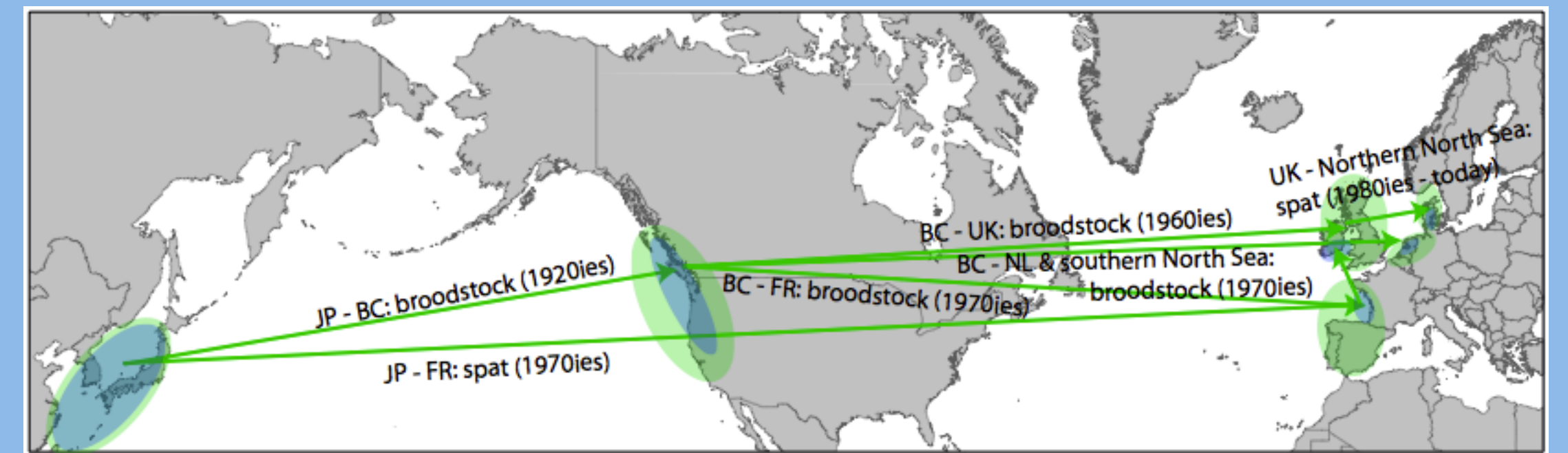
Aims of this project

- Construct transcriptome backbone for marker development and gene annotation
- Invasion genetics
- Adaptation, transcriptional responses and transmission of infections in “old” and “new” combinations of hosts and parasites



Study system – parasitic copepods *Mytilicola intestinalis* and *M. orientalis* in mussels *Mytilus galloprovincialis* and *M. edulis* and oysters *Crassostrea gigas*

- Invasion of two closely related congeners into same habitat with same new potential host species
- Possibility to look at phenotypic and molecular targets of selection
- Native range of *M. intestinalis* and *M. orientalis*: Mediterranean Sea and inland sea of Japan respectively
- Precise invasion routes and time points known
- High field prevalences, direct life cycle, larvae do not feed, possible to keep in lab



Aim 1: Invasion genetics

- Neutral + selected SNP/msat markers
- Native range and invaded range
- *M. intestinalis* and *M. orientalis* plus hosts

Aim 2: Development of genomic resources

- Characterise *Mytilicola* genetically
- Construct transcriptome backbones by next-generation sequencing
- Development of nuclear markers (Aim 1)
- Essential for mapping of further experiments (Aim 5)

Infection experiments (Aims 3, 4 and 5)

Infect different combinations (see below); 20 hosts per treatment; all same infective dose

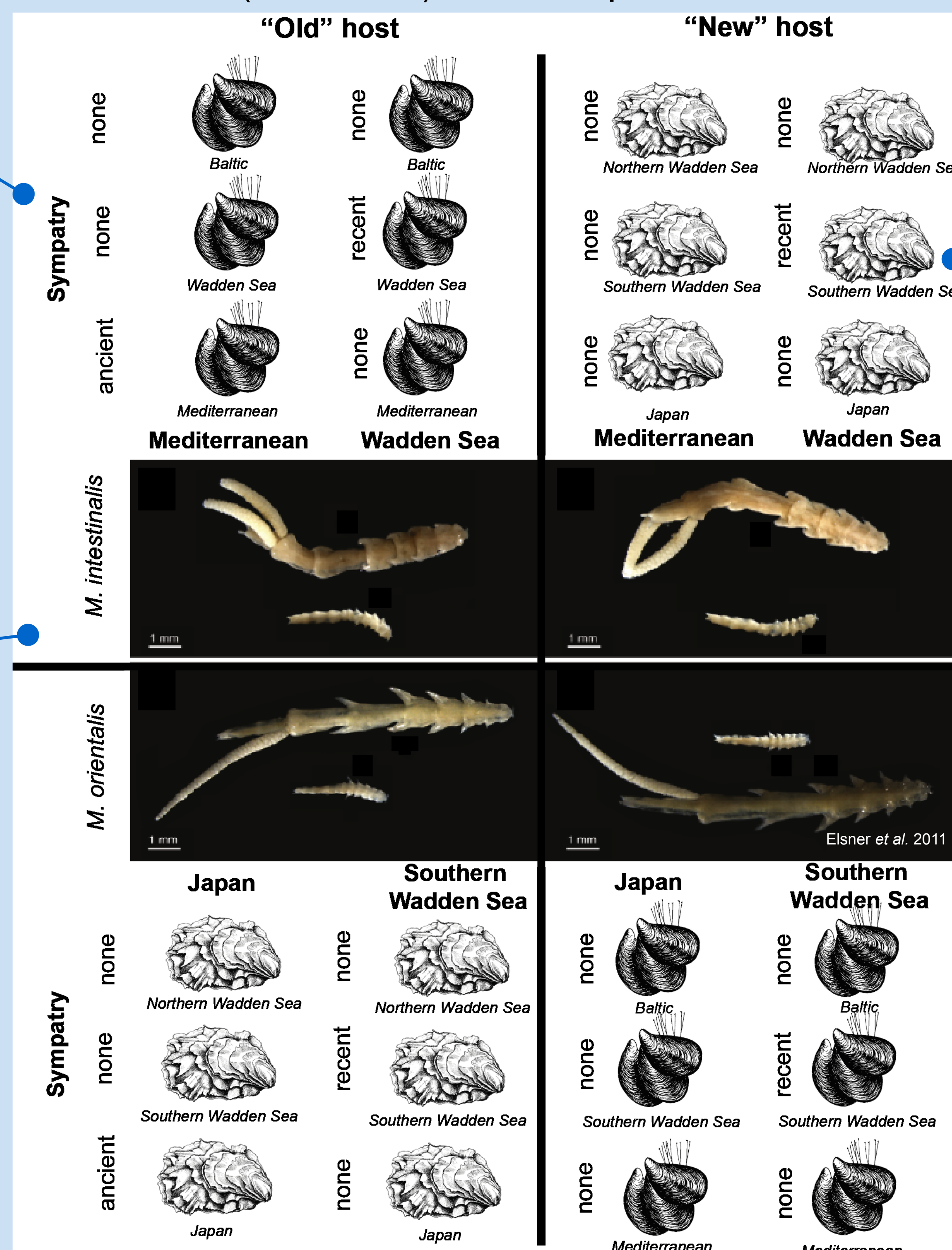
Aim 3: Adaptation to “old” local VS “new” invasive hosts

- Response variables:
- Infection rate and intensity
 - Sustainability of parasite population
 - Host body condition

Expectation: Better adaptation to “old” local host, but higher infection rate and intensity in “new” host

Aim 4: Transmission within and between “old” and “new” hosts

- Additional experiment after Aim 3: use hosts with high infection rates to determine transmission rates – **expectations:**
- Transmission of generalist *M. orientalis* same between “old” and “new” hosts
 - Transmission of specialist *M. intestinalis* same between “old” and “new” mussels, less to “new” oysters



Aim 5: Plastic transcriptional response along a gradient from ancient to recent sympatry

- RNAseq from parasites and gut tissue of hosts – **expectations:**
- Evolution of generalism: *M. orientalis* shows more signs of generalism
 - Molecular signatures of host parasite coevolution during biological invasion
 - Stronger immune response with less specificity in recent sympatry

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