

Divergence of an introduced population of the Swimbladder-nematode *Anguillicola crassus* - a transcriptomic perspective



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Abstract

Put your abstract or summary here, if your university requires it.

To my grandmother Ruth my brother Roman and my wife Silvia

Acknowledgements

I would like to acknowledge the thousands of individuals who have coded for free software and open source projects. It is due to their efforts that code is shared, tested, challenged and improved. Sharing their intellectual property as a general good, they serve progress in science and technology.

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GLOSSARY

Glossary

DNA Desoxy Ribonucleic Acid; a chemical molecule bearing the heritable genetic information in all life on earth

dpi Days post infection; In infection experiments, a point in time given in

days after an individual has been infected

ORF Open Reading Frame; a region in a DNA-sequence beginning with a start-codon and not containing a stop-codon. For example a region within a processed mRNA transcript being transcribed into a protein

SNP Single Nucleotide Polymorphism; variation occurring in a single nucleotide between two closely related homologous sequences. Leading to for example to allelic differences within a population or even the homologous chromosomes in an individual

GLOSSARY

1

Introduction

1.1 The study organism: *Anguillicola crassus*

1.1.1 Ecological significance

Anguillicola crassus Kuwahara, Niimi and Ithakagi 1974 (1, 2) is a swimbladder nematode naturally parasitizing the Japanese eel (*Anguilla japonica*) indigenous to East-Asia. After a single introduction (3) to Germany in the early 1980s *A. crassus* has colonized almost all populations of the European eel (*Anguilla anguilla*) (4). Since the 1990s populations of the American eel (*Anguilla rostrata*) have been colonized as novel hosts (5, 6, 7) and finally it has been detected in three indigenous *Anguilla* species on the island of Reunion near Madagascar (8).

In Asia, as well as in the introduced ranges, copepods and ostracods serve as intermediate hosts of *A. crassus* (9), in which L2 larvae develop to L3 larvae, infective to the final host. Once ingested by an eel they migrate through the intestinal wall and via the body cavity into the swimbladder wall (10), i.a. using a trypsin-like proteinase(11). In the swimbladder wall L3 larvae hatch to L4 larvae. After a final moult from L4 to preadult the parasites inhabit the lumen of the swimbladder, where they eventually mate. Eggs containing L2 larvae are released via the ductus pneumaticus into the eels gut and finally into the water(12).

Within the novel range and hosts, conspicuously elevated prevalences and intensities of infection occur (reviewed in (4) and (13)). These differences in abundance of *A. crassus* in East Asia compared to Europe are commonly attributed to the different host-parasite relations in the final eel host permitting a differential survival of the

1. INTRODUCTION

larval and the adult parasites (14). Recently, data from experimental infections of European eels with *A. crassus* have been published (15). They show that the parasite undergoes (under experimental conditions) a density-dependent regulation keeping the number of worms within a certain range.

1.1.2 Evolutionary significance

1.1.2.1 Divergence of *A. crassus* populations

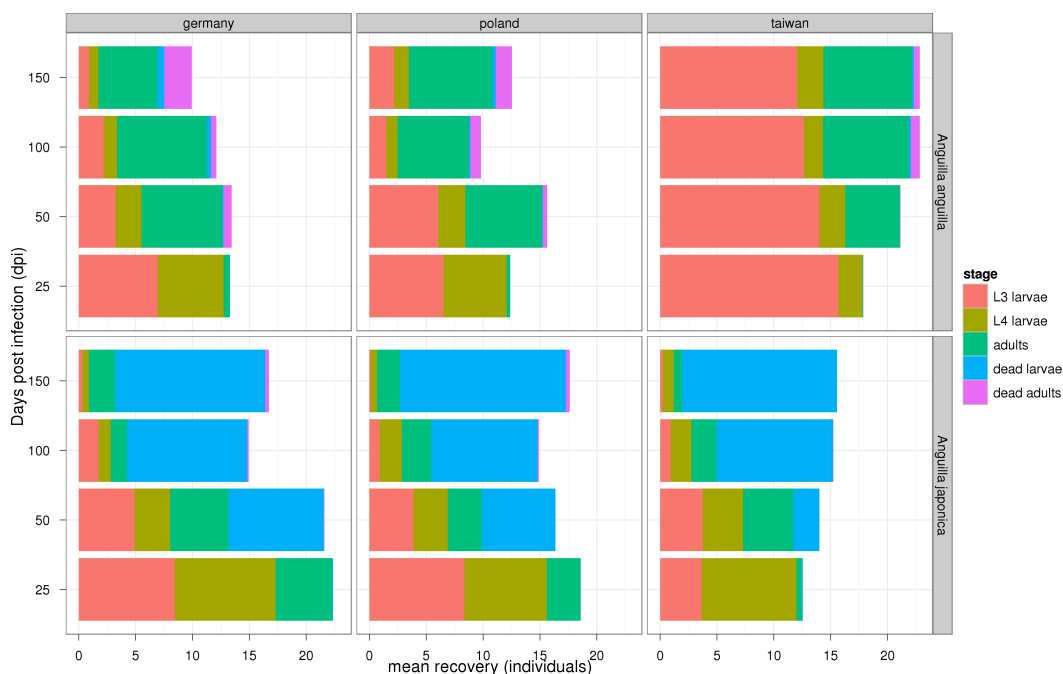


Figure 1.1: Differences in developmental speed - data courtesy of Urszula Weclawski

1.1.2.2 Interest in *A. crassus* based on its phylogenetic position in the phylum nematoda

1.1.3 Functional insights from other nematodes used to formulate hypotheses for *A. crassus*

1.2 Advances in sequencing technology enabeling this study

Recent advances in DNA-sequencing

1.2 Advances in sequencing technology enabeling this study

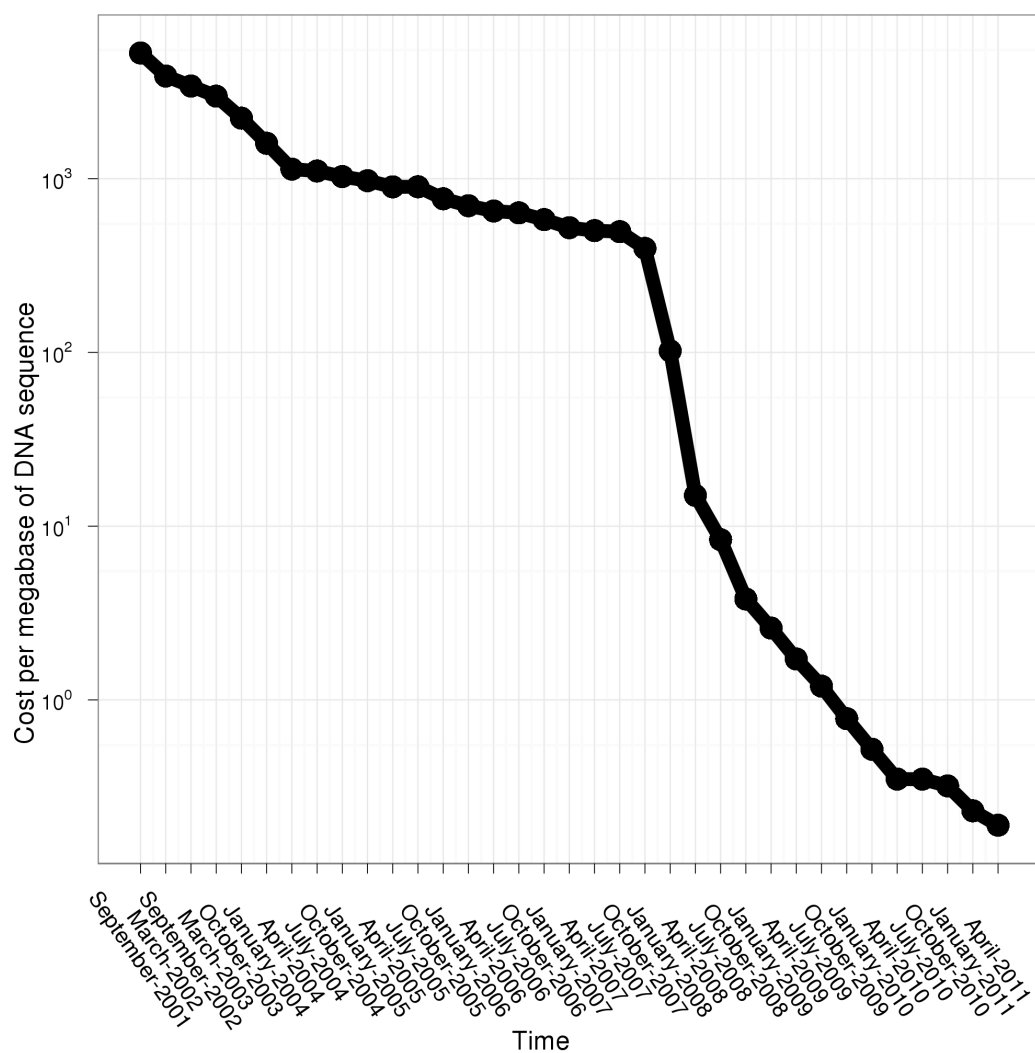


Figure 1.2: Falling sequencing costs - Falling into bottomless, Data provided by National Human Genome Research Institute, NHGRI.

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1.2.1 Pyro-sequencing

1.2.2 Illumina-Solexa sequencing

Gene	GeneID	Length
human latexin	1234	14.9 kbps
mouse latexin	2345	10.1 kbps
rat latexin	3456	9.6 kbps

Table 1.1: title of table - Overview of latexin genes.

2

Aims of the project

2.1 Final aim

Our ultimate goal is...

2.2 Preliminary aims

There will be several preliminary scientific targets to be accomplished on the way...

2. AIMS OF THE PROJECT

3

Discussion

3. DISCUSSION

4

Materials & methods

4. MATERIALS & METHODS

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Declaration

I herewith declare that I have produced this paper without the prohibited assistance of third parties and without making use of aids other than those specified; notions taken over directly or indirectly from other sources have been identified as such. This paper has not previously been presented in identical or similar form to any other German or foreign examination board.

The thesis work was conducted from XXX to YYY under the supervision of PI at ZZZ.

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