

# Investigations of the expression of the multipartite mtDNA of *Globodera pallida*

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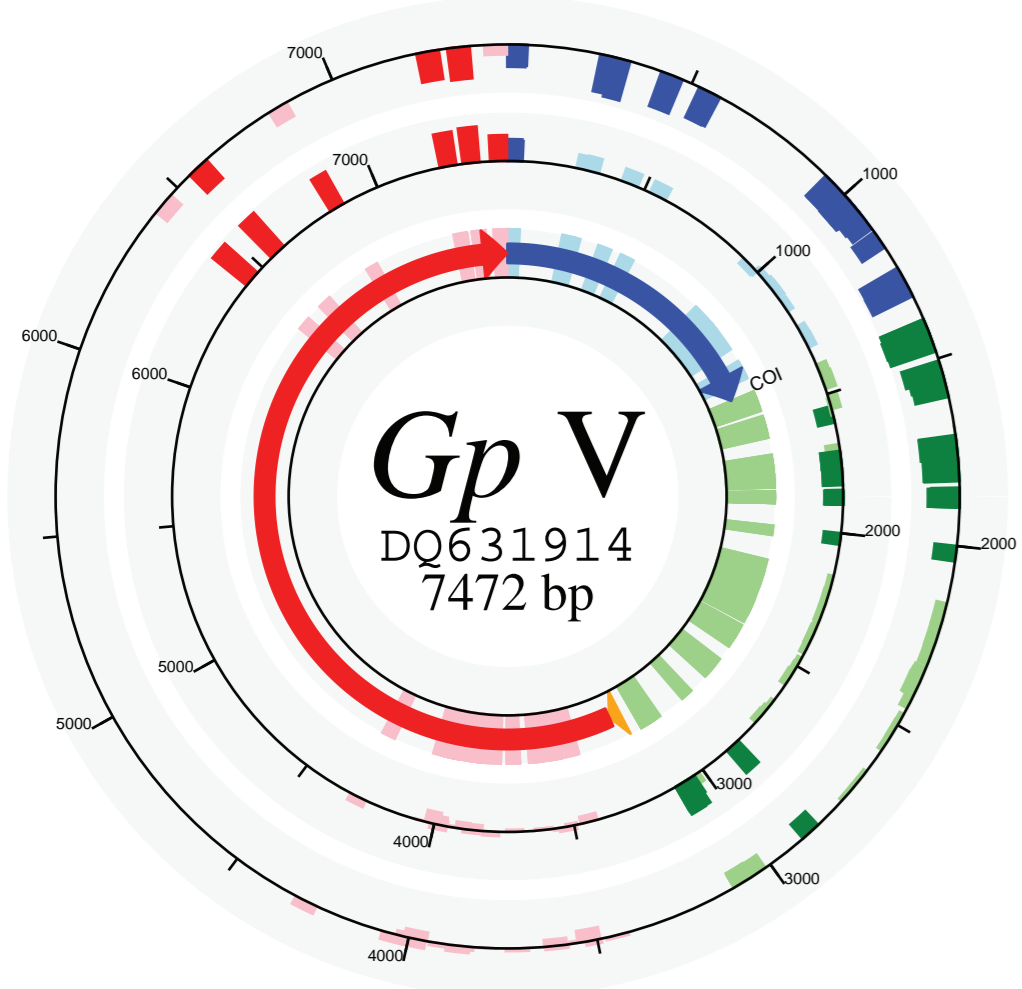
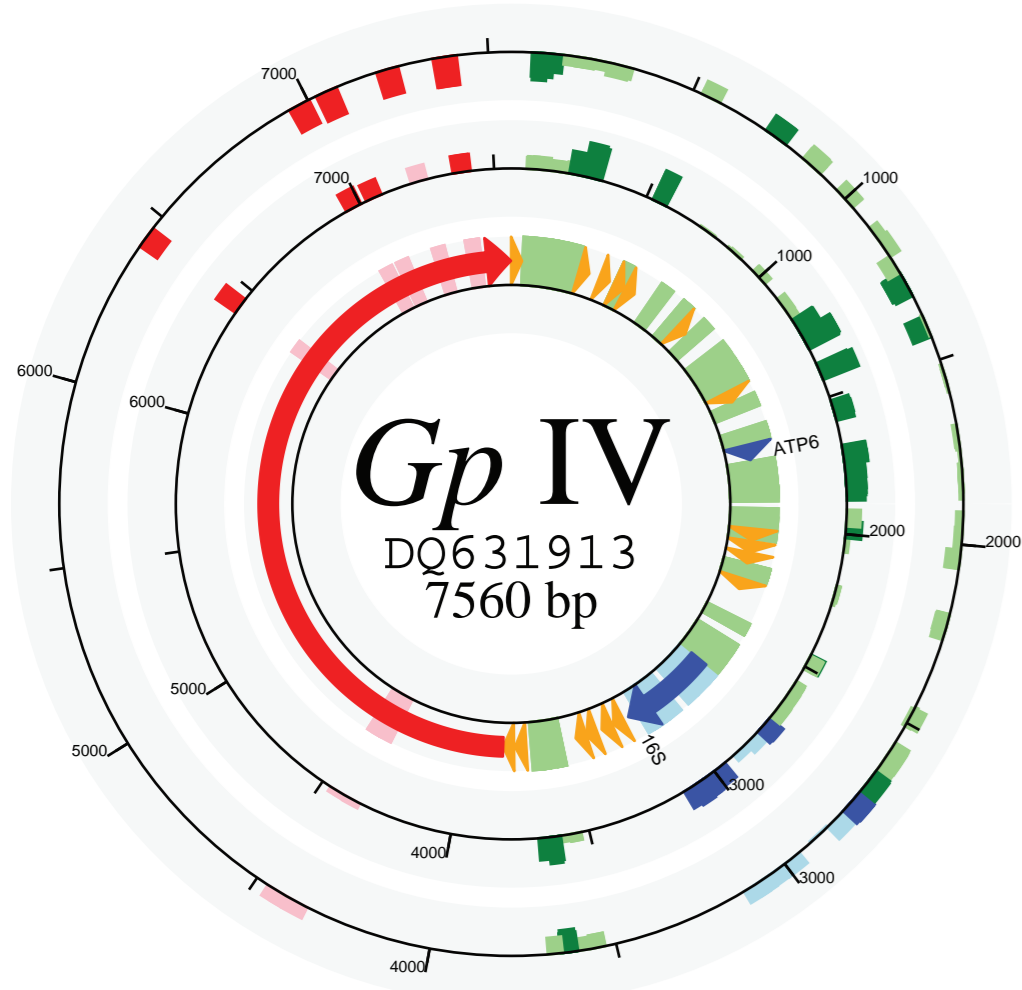
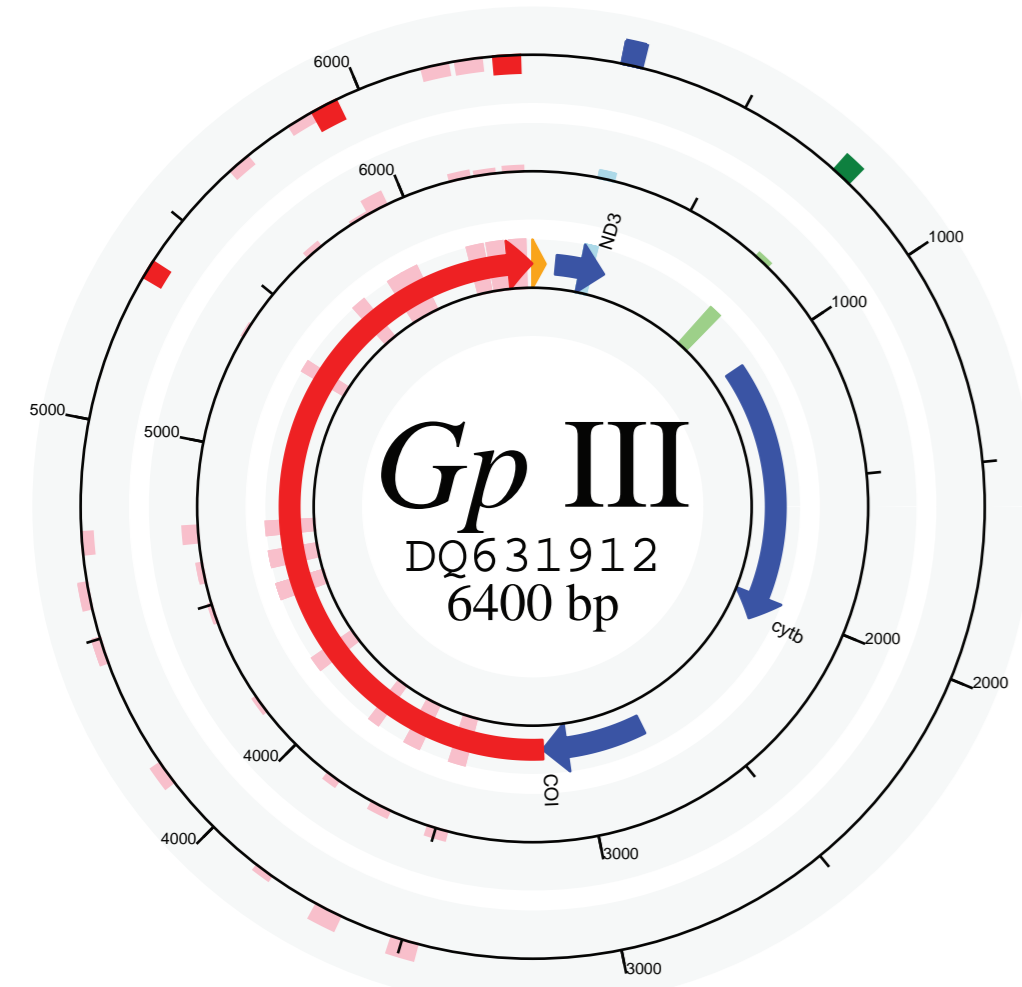
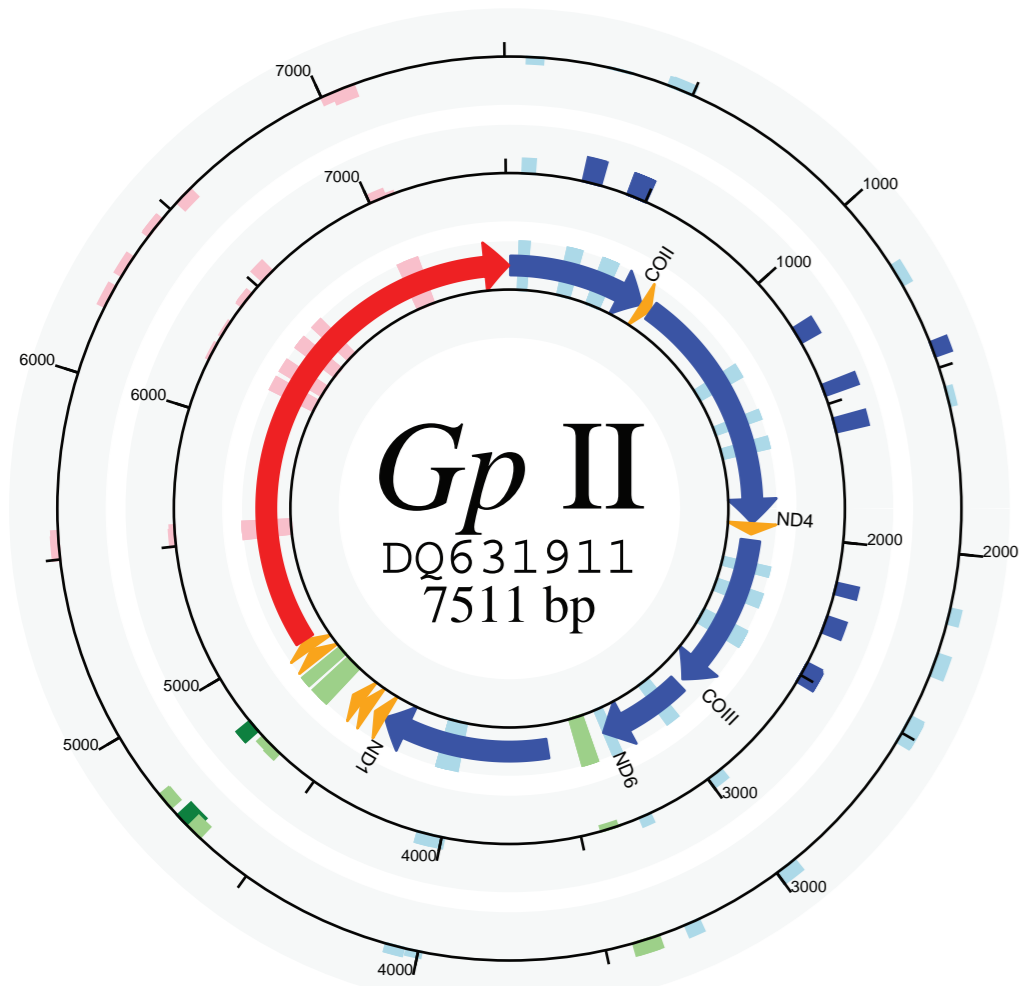
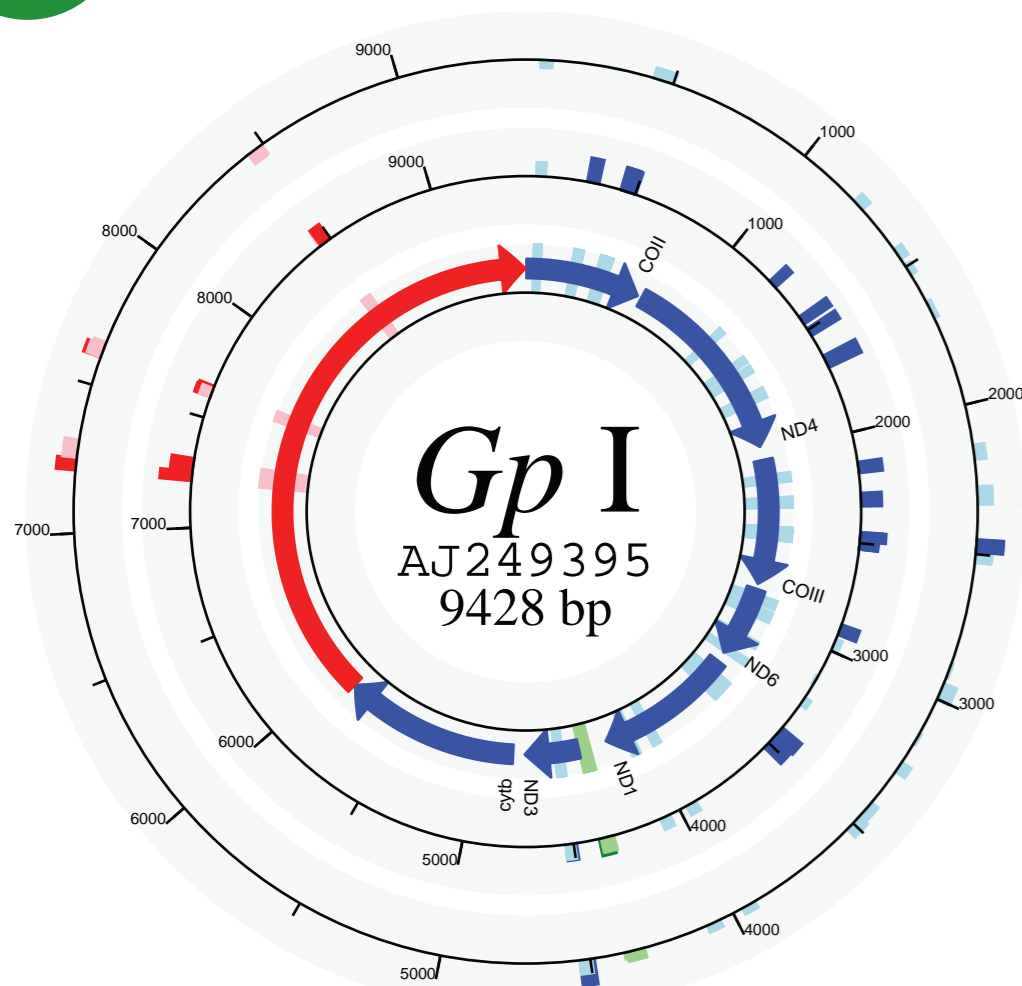
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The mitochondrial genomes of potato cyst nematodes *Globodera pallida* and *G. rostochiensis* consist of several small circular molecules (scmtDNA) in contrast to the typical metazoan mtDNA which comprises a single circular molecule that encodes the 12 or 13 proteins involved in electron transport & oxidative phosphorylation, ribosomal RNAs and tRNAs. A multipartite mitochondrial genome in both species of PCN suggests that this unusual structure predates their evolutionary separation, which has been estimated at over 10 million years.

## Microarray analyses



Comparison of expression of targets from 5 previously sequenced *G. pallida* scmtDNAs at three stages in life cycle (egg, juvenile, parasitic 8 days post infection).

**Inner circle:** Coding (genes - dark blue; tRNA - orange) and noncoding "222" region (red). Positions of probes indicated (blue - coding; green - intergenic; red - noncoding "222" region).

**Middle circle:** Egg versus juvenile, with upregulated expression shown directed outwards and downregulated expression directed inwards.

**Outer circle:** Parasitic (8 dpi) versus juvenile, again with upregulated expression outwards, downregulated expression inwards.

- Overall expression levels were not greatly different between eggs, juveniles and parasitic stages.

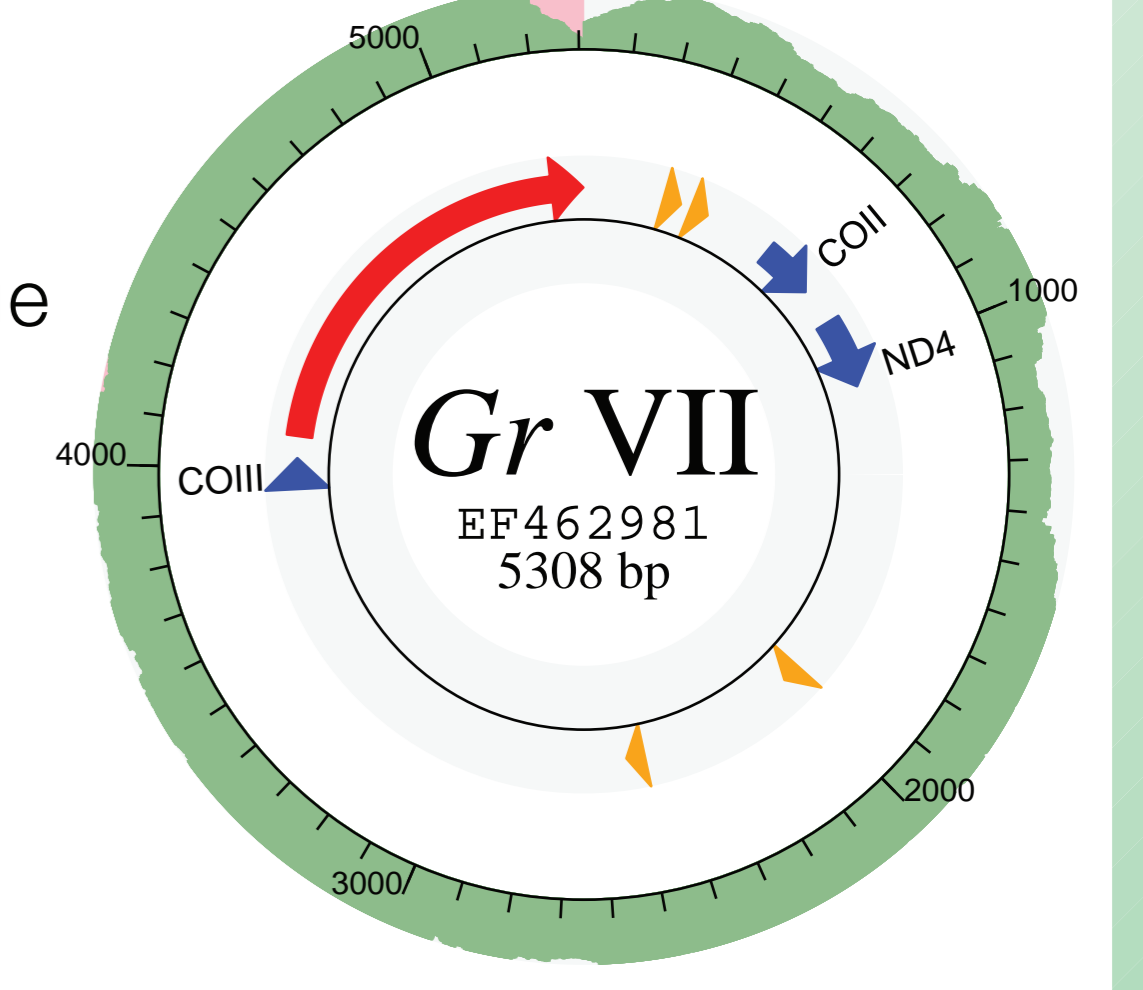
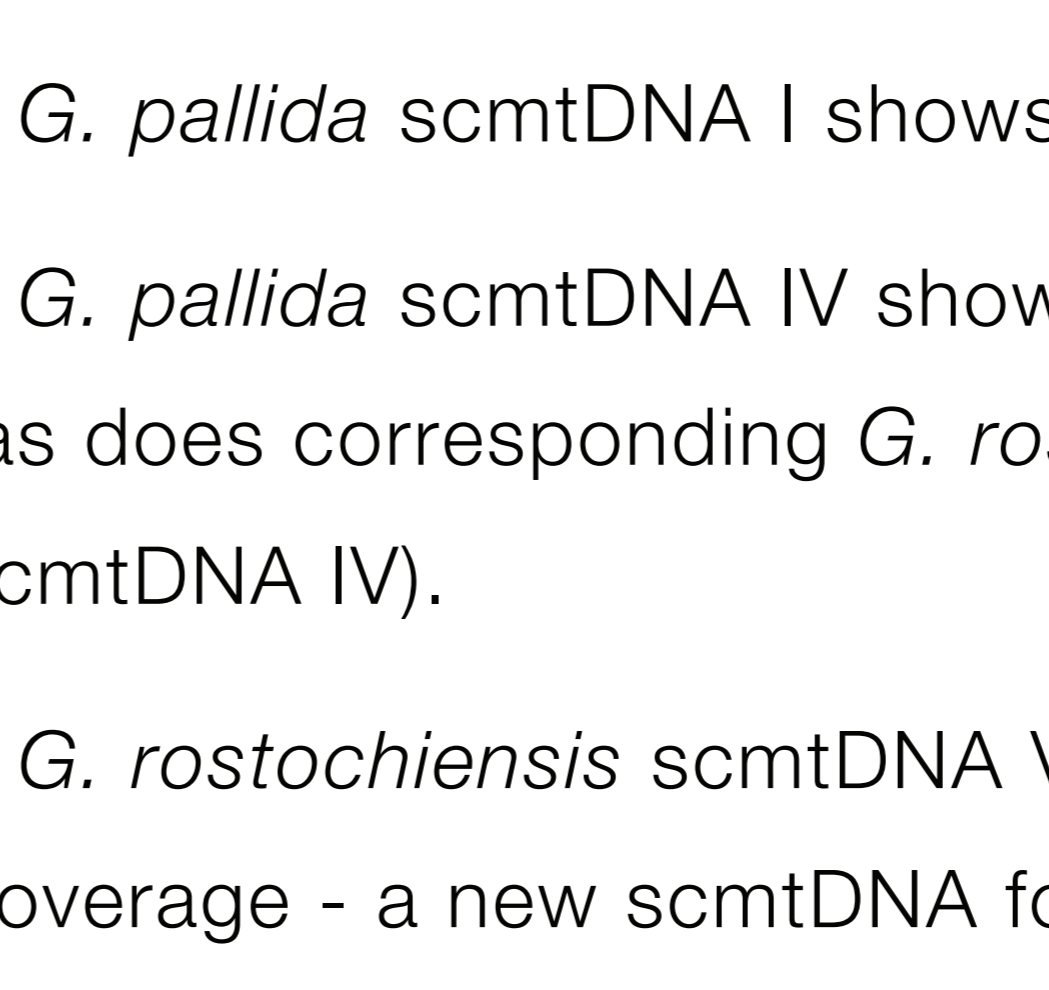
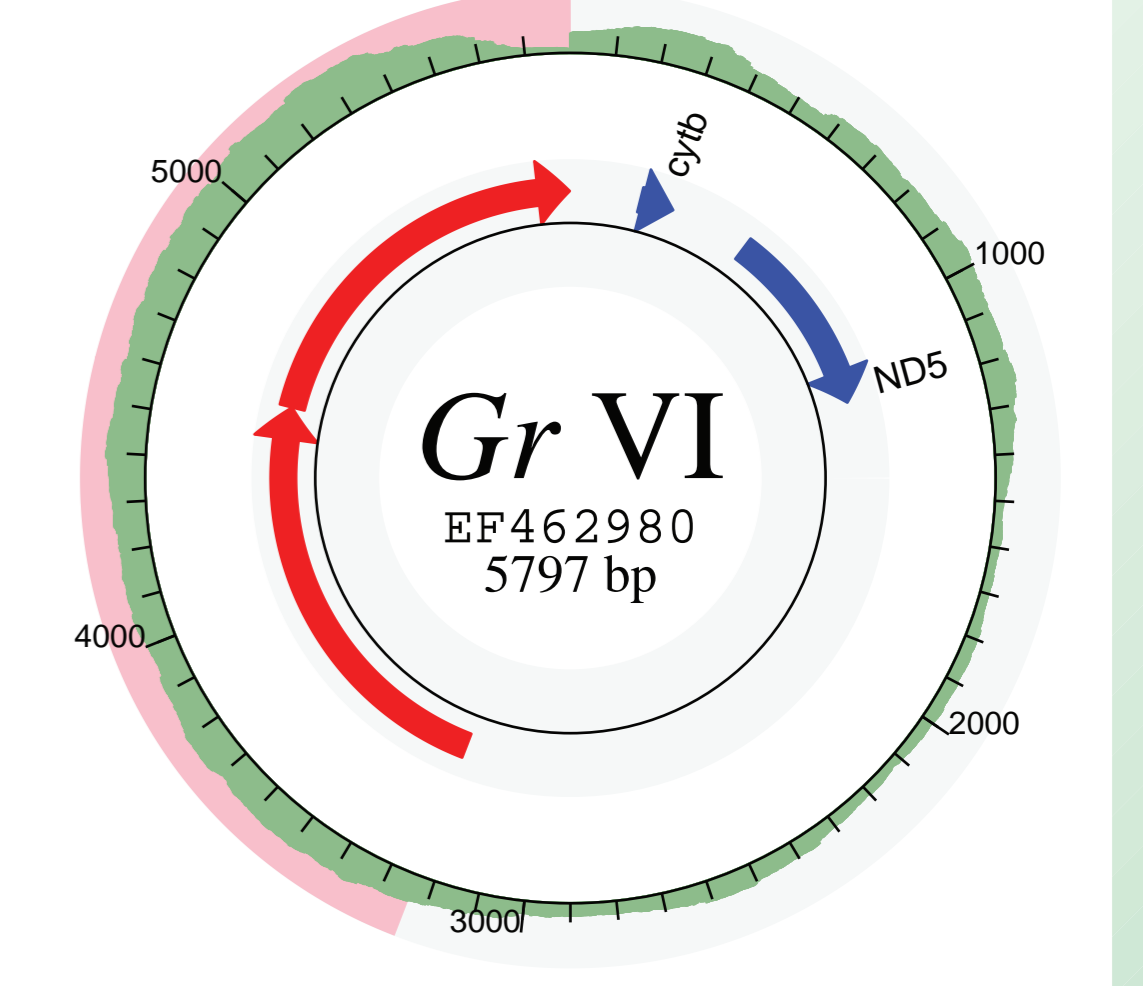
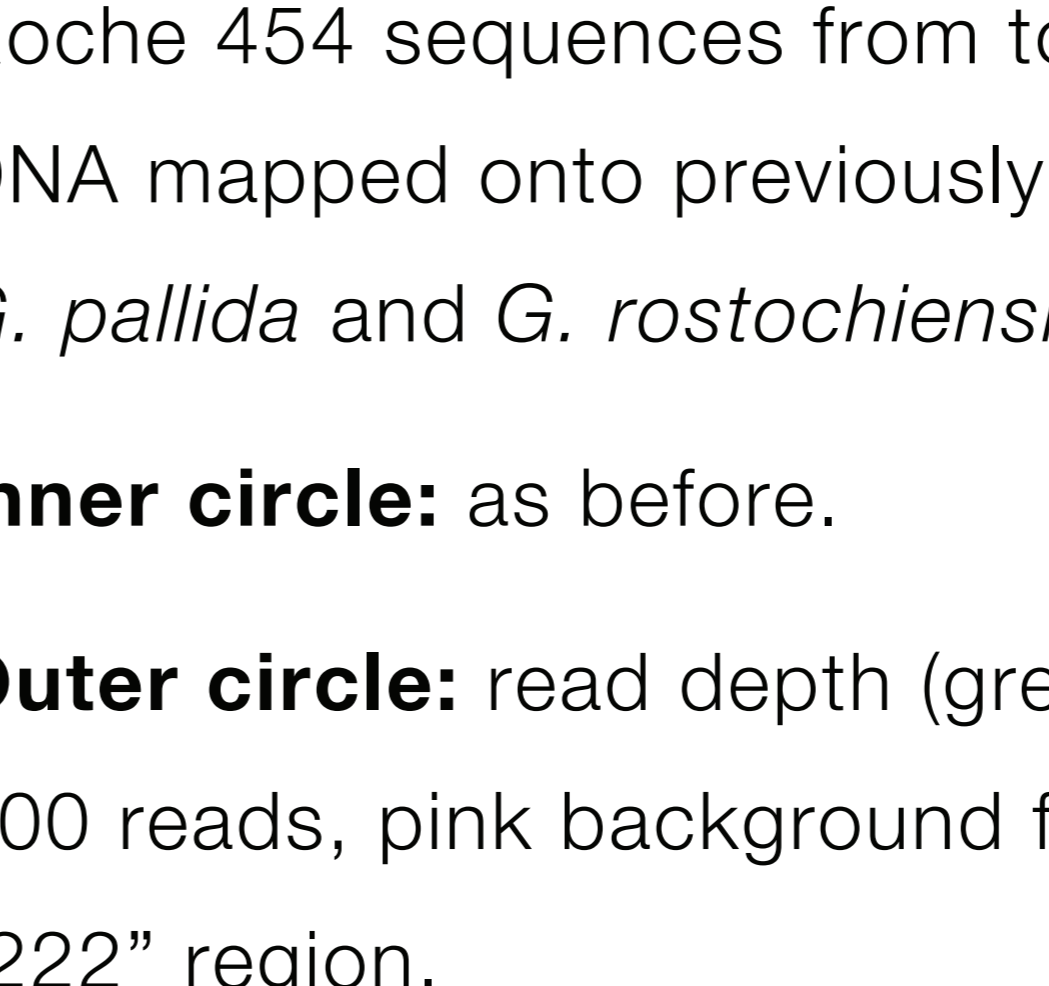
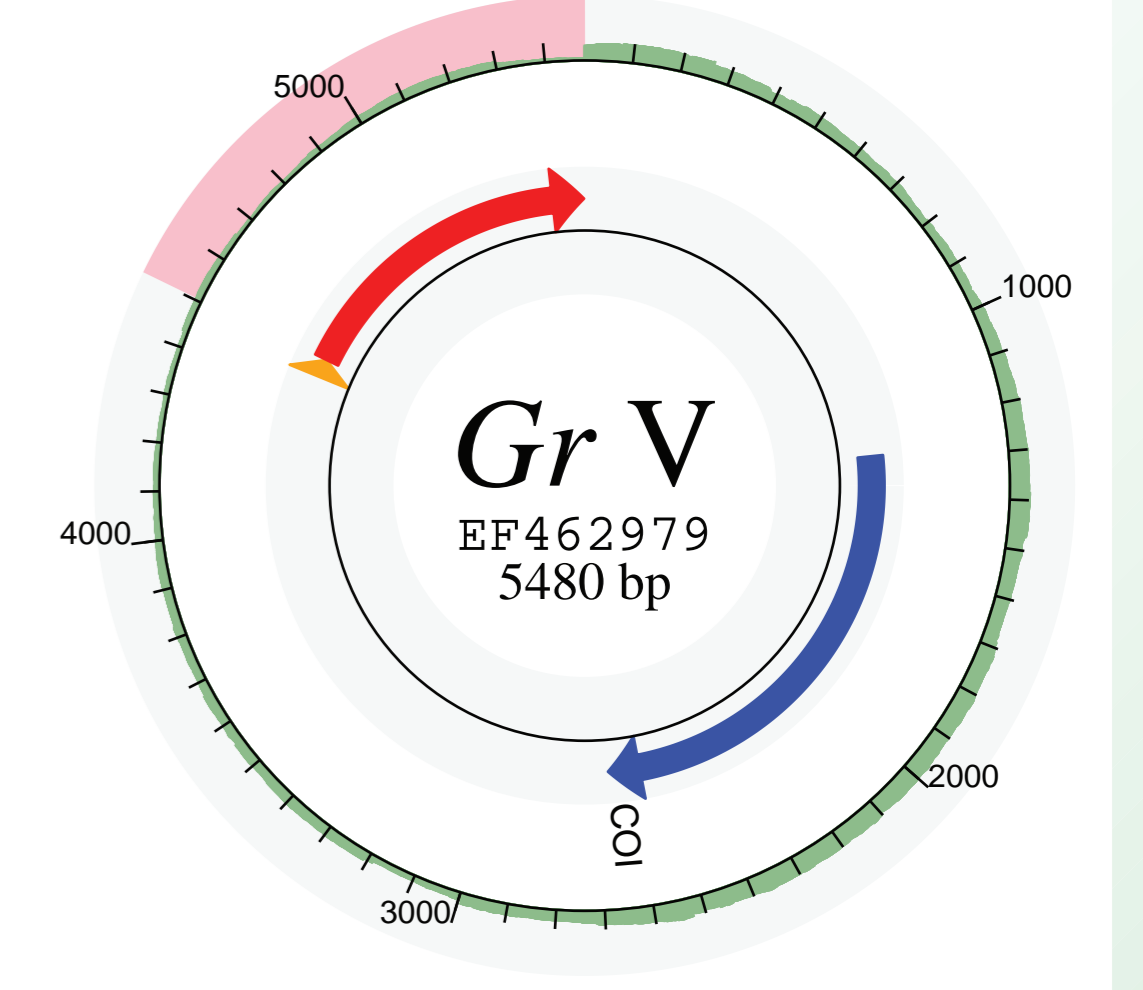
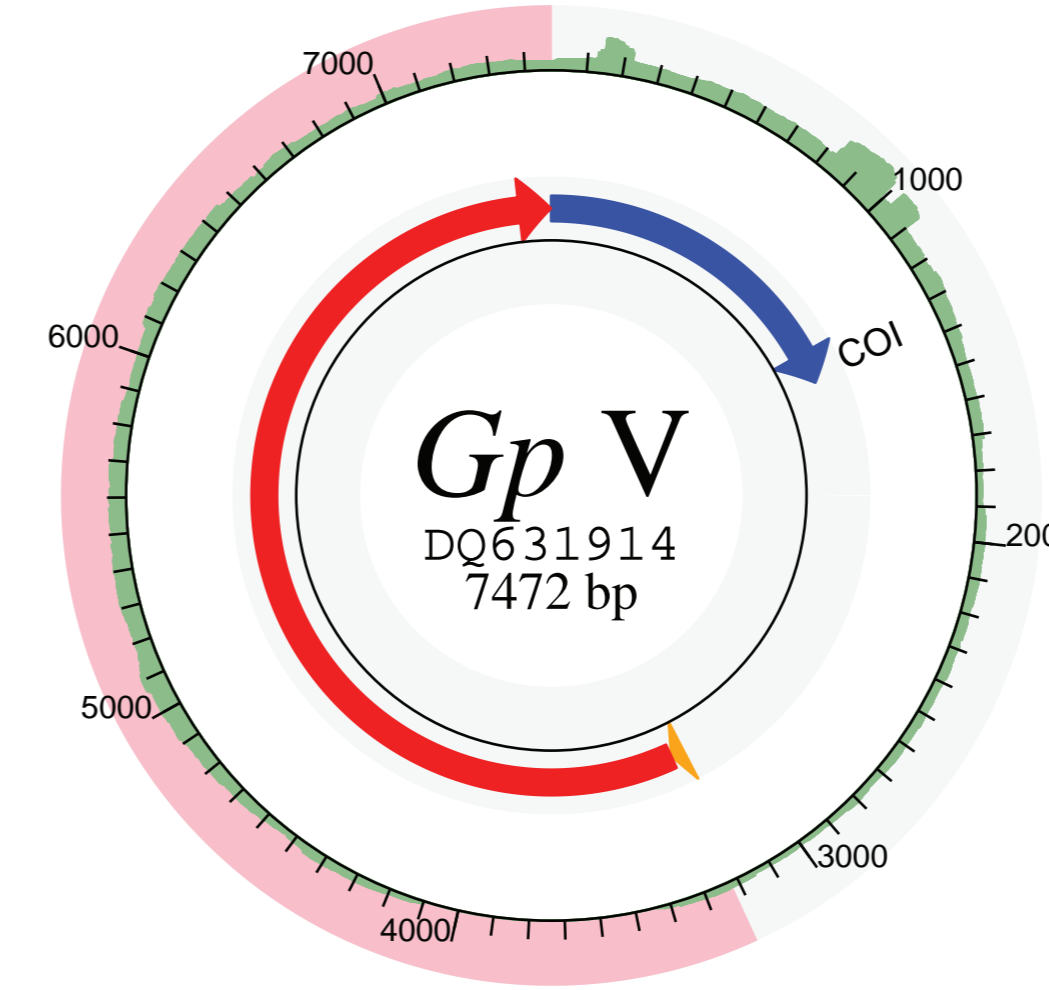
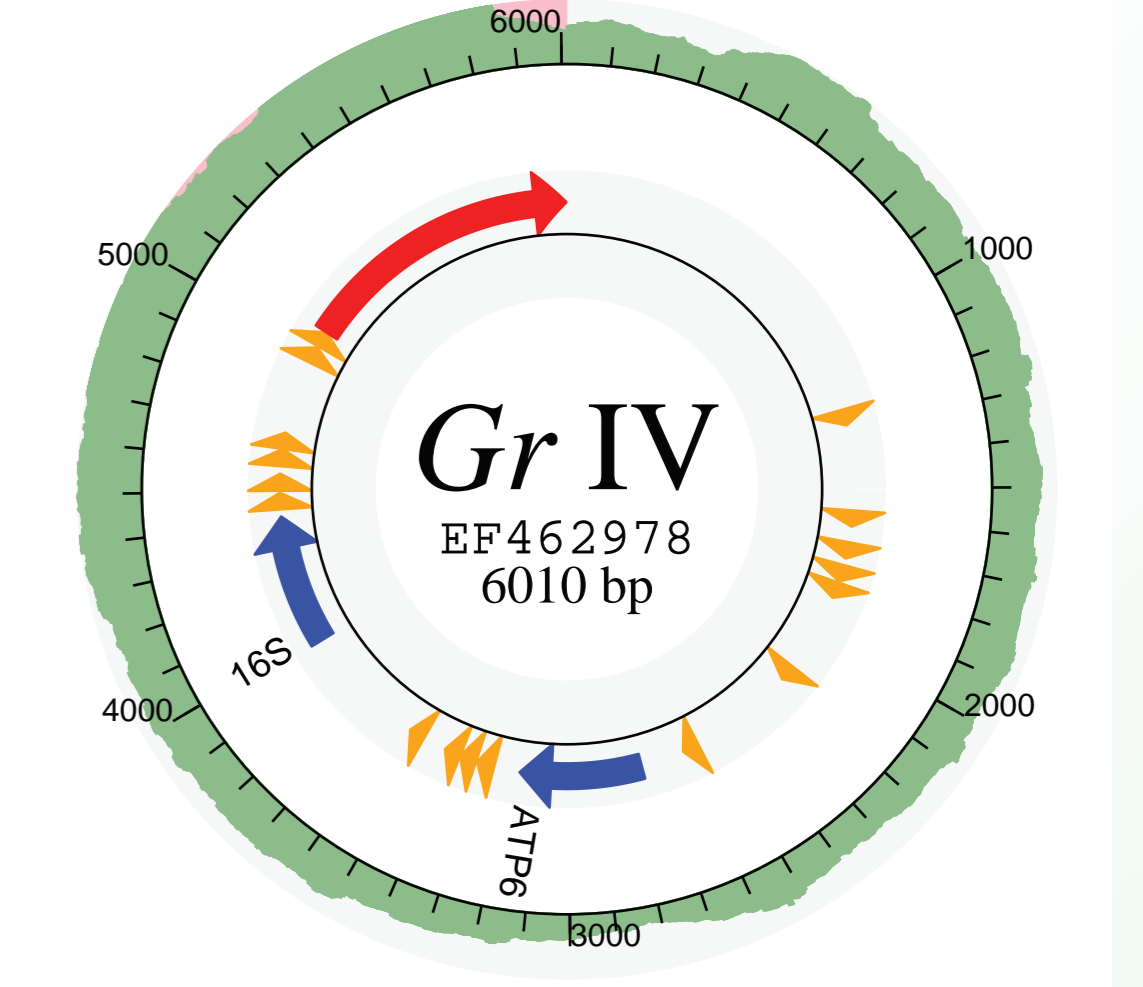
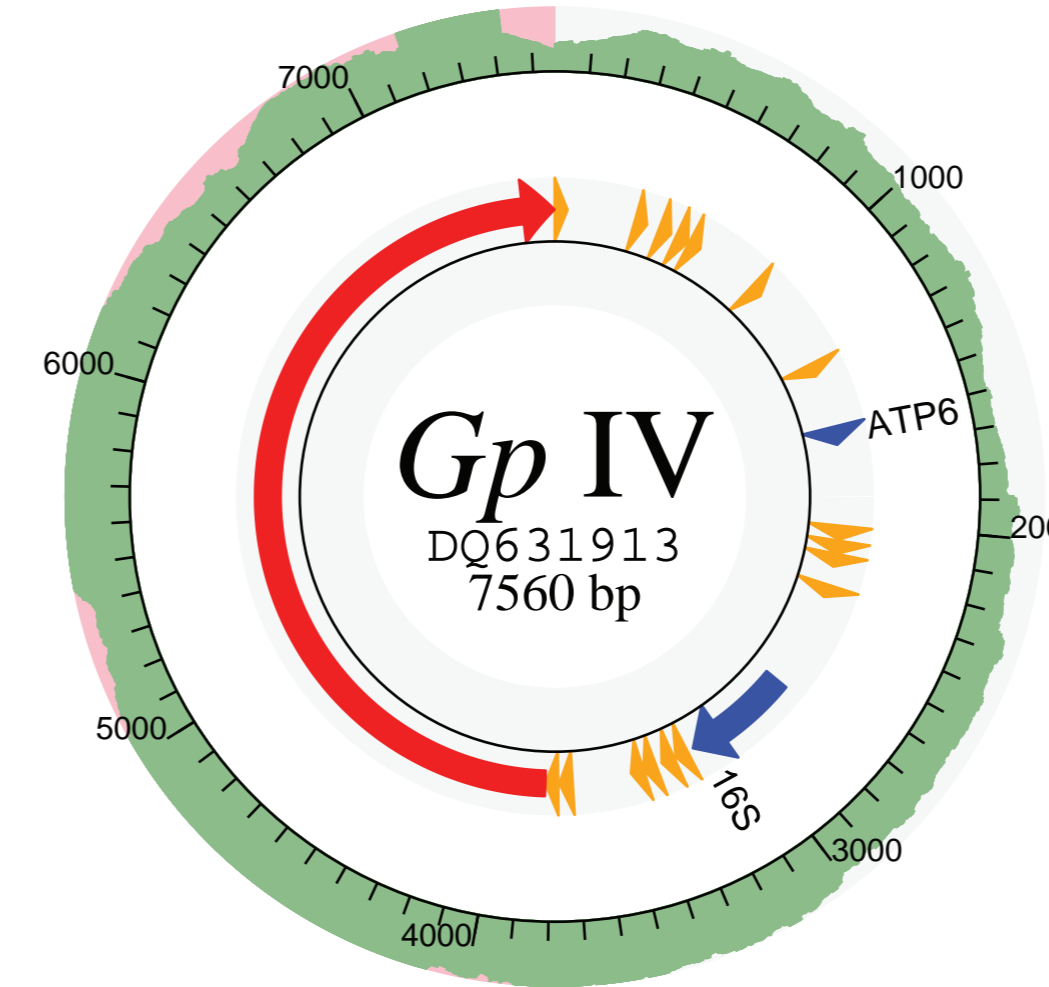
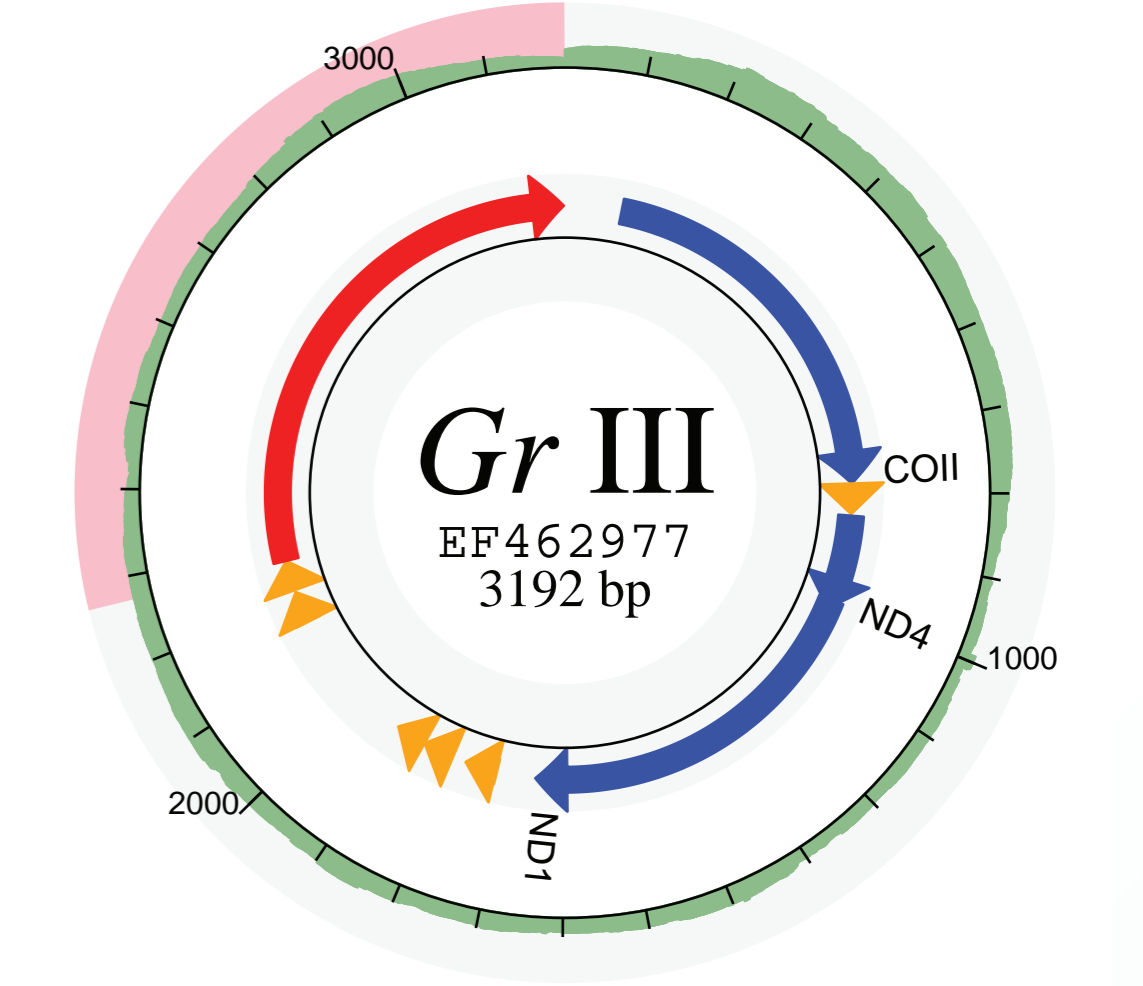
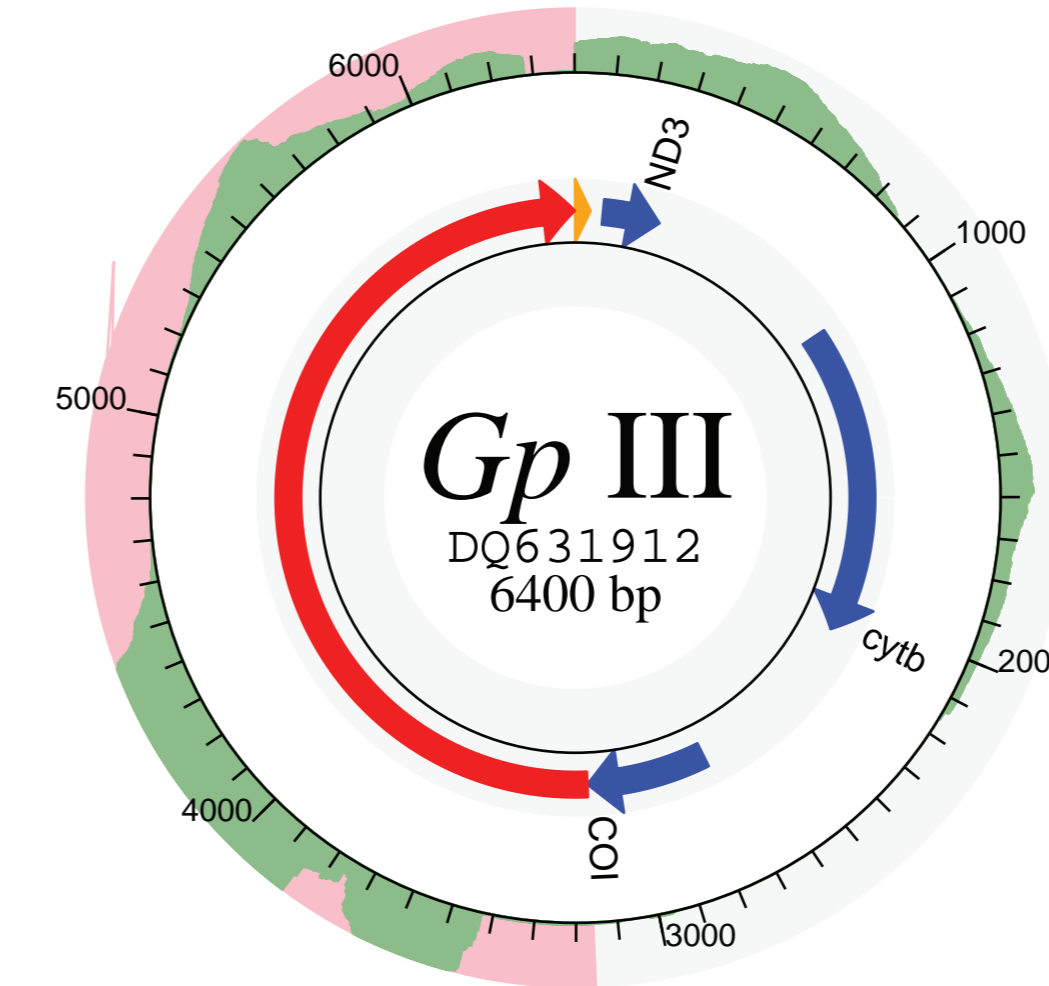
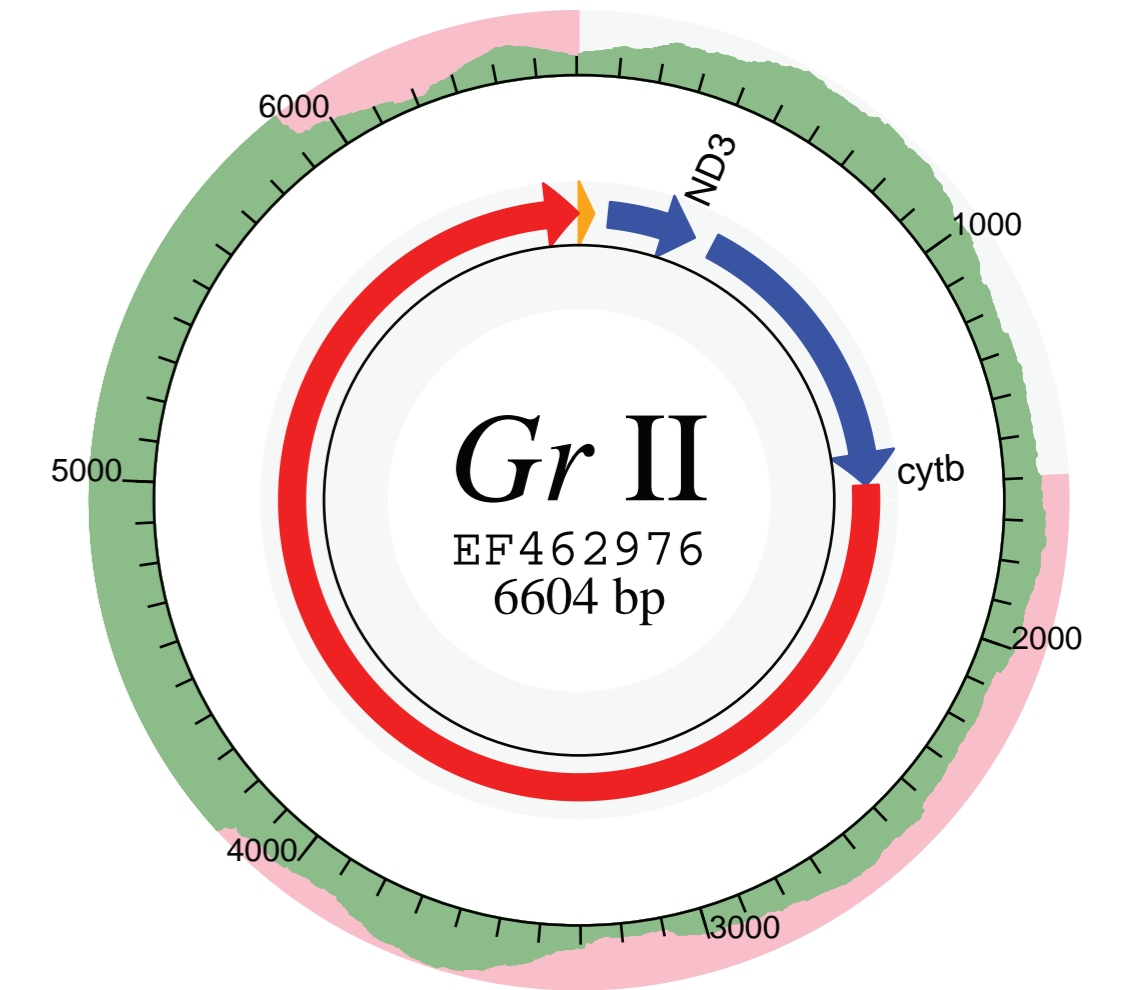
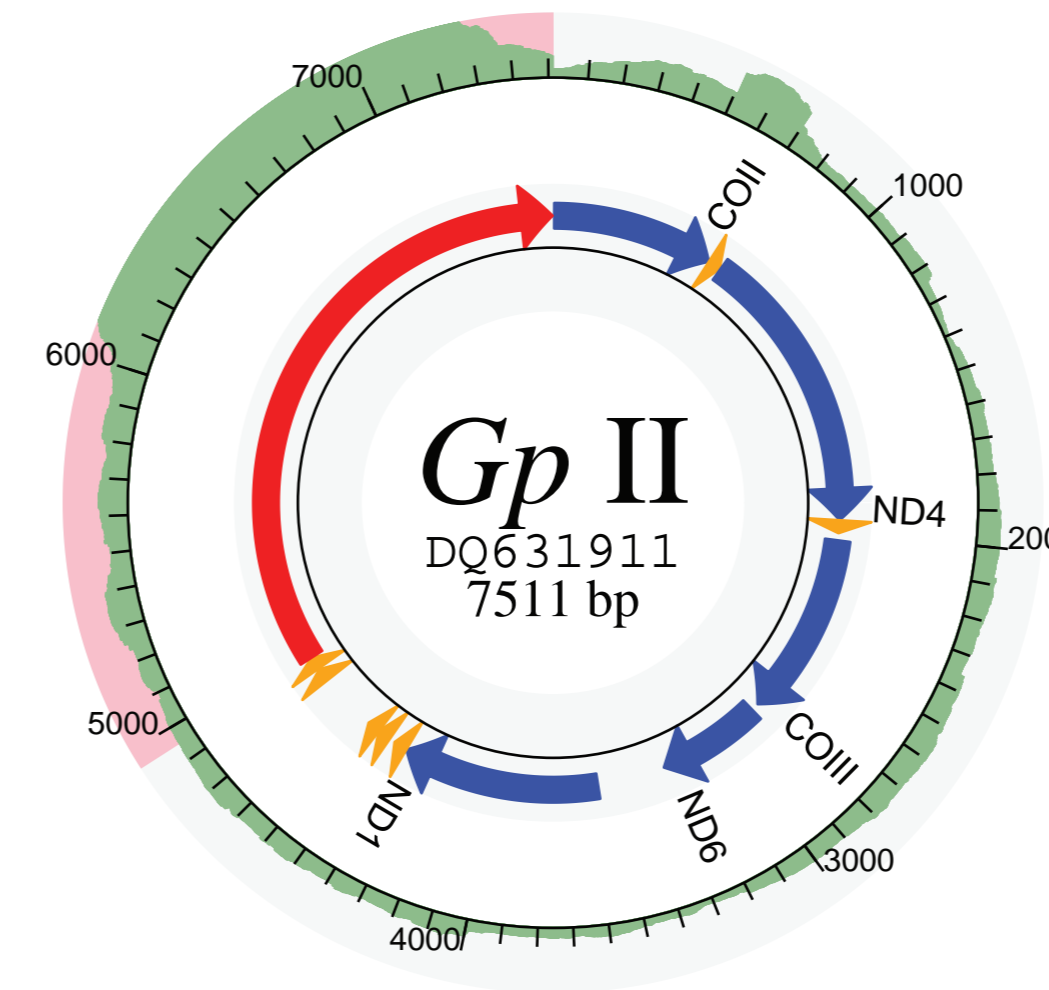
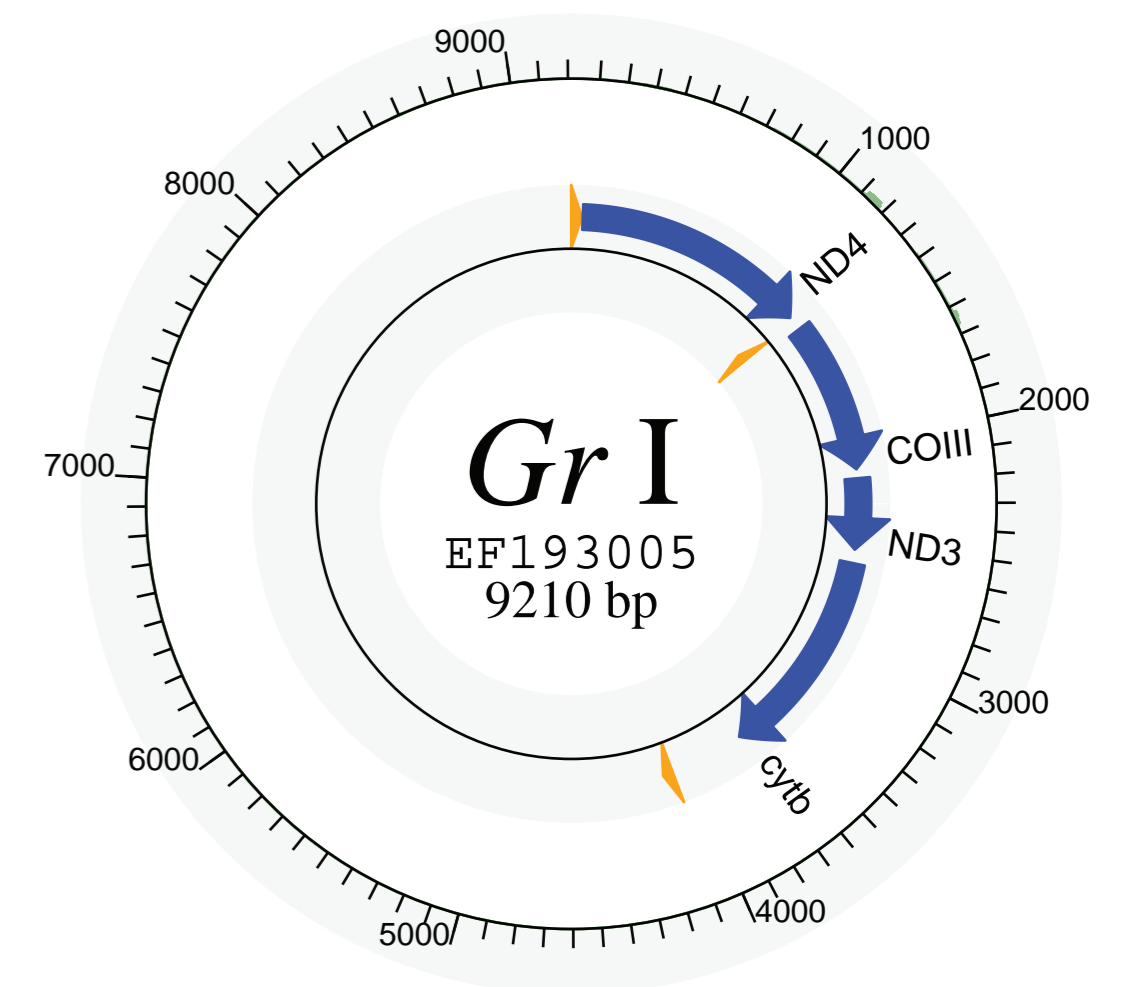
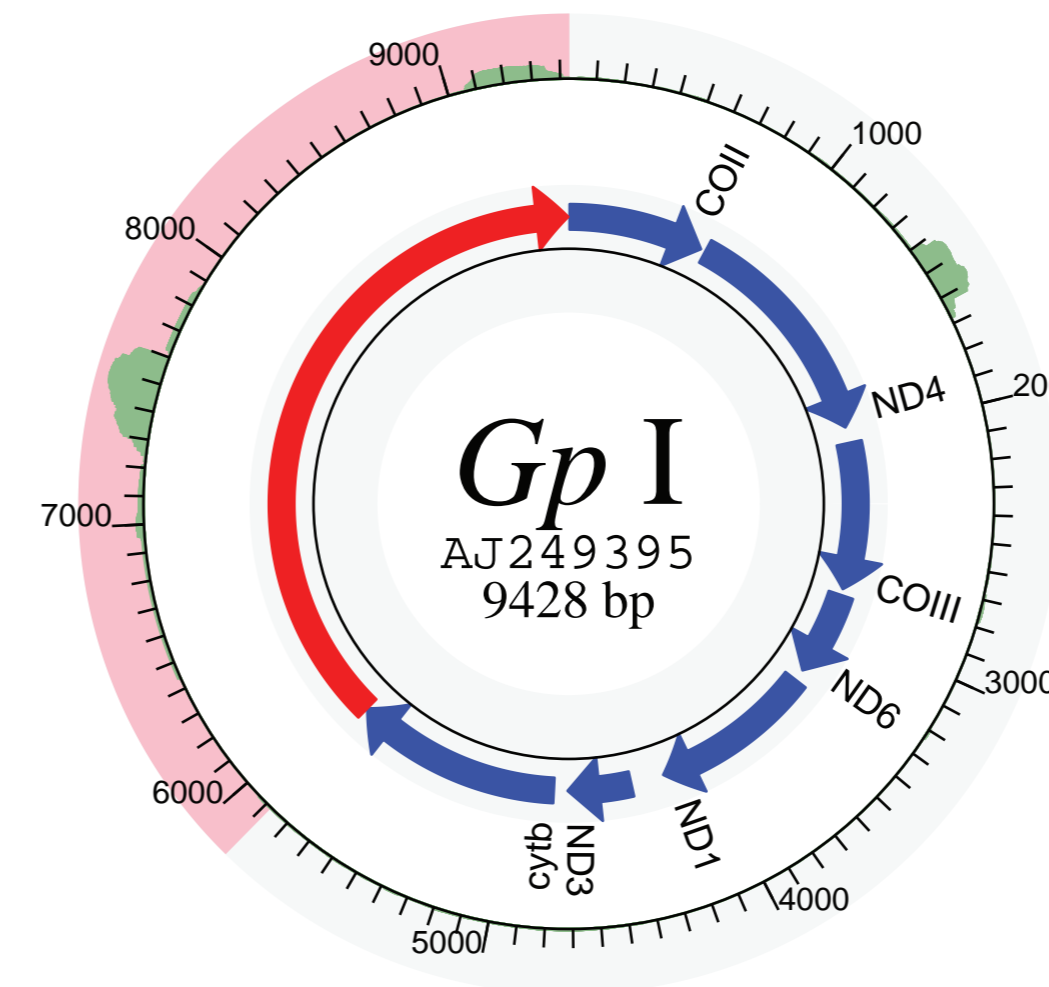
- Generally increased expression in eggs relative to juveniles and 8 dpi relative to juveniles.

- Both noncoding and coding regions expressed and some expression from "negative" strand detected (results not shown).

- Expression of CO1 (scmtDNA V) reduced in 8 day parasitic stage relative to juveniles, in contrast to other coding regions.

Only expression for "positive" strand probes shown. No probes with ambiguous targets shown.

## mtDNA in the genome sequence "to-date"



Roche 454 sequences from total *G. pallida* DNA mapped onto previously sequenced *G. pallida* and *G. rostochiensis* scmtDNA.

**Inner circle:** as before.

**Outer circle:** read depth (green), capped at 200 reads, pink background for noncoding "222" region.

- *G. pallida* scmtDNA I shows little coverage.

- *G. pallida* scmtDNA IV shows good coverage (as does corresponding *G. rostochiensis* scmtDNA IV).

- *G. rostochiensis* scmtDNA VII shows good coverage - a new scmtDNA for *G. pallida*?