

Inter-EURLs Working Group on WGS (WHOLE GENOME SEQUENCING)



Foreword

The WG has been established by the European Commission with the aim to promote the use of WGS across the EURLs' networks, build WGS capacity within the EU and ensure liaison with the work of the EURLs and the work of EFSA and ECDC on the WGS mandate sent by the Commission. The WG includes all the EURLs operating in the field of the microbiological contamination of food and feed and this document represent a deliverable of the WG and is meant to be diffused to all the respective networks of NRLs.

Inventory of training supports

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EURL for Coagulase Positive Staphylococci



European Union Reference Laboratory
Foodborne Viruses



EURL Lm
European Union Reference Laboratory for
Listeria monocytogenes
WGS (EURL *Listeria* Lm)



Introduction

From the survey sent in 2018 by the EURLs to the NRLs network, an inventory of training supports used by different organisations was performed and presented to the working group in November 2018. As all NRLs express their need for training in each step of WGS analyses (wet-lab and dry-lab), it was decided by the working group to draft a guidance document on training possibilities, with the links to the available training supports for the EURLs.

1 Training programme available within EURLs

EURL *Listeria monocytogenes* organised a training session in 2019:

- First day : Cell preparation and extraction
- Second day : Quality control of DNA
- Third day : bioinformatics analysis

EURL AMR organised two training sessions:

- In 2018, four days of training with wet-lab and dry-lab;
- In 2017, 3 days of training with wet-lab and dry-lab.

https://www.eurl-ar.eu/CustomData/Files/Folders/7-training-course-kgs-lyngby-november2013/98_eurl-ar-tc2013-hasman-wgs.pdf

EURL VTEC organised three training sessions, based on bioinformatics analysis:

- in 2018, two days for Bioinformatics
analysis: http://old.iss.it/binary/vtec/cont/PreliminaryAgenda_NGScourse_2018.pdf
- in 2016, two days for Bioinformatics
analysis: http://old.iss.it/binary/vtec/cont/Agenda_corsoNGS2016.pdf
- in 2015, two days for Bioinformatics
analysis: http://old.iss.it/binary/vtec/cont/NGS_Course_Agenda_final.pdf



2 Guidance for training organisation

The working group proposed to organise joint training sessions with several EURLs to their respective NRL networks, in particular concerning the data analysis.

Two types of training courses could be offered: wet-lab and dry-lab.

The wet-lab training course could include:

- DNA extraction;
- Quality control of DNA;
- Library preparation;
- Sequencing;
- Quality control of raw data and assembly.

The dry-lab training course could include:

- -Annotation;
- -Cluster analysis;
- -Gene detection.



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WGS (EURL Listeria Lenses II)



3 Supports to prepare training courses

Supports to organise training courses are available with the following links:

3.1 Wet-lab

Video for support of WGS (from wet-lab to dry-lab) <https://youseq.com/learning>

3.1.1 Support for DNA extraction

Supports from EURL AMR:

- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/439_s-otani-from-isolate-to-wgs-part1-eurl-course-18.pdf
- https://www.eurl-ar.eu/CustomerData/Files/Folders/28-training-course-kgs-lyngby-september-2017-wgs/379_thursday-01-dnaext-jetk.pdf

Support from Promega:

- <https://france.promega.com/resources/teaching-and-training/4-genomic-dna-purification/>

Video of MagnaPure 24 system:

- <https://www.youtube.com/watch?v=yCBowTw-7gk>
- <http://cnpg.compartenetworks.com/336597-MagNA-Pure-24-System-Enter-a-new-world-of-productivity/>

Video of MagnaPure 96 system:

- <https://www.youtube.com/watch?v=m1B5muY5vhc>

3.1.2 Control for DNA extraction

Video proposed by Illumina:

- <https://www.illumina.com/science/technology/next-generation-sequencing/beginners/tutorials.html>

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H501 (EURL Listeria) Lm001



3.1.3 Library preparation

EURL Lm did not perform training for library preparation.

Illumina technology

EURL AMR performed training for library preparation with Nextera kit for **Illumina technology**:

- https://www.eurl-ar.eu/CustomerData/Files/Folders/7-training-course-kgs-lyngby-november2013/98_eurl-ar-tc2013-hasman-wgs.pdf
- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/502_437-anarita-from-isolate-to-wgs-part2-eurl-course-18-update12092019.pdf

Training courses available for Illumina:

- <https://www.illumina.com/training-course-selector.html>
- <https://www.illumina.com/science/technology/next-generation-sequencing/beginners/tutorials.html>
- <https://youtu.be/pXYkT-UI6hw>

Ion Torrent

Course proposed by Thermofisher:

- <https://learn.thermofisher.com/courses/view/id/270>

Video of IonTorrent sequencing:

- <https://www.thermofisher.com/fr/fr/home/life-science/sequencing/next-generation-sequencing/ion-torrent-next-generation-sequencing-technology.html>

3.1.4 Sequencing

EURL AMR presentation about sequencing technologies:

- https://www.eurl-ar.eu/CustomerData/Files/Folders/28-training-course-kgs-lyngby-september-2017-wgs/380_thursday-02-20170830-sequencing-platforms-by-rolf-kaas.pdf

EURL VTEC presentation about sequencing technologies:

- http://old.iss.it/binary/vtec/cont/3_michelacci.pdf



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http://eur-lex.europa.eu



3.2 Dry-lab

EURL VTEC general aspects for data analysis :

- http://old.iss.it/binary/vtec/cont/1_Introduction_Morabito.pdf
- <https://www.illumina.com/science/technology/next-generation-sequencing/beginners/tutorials.html>

EURL AMR general aspects for data analysis :

- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/444_wgs-data-sharing-for-improved-public-health.pdf

EURL VTEC quality control of raw data, :

- http://old.iss.it/binary/vtec/cont/6_michelacci.pdf
- http://old.iss.it/binary/vtec/cont/Basic_tools_for_NGS_Michelacci1.pdf
- http://old.iss.it/binary/vtec/cont/4_Preliminary_analysis_QC_trimming.pdf

EURL AMR quality control of raw data, :

- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/441_qc-metrics-for-wgs-data-180925-kimng.pdf

3.2.1 Assembly and annotation

EURL VTEC presentation of assembly methods :

- http://old.iss.it/binary/vtec/cont/7_orsini.pdf
- http://old.iss.it/binary/vtec/cont/5_Assembly_Ass_stats_virulotyping_serotyping.pdf

EURL VTEC presentation of annotation methods :

- http://old.iss.it/binary/vtec/cont/8_michelacci.pdf

Video to use Applied Maths BioNumerics assembler:

- <http://www.applied-maths.com/video/7x/calculate-de-novo-assembly-locally>

EURL AMR presentation of assembly and annotation methods :

- https://www.eurl-ar.eu/CustomerData/Files/Folders/28-training-course-kgs-lyngby-september-2017-wgs/367_thursday-06-shinny-tools-benchmarking-amr-genes-sep17.pdf

Tutorial for Ridom SeqSphere software:

- https://www.ridom.de/seqsphere/ug/latest/Tutorial_pipeline.html

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3.2.2 Cluster analysis

EURL VTEC presentations :

- http://old.iss.it/binary/vtec/cont/9_michelacci.pdf
- http://old.iss.it/binary/vtec/cont/Whole_genome_SNPs_comparison_Michelacci3.pdf
- http://old.iss.it/binary/vtec/cont/7_MLST.pdf
- http://old.iss.it/binary/vtec/cont/8_wgSNPs.pdf

Bionumerics presentations of wg-MLST :

- <http://www.applied-maths.com/video/7x/overview-wgsnp-workflow-bionumerics>
- <http://www.applied-maths.com/video/7x/1-send-calculation-jobs-external-calculation-engine>
- <http://www.applied-maths.com/video/7x/2-quality-assessment-window>
- <http://www.applied-maths.com/video/7x/3-cluster-analysis-wgmlst-data>
- <http://www.applied-maths.com/video/7x/whole-genome-mlst-typing-only-few-clicks>

EURL AMR presentations :

- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/442_cgmlst-clustering-sep18-2.pdf

3.2.3 Gene detection

EURL VTEC presentation :

- http://old.iss.it/binary/vtec/cont/Whole_genome_SNPs_comparison_Michelacci3.pdf

EURL AMR presentations

- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/435_alignment-and-mapping-philip-clausen.pdf
- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/443_amr-prediction-based-on-wgs-data-valeria.pdf

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3.2.4 Tools for Bioinformatics analyses

EURL-VTEC concept of galaxy servers :

- http://old.iss.it/binary/vtec/cont/4_orsini.pdf
- http://old.iss.it/binary/vtec/cont/5_Knijin.pdf
- http://old.iss.it/binary/vtec/cont/IT_Infrastraction_ARIES_Knijin.pdf
- http://old.iss.it/binary/vtec/cont/ARIES_Knijin.pdf
- http://old.iss.it/binary/vtec/cont/3_Practical_aspects.pdf

EURL-AMR databases :

- https://www.eurl-ar.eu/CustomerData/Files/Folders/31-training-course-kgs-lyngby-2018/447_the-eurl-ar-hub-sep18-no-password.pdf

Presentation of CGE tools

- https://www.eurl-ar.eu/CustomerData/Files/Folders/28-training-course-kgs-lyngby-september-2017-wgs/371_wednesday-06-shinny-cge-tools-sep17.pdf