Screening for CPO/CPE in Demark

STATENS SERUM INSTITUT


GÆLDENDE

BEK nr 1091 af 30/08/2018

Udgivet af Ældreministeriet

Yderligere oplysninger >

Bekendtgørelse om anmeldelse af tilfælde af Carbapenemase-Producerende Organismer (CPO) påvist hos personer

I medfør af § 26 i lov om foranstaltninger mod smitsomme sygdomme, jf. lovbekendtgørelse nr. 814 af 27. august 2009,

Notifiable in Danish legislation since September 2018

Henrik Hasman
Senior scientist
Statens Serum Institut

NATIONAL SURVEILLANCE SYSTEM OF DK

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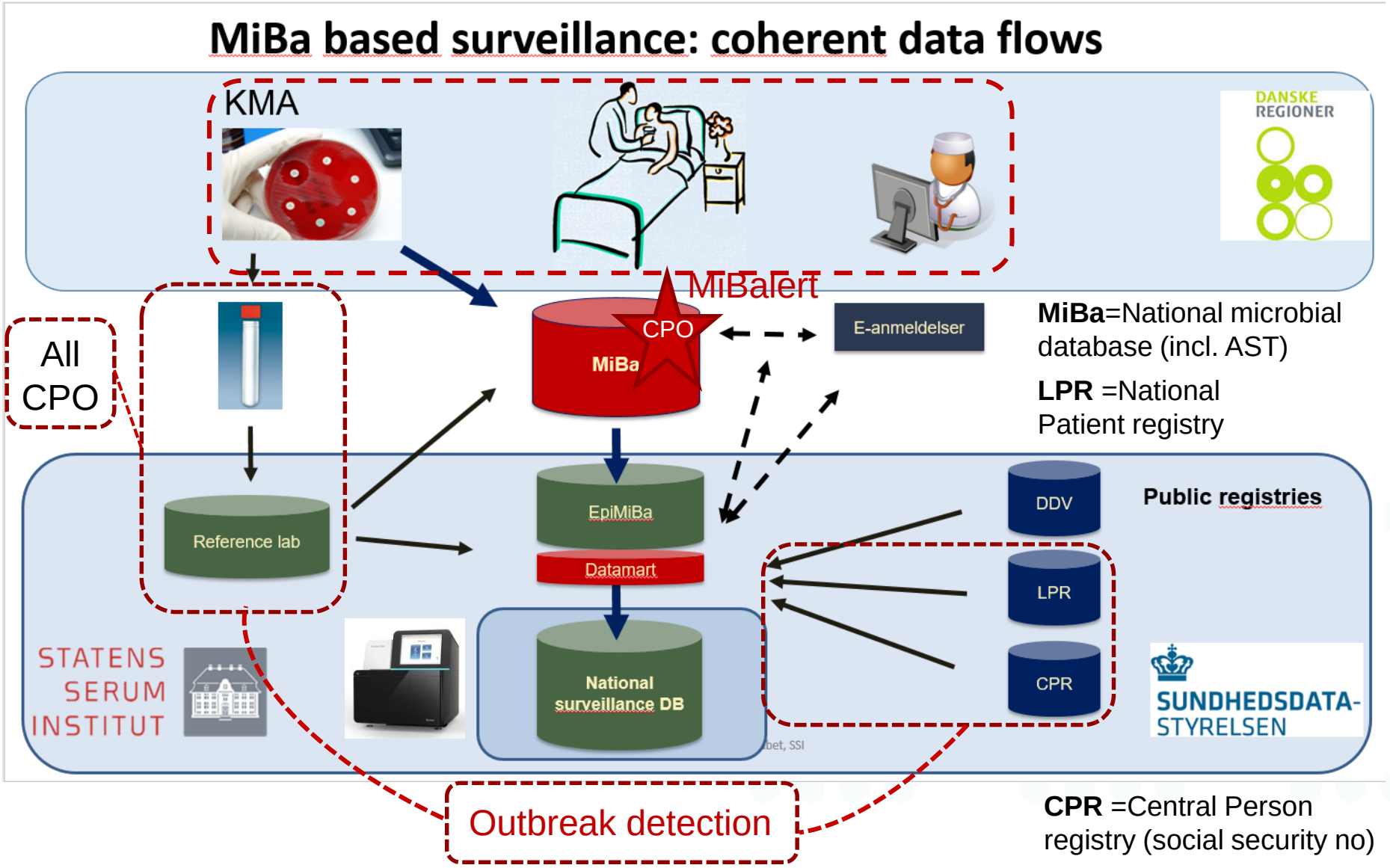

MiBa=National microbial database (incl. AST)

LPR =National Patient registry

CPR =Central Person registry (social security no)

NATIONAL GUIDELINES FOR CPO IN DK

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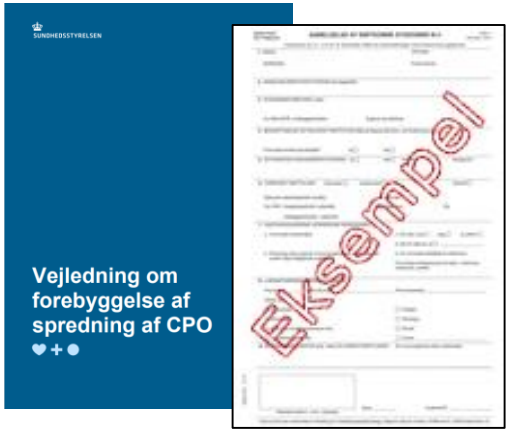
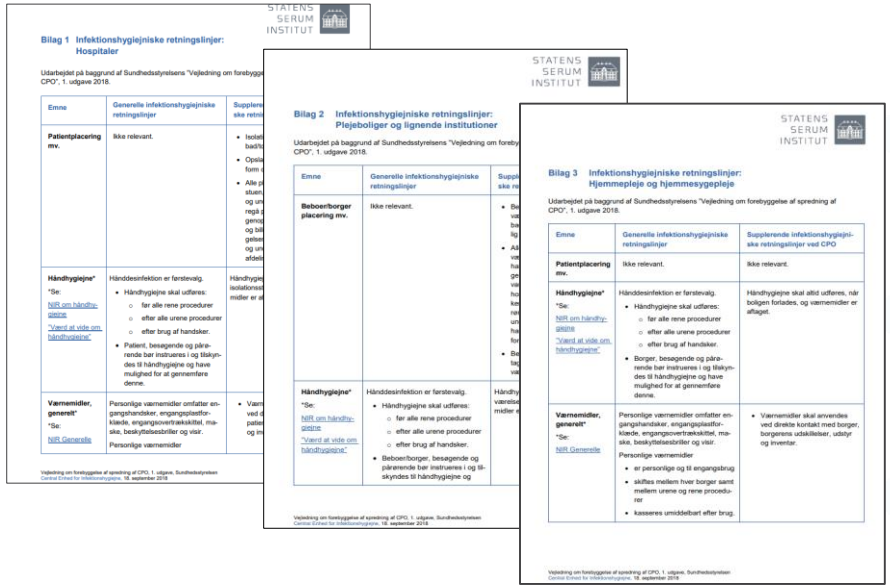
- National guidelines for detection and containment of CPO (Sept., 2018)



- Mandatory reporting by clinicians of CPE
- Mandatory submission of all CPO isolates to SSI
- All submitted isolates are subjected to WGS analysis
- SSI has the mandate and obligation to investigate CPO outbreaks
- Outbreaks are tracked in a central database and reported back to the relevant hospitals.

- Three supplementary guidelines in relation to infection hygene control
  - Hospitals
  - Nursing homes
  - Home care



GENERAL RISK SITUATIONS FOR CPO

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- Questionaire at time of hospitalization

Form 1a: Risc situations for CPO *To be asked at beginning of all hospitalization events*	
At hospitalization please ask the following question	**If the answer is yes, then the listed criteria below should also apply:**
1. Is the patient known to be CPO positive?	
2. Has the patient had any direct contact with a CPO positive person (e.g. in the household or similar)?	
3. Has the patient been receiving treatment in a hospital or clinic abroad within the last 6 months (excluding The Nordic countries)?	**a) The stay lasted more than 24 hours, or** **b) An invasive operation has been performed regardless of the length of the stay.**
4. Has the patient been staying abroad outside the Nordics and recived treatment with antibiotics during this stay?	

ADDITIONAL RISK SITUATIONS FOR CPO

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- Besides the general risk situations listed in Form 1a, certain additional known risk factors/situations may apply less frequently, thus not requiring all patients to be asked on a routinely basis. Here, the physician may have prior knowledge about the patient to suspect an increased risk for CPO carriage. In these case, the questions in Form 1b should be asked.

Form 1b: Special risk situations for CPO

To be asked at beginning of all hospitalization events, if the physician find it appropriate or if the patient is already aware that he/she/they is in a risk situation.

Persons who have, within the last 6 months	**- Been hospitalized in a CPO-positive department** **- Been staying in a CPO-positive nursing home (or similar..)** **- Been staying in confined spaces with poor sanitary conditions (e.g. war zones, refugee camps, foreign forster homes ect.)**
Persons who have, within the last 6 months	**- Been in dialysis treatment or have received anti-neoplastic medical treatment.**

CPO IN DENMARK

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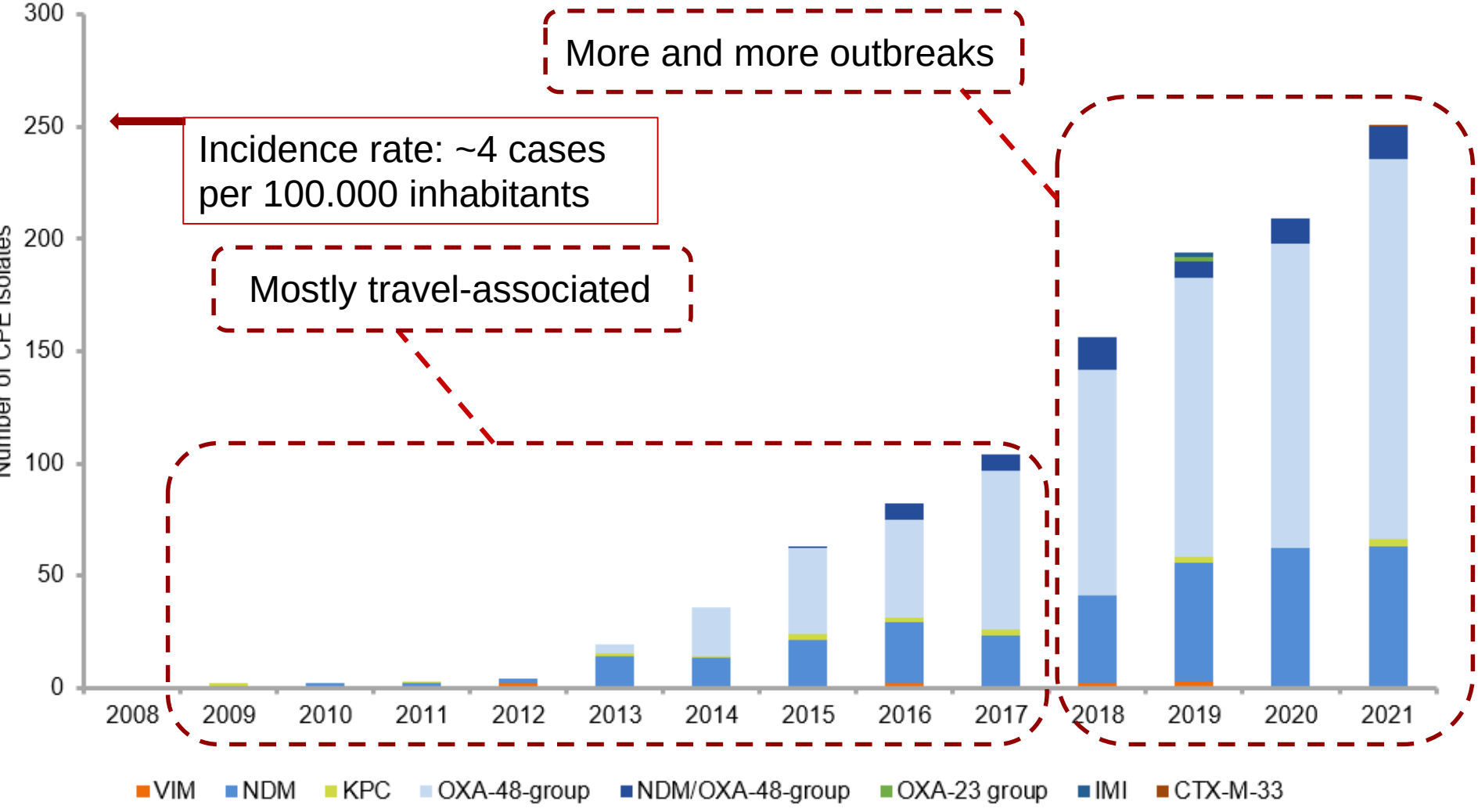
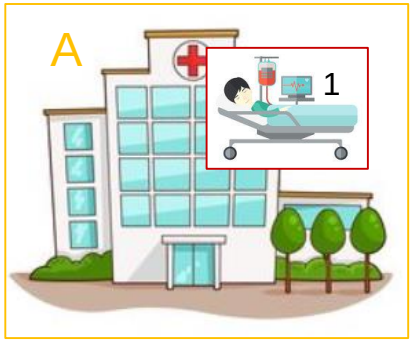
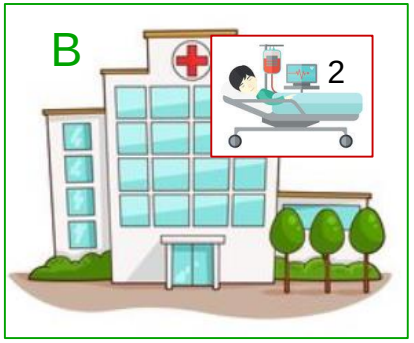


All isolates are submitted to WGS (Illumina) and analyzed (Ridom SeqSphere+) to detect genomic (clonal) clusters across departments, hospitals and regions.

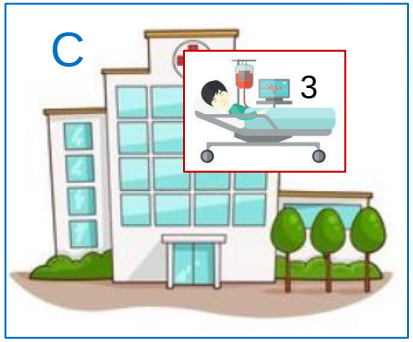
THE COMPLICATED (REGIONAL) OUTBREAK SITUATION





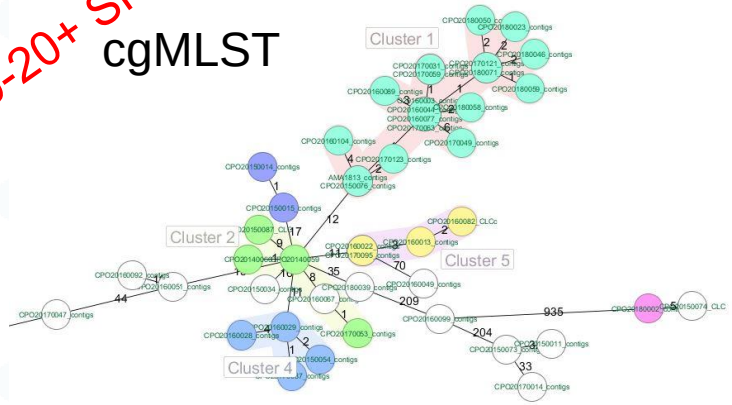
E. coli
NDM+

E. coli
ST1 (CT1)
*bla*NDM-1



~0-20+ SNPs/alleles

cgMLST



WGS-BASED SURVEILLANCE AT SSI

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- 2013 : Pilot projekts
- 2014 - : WGS of ESBL/pAmpC *E. coli* from blood infections
- 2014 - : WGS of CPO's (all isolates)
- 2015 - : WGS of clinical VRE + all LRE
- 2016 - : MinION Nanopore (selected isolates but later all CPO)
- 2018 : WGS of ESBL/pAmpC *K. pneumoniae* from bloodinfections

cgMLST ANALYSER I SEQSPHERE+

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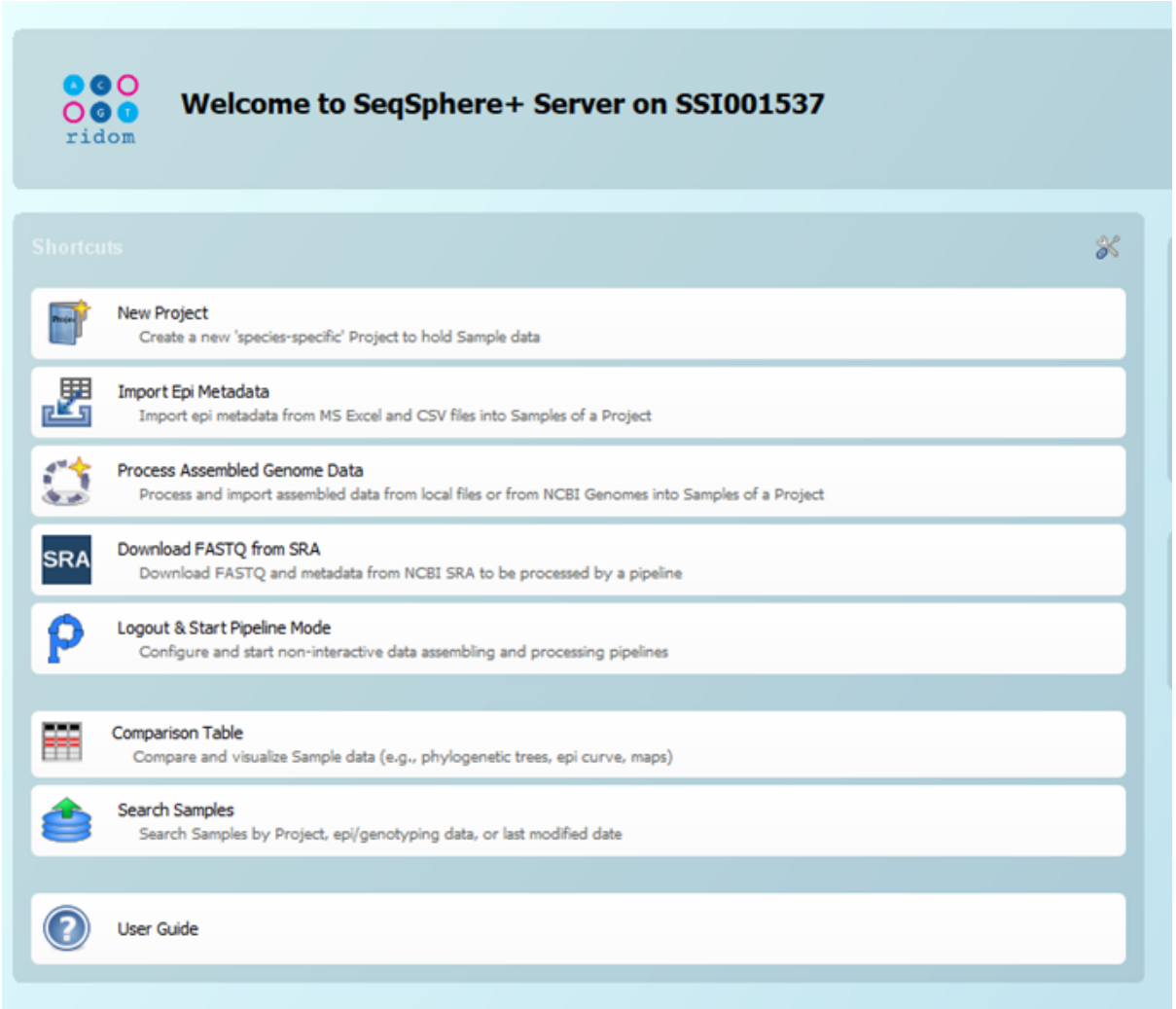

CPO IN DENMARK – E. COLI 2014-2022

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CPO IN DENMARK – E. COLI ST410

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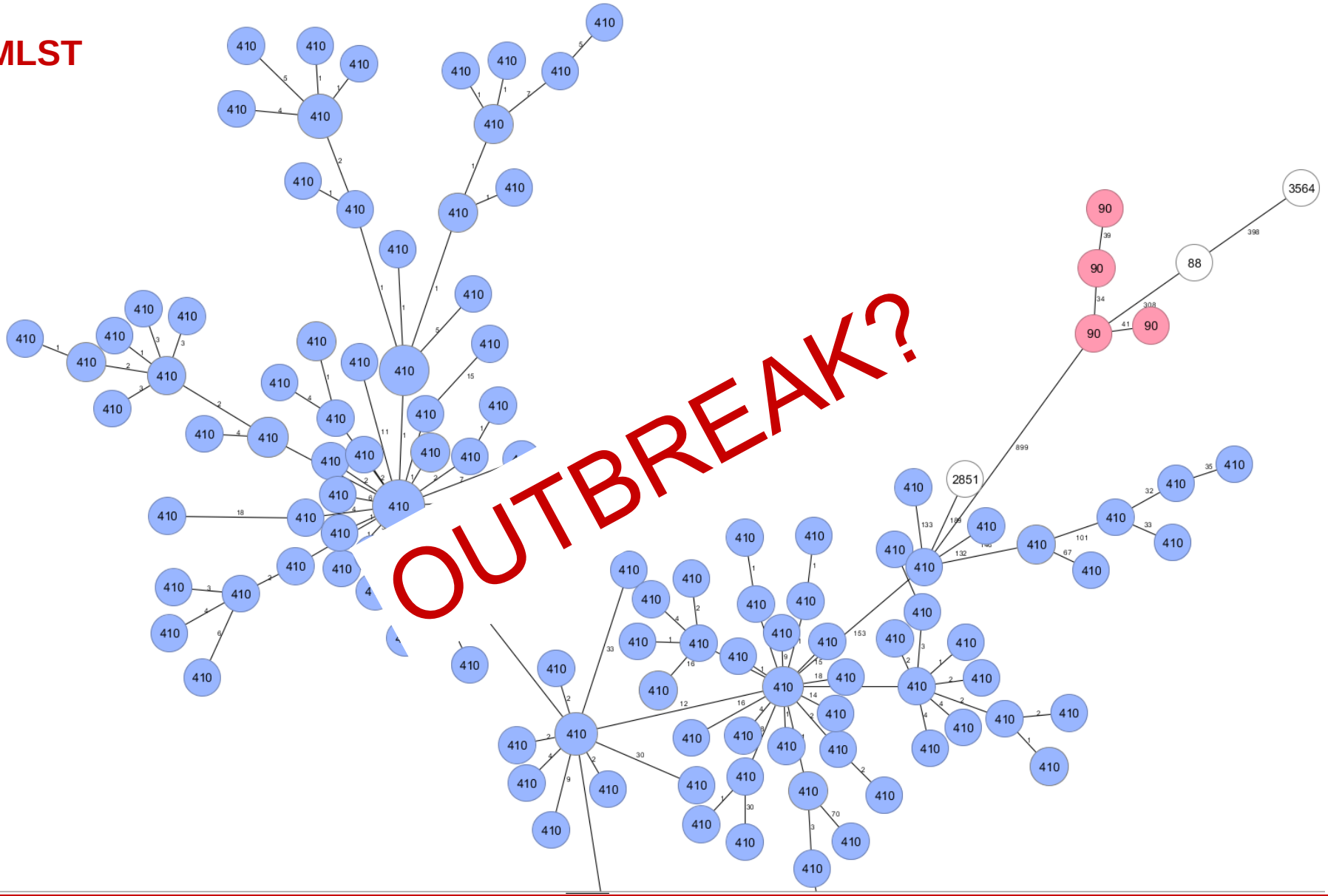

CPO IN DENMARK – E. COLI ST410

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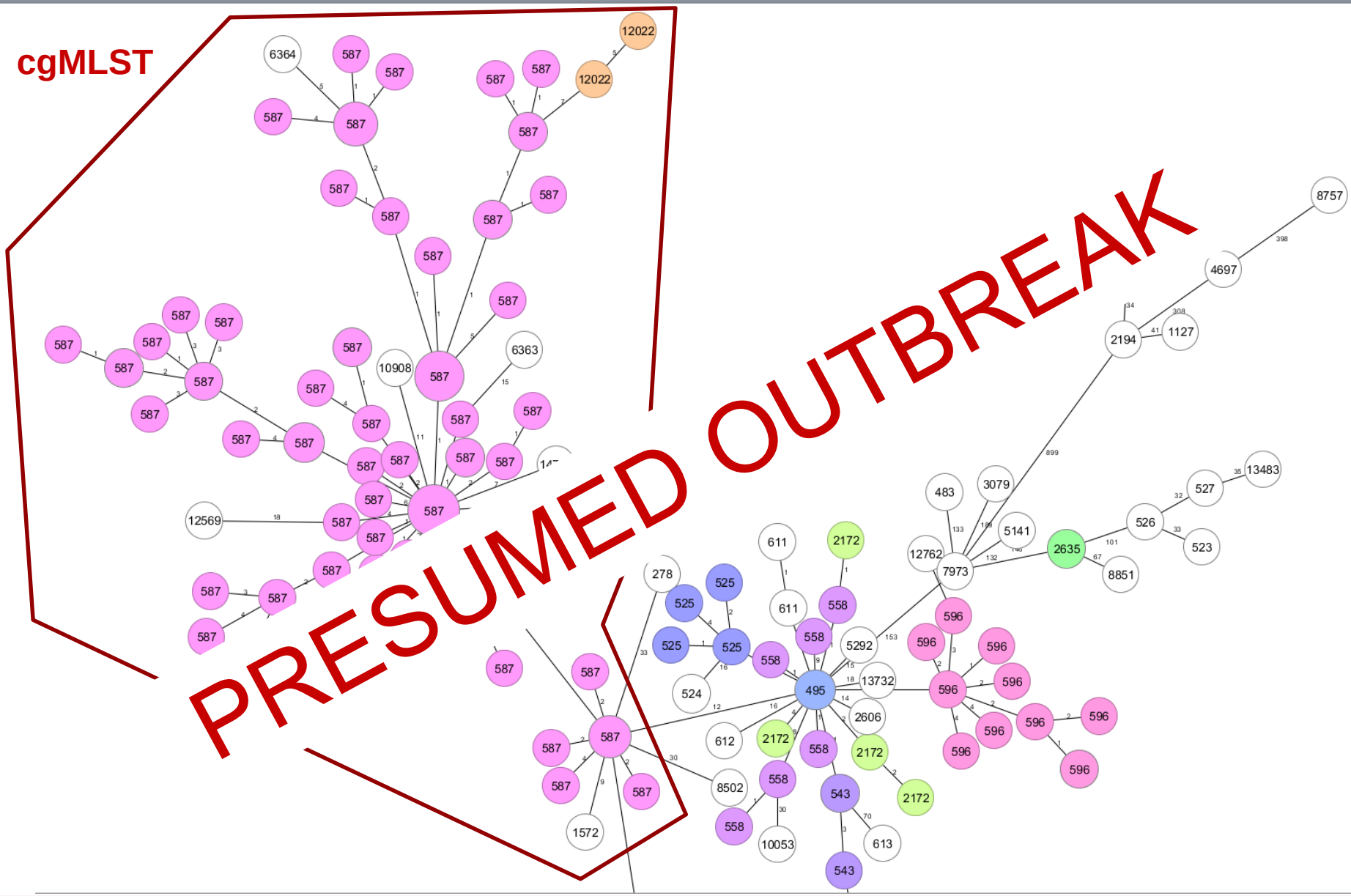

CPO IN DENMARK – E. COLI ST410

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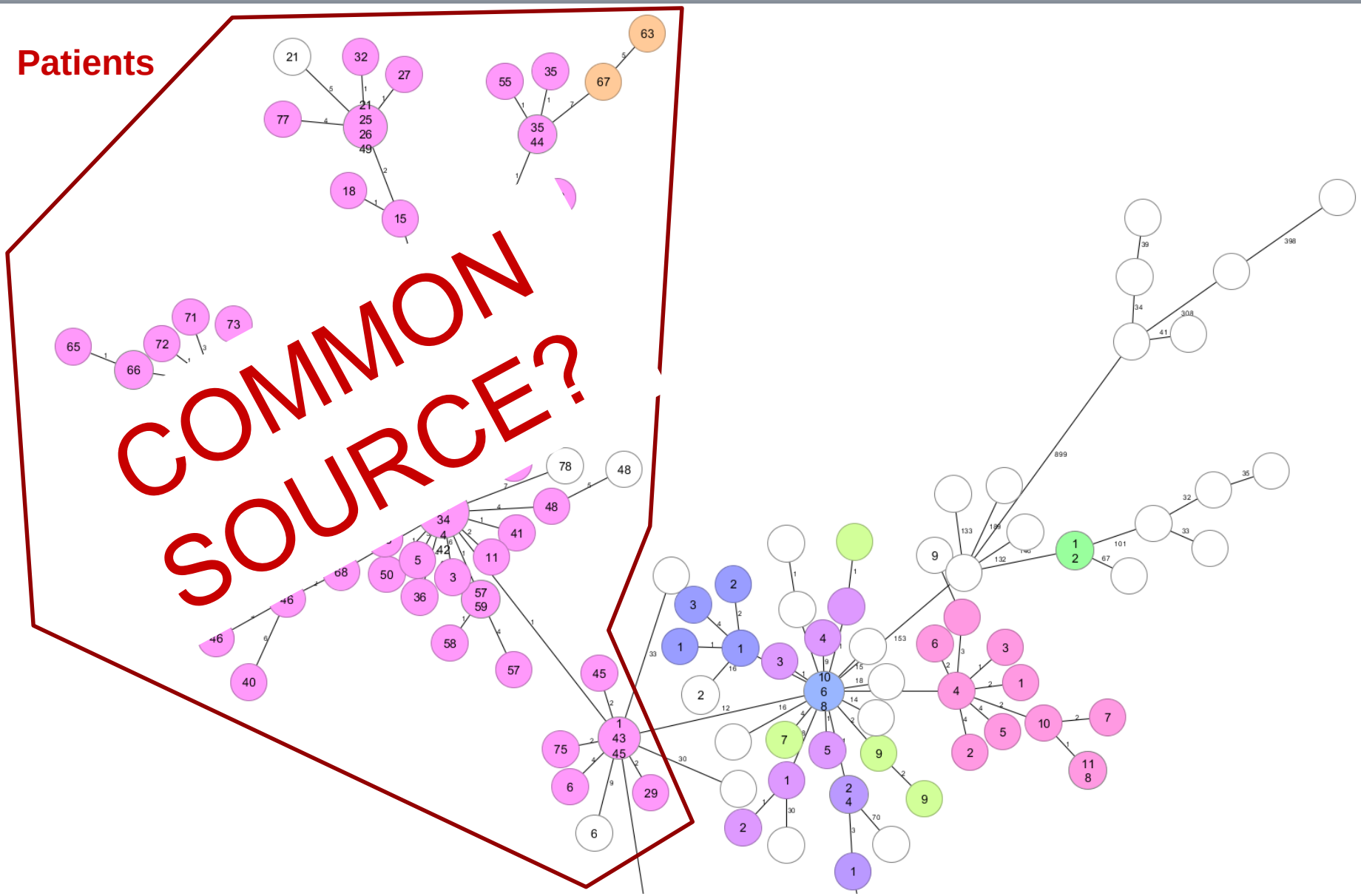
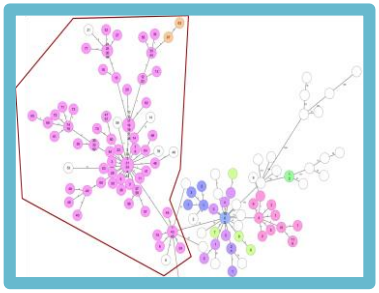
Patients



NOSOCOMIAL OUTBREAKS

Epidemiology



Molecular typing

Evasive action

Central dogma of (hospital) epidemiology

Direct chain of transmission

Indirect chain of transmission

DAI – DRAIN ASSOCIATED INFECTIONS

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Journal of Hospital Infection 93 (2016) 152–154

Available online at www.sciencedirect.com

Journal of Hospital Infection

ELSEVIER

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Short report

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J.S. Soothill*

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SEARCH

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ah De Geyter[1*], Lieve B
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, Helena Martini[1],

CPE CITROBACTER FREUNDII IN DENMARK

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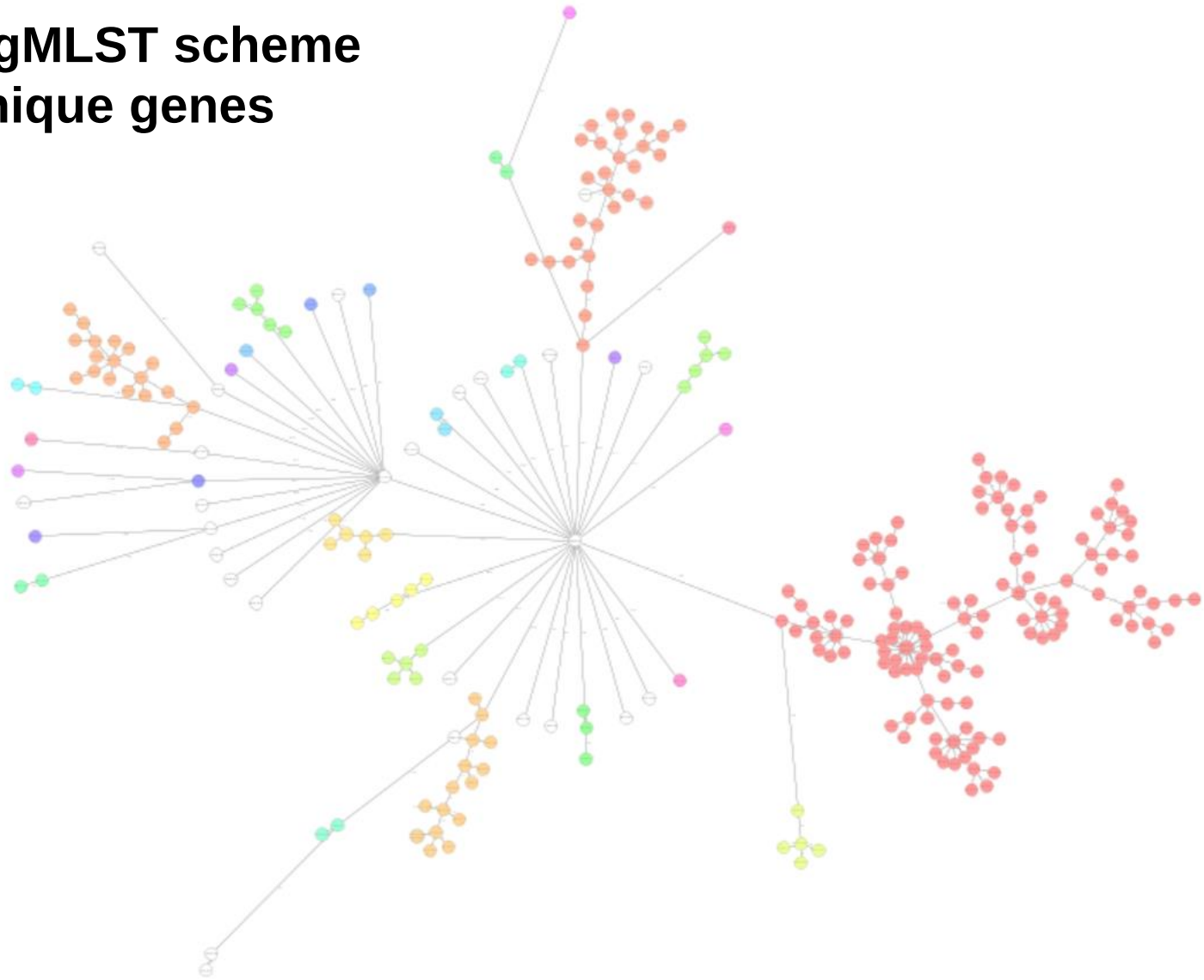
RIVM cgMLST scheme
2965 unique genes



CPE CITROBACTER FREUNDII IN DENMARK

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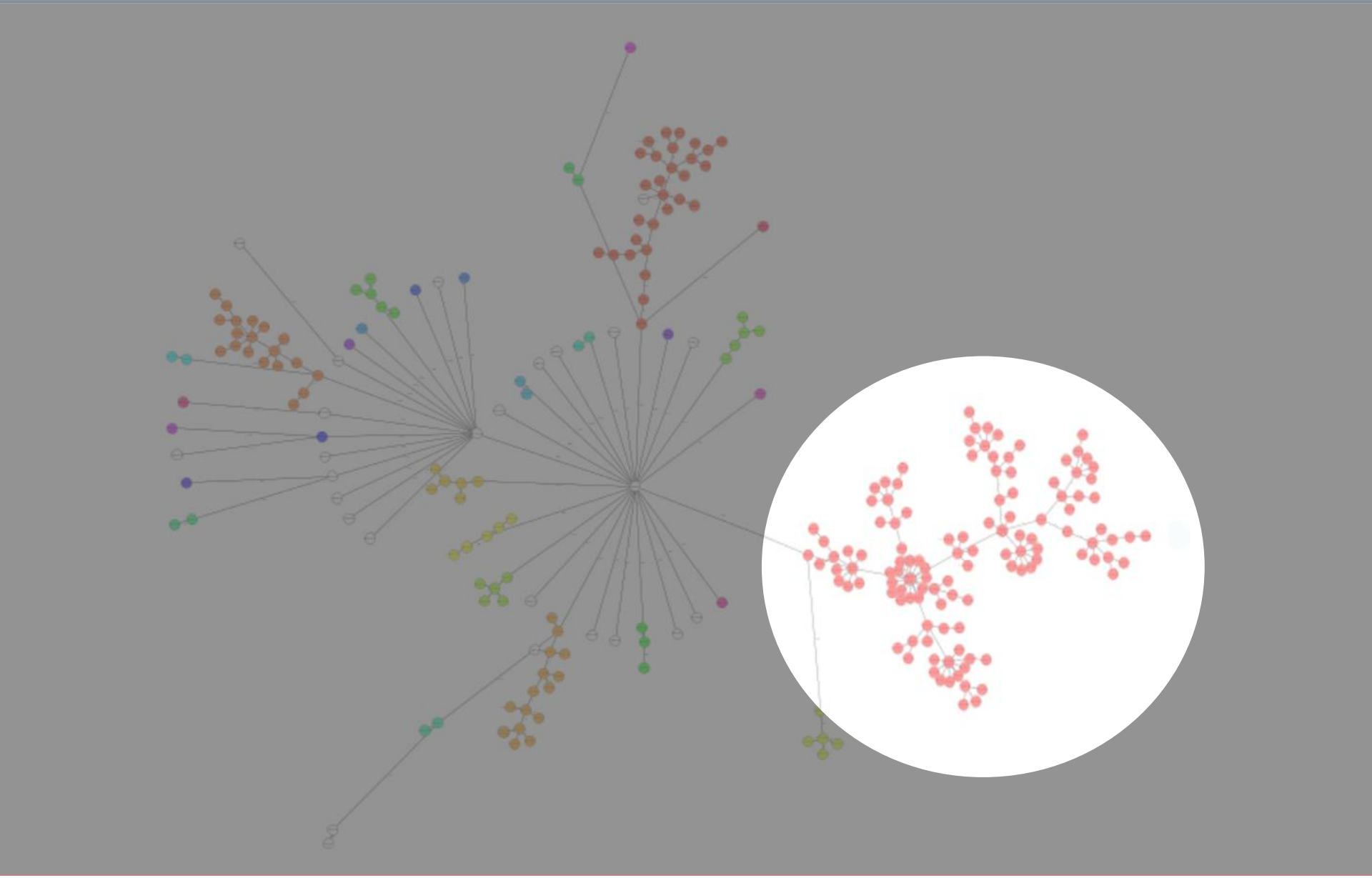

C. FREUNDII ST18 – JOINT PROJECT?

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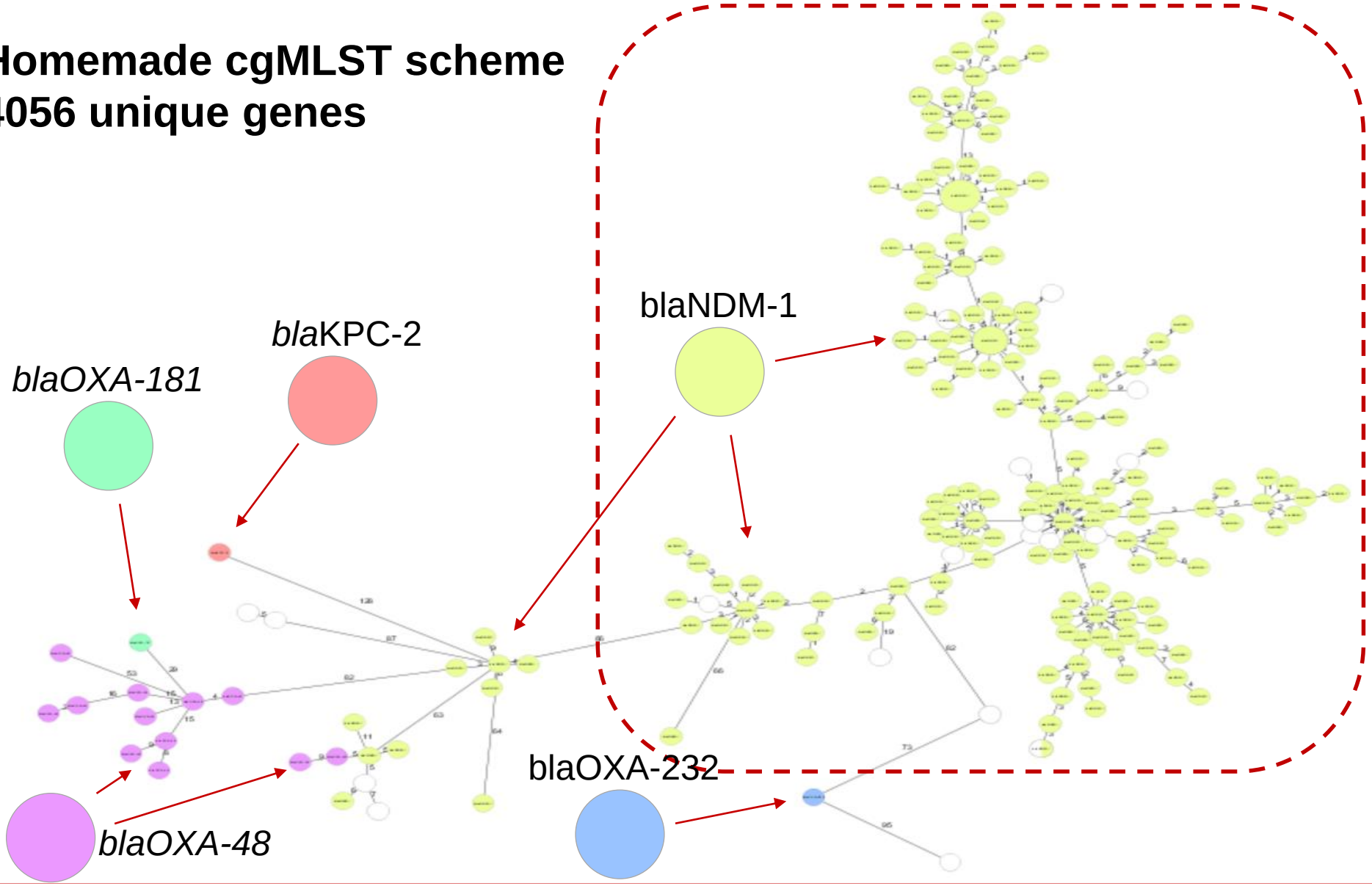
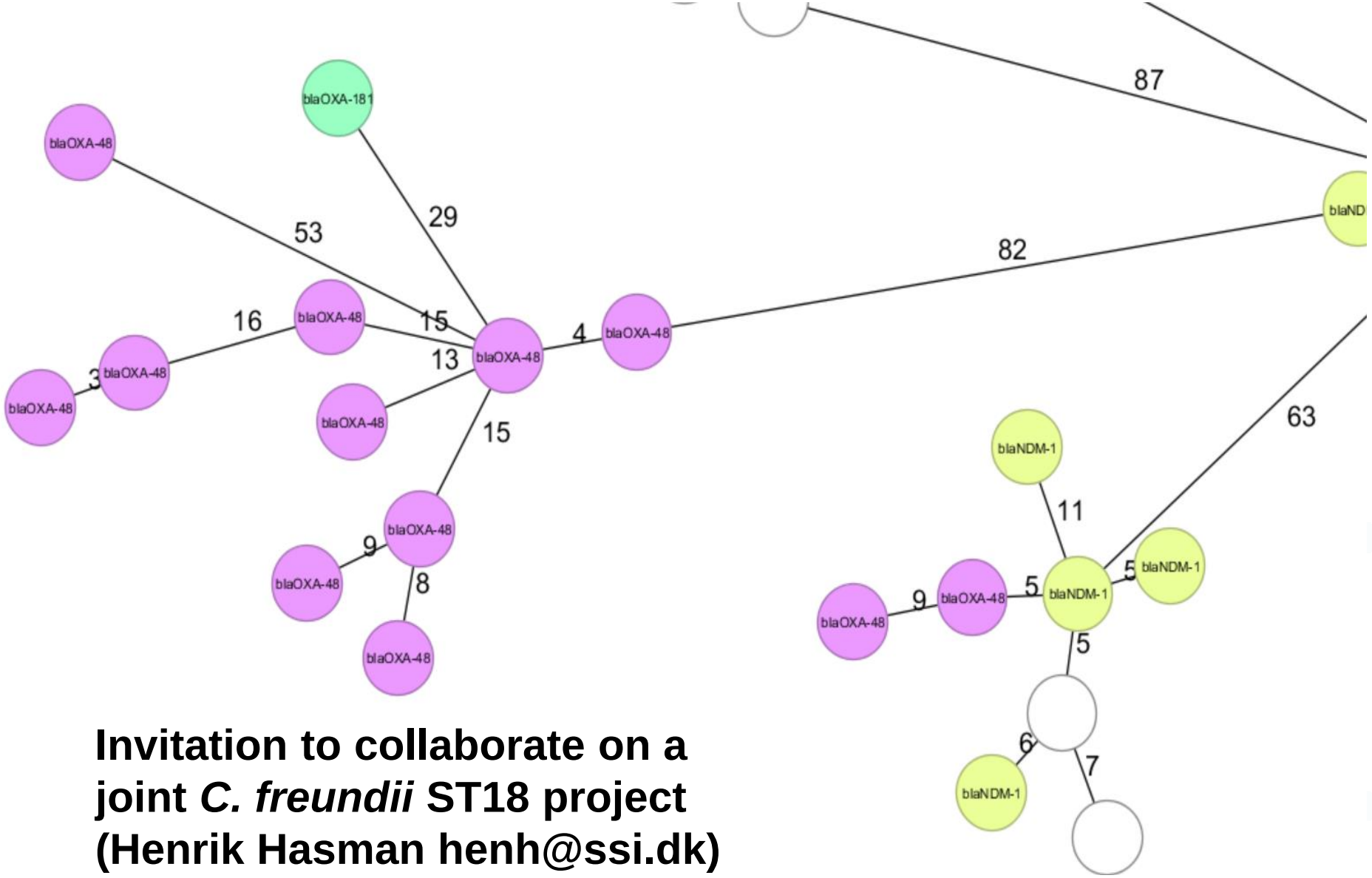
Homemade cgMLST scheme
4056 unique genes



C. FREUNDII ST18 – JOINT PROJECT?



Invitation to collaborate on a joint *C. freundii* ST18 project (Henrik Hasman henh@ssi.dk)

CPO ISOLATES (2022) AND UKRAINE

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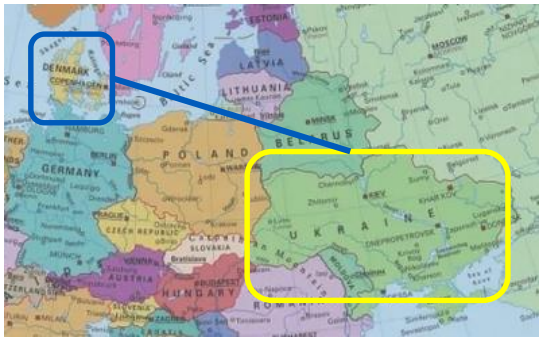

Patient	Species	Proveart	Rejse	CarbapenemaseNGS	MLST1
7	K. pneumoniae	podning axil	Ukraine	blaNDM-1, blaOXA-48	ST23
7	K. pneumoniae	podning axil	Ukraine	blaNDM-1	ST307
7	P. aeruginosa	podning axil	Ukraine	blaNDM-1	ST773
6	K. pneumoniae	urin	Ukraine	negativ	ST23
6	A. baumannii	cicatrice	Ukraine	blaOXA-72	STNovel
5	K. pneumoniae	podning rectum	Ukraine	blaNDM-1, blaOXA-232	ST5859
5	E. coli	podning rectum	Ukraine	blaOXA-181	ST101
4	E. coli	podning rectum	Ukraine	blaNDM-5	ST361
3	E. coli	podning rectum	Ukraine	blaOXA-48	ST405
2	A. baumannii	cicatrice	Ukraine	blaOXA-72	STNovel
1	E. coli	podning rectum	Ukraine	blaKPC-3	ST131

NATIONAL FOCAL POINTS AMR - EPIPULSE

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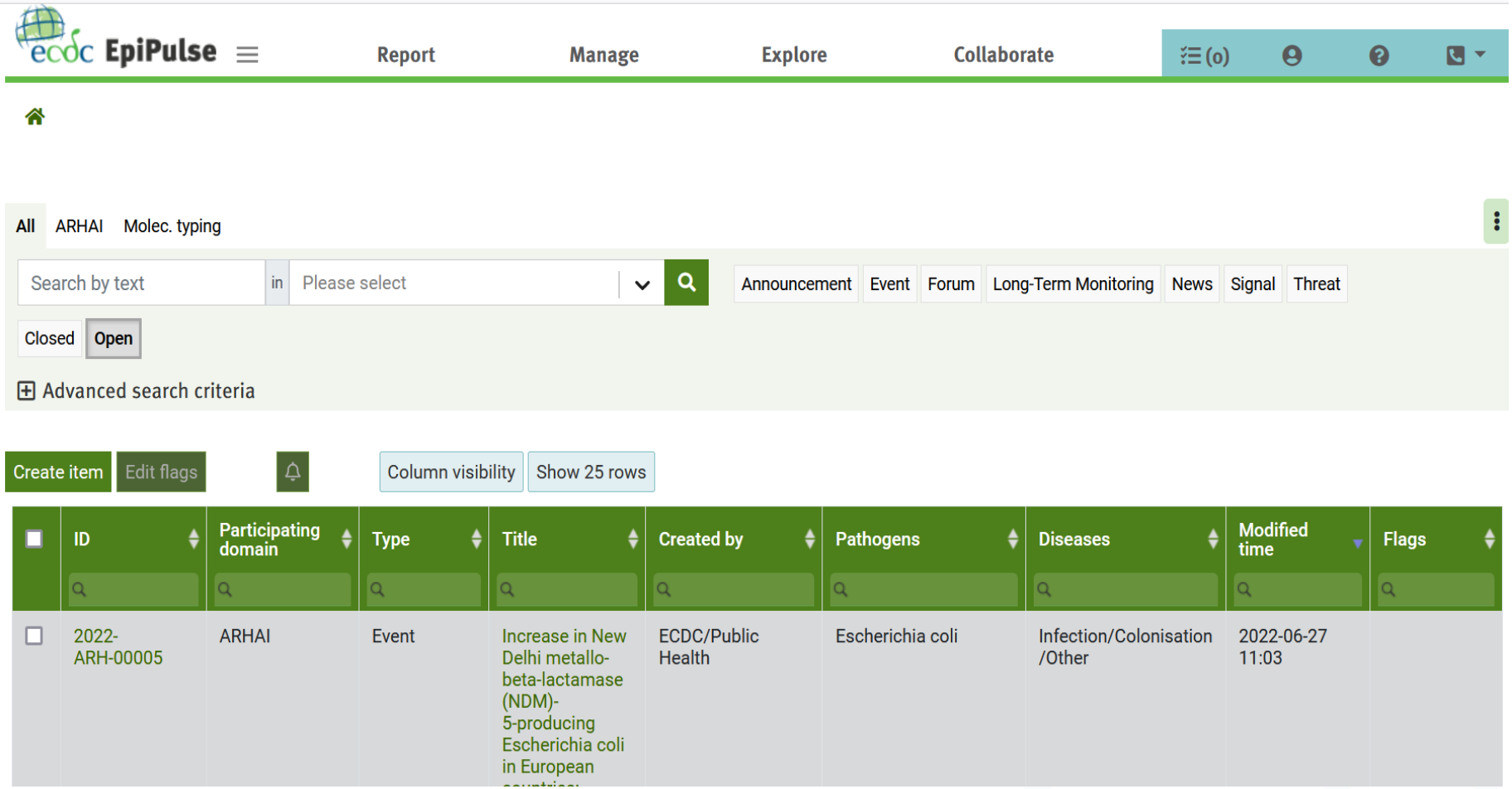

QUESTIONS PLEASE?

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PLASMID SEQUENCING

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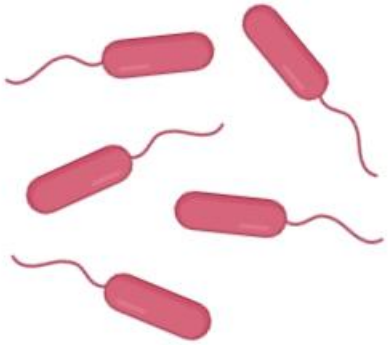
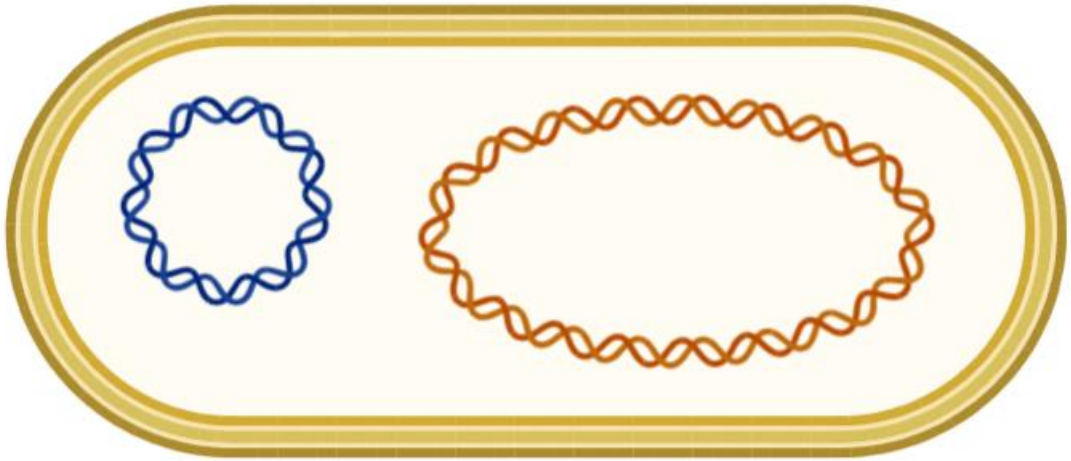
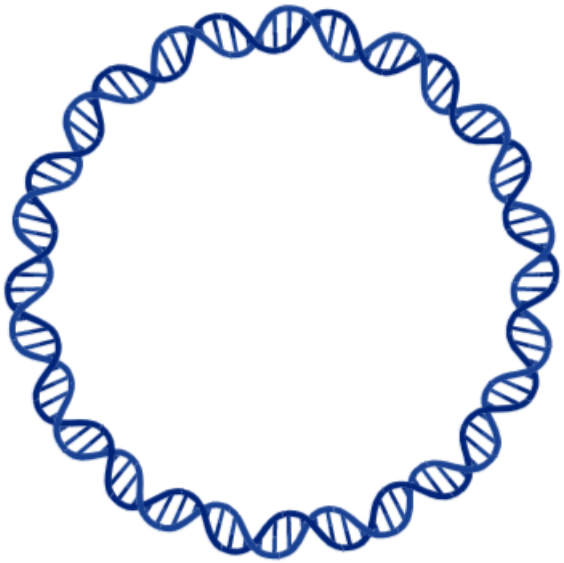
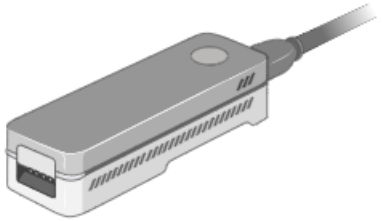
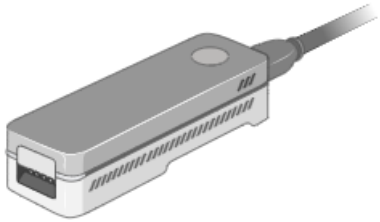


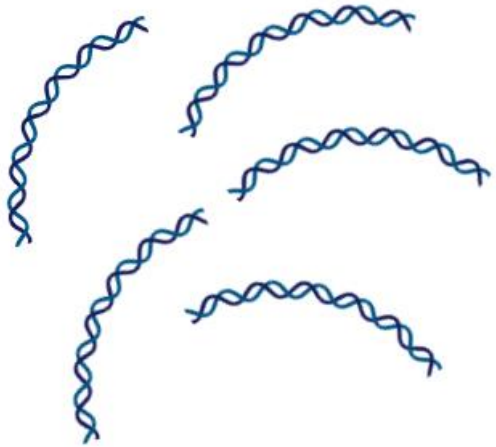






ILLUMINA VS MINION DATA





Read error rate: 0.1% – 1%

Genome coverage: 98%* - 100%

Read error rate: 5% – 15%

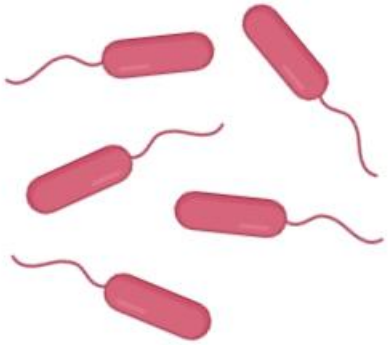
Genome coverage: ~100%**

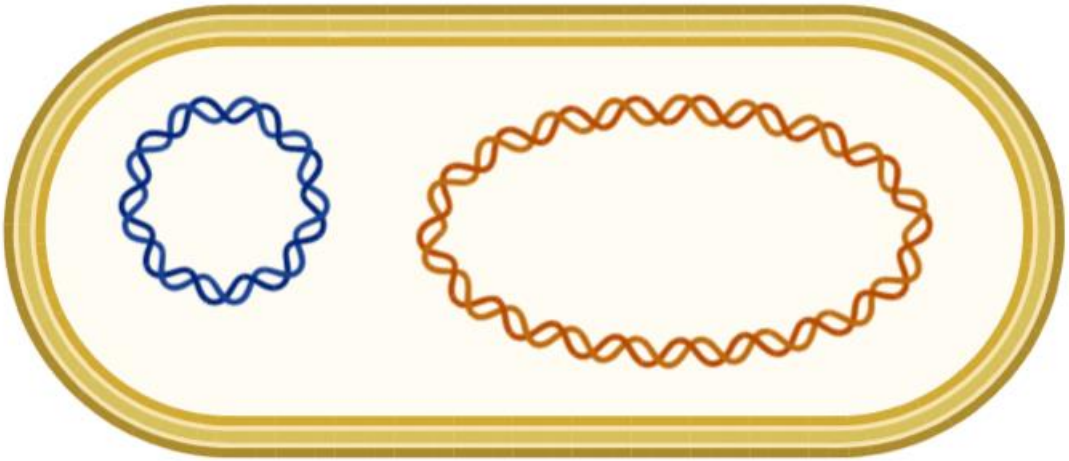
** Bias from Tagmentation insertion sites*

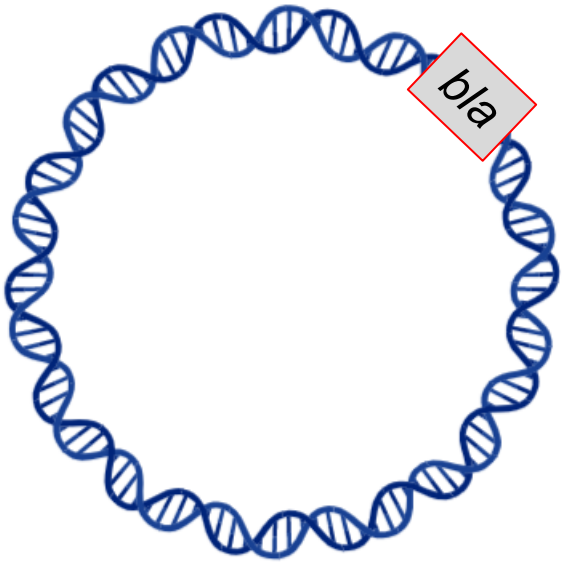
*** Small plasmids may be missed*

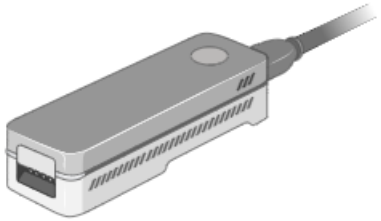
PLASMID SEQUENCING

STATENS SERUM INSTITUT

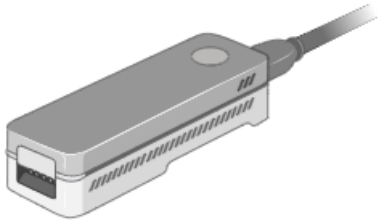


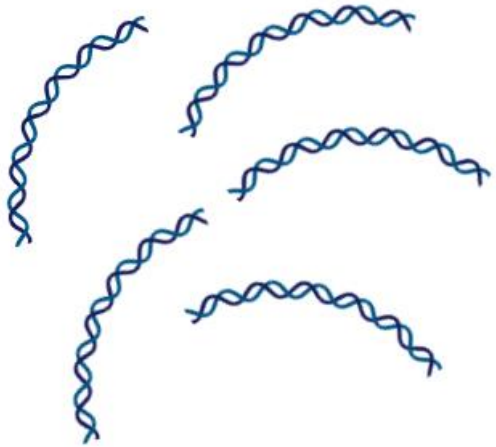






ILLUMINA VS MINION DATA





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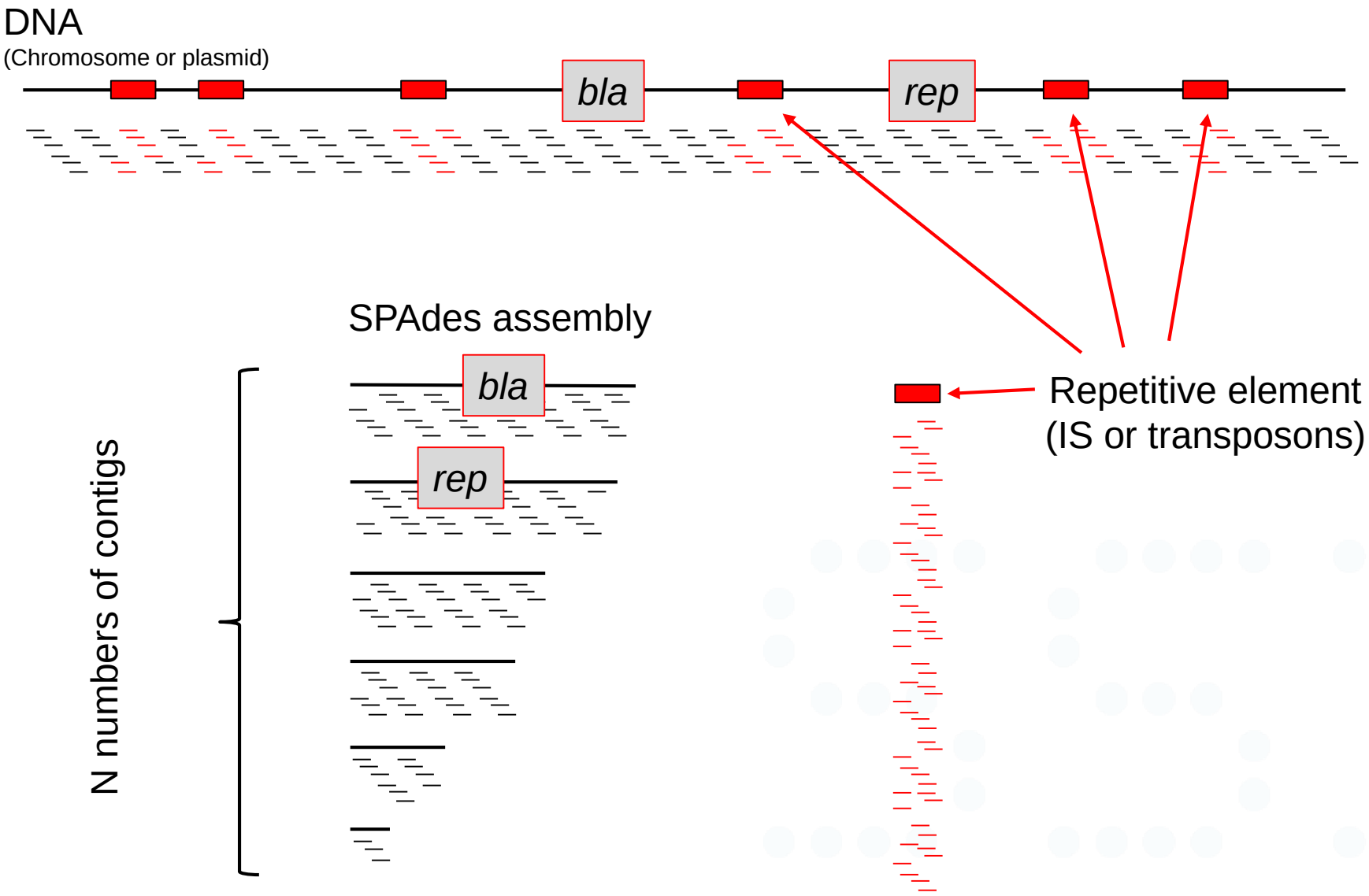
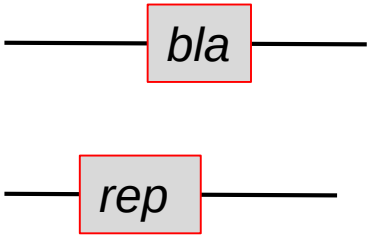
ILLUMINA ASSEMBLY USING SPADES





Other reports Distance tree of results MSA viewer

Descriptions | Graphic Summary | Alignments | Taxonomy

Sequences producing significant alignments Download Select columns Show 100

select all *100 sequences selected* GenBank Graphics Distance tree of results MSA Viewer

Description	Scientific Name	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
Klebsiella quasipneumoniae subsp. quasipneumoniae SHB035 plasmid pYUSBH035 DNA, complete sequence	Klebsiella quasip...	73.1	73.1	100%	6e-10	100.00%	46161	LC716358.1
Enterobacter hormaechei strain Eh27 plasmid pEh27_3, complete sequence	Enterobacter hor...	73.1	73.1	100%	6e-10	100.00%	53096	CP053694.1
Klebsiella pneumoniae strain dm664b plasmid p1_dm664b_NDM5, complete sequence	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	163355	CP095682.1
Enterobacter hormaechei strain beb_c250b plasmid p1_beb_c250b_NDM5, complete sequence	Enterobacter hor...	73.1	73.1	100%	6e-10	100.00%	94643	CP095681.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGX21 subclass B1 metallo-beta-lactamase NDM-5 (blaND...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	813	ON553466.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGN70 subclass B1 metallo-beta-lactamase NDM-5 (blaND...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	813	ON553465.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGN224 subclass B1 metallo-beta-lactamase NDM-1 (blaN...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	813	ON511106.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGA96 subclass B1 metallo-beta-lactamase NDM-1 (blaND...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	820	ON511105.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGX130 subclass B1 metallo-beta-lactamase NDM-1 (blaN...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	813	ON511104.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGK9 subclass B1 metallo-beta-lactamase NDM-1 (blaND...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	813	ON511103.1
Klebsiella pneumoniae subsp. pneumoniae strain MMGK6 subclass B1 metallo-beta-lactamase NDM-1 (blaND...	Klebsiella pneum...	73.1	73.1	100%	6e-10	100.00%	813	ON511102.1

GView Server