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della puglia e della basilicata

Epidemiologia molecolare della listeriosi: dal fingerprinting al WGS

Dr. Antonio Parisi

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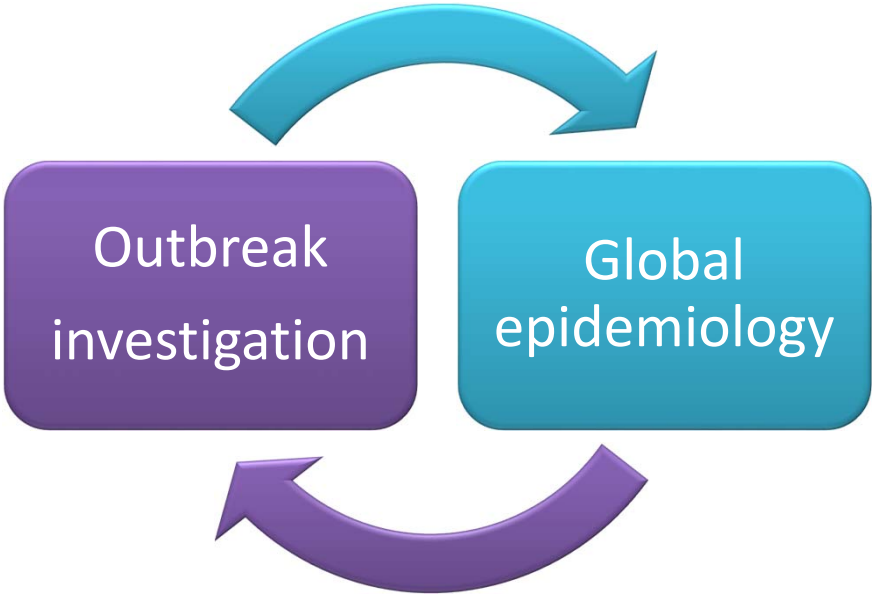
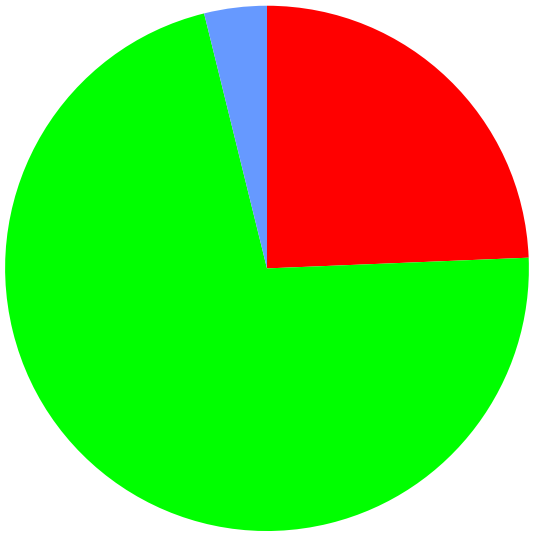
Epidemiologia molecolare



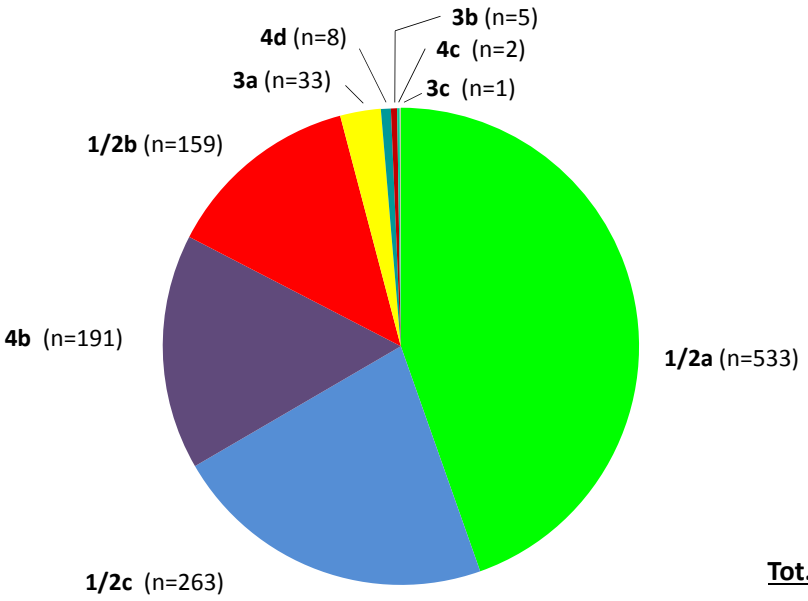
L. monocytogenes – isolati



Uomo n=291
Alimenti n=858
Ambiente n=46

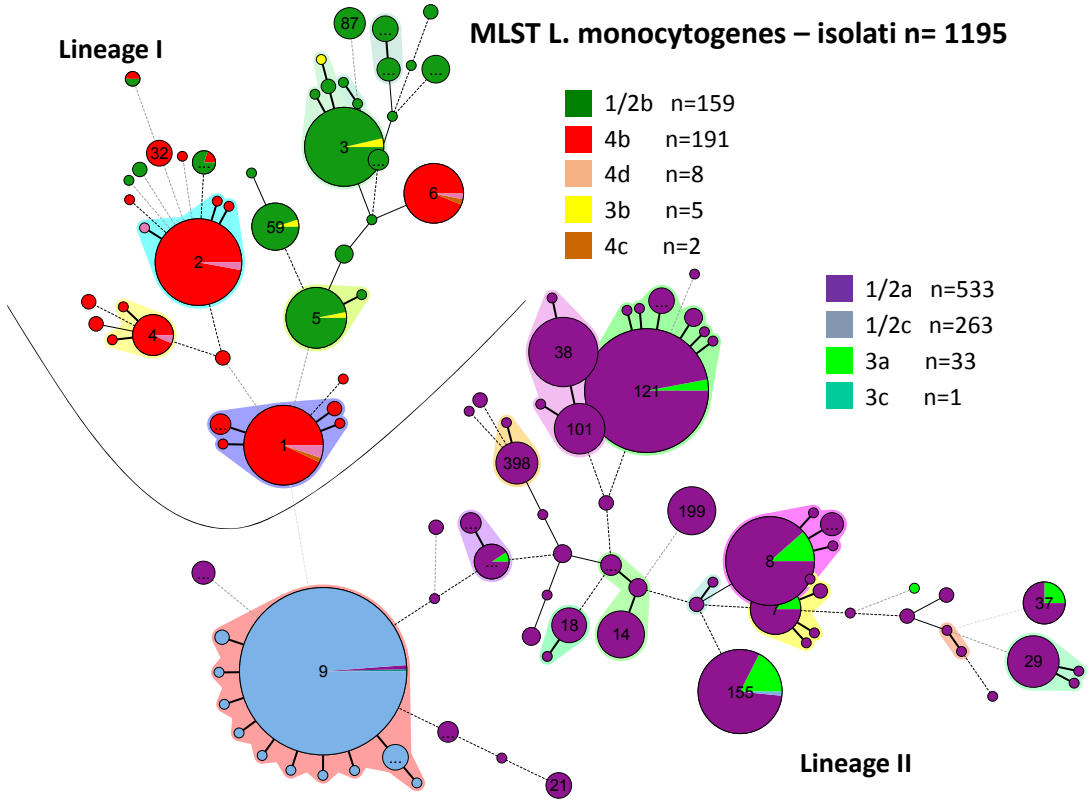
Tot. isolati n= 1195

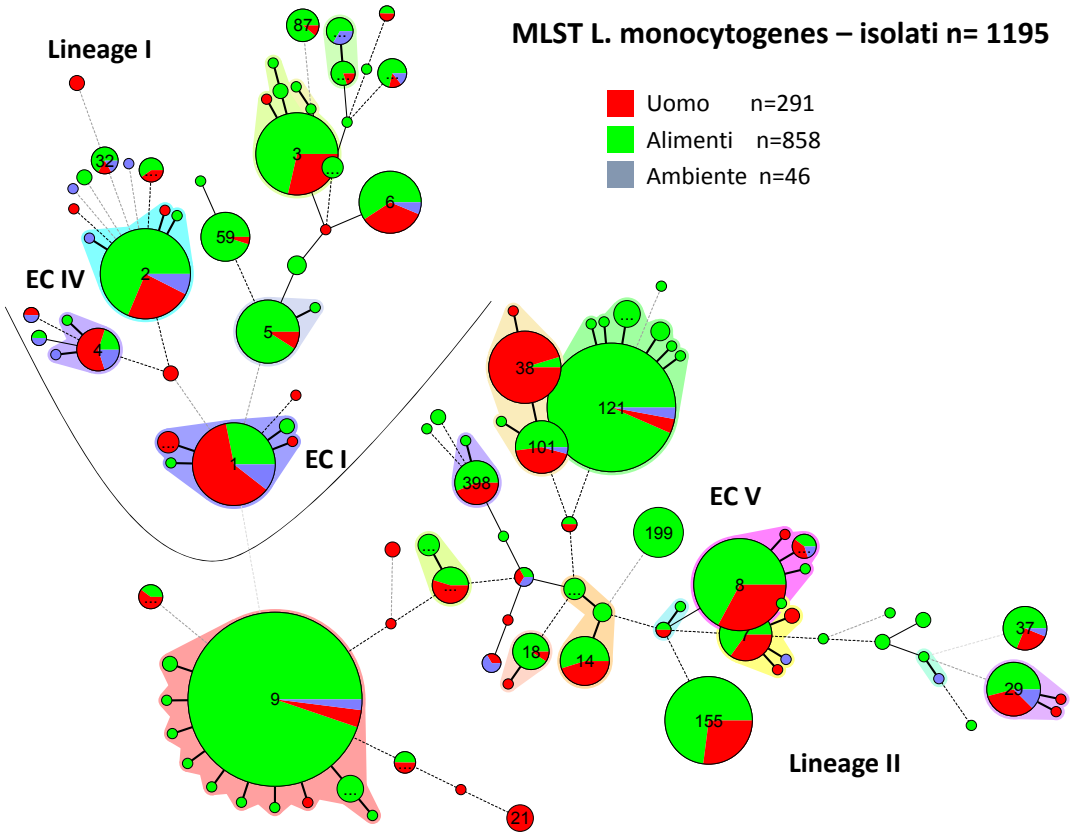
L. monocytogenes - sierotipi



Sierotipo	%
1/2a	44,6
1/2c	22,0
4b	16,0
1/2b	13,3
3a	2,8
4d	0,7
3b	0,4
4c	0,2
3c	0,1

Tot. isolati n= 1195


MLST L. monocytogenes – isolati n= 1195
Lineage I
Lineage II
1/2b n=159
4b n=191
4d n=8
3b n=5
4c n=2
1/2a n=533
1/2c n=263
3a n=33
3c n=1
87
3
32
6
59
2
5
4
1
38
121
101
398
199
8
7
37
29
18
14
155
9
21


MLST L. monocytogenes – isolati n= 1195
Uomo n=291
Alimenti n=858
Ambiente n=46
Lineage I
EC IV
EC I
EC V
Lineage II
87
32
3
6
59
2
5
4
1
38
121
101
398
199
8
7
37
29
18
14
155
9
21

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L. monocytogenes Cloni Epidemici (EC)

- **ECI (Lineage I, 4b, comK prophage -)**
  - Canada coleslaw, 1981
  - LA soft cheese, 1985
  - Switzerland soft cheese, 1989
- **ECII (Lineage I, 4b, *comk* prophage +)**
  - U.S. hot dog, 1998-1999
  - U.S. turkey deli, 2002
  - Belgium time-linked cluster of cases, 2006-2007
- **ECIII (Lineage II, 1/2a, *comK* prophage +)**
  - U.S. hot dog, 1989
  - U.S. turkey deli, 2000
- **ECIV (Lineage I, 4b, *comK* prophage +)**
  - Boston vegetable, 1979
  - UK pate, 1989
  - Northern Italy corn, 1997
- **ECV (Lineage II, 1/2a, *comK* prophage +)**
  - 2008 Canadian RTE meat outbreak
  - 2010 Canadian prosciutto ham outbreak

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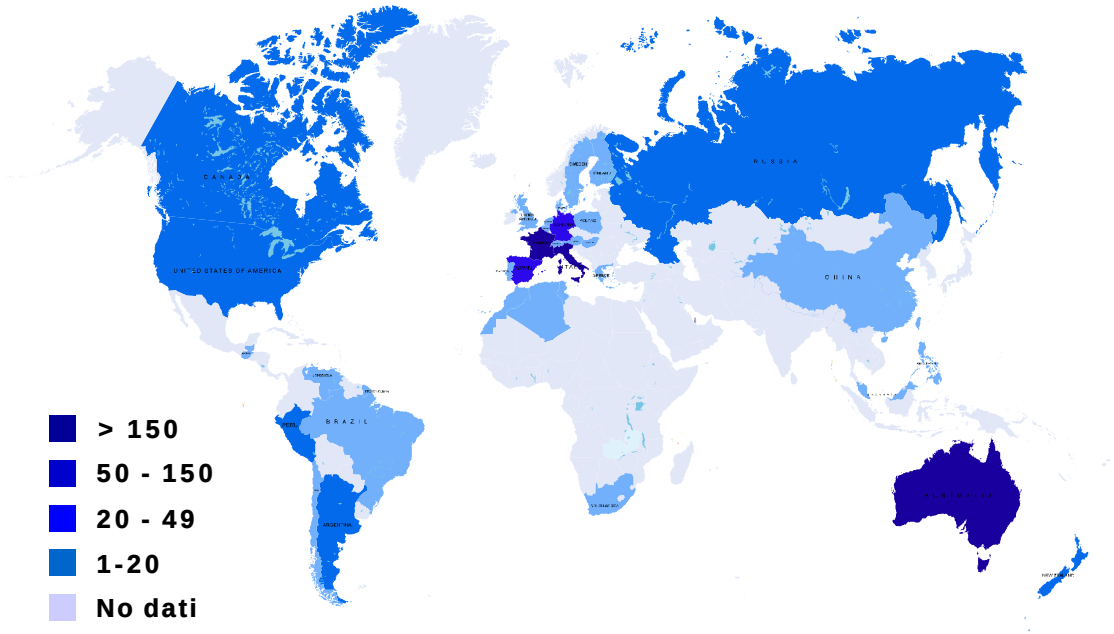
MLST database – Uomo (n=1126)



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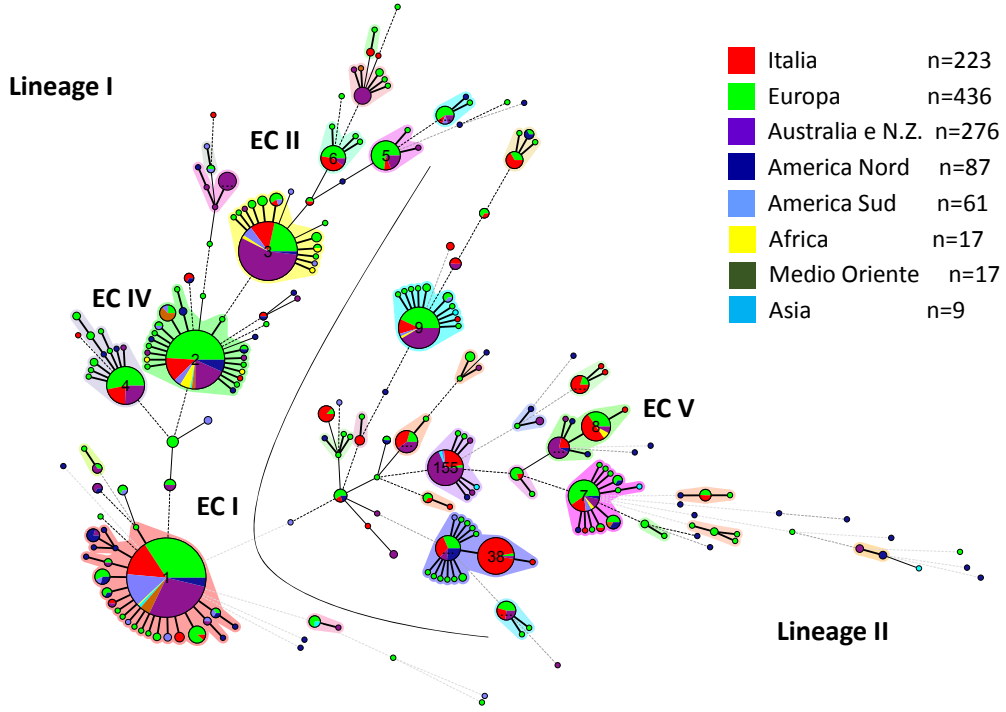
L. monocytogenes – Uomo (n=1126)



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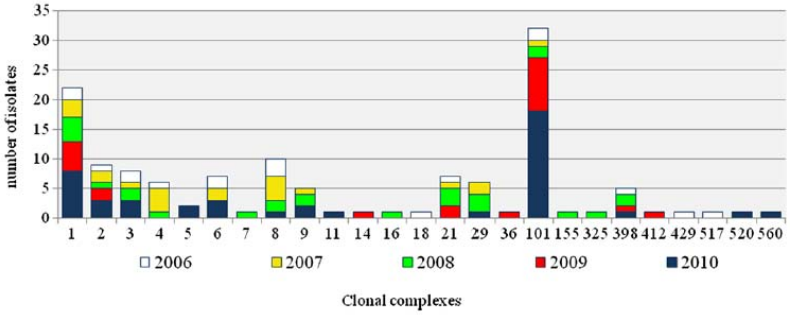
Mammina *et al. BMC Infectious Diseases* 2013, **13**:152
http://www.biomedcentral.com/1471-2334/13/152

BMC
Infectious Diseases

RESEARCH ARTICLE Open Access

Enhanced surveillance of invasive listeriosis in the Lombardy region, Italy, in the years 2006-2010 reveals major clones and an increase in serotype 1/2a

Caterina Mammina[1*], Antonio Parisi[2], Anna Guaita[3], Aurora Aleo[1], Celestino Bonura[1], Antonino Nastasi[4] and Mirella Pontello[3]



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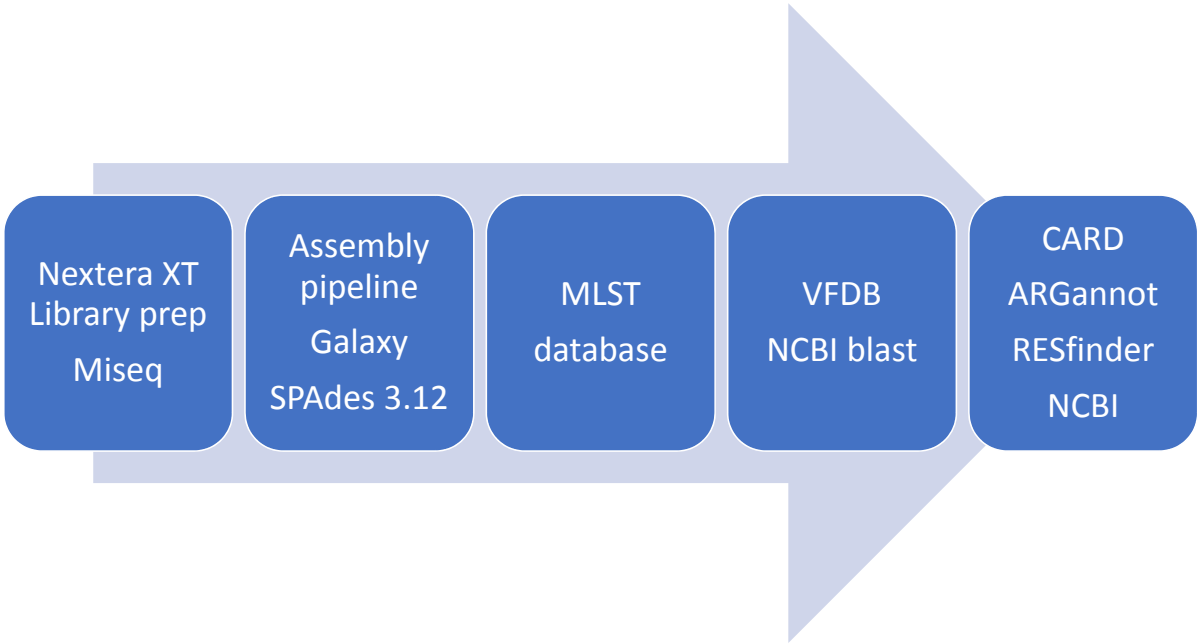
Whole Genome Sequencing



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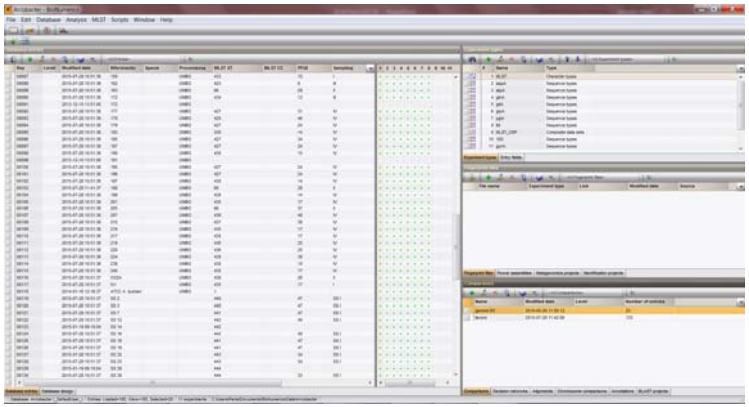
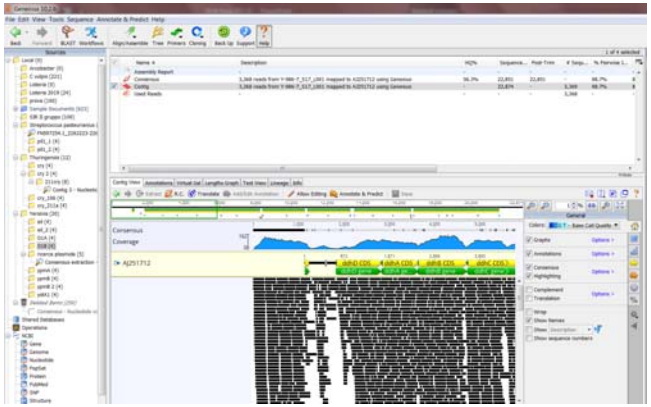
Conclusioni

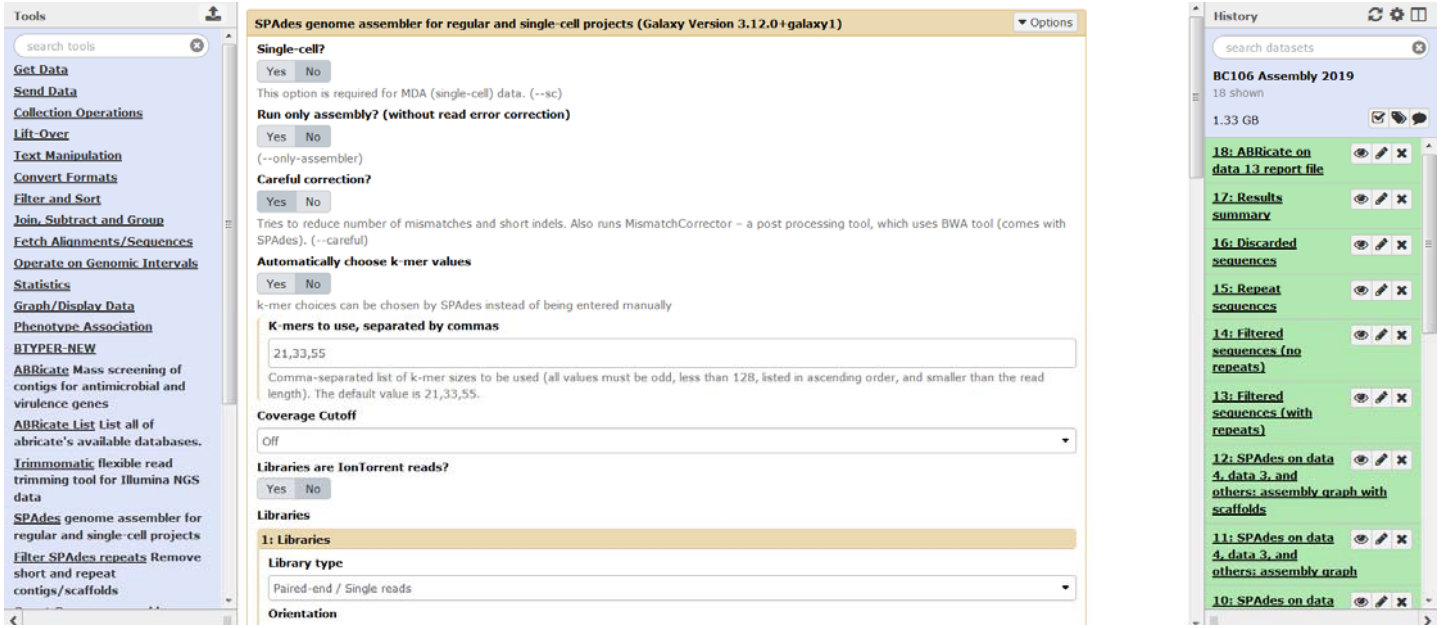
Bionumerics



Geneious



Galaxy


Tools
search tools
Get Data
Send Data
Collection Operations
Lift-Over
Text Manipulation
Convert Formats
Filter and Sort
Join, Subtract and Group
Fetch Alignments/Sequences
Operate on Genomic Intervals
Statistics
Graph/Display Data
Phenotype Association
BTYPER-NEW
ABRicate Mass screening of contigs for antimicrobial and virulence genes
ABRicate List List all of abricate's available databases.
Trimmomatic flexible read trimming tool for Illumina NGS data
SPAdes genome assembler for regular and single-cell projects
Filter SPAdes repeats Remove short and repeat contigs/scaffolds
SPAdes genome assembler for regular and single-cell projects (Galaxy Version 3.12.0+galaxy1)
Options
Single-cell?
Yes No
This option is required for MDA (single-cell) data. (--sc)
Run only assembly? (without read error correction)
Yes No
(--only-assembler)
Careful correction?
Yes No
Tries to reduce number of mismatches and short indels. Also runs MismatchCorrector – a post processing tool, which uses BWA tool (comes with SPAdes). (--careful)
Automatically choose k-mer values
Yes No
k-mer choices can be chosen by SPAdes instead of being entered manually
K-mers to use, separated by commas
21,33,55
Comma-separated list of k-mer sizes to be used (all values must be odd, less than 128, listed in ascending order, and smaller than the read length). The default value is 21,33,55.
Coverage Cutoff
Off
Libraries are IonTorrent reads?
Yes No
Libraries
1: Libraries
Library type
Paired-end / Single reads
Orientation

History
search datasets
BC106 Assembly 2019
18 shown
1.33 GB
18: ABRicate on data 13 report file
17: Results summary
16: Discarded sequences
15: Repeat sequences
14: Filtered sequences (no repeats)
13: Filtered sequences (with repeats)
12: SPAdes on data 4, data 3, and others: assembly graph with scaffolds
11: SPAdes on data 4, data 3, and others: assembly graph
10: SPAdes on data

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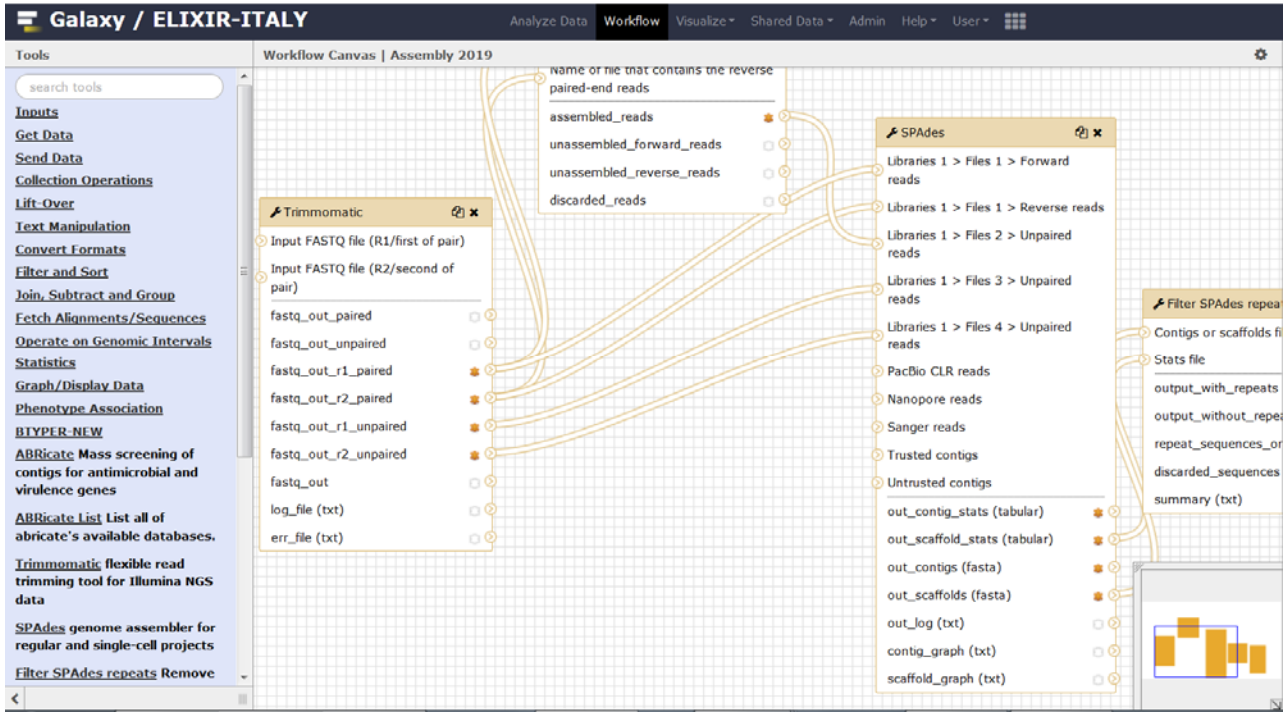
Galaxy



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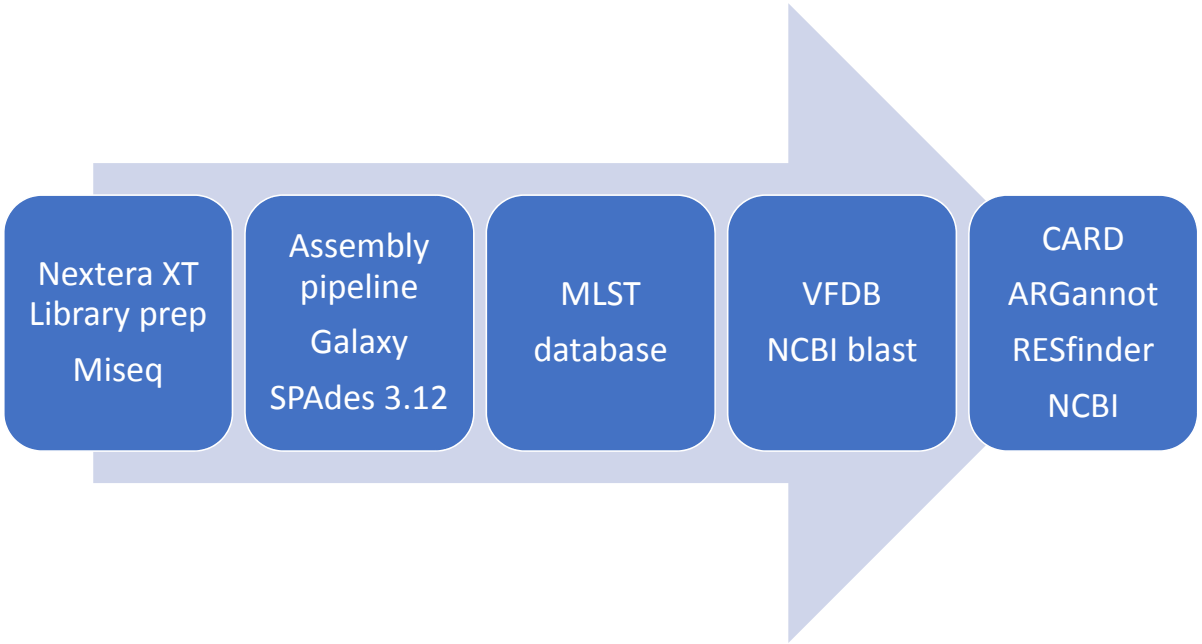

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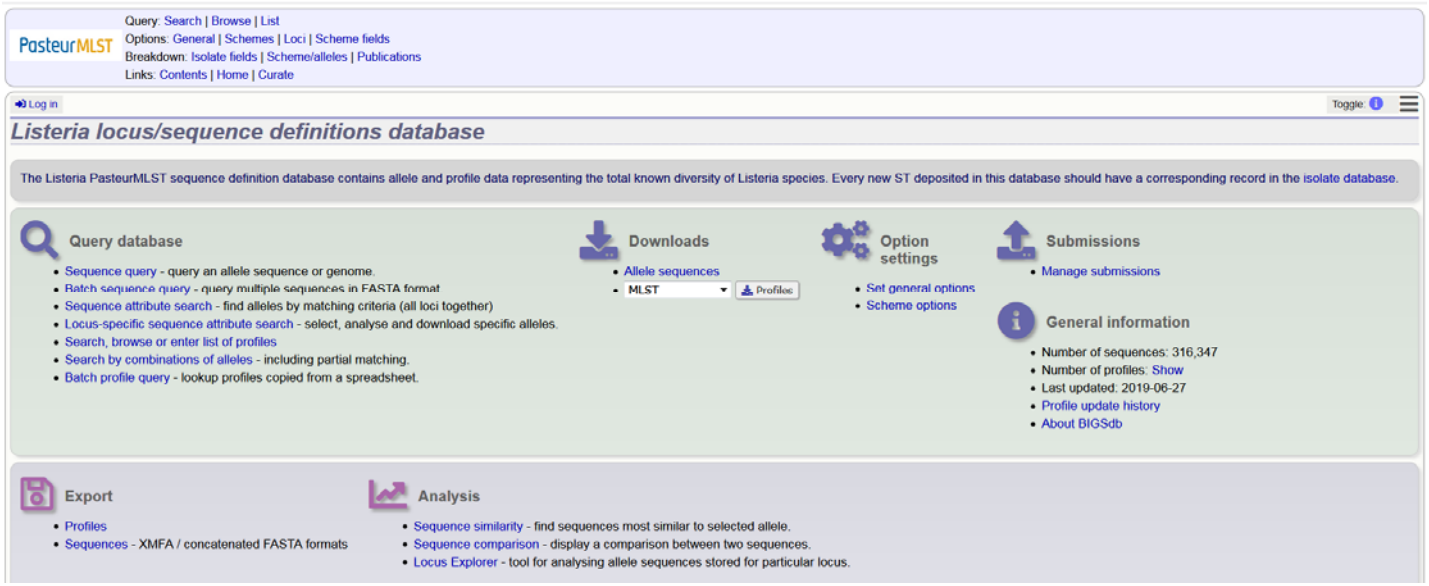
https://bigsdb.pasteur.fr



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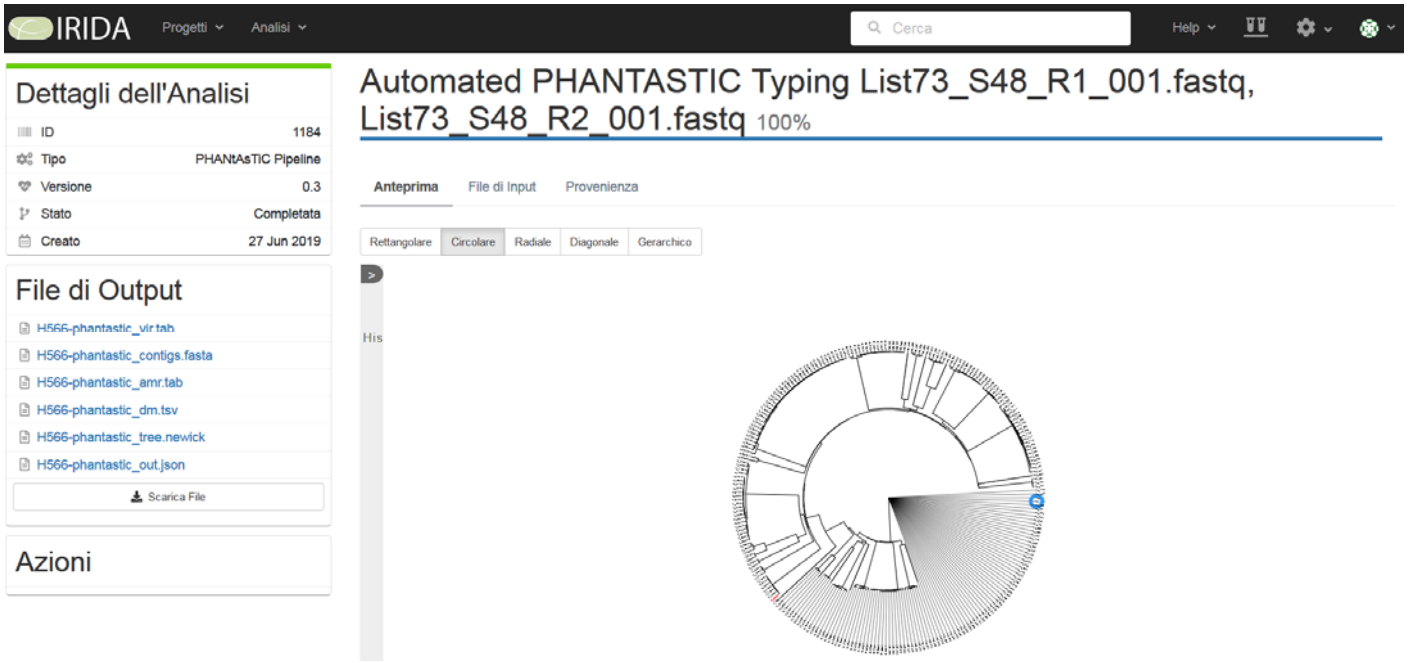
https://bigsdb.pasteur.fr

IRIDA ARIES


IRIDA
Progetti
Analisi
Cerca
Help
Dettagli dell'Analisi
ID 1184
Tipo PHANtAsTIC Pipeline
Versione 0.3
Stato Completata
Creato 27 Jun 2019
File di Output
H566-phantastic_vir.tab
H566-phantastic_contigs.fasta
H566-phantastic_amr.tab
H566-phantastic_dm.tsv
H566-phantastic_tree.newick
H566-phantastic_out.json
Scarica File
Azioni
Automated PHANTASTIC Typing List73_S48_R1_001.fastq, List73_S48_R2_001.fastq 100%
Anteprima
File di Input
Provenienza
Rettangolare
Circolare
Radiale
Diagonale
Gerarchico

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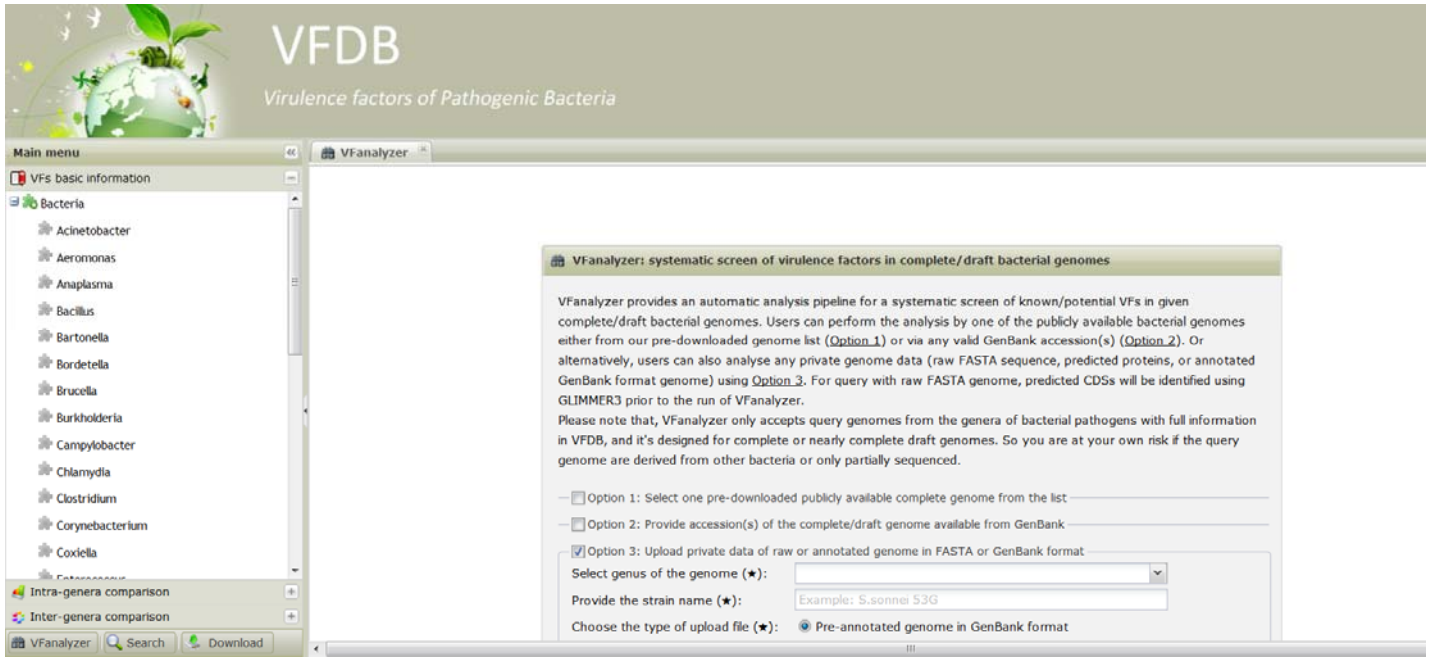
Virulenza



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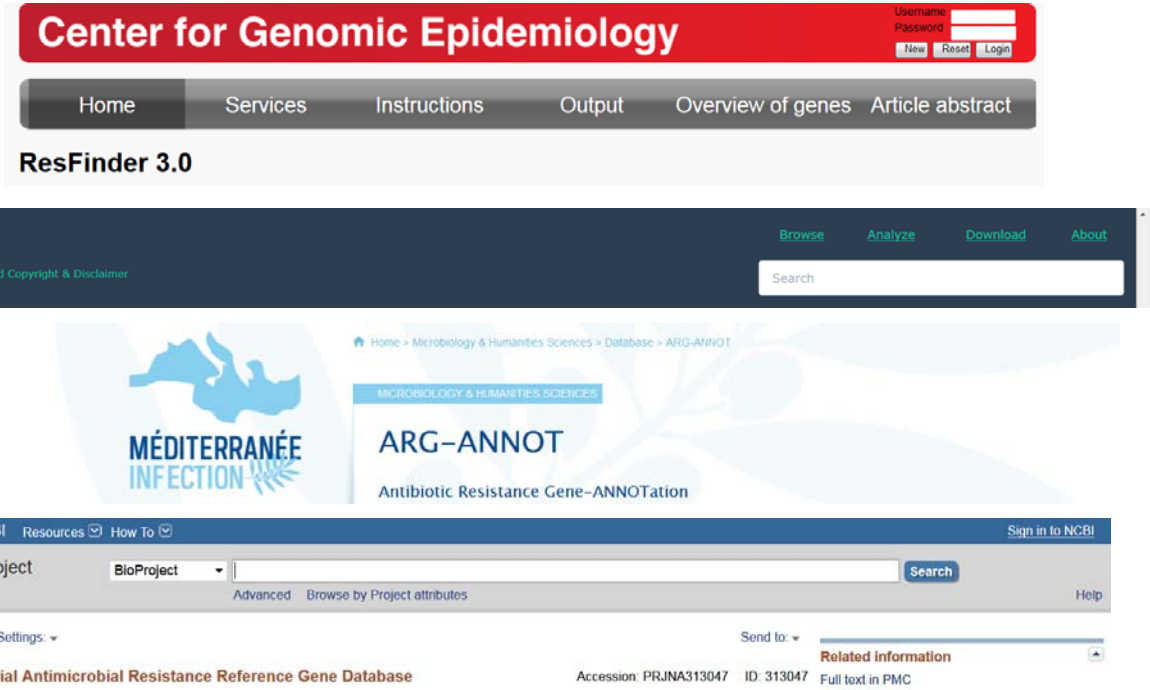
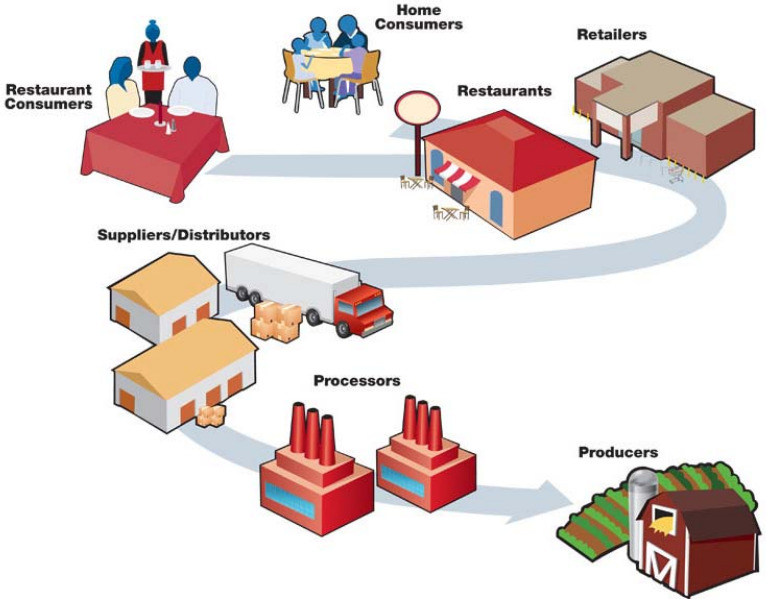
Antibiotico-resistenza



Outbreak investigation

Tracing the Food Back to the Source



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AFLP > PFGE

International Journal of Food Microbiology 149 (2011) 177–182

Contents lists available at ScienceDirect

International Journal of Food Microbiology

journal homepage: www.elsevier.com/locate/ijfoodmicro

Short communication

Comparison of two AFLP methods and PFGE using strains of *Listeria monocytogenes* isolated from environmental and food samples obtained from Piedmont, Italy

Food Microbiology 27 (2010) 101–108

Contents lists available at ScienceDirect

Food Microbiology

journal homepage: www.elsevier.com/locate/fm

Amplified Fragment Length Polymorphism and Multi-Locus Sequence Typing for high-resolution genotyping of *Listeria monocytogenes* from foods and the environment

Antonio Parisi [a,+], Laura Latorre [a], Giovanni Normanno [b], Angela Miccolupo [a], Rosa Fraccalvieri [a], Vanessa Lorusso [b], Gianfranco Santagada [a]

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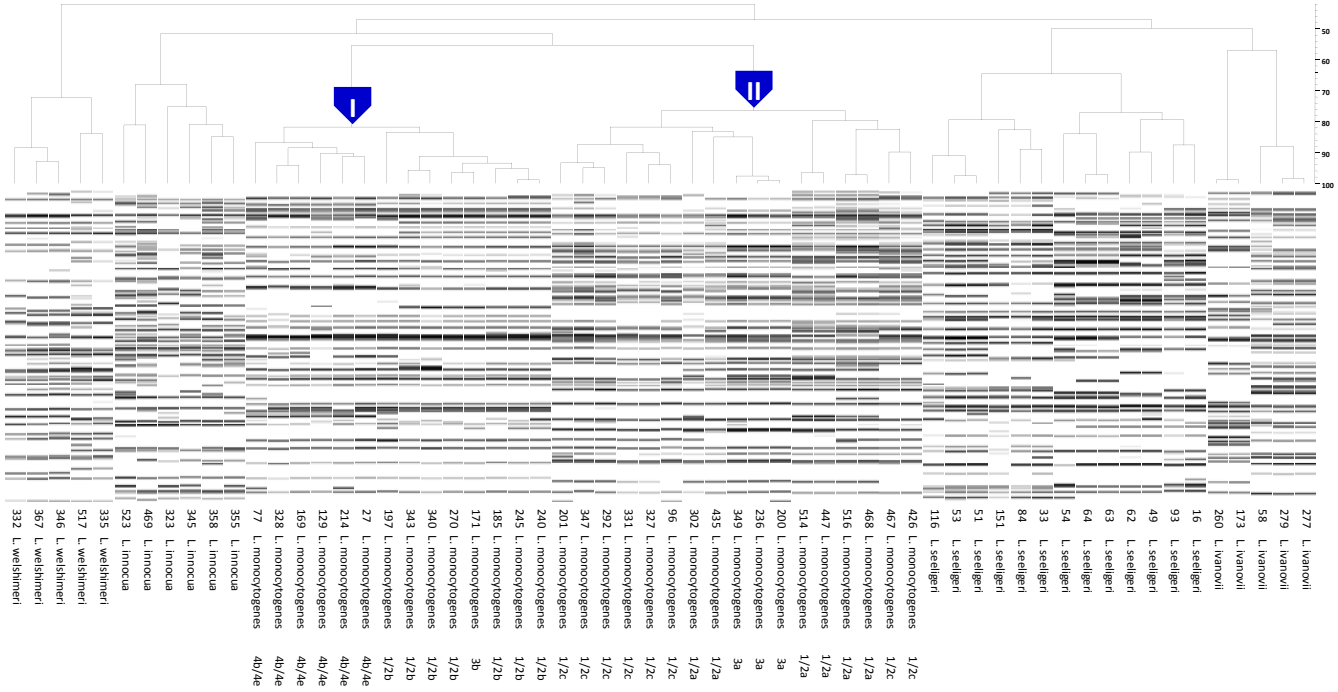
Fingerprinting



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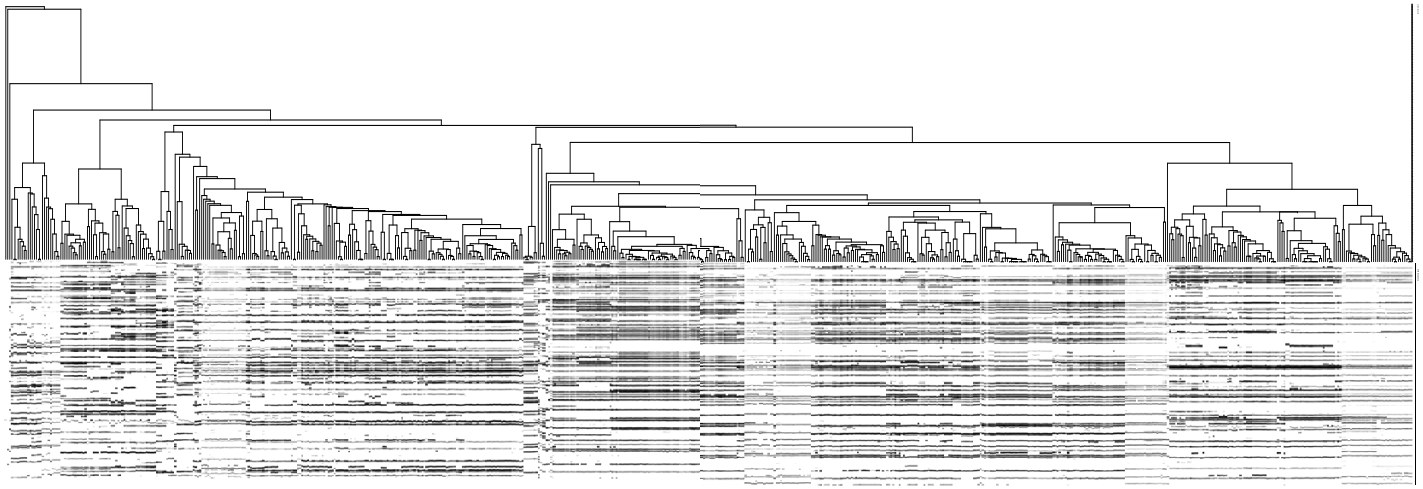
AFLP



N=670

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Listeria e alimenti

Journal of Food Protection, Vol. 70, No. 6, 2007, Pages 1507–1512

Low Prevalence of *Listeria monocytogenes* in Foods from Italy

L. LATORRE,[1]* A. PARISI,[2] R. FRACCALVIERI,[1] G. NORMANNO,[3] M. C. NARDELLA LA PORTA,[4] E. GOFFREDO,[4]
L. PALAZZO,[5] G. CICCARESE,[6] N. ADDANTE,[2] AND G. SANTAGADA[1]

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Listeria e alimenti

ELSEVIER

Food Control

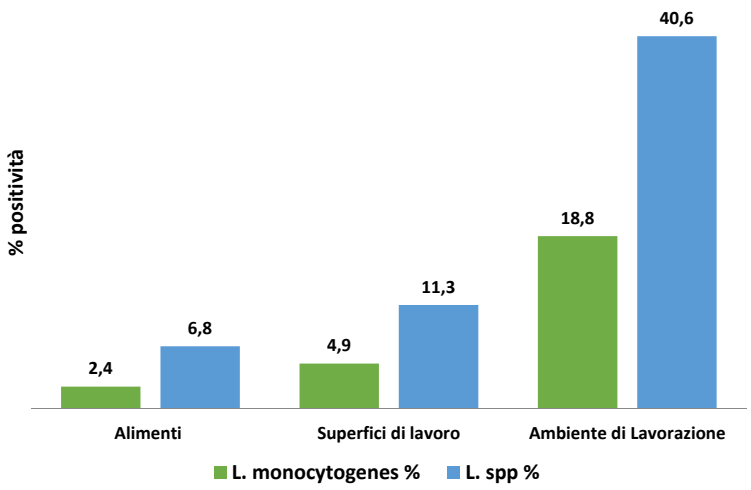
Available online 23 May 2012

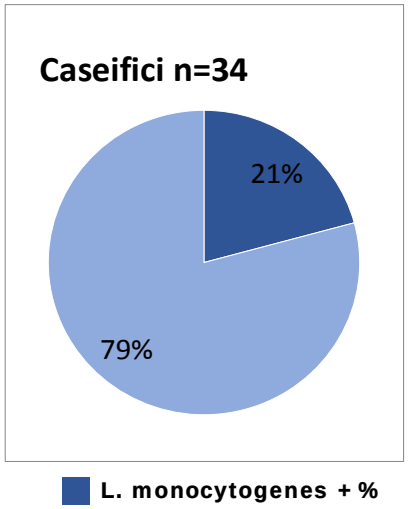
In Press, Accepted Manuscript — Note to users

Occurrence of *Listeria* spp. in Dairy plants in southern Italy and Molecular subtyping of isolates using AFLP

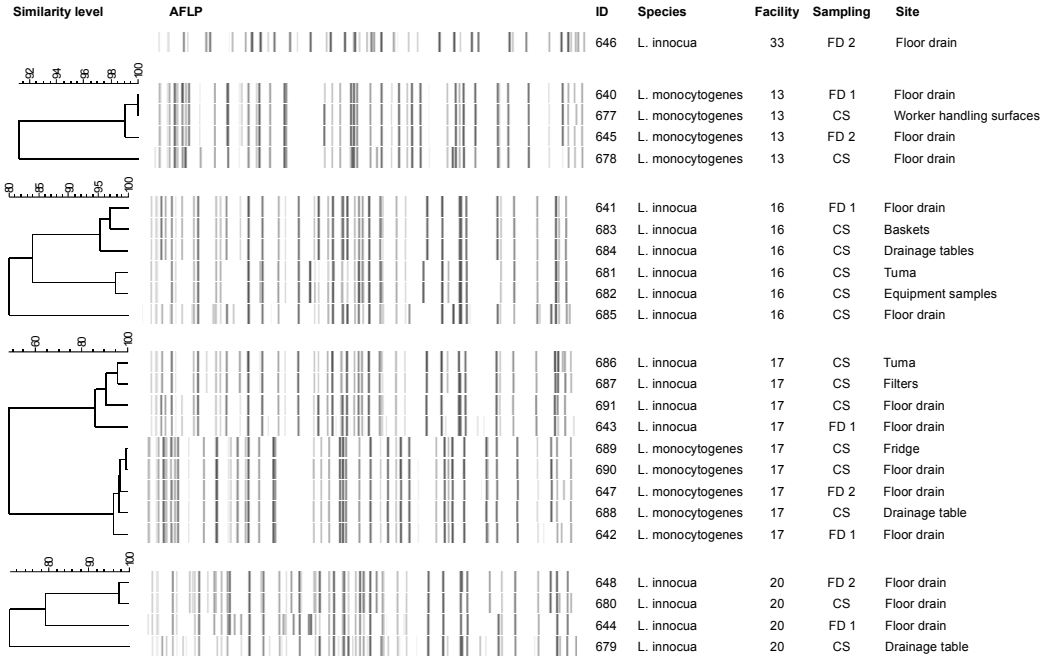
A. Parisi[a], L. Latorre[a], R. Fraccalvieri[a], A. Miccolupo[a], G. Normanno[b], M. Caruso[a], G. Santagada[a]

Listeria e alimenti





Listeria e alimenti



ID	Species	Facility	Sampling	Site
646	L. innocua	33	FD 2	Floor drain
640	L. monocytogenes	13	FD 1	Floor drain
677	L. monocytogenes	13	CS	Worker handling surfaces
645	L. monocytogenes	13	FD 2	Floor drain
678	L. monocytogenes	13	CS	Floor drain
641	L. innocua	16	FD 1	Floor drain
683	L. innocua	16	CS	Baskets
684	L. innocua	16	CS	Drainage tables
681	L. innocua	16	CS	Tuma
682	L. innocua	16	CS	Equipment samples
685	L. innocua	16	CS	Floor drain
686	L. innocua	17	CS	Tuma
687	L. innocua	17	CS	Filters
691	L. innocua	17	CS	Floor drain
643	L. innocua	17	FD 1	Floor drain
689	L. monocytogenes	17	CS	Fridge
690	L. monocytogenes	17	CS	Floor drain
647	L. monocytogenes	17	FD 2	Floor drain
688	L. monocytogenes	17	CS	Drainage table
642	L. monocytogenes	17	FD 1	Floor drain
648	L. innocua	20	FD 2	Floor drain
680	L. innocua	20	CS	Floor drain
644	L. innocua	20	FD 1	Floor drain
679	L. innocua	20	CS	Drainage table

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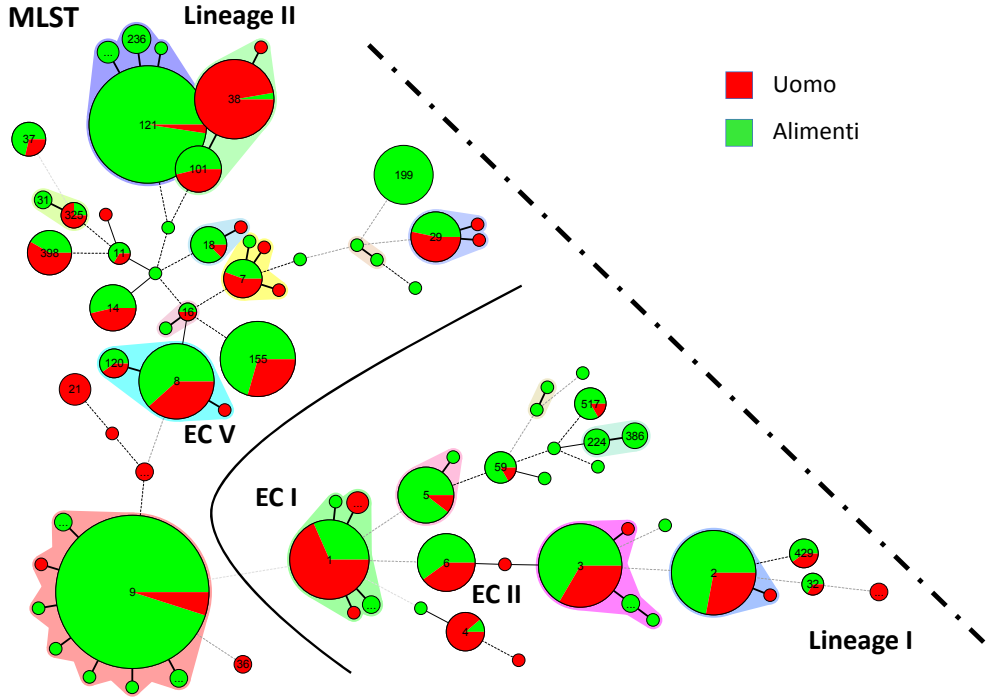

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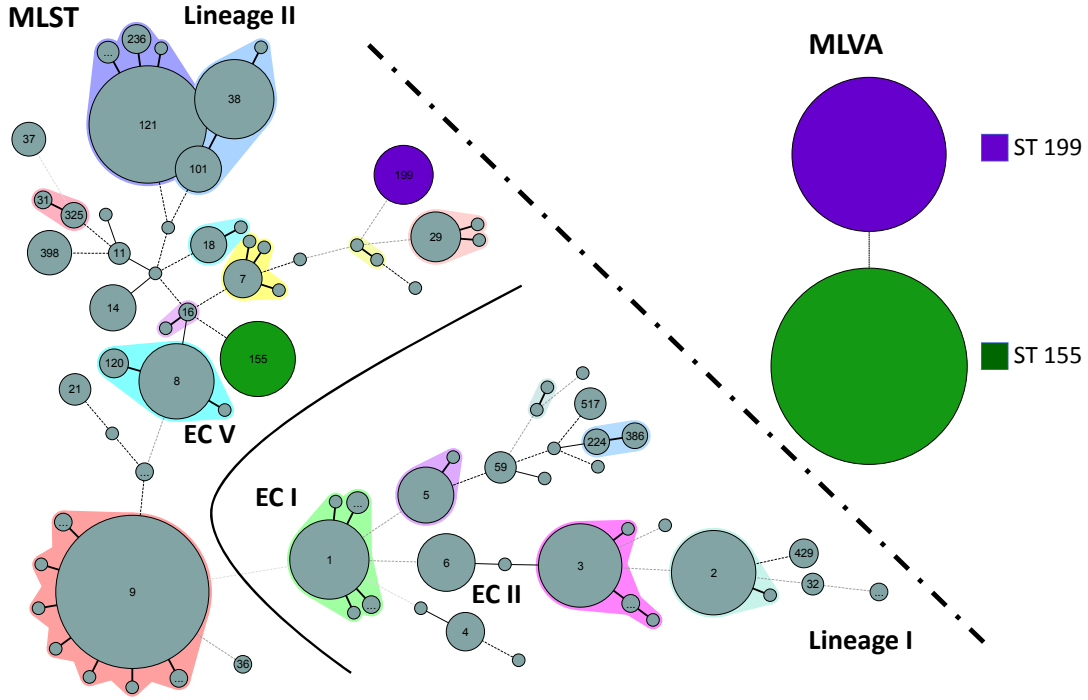
MLVA > MLST



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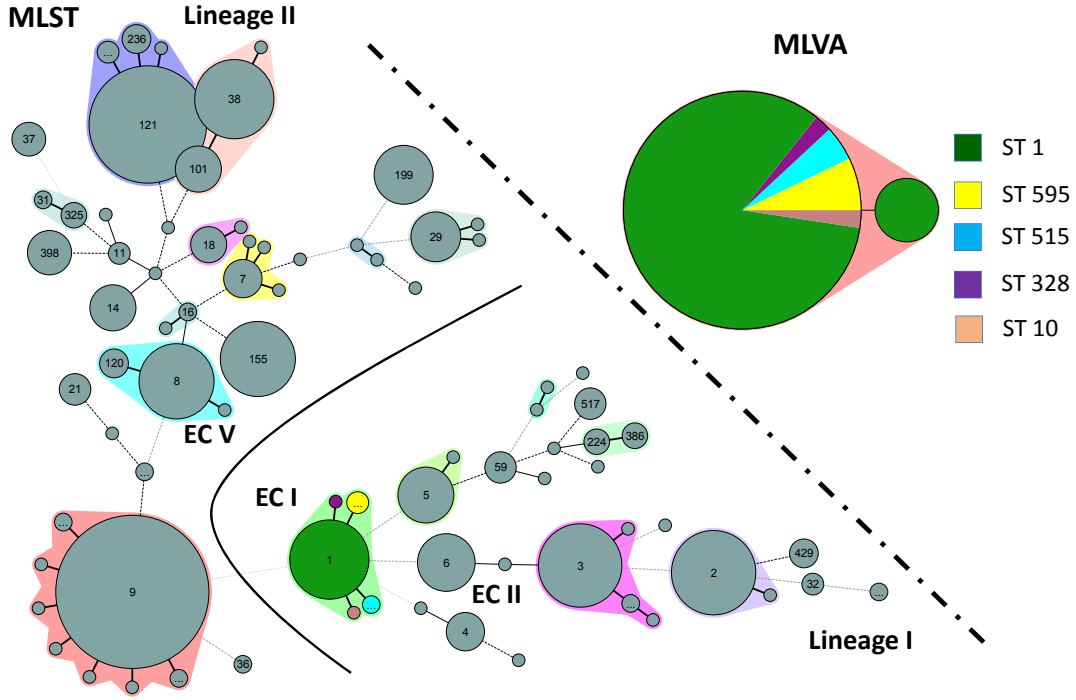
della puglia e della basilicata

MLVA > MLST



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della puglia e della basilicata

MLVA > MLST

MLVAbank for Microbes Genotyping

Home Users Databases

Public Databases

Listeria

Owned by aparisi

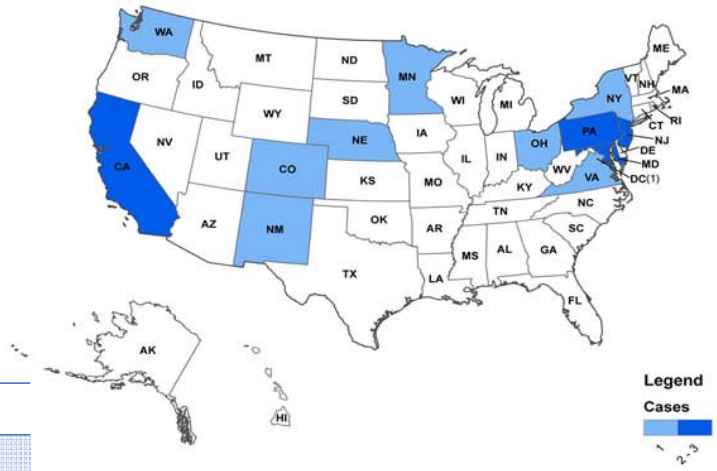
Query Views Panel selection

Columns (click to hide) : Key - MLST_ST - Serotype - data - origine - matrice - Nazione - Regione - Provincia - abcZ - bglA - cat - dapE - dat - ldh - lhkA

Strains per page 100 1 2 3 » Go to page 1

Key	MLST_ST	Serotype	data	origine	matrice	Nazione	Regione	Provincia	abcZ	bglA	cat	dapE	dat	ldh	lhkA	LMV1	LM3	LMV9	LM32	LMV6	LM15
336	224	1/2b	2005	ALIMENTI	Salsiccia stagionata	Italia	Basilicata		11	3	12	38	3	94	2	20	3	11	17	5	5
1231	3	1/2b	2010	ALIMENTI	salame	Italia	Lazio	Roma	4	4	4	3	2	1	5	20	8	10	17	5	8
1232	9	1/2c	2010	ALIMENTI	carne macinata	Italia	Lazio	Roma	6	5	6	4	1	4	1	24	7	7	13	4	3
1233	8	1/2a	2010	ALIMENTI	salmone	Italia	Lazio	Roma	5	6	2	9	5	3	1	21	6	7	13	4	3
1234	386	1/2b	2010	ALIMENTI	Latte da Sezione	Italia	Toscana	Arezzo	11	3	12	38	3	94	42	20	3	11	17	5	5
1235	155	3a	2010	ALIMENTI	muscolo bovino	Italia	Basilicata		7	10	16	7	5	2	1	20	2	7	13	3	3
1242	6	4b/4e	2010	ALIMENTI	Mozzarella	Italia	Puglia		3	9	9	3	3	1	5	16	2	10	17	8	4
1243	6	4b/4e	2010	ALIMENTI	Mozzarella	Italia	Puglia		3	9	9	3	3	1	5	16	2	10	17	8	4
1244	1	4b/4e	2010	ALIMENTI	Salsiccia piccante fresca	Italia	Puglia		3	1	1	1	3	1	3	19	2	10	18	4	4
1245	9	1/2c	2010	ALIMENTI	Salsiccia fresca di suino	Italia	Basilicata		6	5	6	4	1	4	1	23	7	7	13	5	3

Multistate Outbreak of Listeriosis



Dati CDC	
N. casi	22
Decessi	4
Stati	14

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della puglia e della basilicata

Multistate Outbreak of Listeriosis

Ministero della Salute

Conta

Ti trovi in: Home > Temi > Alimenti > Sicurezza alimentare > Archivio in evidenza >Dettaglio In evidenza

Sicurezza alimentare

A cura di:
Direzione generale per l'igiene e la sicurezza degli alimenti e la nutrizione

Listeriosi umana negli USA dovuta a consumo di ricotta italiana

Si comunica che a seguito dell'attività condotta dal Ministero della salute con la collaborazione dell'Istituto superiore di sanità e del Comando carabinieri per la tutela della salute-Nas, per determinare le cause di listeriosi umana verificatesi negli Stati Uniti, a seguito di consumo di ricotta della ditta "Fattorie Chiarappa"con stabilimento in Conversano (BA), il procuratore della repubblica di Bari ha disposto il sequestro su tutto il territorio nazionale dei seguenti prodotti:

- Ricotta frescolina marte tipo toscanella
- Ricotta Torretta Marte
- Ricotta frescolina Marte arrostita
- Ricotta marzotica Marte tipo greca
- Ricotta marzotica Marte.

Il sequestro, sempre su disposizione della procura, sarà effettuato dal Nas e dal Corpo forestale dello stato.
Il ritiro dal mercato dei prodotti indicati, si è reso necessario a scopo precauzionale in quanto, non sono state riscontrare le garanzie sanitarie richieste dalle disposizioni normative in materia di igiene della produzione.
Si ricorda al consumatore che la listeriosi fa parte del gruppo di malattie definibili come tossinfezioni alimentari, e prende il nome dall'agente patogeno che la causa, il batterio Listeria monocytogenes.
La listeriosi è particolarmente pericolosa per le persone immunodepresse, malati di cancro, diabete, Aids, le persone anziane, i neonati e le donne in gravidanza.

Data pubblicazione: 2 ottobre 2012

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Multistate Outbreak of Listeriosis

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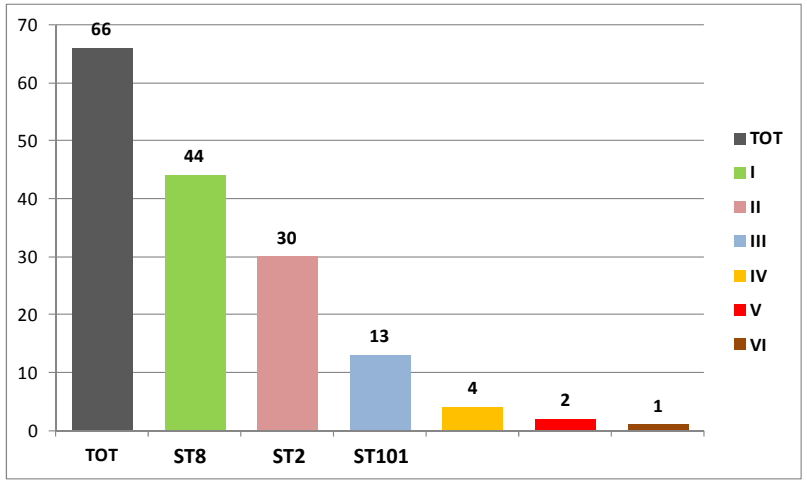
Multistate Outbreak of Listeriosis



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Multistate Outbreak of Listeriosis

TOTALE	392	270	74	33	10	4	1

Profili genetici isolati	Profilo MLVA	Prob. MLST	MLST
I	21 7 7 13 4 3	ST8	ST8
II	19 2 11 17 5 6	ST2	ST2
III	21 2 7 14 4 7	ST38	ST101
IV	19 2 7 14 4 5	ST121	ST121
V	20 4 10 15 4 5	ST5	ST5
VI	21 6 7 13 4 3	ST8	ST8

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Multistate Outbreak of Listeriosis

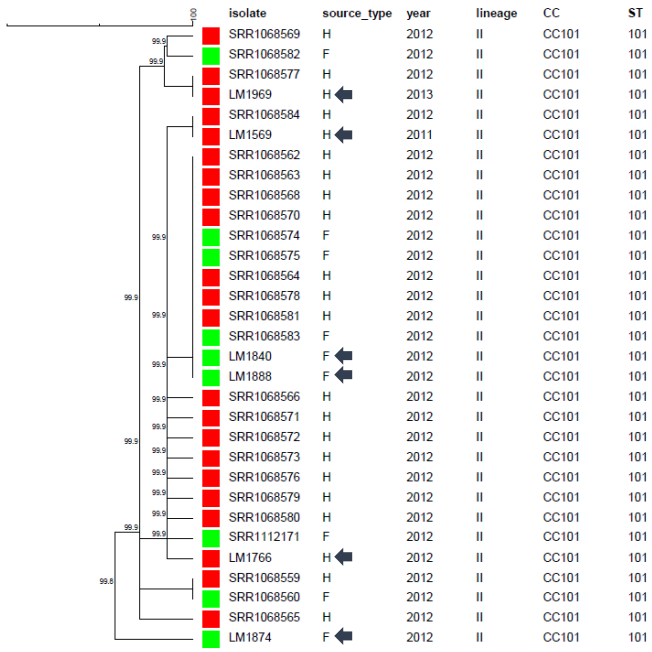
genomeA
Journals.ASM.org

Draft Genome Sequences of Six *Listeria monocytogenes* Strains Isolated from Dairy Products from a Processing Plant in Southern Italy

Matteo Chiara,[a] Anna Maria D'Erchia,[b] Caterina Manzari,[b] Alice Minotto,[a] Cosimo Montagna,[c] Nicoletta Addante,[c] Gianfranco Santagada,[d] Laura Latorre,[d] Graziano Pesole,[b,e] David S. Horner,[a] Antonio Parisi[c]

cgMLST: 1748 genes

cgMLST1748



isolate	source_type	year	lineage	CC	ST
SRR1068569	H	2012	II	CC101	101
SRR1068582	F	2012	II	CC101	101
SRR1068577	H	2012	II	CC101	101
LM1969	H	2013	II	CC101	101
SRR1068584	H	2012	II	CC101	101
LM1569	H	2011	II	CC101	101
SRR1068562	H	2012	II	CC101	101
SRR1068563	H	2012	II	CC101	101
SRR1068568	H	2012	II	CC101	101
SRR1068570	H	2012	II	CC101	101
SRR1068574	F	2012	II	CC101	101
SRR1068575	F	2012	II	CC101	101
SRR1068564	H	2012	II	CC101	101
SRR1068578	H	2012	II	CC101	101
SRR1068581	H	2012	II	CC101	101
SRR1068583	F	2012	II	CC101	101
LM1840	F	2012	II	CC101	101
LM1888	F	2012	II	CC101	101
SRR1068566	H	2012	II	CC101	101
SRR1068571	H	2012	II	CC101	101
SRR1068572	H	2012	II	CC101	101
SRR1068573	H	2012	II	CC101	101
SRR1068576	H	2012	II	CC101	101
SRR1068579	H	2012	II	CC101	101
SRR1068580	H	2012	II	CC101	101
SRR1112171	F	2012	II	CC101	101
LM1766	H	2012	II	CC101	101
SRR1068559	H	2012	II	CC101	101
SRR1068560	F	2012	II	CC101	101
SRR1068565	H	2012	II	CC101	101
LM1874	F	2012	II	CC101	101

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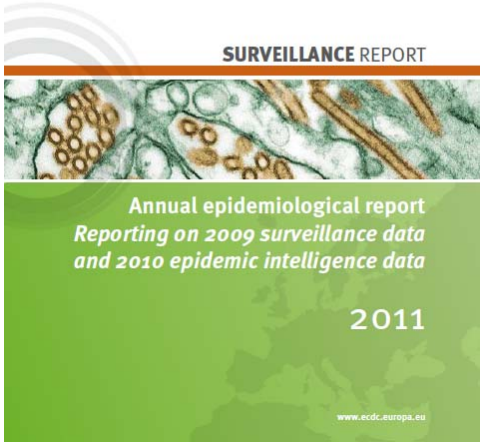
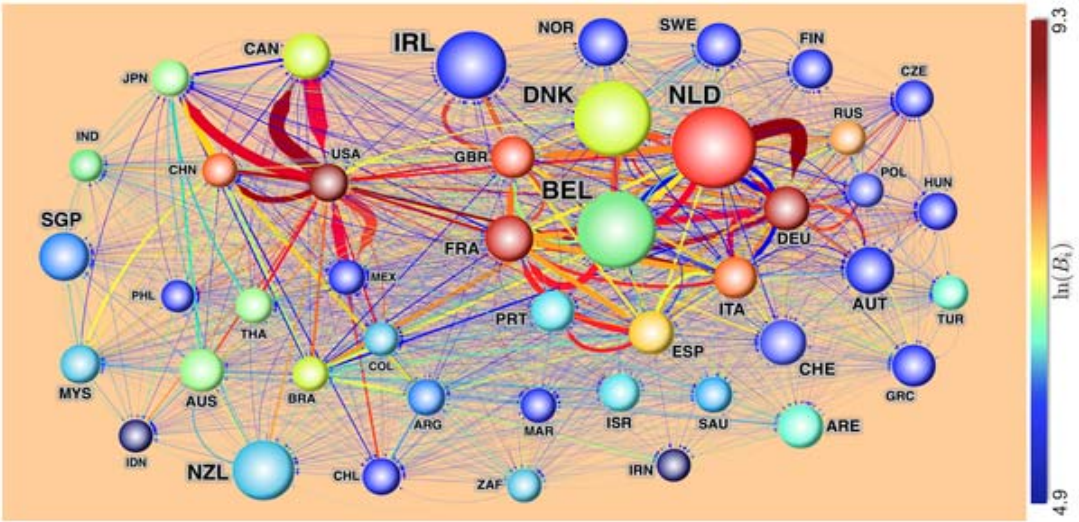
Conclusioni

Conclusioni



The ability to recognise, investigate and identify the likely source of an outbreak remains critically important for food and waterborne diseases.

The backbone of the IFTN based on the 2007 dataset.



Ercsey-Ravasz M, Toroczkai Z, Lakner Z, Baranyi J (2012) Complexity of the International Agro-Food Trade Network and Its Impact on Food Safety. PLoS ONE 7(5): e37810. doi:10.1371/journal.pone.0037810
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0037810

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Conclusioni

Globalisation of Food Trade

"The World on your Plate"

Chicken Kiev

Herb Butter:
- Salted butter - Ireland
- garlic puree - China, USA, Spain
- garlic salt - China, USA, Spain
- lemon - USA
- parsley - France, UK
- pepper - India
- water - Ireland

Chicken Breast: Chicken - Ireland, Belgium UK, Thailand etc.

Batter:
- Flour - Belgium, France
- Water - Ireland

Bread Crumb:
- Bread crumb - Ireland, UK
- Rape-seed oil - EU, Australia Eastern Europe

Alan Reilly, CEO, Food Safety Authority of Ireland

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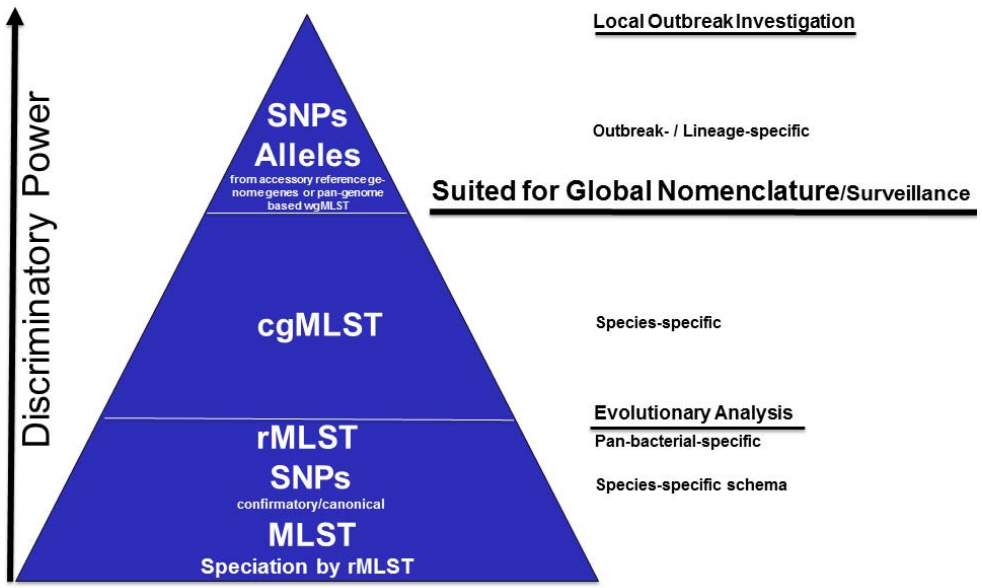
Conclusioni

Conclusioni



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Grazie per la cortese attenzione