




**IZSAM G.CAPORALE
TERAMO**

Approccio metagenomico per la diagnosi e caratterizzazione di patogeni

Teramo, 26 giugno 2020
Sala Convegni "V. Prencipe", CIFIV

Maurilia Marcacci





Approccio metagenomico per una diagnosi rapida ed accurata di alcune infezioni batteriche e virali

Area tematica: Sanità animale

Responsabile scientifico: Giovanni Savini

FAST D

Responsabile U.O.1: Giovanni Savini IZSAM

Responsabile U.O.2: Elisabetta Di Giannatale IZSAM

Responsabile U.O.3: Patrizia Colangeli IZSAM





NGS

THE GENOMICS REVOLUTION



Obiettivi del progetto FASTD

- **Caratterizzazione dei ceppi virali e batterici presenti nelle biobanche dell'IZSAM (CRN, LNR e Centri di referenza OIE)**
- **Metagenomica Shotgun sui campioni che arrivano quotidianamente in IZSAM**

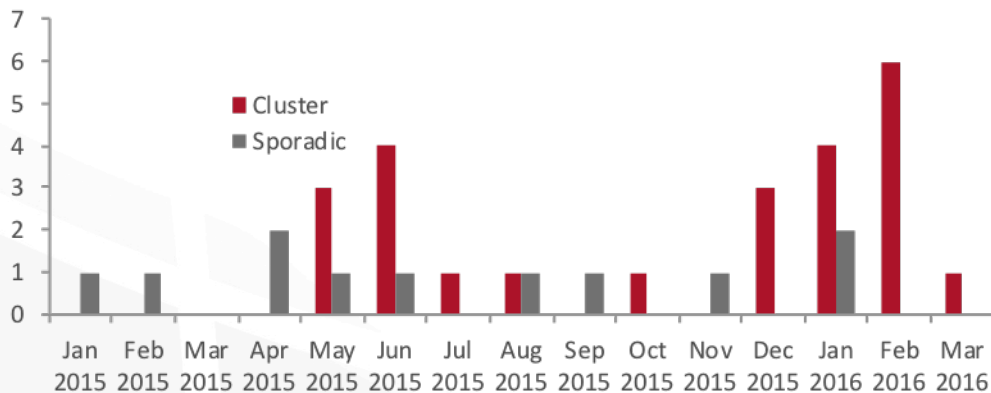


- Sierotipo/Sierograppo
- MLST
- Core genome (MLST plus)
- Antibiotico-resistenza
- Matrice SNPs

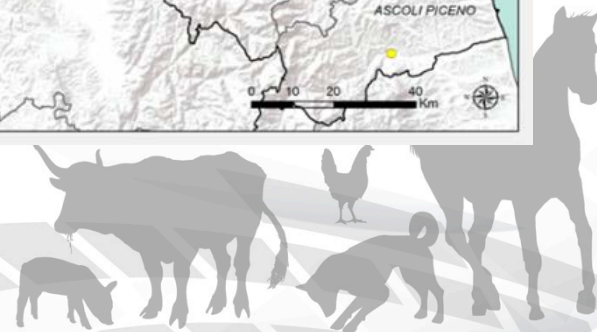
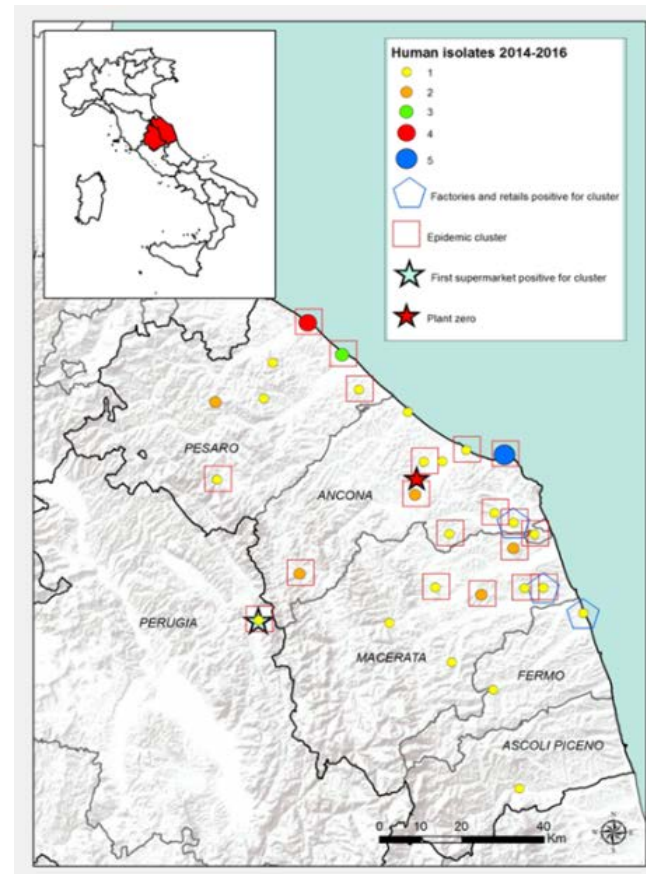


Focolaio Listeria Marche 2015-2016

ST7 e Nuovo pulsotipo in Italia:
24 casi umani fino a marzo 2016

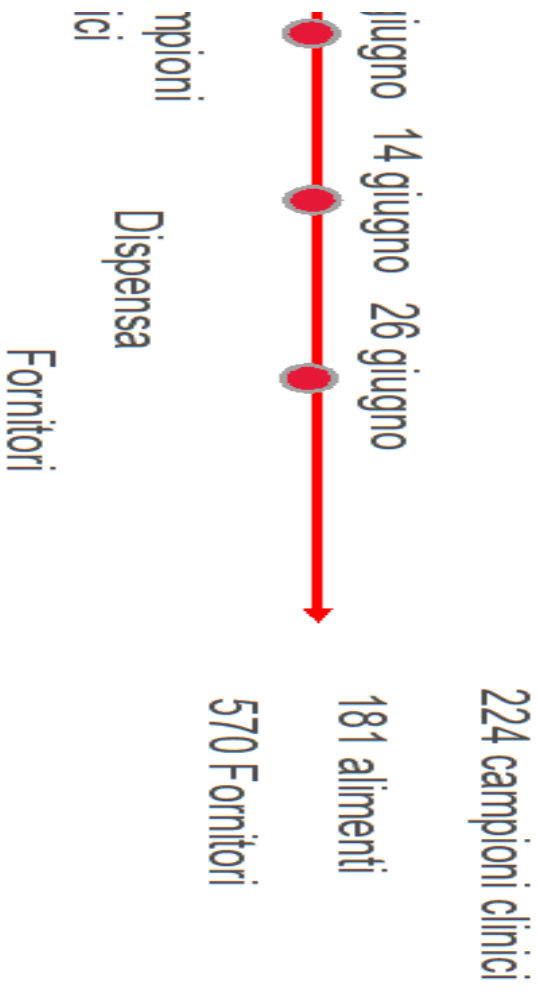


Curva epidemica



Focolaio Campilobacteriosi Abruzzo 2018

Indagini di laboratorio




*ser spp. negli alimenti, tamponi ambientali e nelle feci (ISO 10272-1:2017)
tramite Real Time PCR
/obacter spp. e caratterizzazione molecolare di C. jejuni*





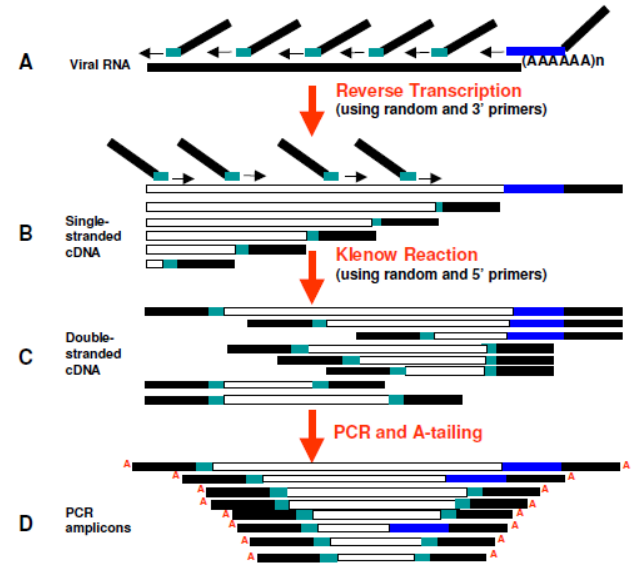
Obiettivi del progetto

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- **Caratterizzazione dei ceppi virali e batterici presenti nelle biobanche dell'IZSAM (CRN, LNR e Centri di referenza OIE)**
 - **Metagenomica Shotgun sui campioni che arrivano quotidianamente in IZSAM**



METAGENOMICA SHOTGUN

Sequenziamento diretto da campioni biologici





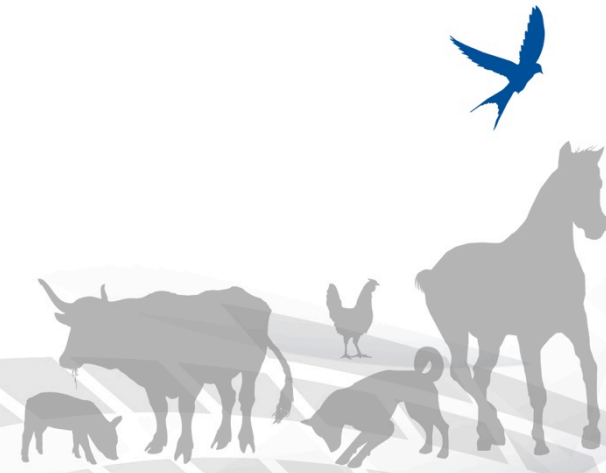
Vantaggi sequenziamento diretto

Virus discovery

Riduzione tempi e costi

Virus non coltivabili


Nuovi Sierotipi




Received: 27 November 2017

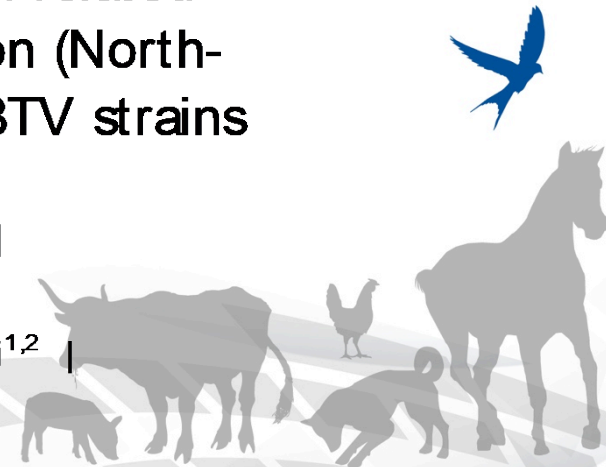
DOI: 10.1111/tbed.12822

RAPID COMMUNICATION

WILEY  Transboundary and Emerging Diseases

One after the other: A novel Bluetongue virus strain related to Toggenburg virus detected in the Piedmont region (North-western Italy), extends the panel of novel atypical BTV strains

Maurilia Marcacci^{1,2} | Serena Sant³ | Iolanda Mangone^{1,2} | Maria Goria³ |
Alessandro Dondo³ | Simona Zoppi³ | René G. P. van Gennip⁴ | Maria
Cristina Radaelli³ | Cesare Cammà^{1,2} | Piet A. van Rijn^{4,5} | Giovanni Savini^{1,2} |
Alessio Lorusso^{1,2} 



A novel Bluetongue virus serotype 3 strain in Tunisia, November 2016

S. Sghaier^{1†} | A. Lorusso^{2†}  | O. Portanti² | M. Marcacci² | M. Orsini² | M. E. Barbria³ | A. S. Mahmoud²⁻⁴ | S. Hammami⁵ | A. Petrini² | G. Savini²

59 (2018) 63–71



ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Infection, Genetics and Evolution

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



Research paper

Analysis of bluetongue serotype 3 spread in Tunisia and discovery of a novel strain related to the bluetongue virus isolated from a commercial sheep pox vaccine



Alessio Lorusso^{a,b,*,1}, Soufien Sghaier^{c,1}, Marco Di Domenico^{a,b}, Mohamed Elias Barbria^d, Guendalina Zaccaria^{a,b}, Aida Megdich^c, Ottavio Portanti^{a,b}, Imed Ben Seliman^e, Massimo Spedicato^{a,b}, Federica Pizzurro^{a,b}, Irene Carmine^{a,b}, Liana Teodori^{a,b}, Mejdi Mahjoub^f, Iolanda Mangone^{a,b}, Alessandra Leone^{a,b}, Salah Hammami^g, Maurilia Marcacci^{a,b}, Giovanni Savini^{a,b}



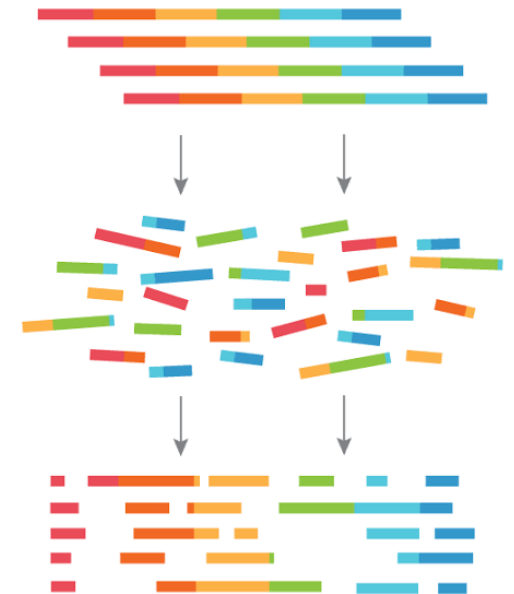


Single Molecule Real Time (SMRT) Sequencing



MinION Oxford Nanopore

READS LUNGHE



ATGTTCCGATTAGGAAACCTATCTGTAACGTGTTTCATTAGTAAAGGAGGAAA

Lab in a suitcase, and other adventures with Nanopore sequencing



Josh Quick

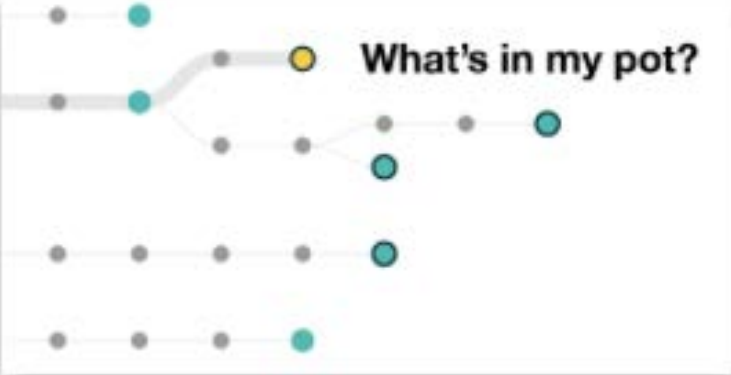

European Mobile Laboratory Project and the University of Birmingham

19th June 2015

Josh Quick, Abubakar Soumah, Miles Carroll showing the first Ebola sequencing run in Guinea, taken at Donka Hospital, Conakry.



Analisi in tempo reale



What's in my pot?

FASTQ WIMP 3.0.0

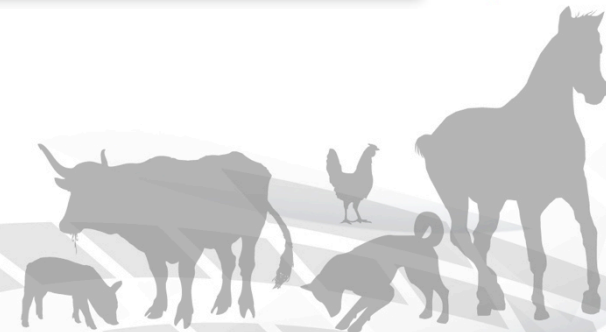
CLASSIFICATION BARCODING
METAGENOMICS FASTQ



**ANTIMICROBIAL
RESISTANCE**

**FASTQ ANTIMICROBIAL
RESISTANCE** 3.0.0

ALIGNMENT CLASSIFICATION BARCODING
AMR FASTQ



Article

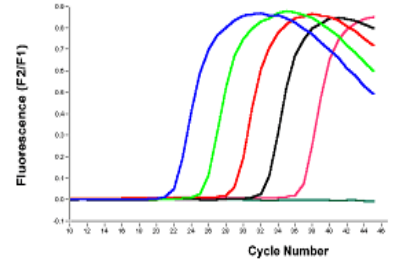
Detection of Astrovirus in a Cow with Neurological Signs by Nanopore Technology, Italy

Guendalina Zaccaria ¹, Alessio Lorusso ^{1,*}, Melanie M. Hierweger ^{2,3}, Daniela Malatesta ¹, Sabrina VP Defourny ¹, Franco Ruggeri ⁴, Cesare Cammà ¹, Pasquale Ricci ⁴, Marco Di Domenico ¹, Antonio Rinaldi ¹, Nicola Decaro ⁵, Nicola D'Alterio ¹, Antonio Petrini ¹, Torsten Seuberlich ³ and Maurilia Marcacci ^{1,5}

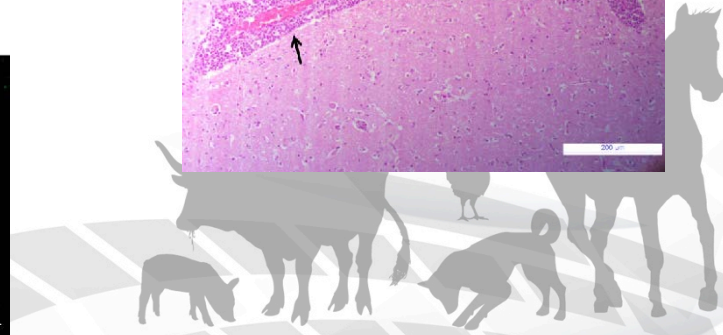
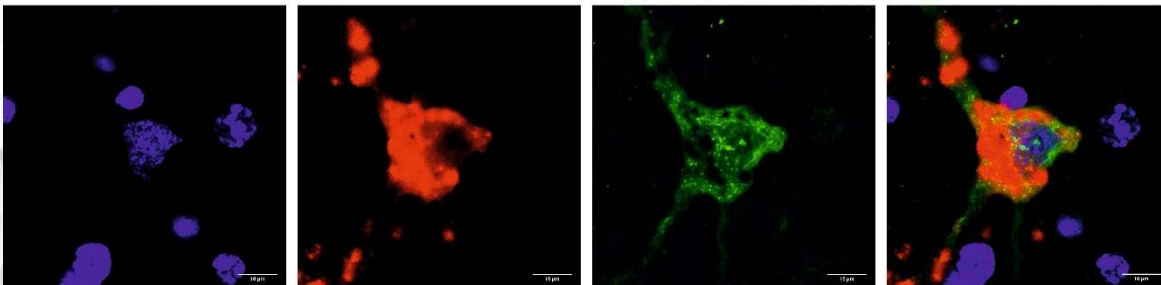
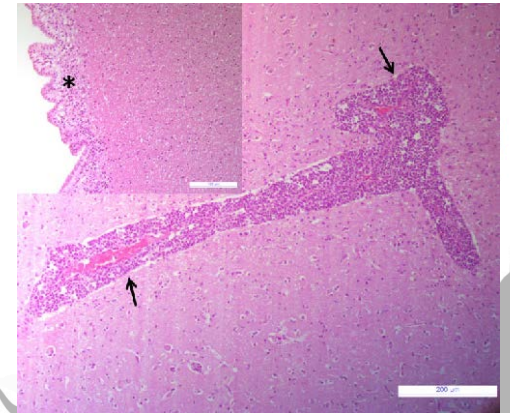
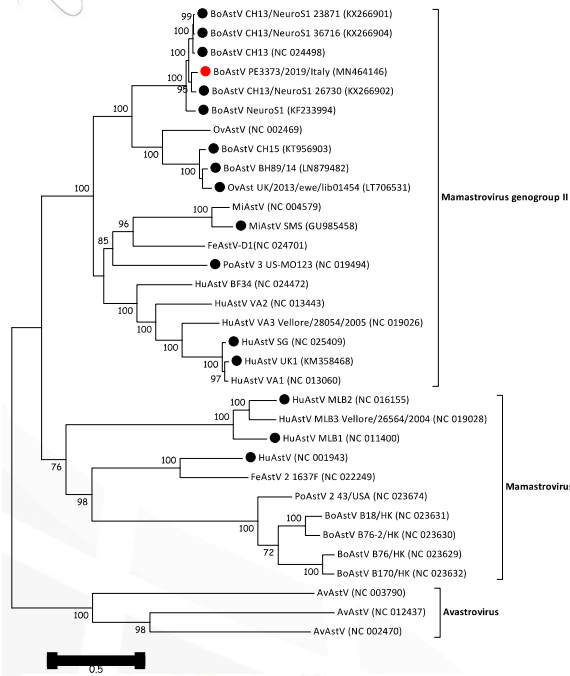




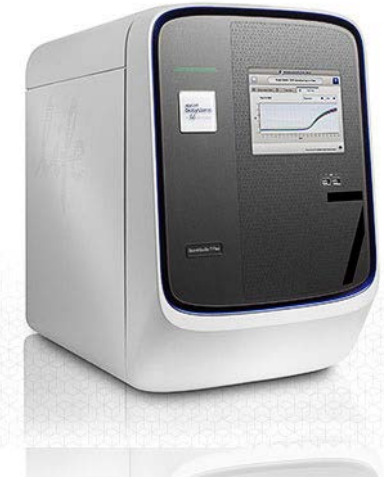
DNA and RNA



Complete genome of Bovine Astrovirus



SARS-CoV-2



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Search

Accession ID: Virus name: complete high coverage
Location: Europe / Italy / Abruzzo Host: low coverage excl w/Patient status
Collection date: To Submission date: To

<input type="checkbox"/>	Virus name	Passage of	Accession ID	Collection da	Submission t	Length	Host	Location	Originating lab
<input type="checkbox"/>	hCoV-19/Italy/TE26425/2020	Original	EPI_ISL_436732	2020-04-27	2020-05-07	29,874	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE26423/2020	Original	EPI_ISL_436731	2020-04-26	2020-05-07	29,871	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE20969/2020	Original	EPI_ISL_436730	2020-04-27	2020-05-07	29,862	Human	Europe / Italy / A	Servizio di igien
<input type="checkbox"/>	hCoV-19/Italy/TE26643/2020	Original	EPI_ISL_436729	2020-04-27	2020-05-07	29,873	Human	Europe / Italy / A	SERVIZIO DI IC
<input type="checkbox"/>	hCoV-19/Italy/TE26540/2020	Original	EPI_ISL_436728	2020-04-27	2020-05-07	29,856	Human	Europe / Italy / A	SERVIZIO DI IC
<input type="checkbox"/>	hCoV-19/Italy/TE26539/2020	Original	EPI_ISL_436727	2020-04-27	2020-05-07	29,872	Human	Europe / Italy / A	SERVIZIO DI IC
<input type="checkbox"/>	hCoV-19/Italy/TE26533/2020	Original	EPI_ISL_436726	2020-04-27	2020-05-07	29,868	Human	Europe / Italy / A	SERVIZIO DI IC
<input type="checkbox"/>	hCoV-19/Italy/TE27020/2020	Original	EPI_ISL_436725	2020-04-27	2020-05-07	29,873	Human	Europe / Italy / A	RSAR/P Villa S.
<input type="checkbox"/>	hCoV-19/Italy/TE5827/2020	Original	EPI_ISL_436724	2020-03-21	2020-05-07	29,902	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE5887/2020	Original	EPI_ISL_436723	2020-03-20	2020-05-07	29,901	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE547/2020	Original	EPI_ISL_436722	2020-03-20	2020-05-07	29,903	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE5545/2020	Original	EPI_ISL_436721	2020-03-20	2020-05-07	29,902	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE5543/2020	Original	EPI_ISL_436720	2020-03-20	2020-05-07	29,903	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE5541/2020	Original	EPI_ISL_436719	2020-03-20	2020-05-07	29,901	Human	Europe / Italy / A	Ospedale Civile
<input type="checkbox"/>	hCoV-19/Italy/TE5473/2020	Original	EPI_ISL_436718	2020-03-19	2020-05-07	29,901	Human	Europe / Italy / A	Ospedale Regi
<input type="checkbox"/>	hCoV-19/Italy/TE1168/2020	Original	EPI_ISL_435155	2020-04-09	2020-05-03	29,868	Human	Europe / Italy / A	SERVIZIO DI IC

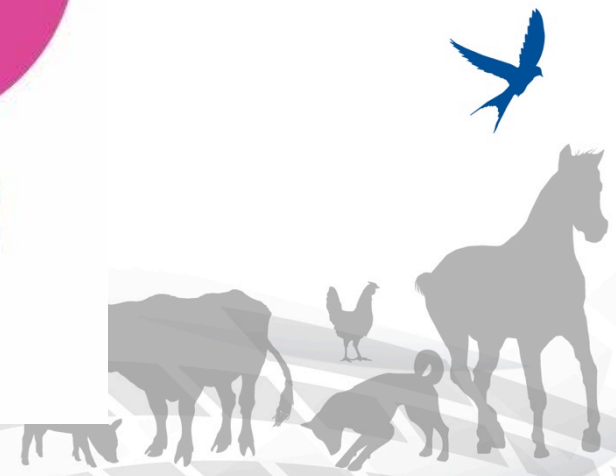
Total: 52 viruses


<< first < prev 1 2 next > last >>

Important note: In the GISAID EpiFlu™ Database Access Agreement, you have accepted certain terms and conditions for viewing and using data regarding influenza viruses. To the extent the Database contains data relating to non-influenza viruses, the viewing and use of these data is subject to the same terms and conditions, and by viewing or using such data you agree to be bound by the terms of the GISAID EpiFlu™ Database Access Agreement in respect of such data in the same manner as if they were data relating to influenza viruses.



Workflow diagnostico comune in Sanità



- 
- **Virologia e colture cellulari**
 - **Diagnostica e sorveglianza malattie esotiche**
 - **Batteriologia e igiene delle produzioni lattiero-casearie**
 - **Igiene e Tecnologie degli Alimenti**
 - **Biologia molecolare e tecnologie omiche**
 - **Bioinformatica**
 - **Diagnostica specialistica**

