



WRLFMD Quarterly Report July to September 2018

Foot-and-Mouth Disease



Department
for Environment
Food & Rural Affairs





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1. Summary of samples tested and reported FMD outbreaks

1.1. Asia

China, People's Republic of

Between June and September 2018, 10 **FMD type O** outbreaks (clustered in seven apparently unconnected foci) were reported: Yunnan (pigs), Guangxi (pigs), Guangdong (pigs), Inner Mongolia (cattle), Henan (sheep), Xinjiang (cattle) and Gansu (cattle). No genotyping results have been reported. On 25/08/2018, five **FMD type O** VP1 sequence were received from the LVRI. They were from samples collected in various provinces during 2018: i) Yinchuan, Ningxia (cattle; 10/01/2018); ii) Cenxi, Guangxi (pigs; 11/04/2018); iii) Hami, Xinjiang (cattle; 12/04/2018); iv) Xinzhou, Shanxi (cattle; 27/05/2018); and v) Zunyi, Guizhou (cattle; 05/06/2018). Genotyping revealed the following: i) SEA/Mya-98; ii) CATHAY; iii & iv) ME-SA/PanAsia; and v) ME-SA/Ind-2001e (see below).

Hong Kong Special Administrative Region

On 14/09/2018, a batch of eight samples was received by the WRLFMD. Virus serotyping was complicated by the inability of a range of antigen-detection ELISAs (based on polyclonal antisera, monoclonal antibodies or recombinant integrin) to detect FMD virus in some of these samples. Genotyping of the viruses isolated on cell cultures revealed eight of the virus isolates belonged to the **FMDV O** CATHAY topology.

Israel

Between April and July 2018, five outbreaks of **FMD type O** were reported in Hazafon and Haifa. Three were in cattle, one in a sheep and one in an Indian hog deer (*Hyelaphus porcinus*). A further outbreak occurred in September in cattle in Hazafon. No genotyping results have been reported.

Malaysia

On 06/08/2018, a batch of 12 samples (sampled between September 2016 and May 2018) were received, 10 were from cattle, one from a water buffalo and one from a Gaur (Indian bison; *Bos gaurus*). Eleven samples were identified as **FMD type O** and

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one (from cattle) was NVD. Genotyping revealed a single case of SEA toposotype, Mya-98 lineage and 10 cases of ME-SA toposotype, Ind-2001 lineage, e sublineage. **This is the first report of the O/ME-SA/Ind-2001 lineage in Malaysia.**

Mongolia

On 20/08/2018, a batch of 21 samples were received to WRLFMD. They had been collected between January and April 2018 from cattle (n=13), sheep (n=4), gazelle (unspecified species; n=2) and a Bactrian camel (n=2; one sample was a cell culture passaged virus isolate). Diagnostic tests revealed the presence of **FMD type O** viruses in 14 samples while FMDV genome was detected in a further four samples and three were NVD (including the two samples from gazelle). Genotyping showed that 10 virus isolates belonged to the ME-SA/Ind-2001e lineage (including the virus from a camel), three belonged to the ME-SA/PanAsia lineage and one to the SEA/Mya-98 lineage.

Myanmar

Outbreaks of **FMD type O** were reported to have occurred in May 2018 in Rakhine State in cattle. They fell into two geographic clusters of 8 and 20 outbreaks. No genotyping results have been reported.

1.2. Africa

Algeria

Between 20/06/2018 and 27/08/2018, 40 outbreaks of **FMD type O** were reported in cattle in various northern provinces. Two samples were received by the WRLFMD on the 03/07/2018. Both were shown to belong to the EA-3 toposotype and to be most closely related to viruses from West Africa (Guinea - see below).

Botswana

Between 25/06/2018 and 03/08/2018, 17 outbreaks of **FMD type SAT 2** were reported in cattle in Ngamiland. No further genotyping has been reported.

Chad

A single **FMD type SAT 2** VP1 sequence was submitted by ANSES on 13/08/2018. It was from a sample that was collected from cattle at Koundjourou on 18/12/2016. Genotyping showed it belonged to toposotype VII, Lib-12 lineage (see below).

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Gambia

Three outbreaks of suspected **FMD (untyped)** were reported in July 2018 from cattle in the Niani district.

Guinea

Between May and August 2018, 42 outbreaks of **FMD type O** were reported in cattle, sheep and goats from all over the country. Four samples submitted to ANSES were VP1 sequenced and shown to belong to the EA-3 toposotype and to be very closely related to the recent outbreaks in Algeria (see below).

Guinea-Bissau

Between the 2nd and 5th August 2018, four outbreaks of **FMD type O** were reported in cattle in the Oio region. No genotyping results have been reported.

Kenya

A batch of 21 samples were received on 29/08/2018. They were collected between January 2017 and June 2018 from cattle in various locations. Diagnostic assays revealed the presence of **FMD type O** (n=3), **FMD type A** (n=3), **FMD type SAT 1** (n=1) and **FMD type SAT 2** (n=1). FMDV genome was detected in a further 11 samples, while two were NVD. Genotyping showed the type O viruses to belong to the three distinct clusters within the EA-2 toposotype; the type A viruses belonged to the AFRICA toposotype, G-I lineage; the SAT 1 virus belonged to toposotype I; and the SAT 2 belonged to toposotype IV.

Malawi

Between June August 2018, nine outbreaks of **FMD type SAT 2** were reported in cattle at two locations within the Central region (Dedza and Lilongwe). No genotyping results have been reported.

Mauritania

Three **FMD type A** sequences were received from ANSES on 13/08/2018. They were from samples collected from cattle at Gorgol, M'Bout, Wouro Demba Ndikiry on 28/01/2017. Genotyping revealed that they belonged to the AFRICA toposotype, G-VI lineage (see below).

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Mozambique

Between December 2017 and August 2018, 28 outbreaks of suspected **FMD (untyped)** were reported in Tete province (in the north-west of the country) which borders central Malawi where FMD type SAT 2 has recently occurred. No genotyping results have been reported.

Sierra Leone

In August 2018, two outbreaks of suspected **FMD (untyped)** have been reported in cattle in Kambia district (Northern Province) and Kono district (Eastern Province). No genotyping results have been reported.

South Africa

In August 2017, two outbreaks of **FMD type SAT 2** were reported in cattle at Greater Giyani, Limpopo. No genotyping results have been reported.

South Sudan

On 29/08/2018, a batch of 29 samples was received. They were collected from cattle between April and June 2017. Diagnostic assays failed to isolate any FMD viruses, however, FMDV genome was detected in seven samples. Twenty-two samples were NVD. Using a new lineage-specific real-time RT-PCR developed by WRLFMD and NAHDIC (Ethiopia) it was shown that the genome-positive samples probably contained **FMDV O/EA-3** genome; however, it was not possible to obtain any sequencing data to confirm this.

Sudan

On 20/07/2018, a batch of 39 samples were received. They were collected from cattle between December 2014 and March 2018. Diagnostic assays identified **FMD type O** in seven samples, **FMD type A** in 13 samples and **FMD type SAT 2** in five samples. A further six samples contained FMDV genome and eight were NVD. Genotyping showed that the type O viruses belonged to the EA-3 topotype; the type A virus belonged to the AFRICA topotype, G-IV lineage; and the type SAT 2 viruses to topotype VII, Alx-12 lineage.

Zimbabwe

Outbreaks (n=10) of **FMD type SAT 1** have continued to occur during July to September in the Midlands and Masvingo provinces where over 100 outbreaks have

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previously been reported. No genotyping results have been reported. During July and August, outbreaks (n=7) of suspected **FMD (untyped)** in cattle have been reported in Mashonaland East and Mashonaland West, while between June and September, 52 outbreaks of **FMD type SAT 2** have been reported in Mashonaland Central and Mashonaland East. It is not clear if these two are due to the same serotype or if they are linked. No genotyping results have been reported. A single VP1 sequence was received from the SSARRL (BVI) on 16/08/2018. It came from a sample collected from cattle at Gwanda, Matabeleland South on 11/05/2018. Genotyping revealed it belonged to topotype II (see below).

1.3. South America

Colombia

A single outbreak due to **FMD type O** was reported to have occurred in cattle at El Cerrito, Segunda Chorrera, Sogamoso, Boyacá on 17/09/2018. No genotyping results have been reported.

1.4. Uncharacterised FMD viruses

A number of outbreaks have occurred where samples have not been sent to the WRLFMD. It is probable that the countries involved have performed their own genetic characterisation; however, through the OIE/FAO Laboratory Network we would also like to encourage the submission of samples (or complete VP1 sequences) to the WRLFMD.

An up-to-date list and reports of FMD viruses characterised by sequencing can be found at the following website: http://www.wrlfmd.org/fmd_genotyping/2018.htm.

Results from samples or sequences received at WRLFMD (status of samples being tested) are shown in Table 1 and a complete list of clinical sample diagnostics made by the WRLFMD from July to September 2018 is shown in Annex 1 (Summary of Submissions). A record of all samples received by WRLFMD is shown in Annex 1 (

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Clinical Samples).

Table 1: Status of sequencing of samples or sequences received by the WRLFMD from July to September 2018 (* indicates a batch carried over from the previous quarter).

WRLFMD Batch No.	Date received	Country	Serotype	No. of samples	No. of sequences	Sequencing status
WRLFMD/2018/00019	03/07/2018	Algeria	O	2	2	completed
WRLFMD/2018/00020	20/07/2018	Sudan	O	7	7	completed
WRLFMD/2018/00020	20/07/2018	Sudan	A	13	13	completed
WRLFMD/2018/00020	20/07/2018	Sudan	SAT 2	5	5	completed
WRLFMD/2018/00021	06/08/2018	Malaysia	O	11	11	completed
WRLFMD/2018/00022	20/08/2018	Mongolia	O	14	14	completed
WRLFMD/2018/00023	29/08/2018	Kenya	O	3	3	completed
WRLFMD/2018/00023	29/08/2018	Kenya	A	3	3	completed
WRLFMD/2018/00023	29/08/2018	Kenya	SAT 1	1	1	completed
WRLFMD/2018/00023	29/08/2018	Kenya	SAT 2	1	1	completed
WRLFMD/2018/00025	14/09/2018	Hong Kong	O	7	7	completed
Total				67	67	

Table 2: VP1 sequences submitted by other FMD Network laboratories to the WRLFMD from July to September 2018.

WRLFMD Batch No.	Date received	Country	Serotype	No. of sequences	Submitting laboratory
WRLMEG/2018/00031	13/08/2018	Chad	SAT 2	1	ANSES
WRLMEG/2018/00032	13/08/2018	Mauritania	A	3	ANSES
WRLMEG/2018/00033	16/08/2018	Zimbabwe	SAT 2	1	SSARRL (BVI)
WRLMEG/2018/00034	25/08/2018	China	O	5	LVRI
WRLMEG/2018/00035	08/09/2018	Guinea	O	4	ANSES
Total				14	

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2. Detailed Analysis

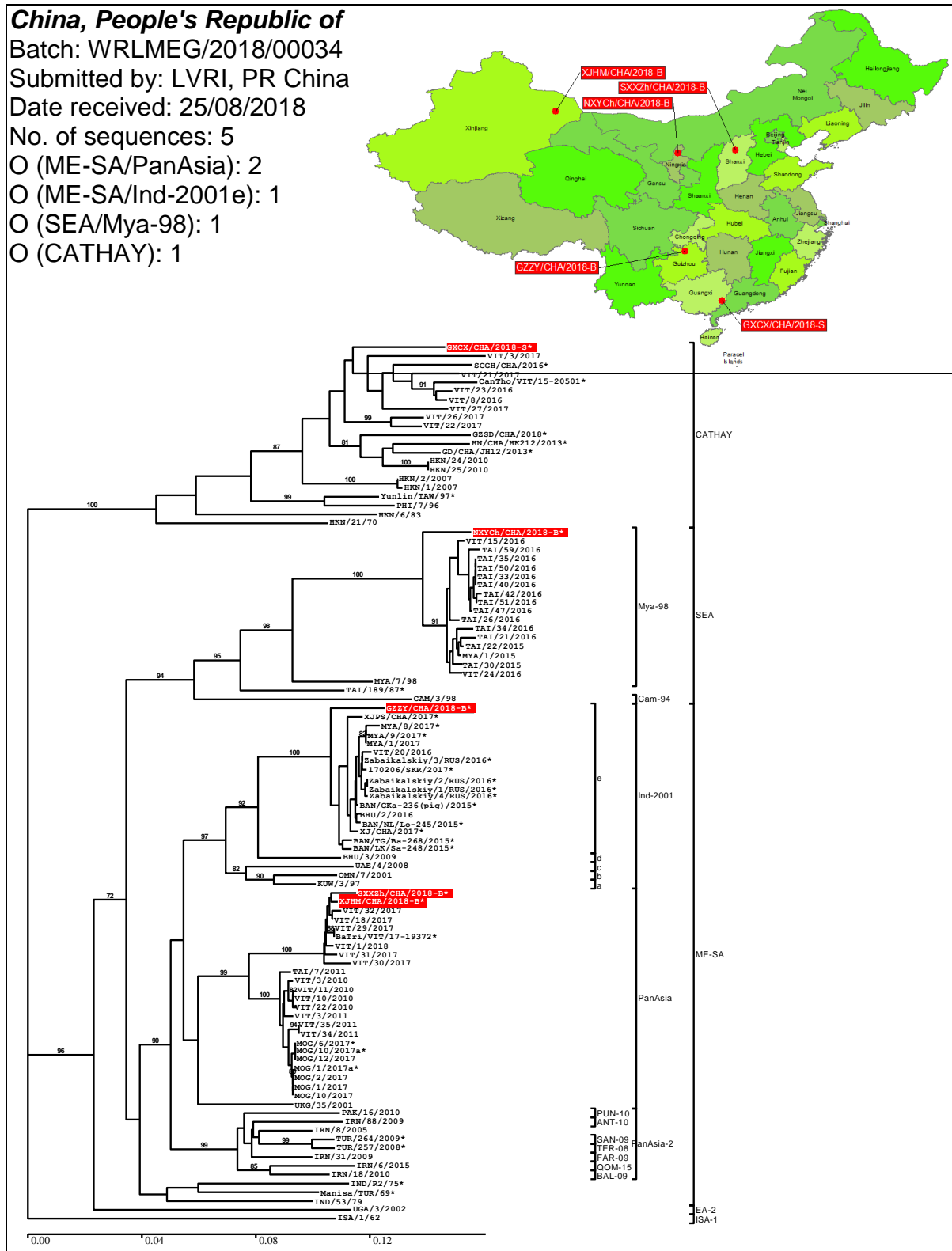
Key for maps and trees:

Serotype O
Serotype A
Serotype C
Serotype Asia-1
Serotype SAT 1
Serotype SAT 2
Serotype SAT 3
FMDV Genome Detected
No Virus Detected

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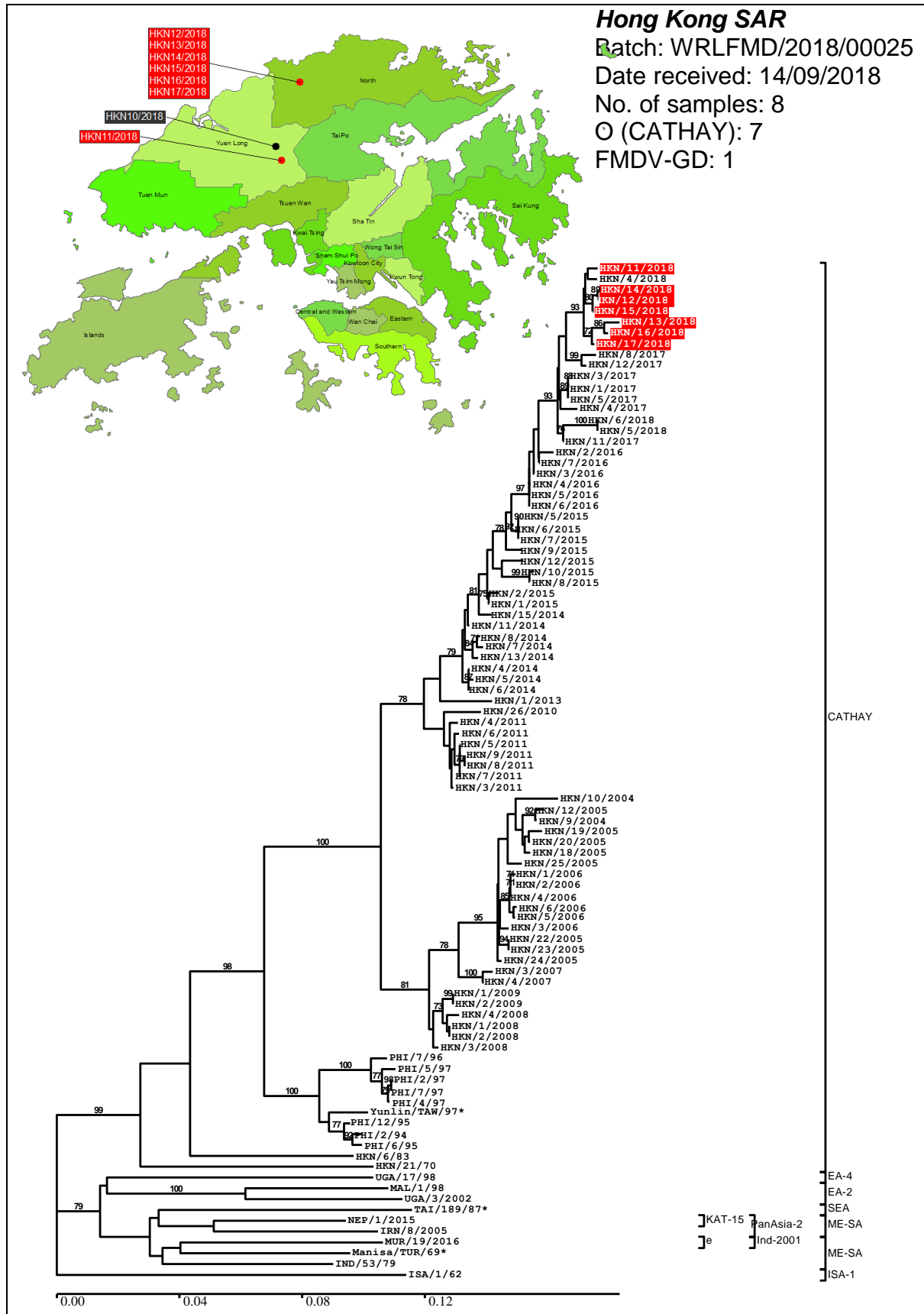
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2.1. ASIA

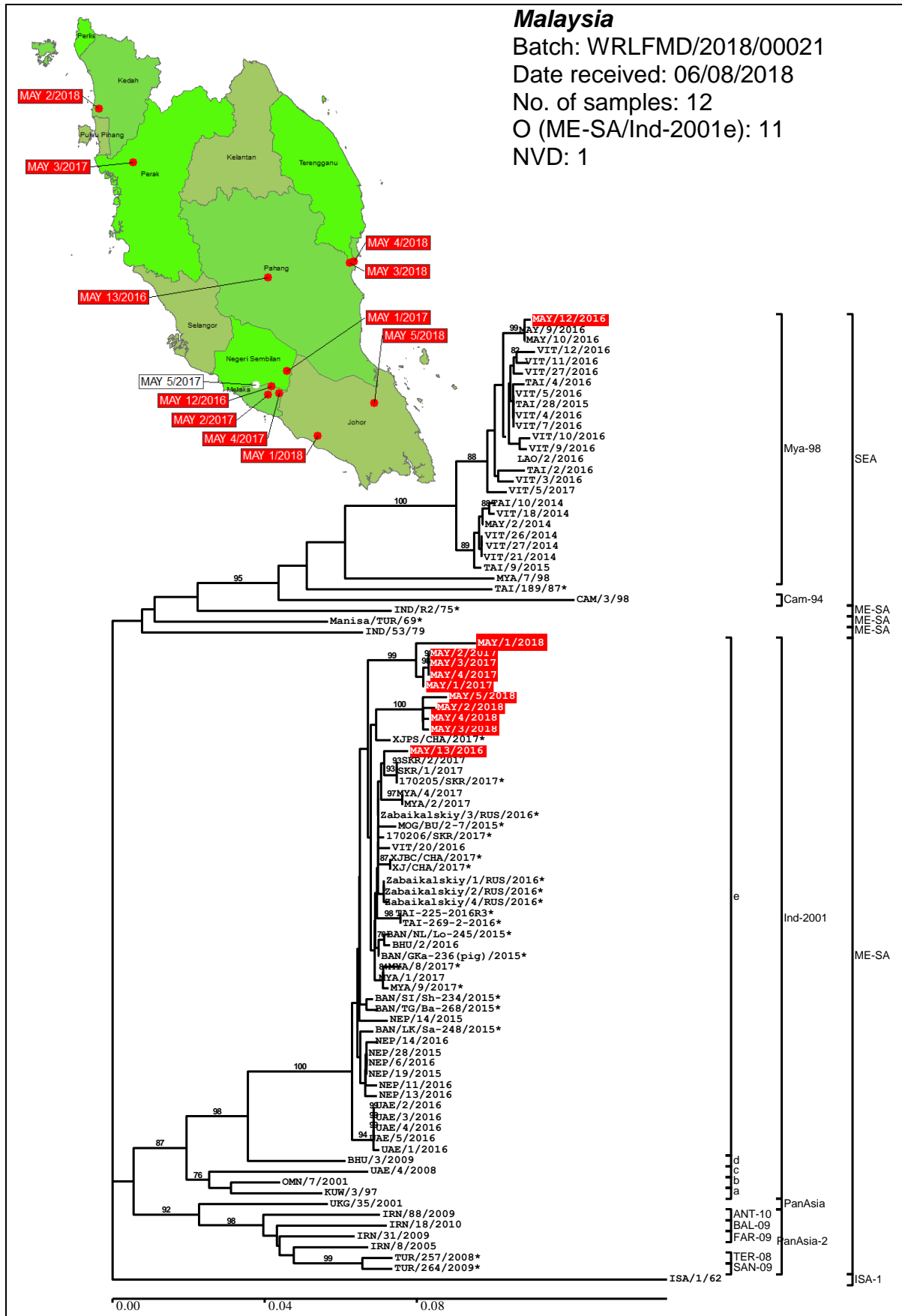


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Mongolia

Batch:
WRLFMD/2018/00022

Date received:
20/08/2018

No. of samples: 21

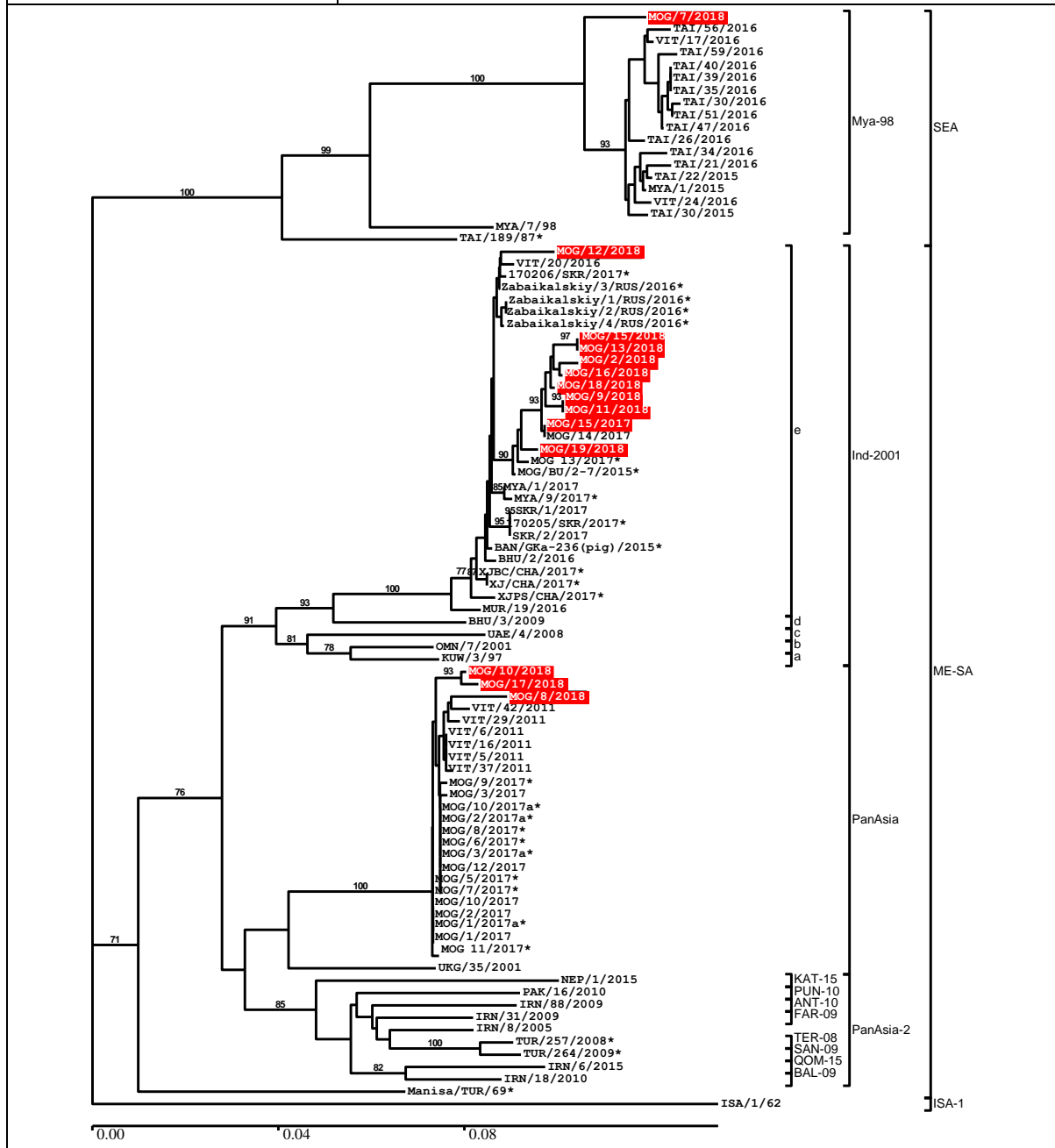
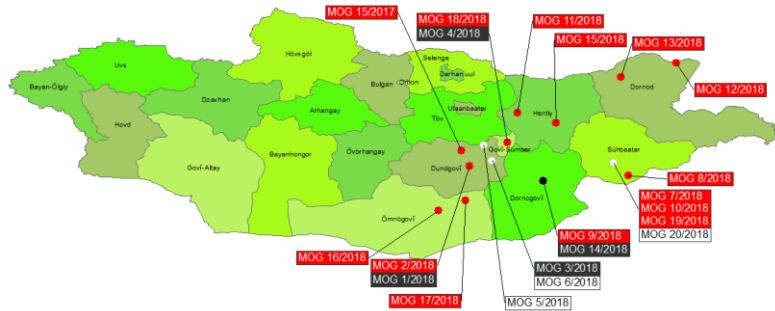
O (SEA/Mya-98): 1

O (ME-SA/Ind-2001): 3

O (ME-SA/PanAsia): 10

FMDV-GD: 4

NVD: 3

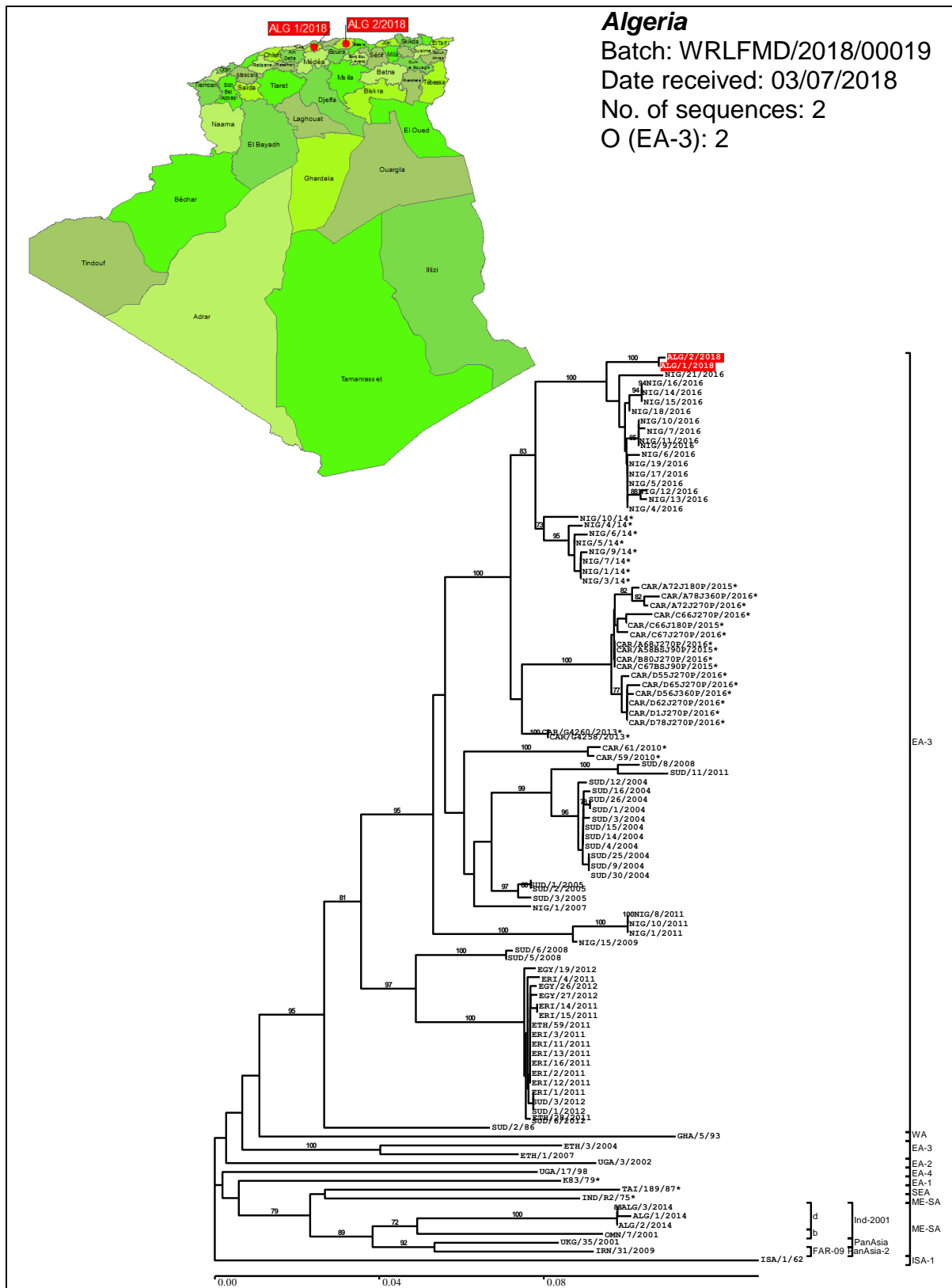


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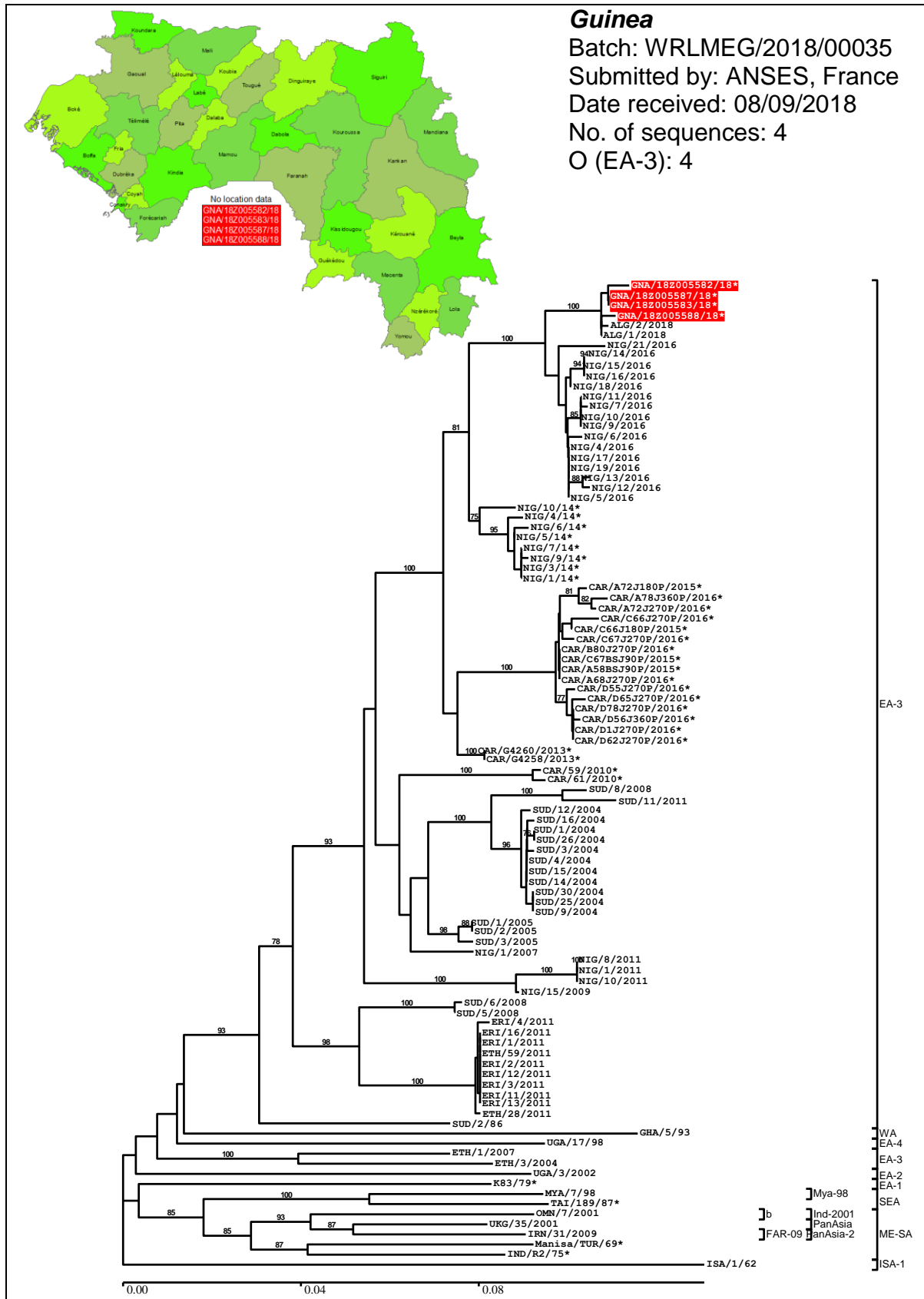


2.2. AFRICA



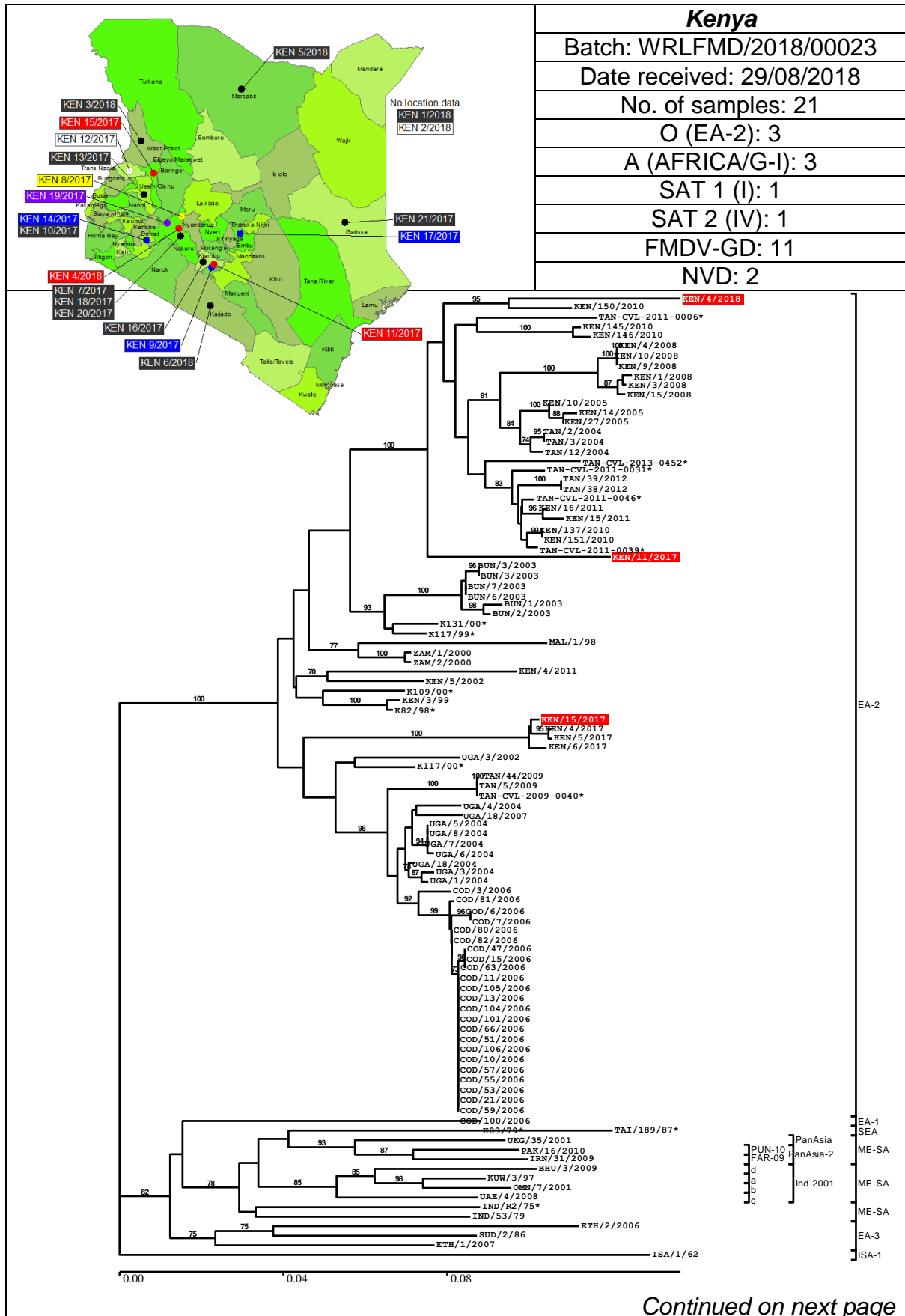
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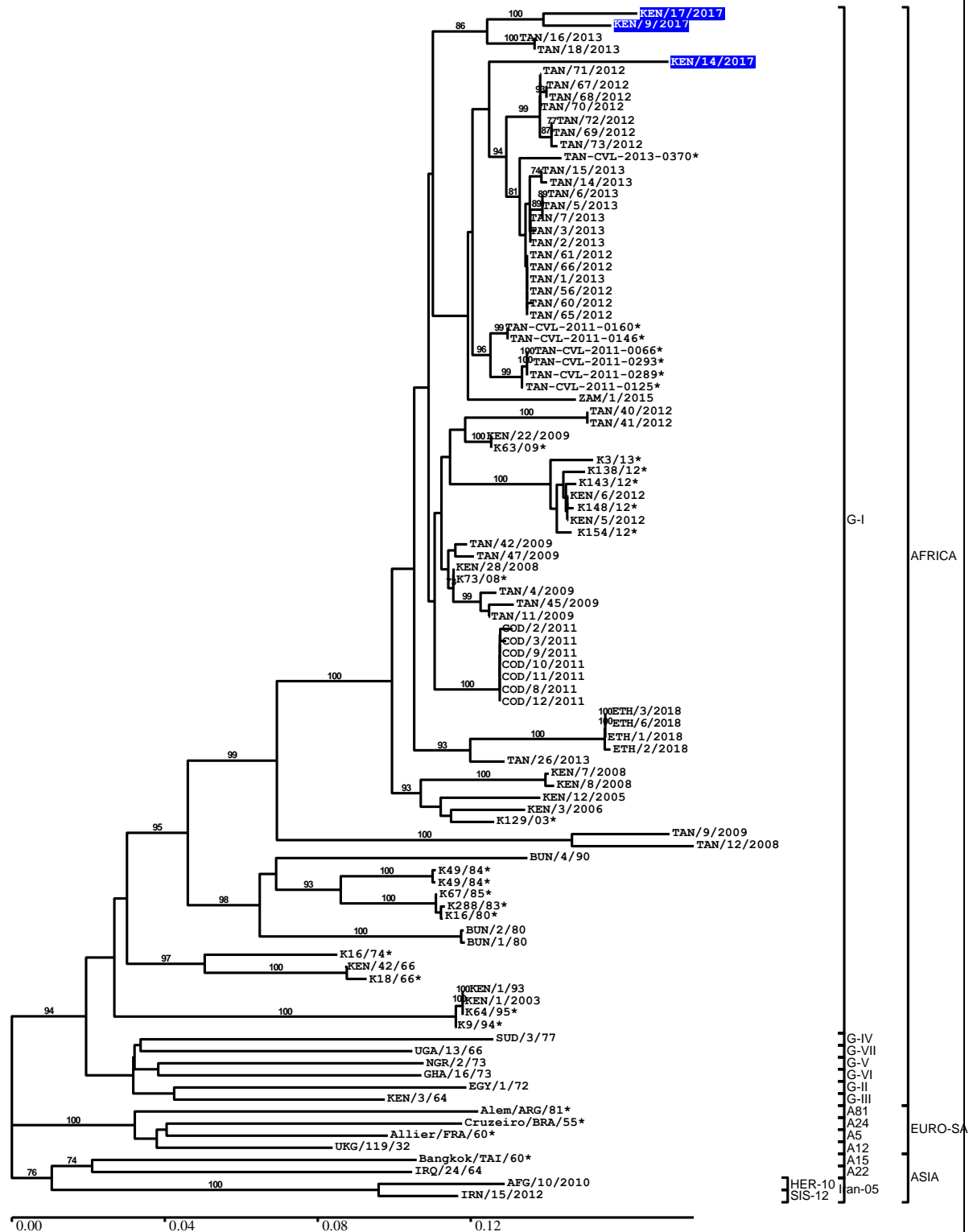


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Kenya continued



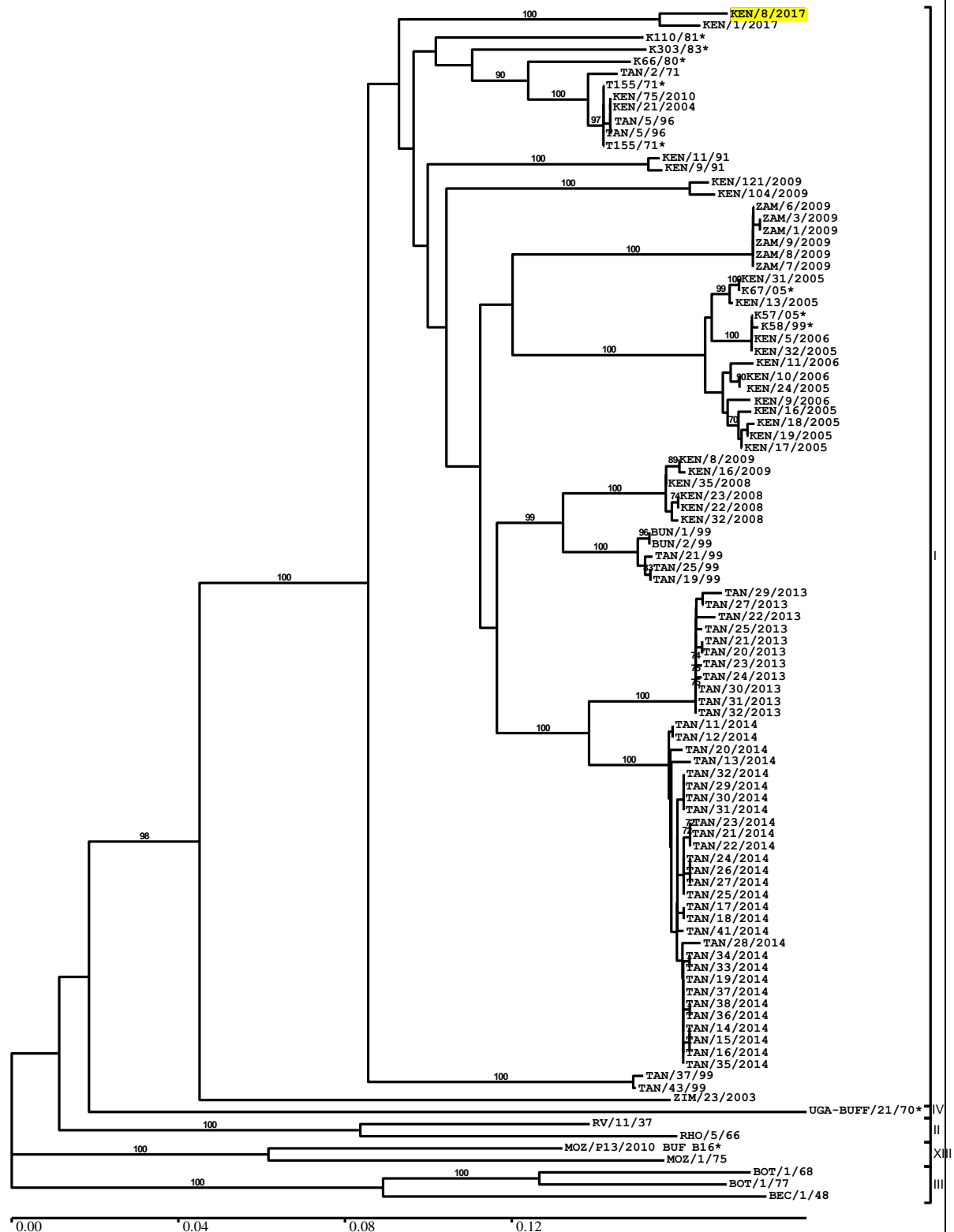
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Kenya continued



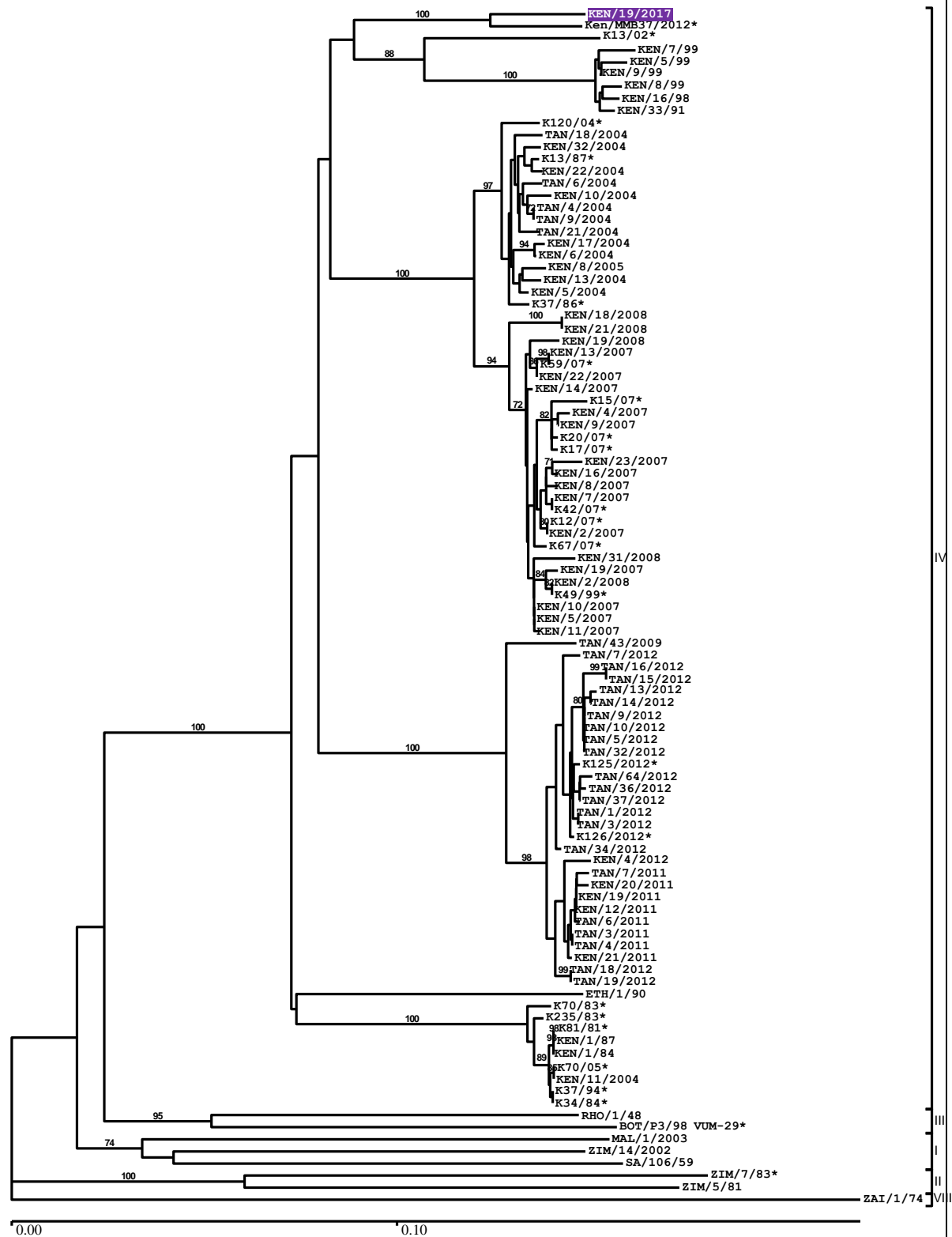
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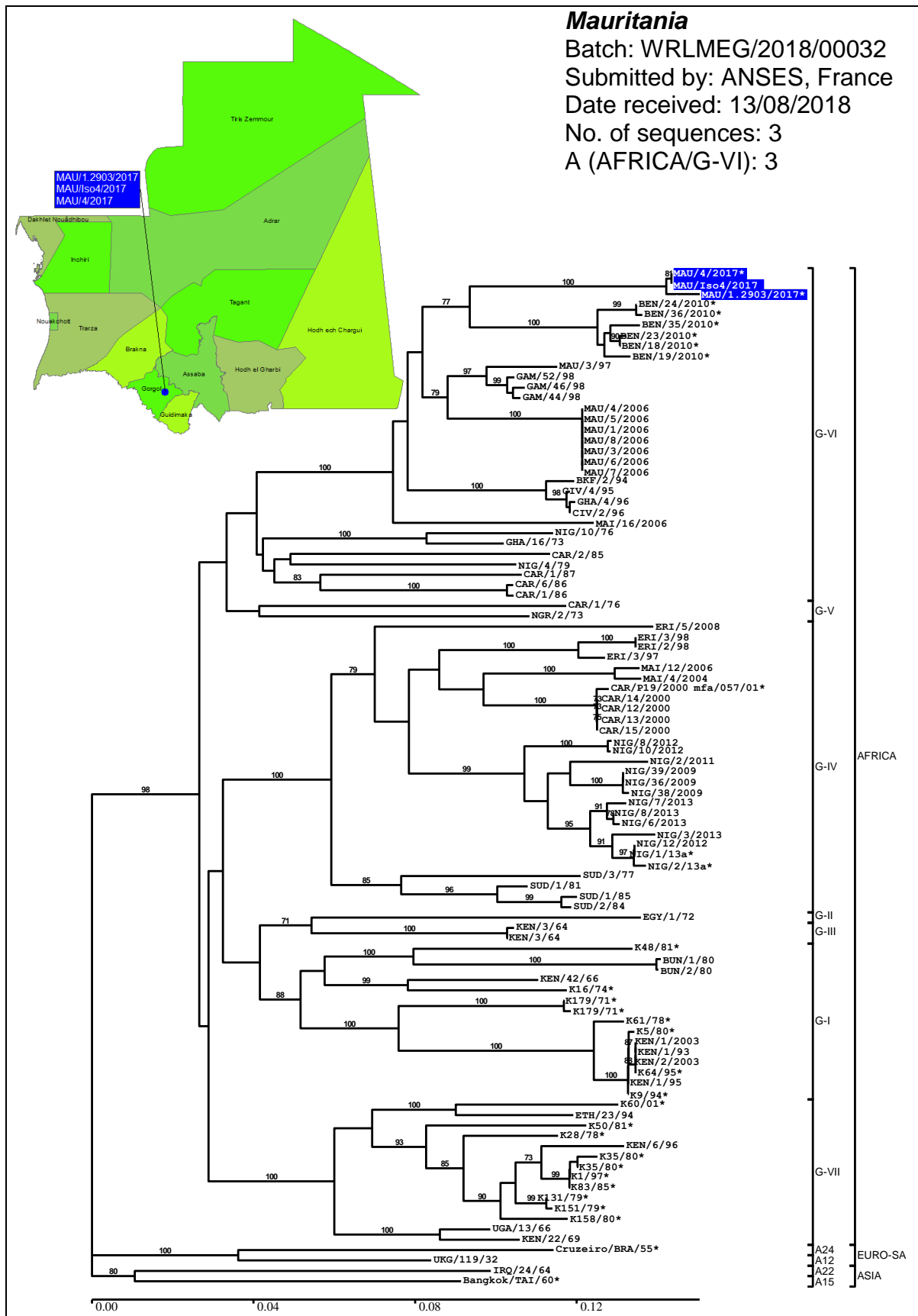


Kenya continued



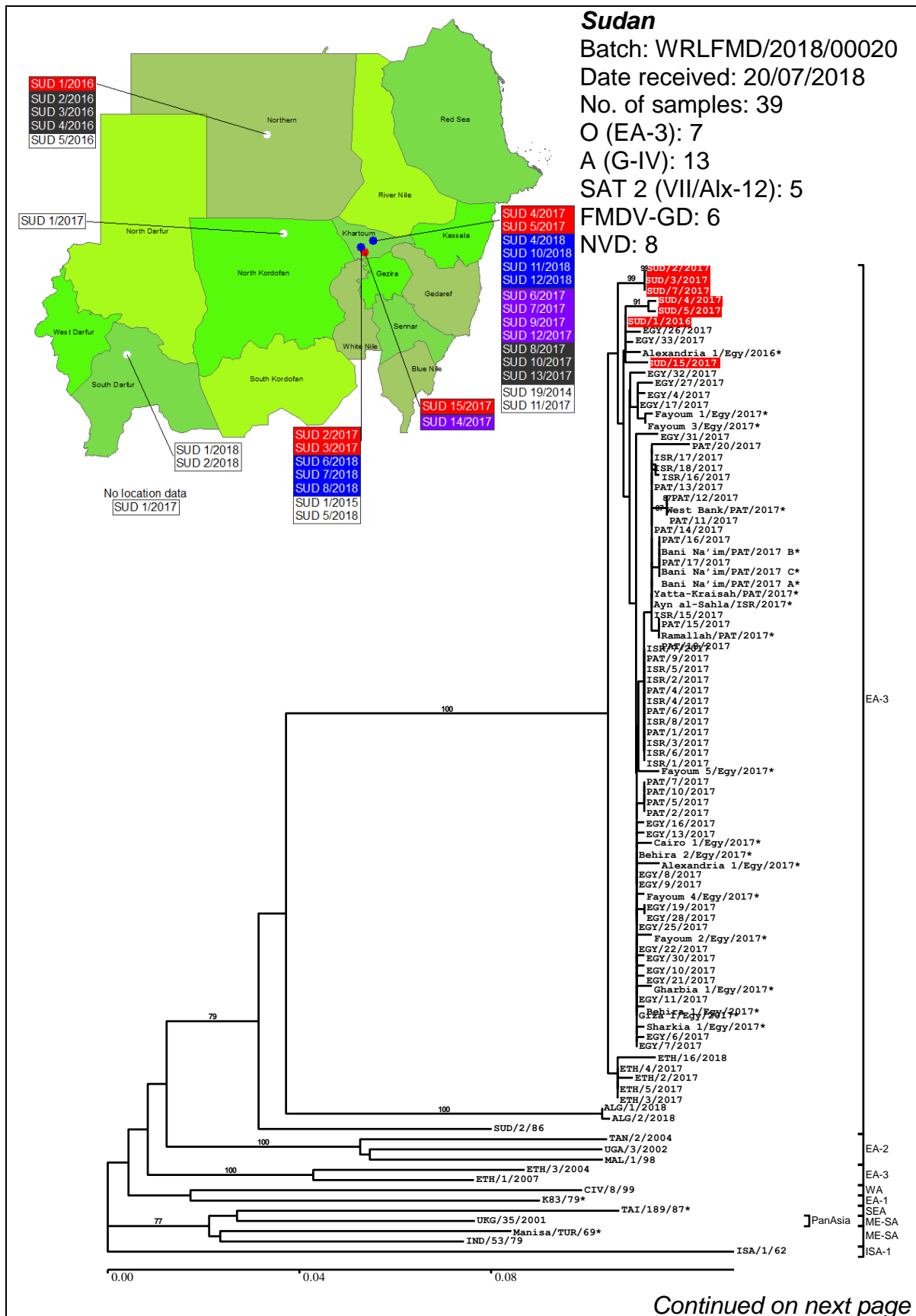
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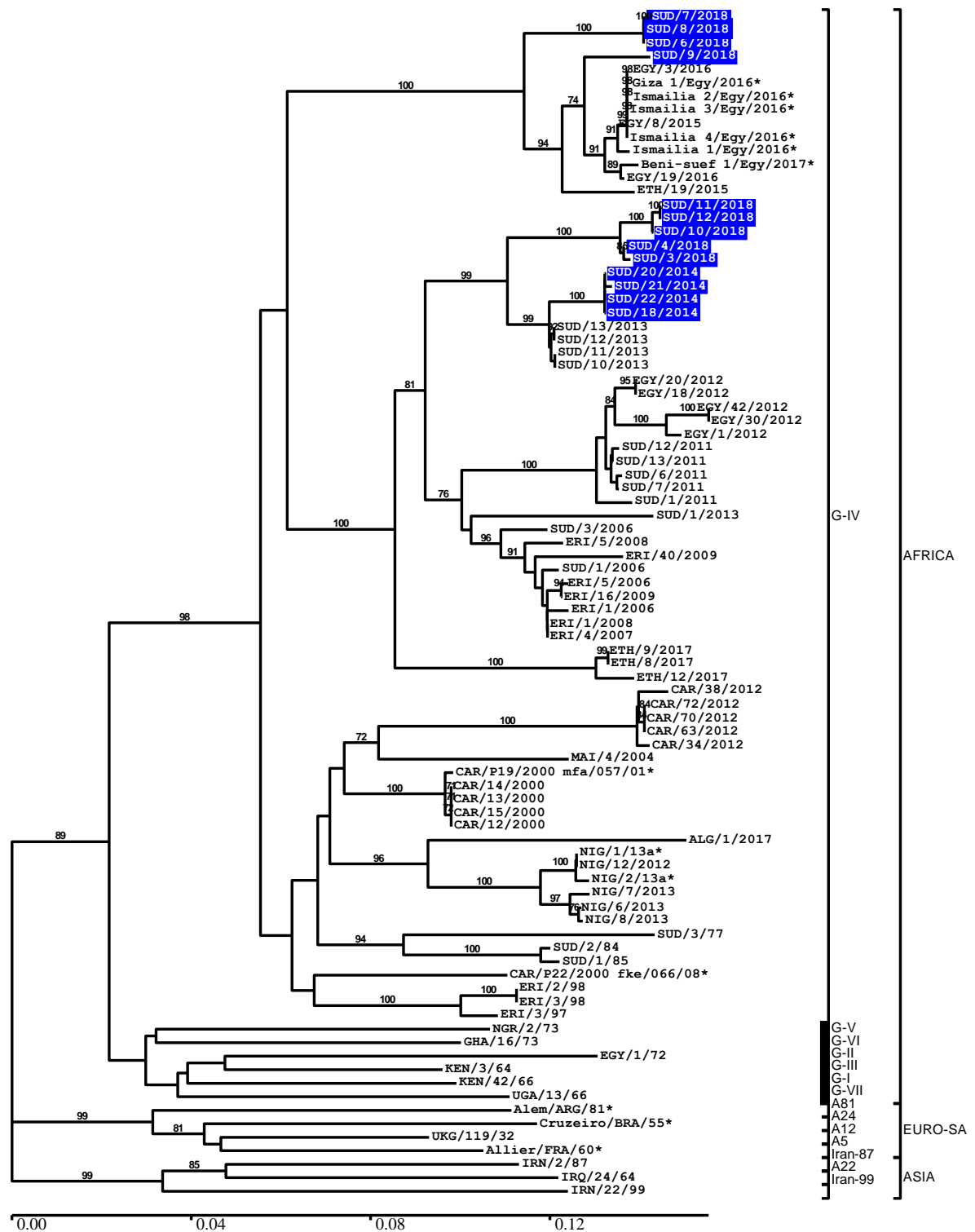


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Sudan continued

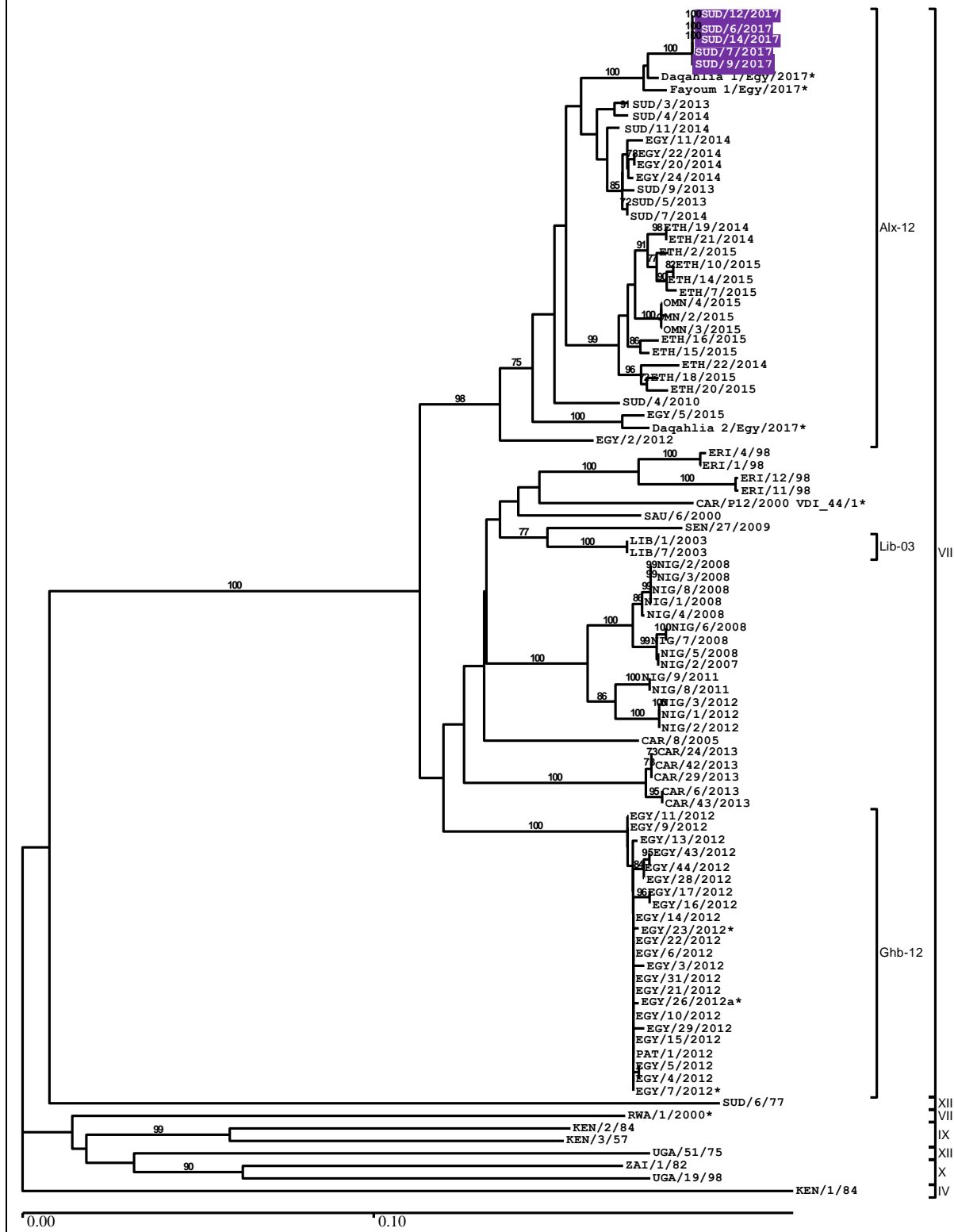


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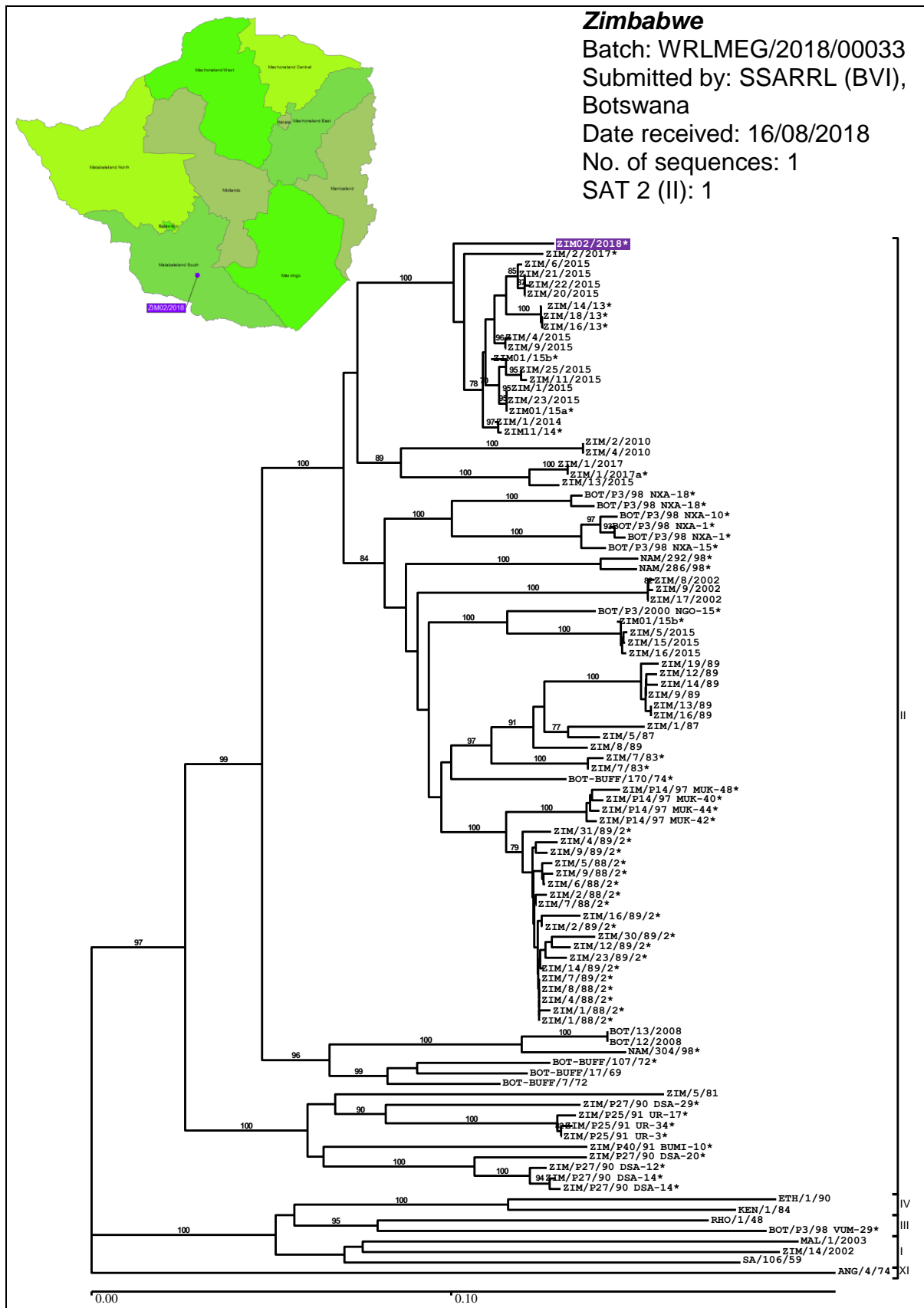


Sudan continued



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2.3. Vaccine matching

During this reporting period vaccine matching has been undertaken for 28 FMD virus field strains by the WRLFMD® July to September 2018:

Table 3: Summary of samples tested by vaccine matching.

Serotype	O	A	C	Asia-1	SAT 1	SAT 2	SAT 3
Afghanistan	3	1		1			
Algeria	2						
Bhutan	2	2					
Malaysia	3						
Sri Lanka	2						
Sudan	2	2				1	
Vietnam	4	2					
Zambia	1						
Σ	19	7	-	1	-	1	-

For individual data see Annex 1, section 2.6 (Antigenic Characterisation).

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Annex 1: Sample data

2.4. Summary of Submissions

Table 4: Summary of samples collected and received to WRLFMD (July to September 2018)

Country	Nº of samples	Virus isolation in cell culture/ELISA								RT-PCR for FMD (or SVD) virus (where appropriate)	
		FMD virus serotypes							No Virus Detected	Positive	Negative
		O	A	C	SAT 1	SAT 2	SAT 3	ASIA -1			
ALGERIA	2	2	-	-	-	-	-	-	-	2	-
KENYA	21	3	3	-	1	1	-	-	13	19	2
MALAYSIA	12	11	-	-	-	-	-	-	1	11	1
MONGOLIA	21	14	-	-	-	-	-	-	7	17	4
SOUTH SUDAN	29	-	-	-	-	-	-	-	29	7	22
SUDAN	38	6	13	-	-	5	-	-	14	30	8
TOTAL	123	36	16	-	1	6	-	-	64	86	37

Abbreviations used in table

VI / ELISA	FMD (or SVD) virus serotype identified following virus isolation in cell culture and antigen detection ELISA
FMD	Foot-and-mouth disease
SVD	Swine vesicular disease
NVD	No FMD, SVD or vesicular stomatitis virus detected
NT	Not tested
rRT-PCR	Real-time reverse transcription polymerase chain reaction for FMD (or SVD) viral genome

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2.5. Clinical Samples

Table 5: Clinical sample diagnostics made by the WRLFMD® July to September 2018

Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				V/ELISA	RT-PCR	Final report
ALGERIA	03-Jul-18	10-Jul-18	ALG 1/2018	CATTLE	20-Jun-18	O	POS	O
			ALG 2/2018	CATTLE	21-Jun-18	O	POS	O
KENYA	29-Aug-18	13-Sep-18	KEN 7/2017	BOVINE	23-Jan-17	NEG	POS	FMDV GD
			KEN 8/2017	BOVINE	16-Mar-17	SAT 1	POS	SAT 1
			KEN 9/2017	BOVINE	29-May-17	A	POS	A
			KEN 10/2017	BOVINE	03-Jun-17	NEG	POS	FMDV GD
			KEN 11/2017	BOVINE	12-Jul-17	O	POS	O
			KEN 12/2017	BOVINE	21-Aug-17	NEG	NEG	NVD
			KEN 13/2017	BOVINE	03-Sep-17	NEG	POS	FMDV GD
			KEN 14/2017	BOVINE	21-Sep-17	A	POS	A
			KEN 15/2017	BOVINE	17-Oct-17	O	POS	O
			KEN 16/2017	BOVINE	23-Oct-17	NEG	POS	FMDV GD
			KEN 17/2017	BOVINE	08-Nov-17	A	POS	A
			KEN 18/2017	BOVINE	22-Nov-17	NEG	POS	FMDV GD
			KEN 19/2017	BOVINE	25-Nov-17	SAT 2	POS	SAT 2
			KEN 20/2017	BOVINE	25-Nov-17	NEG	POS	FMDV GD
			KEN 21/2017	BOVINE	26-Nov-17	NEG	POS	FMDV GD
			KEN 1/2018	BOVINE	16-Jan-18	NEG	POS	FMDV GD
			KEN 2/2018	BOVINE	25-Jan-18	NEG	NEG	NVD
			KEN 3/2018	BOVINE	26-Jan-18	NEG	POS	FMDV GD
			KEN 4/2018	BOVINE	19-Feb-18	O	POS	O
			KEN 5/2018	BOVINE	21-Apr-18	NEG	POS	FMDV GD
MALAYSIA	06-Aug-18	15-Aug-18	KEN 6/2018	BOVINE	26-Jun-18	NEG	POS	FMDV GD
			MAY 12/2016	CATTLE	15-Sep-16	O	POS	O
			MAY 13/2016	BISON	29-Nov-16	O	POS	O
			MAY 1/2017	CATTLE	27-Feb-17	O	POS	O
			MAY 2/2017	CATTLE	01-Mar-17	O	POS	O
			MAY 3/2017	CATTLE	03-Mar-17	O	POS	O
			MAY 4/2017	CATTLE	06-Mar-17	O	POS	O
			MAY 5/2017	CATTLE	12-Jul-17	NEG	NEG	NVD
			MAY 1/2018	CATTLE	13-Feb-18	O	POS	O
			MAY 2/2018	CATTLE	14-Feb-18	O	POS	O
			MAY 3/2018	CATTLE	04-Apr-18	O	POS	O
			MAY 4/2018	CATTLE	20-Apr-18	O	POS	O
			MAY 5/2018	BUFFALO	30-May-18	O	POS	O
			MOG 15/2017	CATTLE	15-Jan-18	O	POS	O
MONGOLIA	20-Aug-18	10-Sep-18	MOG 1/2018	CAMEL	03-Jan-18	NEG	POS	FMDV GD
			MOG 2/2018	CAMEL	03-Jan-18	O	POS	O
			MOG 3/2018	CATTLE	04-Jan-18	NEG	POS	FMDV GD
			MOG 4/2018	CATTLE	12-Jan-18	NEG	POS	FMDV GD
			MOG 5/2018	GAZELLE	12-Jan-18	NEG	NEG	NVD
			MOG 6/2018	GAZELLE	12-Jan-18	NEG	NEG	NVD
			MOG 7/2018	CATTLE	03-Feb-18	O	POS	O
			MOG 8/2018	CATTLE	16-Feb-18	O	POS	O

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Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				V/ELISA	RT-PCR	Final report
SOUTH SUDAN	29-Aug-18	13-Sep-18	MOG 9/2018	SHEEP	19-Feb-18	O	POS	O
			MOG 10/2018	CATTLE	22-Feb-18	O	POS	O
			MOG 11/2018	SHEEP	22-Feb-18	O	POS	O
			MOG 12/2018	CATTLE	23-Feb-18	O	POS	O
			MOG 13/2018	CATTLE	23-Feb-18	O	NEG	O
			MOG 14/2018	CATTLE	23-Feb-18	NEG	POS	FMDV GD
			MOG 15/2018	CATTLE	23-Feb-18	O	POS	O
			MOG 16/2018	CATTLE	03-Mar-18	O	POS	O
			MOG 17/2018	CATTLE	03-Mar-18	O	POS	O
			MOG 18/2018	CATTLE	09-Jan-18	O	POS	O
			MOG 19/2018	SHEEP	09-Apr-18	O	POS	O
			MOG 20/2018	SHEEP	09-Apr-18	NEG	NEG	NVD
			SSD 1/2017	BOVINE	16-Apr-17	NEG	NEG	NVD
			SSD 2/2017	BOVINE	16-Apr-17	NEG	NEG	NVD
			SSD 3/2017	BOVINE	16-Apr-17	NEG	POS	FMDV GD
			SSD 4/2017	BOVINE	16-Apr-17	NEG	POS	FMDV GD
			SSD 5/2017	BOVINE	16-Apr-17	NEG	POS	FMDV GD
			SSD 6/2017	BOVINE	18-May-17	NEG	POS	FMDV GD
			SSD 7/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 8/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 9/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 10/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 11/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 12/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 13/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 14/2017	BOVINE	18-May-17	NEG	NEG	NVD
			SSD 15/2017	BOVINE	18-May-17	NEG	POS	FMDV GD
			SSD 16/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 17/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 18/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 19/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 20/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 21/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 22/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 23/2017	BOVINE	01-Jun-17	NEG	POS	FMDV GD
			SSD 24/2017	BOVINE	01-Jun-17	NEG	POS	FMDV GD
			SSD 25/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 26/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 27/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 28/2017	BOVINE	01-Jun-17	NEG	NEG	NVD
			SSD 29/2018	BOVINE	01-Jun-17	NEG	NEG	NVD
SUDAN	20-Jul-18	06-Aug-18	SUD 18/2014	CATTLE	24-Dec-14	A	POS	A
			SUD 19/2014	CATTLE	24-Dec-14	NEG	NEG	NVD
			SUD 20/2014	CATTLE	24-Dec-14	A	POS	A
			SUD 21/2014	CATTLE	24-Dec-14	A	POS	A
			SUD 22/2014	CATTLE	24-Dec-14	A	POS	A
			SUD 1/2015	CATTLE	08-Apr-15	NEG	NEG	NVD
			SUD 1/2016	CATTLE	25-Dec-16	O	POS	O
			SUD 2/2016	CATTLE	25-Dec-16	NEG	POS	FMDV GD
			SUD 3/2016	CATTLE	25-Dec-16	NEG	POS	FMDV GD
			SUD 4/2016	CATTLE	25-Dec-16	NEG	POS	FMDV GD

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Country	Date		WRL for FMD Sample Identification	Animal	Date of Collection	Results		
	Received	Reported				VI/ELISA	RT-PCR	Final report
			SUD 5/2016	CATTLE	25-Dec-16	NEG	NEG	NVD
			SUD 1/2017	CATTLE	01-Jan-17	NEG	NEG	NVD
			SUD 2/2017	CATTLE	04-Jan-17	O	POS	O
			SUD 3/2017	CATTLE	04-Jan-17	O	POS	O
			SUD 4/2017	CATTLE	09-Jan-17	O	POS	O
			SUD 5/2017	CATTLE	07-Feb-17	O	POS	O
			SUD 6/2017	CATTLE	07-Feb-17	SAT 2	POS	SAT 2
			SUD 7/2017	CATTLE	07-Feb-17	SAT 2	POS	SAT 2
			SUD 8/2017	CATTLE	07-Feb-17	NEG	POS	FMDV GD
			SUD 9/2017	CATTLE	21-Feb-17	SAT 2	POS	SAT 2
			SUD 10/2017	CATTLE	21-Feb-17	NEG	POS	FMDV GD
			SUD 11/2017	CATTLE	21-Feb-17	NEG	NEG	NVD
			SUD 12/2017	CATTLE	21-Feb-17	SAT 2	POS	SAT 2
			SUD 13/2017	CATTLE	21-Feb-17	NEG	POS	FMDV GD
			SUD 14/2017	CATTLE	04-Jun-17	SAT 2	POS	SAT 2
			SUD 15/2017	CATTLE	04-Jun-17	O	POS	O
			SUD 1/2018	CATTLE	01-Jan-18	NEG	NEG	NVD
			SUD 2/2018	CATTLE	01-Jan-18	NEG	NEG	NVD
			SUD 3/2018	CATTLE	06-Feb-18	A	POS	A
			SUD 4/2018	CATTLE	07-Feb-18	A	POS	A
			SUD 5/2018	CATTLE	12-Feb-18	NEG	NEG	NVD
			SUD 6/2018	CATTLE	20-Mar-18	A	POS	A
			SUD 7/2018	CATTLE	20-Mar-18	A	POS	A
			SUD 8/2018	CATTLE	20-Mar-18	A	POS	A
			SUD 9/2018	CATTLE	22-Mar-18	A	POS	A
			SUD 10/2018	CATTLE	28-Mar-18	A	POS	A
			SUD 11/2018	CATTLE	28-Mar-18	A	POS	A
			SUD 12/2018	CATTLE	28-Mar-18	A	POS	A
			TOTAL	123				

Abbreviations used in table

FMD(V)	Foot-and-mouth disease (virus)
FMDV GD	Genome detected
FMDV NGD	Genome not detected (samples submitted in Trizol, only rRT-PCR carried out)
VI/ELISA	FMDV serotype identified following virus isolation in cell culture and antigen ELISA
rRT-PCR	Real-time reverse transcription polymerase chain reaction on epithelial suspension for FMD (or SVD) viral genome
NVD	No foot-and-mouth disease, swine vesicular disease or vesicular stomatitis virus detected
NT	Not tested

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2.6. Antigenic Characterisation

Antigenic characterisation of FMD field isolates by matching with vaccine strains by 2dmVNT from July to September 2018.

Table 6: Vaccine matching studies for O FMDV by VNT

Strain	Serotype	Topotype	Lineage	O 3039	O1 Manisa	O/TUR/5/2009
AFG/44/2017	O	ME-SA	PanAsia-2	0.44	0.36	0.65
AFG/52/2017	O	ME-SA	PanAsia-2	0.36	0.31	0.42
ALG/1/2018	O	EA-3	-	0.51	0.37	0.46
ALG/2/2018	O	EA-3	-	0.45	0.34	0.59
BHU/24/2017	O	ME-SA	Ind-2001	0.48	0.48	0.55
BHU/2/2018	O	ME-SA	Ind-2001	0.29	0.42	0.60
MAY/12/2016	O	SEA	Mya-98	0.56	0.35	0.59
MAY/01/2018	O	ME-SA	Ind-2001	0.50	0.40	0.40
MAY/05/2018	O	ME-SA	Ind-2001	0.60	0.40	0.72
SRL/1/2018	O	ME-SA	Ind-2001	0.32	0.35	0.47
SRL/5/2018	O	ME-SA	Ind-2001	0.13	0.07	0.32
SUD/3/2017	O	EA-3	-	0.49	0.28	0.45
SUD/15/2017	O	EA-3	-AFRICA	0.25	0.26	0.49
VIT/5/2017	O	SEA	Mya-98	0.22	0.10	0.34
VIT/9/2017	O	ME-SA	Ind-2001	0.35	0.26	0.63
VIT/21/2017	O	CATHAY	-	0.17	0.11	0.2
VIT/1/2018	O	ME-SA	PanAsia	0.68	0.44	1.00
ZAM/3/2018	O	EA-2	-	0.40	0.28	0.37

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Table 7: Vaccine matching studies for A FMDV by VNT

Strain	Serotype	Topotype	Lineage	A/IRN/05	A/TUR/20/06	A22 IRAQ	A/ERI/3/98	A/ASIA/GVII
AFG/50/2017	A	ASIA	Iran-05	0.10	0.36	0.20		0.00
BHU/26/2017	A	ASIA	G-VII	0.04	0.00	0.17		0.78
BHU/28/2017	A	ASIA	G-VII	0.05	0.00	0.11		0.79
SUD/9/2018	A	AFRICA	G-IV	0.06	0.02	0.17	0.39	
SUD/10/2018	A	AFRICA	G-IV	0.20	0.12	0.25	0.26	
VIT/6/2017	A	ASIA	Sea-97	0.52	0.14	0.87	0.14	
VIT/19/2017	A	ASIA	Sea-97	0.06	0.13	0.36	0.23	

Table 8: Vaccine matching studies for Asia-1 FMDV by VNT

Strain	Serotype	Topotype	Lineage	Asia 1 Shamir
AFG/56/2017	Asia-1	ASIA	Sindh-08	0.33

Table 9: Vaccine matching studies for SAT 2 FMDV by VNT

Strain	Serotype	Topotype	Lineage	SAT 2 ERI	SAT 2 ZIM
SUD/14/2017	SAT 2	VII	Alx-12	0.76	0.32

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Abbreviations used in tables

M	Vaccine Match <i>$r_1 = \geq 0.3$. Suggests that there is a close relationship between field isolate and vaccine strain. A potent vaccine containing the vaccine strain is likely to confer protection.</i>
N	No Vaccine Match <i>$r_1 = < 0.3$. Suggests that the field isolate is so different from the vaccine strain that the vaccine is unlikely to protect</i>
B	Borderline <i>Any r_1 values between 0.28 to 0.32</i>
NT	Not tested against this vaccine

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Annex 2: FMD publications

Recent FMD Publications (July to September 2018) cited by Web of Science (Pirbright Institute papers and authors are highlighted in **BOLD AND GREY**)

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Lineage	West Eurasia	East Asia	North Africa	India and Southern Asia	East Africa	West and Central Africa	Southern Africa	South America
O ME-SA PanAsia-2	35	-	-	-	-	-	-	-
O ME-SA PanAsia	-	10	-	-	-	-	-	-
O SEA Mya-98	-	33	-	-	-	-	-	-
O ME-SA Ind2001	6	20	35	80	-	-	-	-
O EA or O WA	3	-	20	-	45	37	-	-
O EURO-SA	-	-	-	-	-	-	-	74
O CATHAY	-	10.5	-	-	-	-	-	-
A ASIA Sea-97	-	25	-	-	-	-	-	-
A ASIA Iran-05	25.5	-	-	-	-	-	-	-
A ASIA G-VII	17.5	-	-	16	-	-	-	-
A AFRICA	-	-	35	-	24	25	-	-
A EURO-SA	-	-	-	-	-	-	-	26
Asia-1	12.5	1.5	-	4	-	-	-	-
SAT 1	-	-	-	-	10	10	27	-
SAT 2	0.5	-	10	-	20	28	57	-
SAT 3	-	-	-	-	1	-	16	-
C	-	-	-	-	-	-	-	-

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Annex 4: Other WRLFMD Activities


Proficiency test scheme organised by WRLFMD:

Exercise XXX: sample panels are being dispatched to participating laboratories (including “live” and inactivated samples for virology assays, and validated sera for FMDV-specific antibody tests). Please contact WRLFMD if you would like more information about this exercise.

Training courses:

May 2019: Places are still available on our two-week residential training course on FMD diagnostic methods. Application deadline 14th December 2018 (for further details see: <https://www.pirbright.ac.uk/training-courses/diagnosis-foot-and-mouth-disease>)

February 2019: E-learning training:



**FMD
Laboratory
Investigation
Training
Course**

This course is aimed at those working in national or regional foot-and-mouth disease laboratories and involved in carrying out or managing laboratory testing activities.

Online training

The course covers the full range of activities carried out by FMD laboratories from supervising collection of diagnostic samples through to advanced laboratory testing procedures, biosafety and quality assurance.

Participants will learn to

- Interact with field staff and guide them in collection and submission of appropriate, quality diagnostic samples
- Select appropriate diagnostic tests to detect FMD virus and FMD virus-specific antibodies, and interpret the results of these tests
- Describe the principles of accurate virus detection test methods and assays used for serology
- Outline techniques for further characterization of FMD virus including genomic sequencing and vaccine matching tests
- Explain the importance and basic principles of laboratory Quality Assurance
- Explain the key principles of biosecurity and biosafety measures to be carried out in an FMD laboratory

The course involves 14 hours of interactive e-learning content over a four week period.

The course provides a unique opportunity to interact with your colleagues in FMD laboratories around the world

A limited number of places are available on this course. To apply, send an email to: eufmd-training@fao.org

Dates and more information on the e-learning courses are available at <https://eufmdlearning.works>



The EuFMD and the World Reference Laboratory for FMD, based at the Pirbright Institute, have partnered to produce the online FMD Laboratory Investigation Training Course - FLITC.

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