



INSTITUTE FOR ANIMAL HEALTH
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FMD Genotyping Report

Lab Reference WRL Batch Number: WRLFMD/2012/00028

Sender Details:

Date Received:

Country of Origin:

Date Reported:

Sudan

31st August 2012

Dear Dr Mohamed Habiela Ahmed,

Sequencing work has now been completed in respect of the samples you submitted and the details are as attached. Please note that all of our phylogenetic trees can be accessed via the internet at:

<http://www.wrlfmd.org/>

Results Approved By:

Official Stamp:

Date:

3rd Sept 2012

A UKAS accredited testing laboratory No. 4025.

To help us improve the quality of our service, please send any suggestions or requests to the Reference Laboratory by fax (+44 (0) 1483 232621 or email: trish.ryder@iah.ac.uk. IAH actively seeks and appreciates feedback, if you would like to offer feedback please complete the WRLFMD survey here: <http://www.surveymonkey.com/s/WRLFMD>

FAO World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD)

Genotyping Report

Report Date for this Batch: 31 August 2012

FMDV type O

Country: Sudan

Period: 2009-2011

No. of samples: 5

BATCH: WRLFMD/2012/00028



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FAO World Reference Laboratory for FMD Genotyping Report

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Serotype: O WRLFMD Ref No: SUD/1/2009 Batch No: WRLFMD/2012/00028 Sender Ref: 12/2009 Location: Redwan, Omdurman, Khartoum, Sudan Date collected: 13/12/2009 Date received by WRLFMD: 20/07/2012 Date received for sequencing: 28/08/2012 Species: Cattle Material used: BTy1 Region sequenced: VP1 RT-PCR primers: O-1C244F/EUR-2B52R O-1C272F/EUR-2B52R	Report date: 30/08/2012 Reported by: N.J. Knowles Checked by: D.P. King Topotype: EA-3 Genotype/strain: unnamed Sequence filename: SUD09-01.SEQ Date sequence last updated: 30/08/2012 No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639 Total no. of comparisons: 3396 Min. no. of nt for comparison: 600 Total turn-around time: 41 days Sequencing time: 2 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/1/2010	SUD10-01	639	636	0	99.53	0.47	EA-3	unnamed
2	O/SUD/2/2010	SUD10-02	639	635	0	99.37	0.63	EA-3	unnamed
3	O/SUD/3/2008 (GU566059)	SUD08-03	639	624	0	97.65	2.35	EA-3	unnamed
4	O/SUD/4/2008 (GU566060)	SUD08-04	639	624	0	97.65	2.35	EA-3	unnamed
5	O/SUD/5/2008 (GU566061)	SUD08-05	639	612	0	95.77	4.23	EA-3	unnamed
6	O/SUD/6/2008 (GU566062)	SUD08-06	639	611	0	95.62	4.38	EA-3	unnamed
7	O/SUD/1/99 (DQ165076)	SUD99-01	639	598	0	93.58	6.42	EA-3	unnamed
8	O/SUD/3/99 (GU566043)	SUD99-03	639	598	0	93.58	6.42	EA-3	unnamed
9	O/SUD/4/99 (GU566044)	SUD99-04	639	598	0	93.58	6.42	EA-3	unnamed
10	O/SUD/25/2004 (GU566053)	SUD04-25	639	597	0	93.43	6.57	EA-3	unnamed
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/2/86 (DQ165075)	SUD86-02	639	576	0	90.14	9.86	EA-3	unnamed
2	O/ETH/1/2007 (FJ798137)	ETH07-01	639	555	0	86.85	13.15	EA-3	unnamed
3	O/IND/53/79 (AF292107)	IND79A53	639	549	0	85.92	14.08	ME-SA	unnamed
4	O/ETH/3/2004 (FJ798109)	ETH04-03	639	545	0	85.29	14.71	EA-3	unnamed
5	O/UGA/17/98 (HM211075)	UGA98-17	639	545	0	85.29	14.71	EA-4	unnamed
6	O/IRN/61/2001 (DQ164896)	IRN01-61	638	544	1	85.27	14.73	ME-SA	Irn-2001
7	O/K83/79* (AJ303511)	KEN79B83	638	543	1	85.11	14.89	EA-1	unnamed
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	543	0	84.98	15.02	ME-SA	PanAsia
9	O/GHA/5/93 (AJ303488)	GHA93-05	639	542	0	84.82	15.18	WA	unnamed
10	O/MAL/1/98 (DQ165074)	MAL98-01	639	541	0	84.66	15.34	EA-2	unnamed

nt, nucleotides

*, not a WRLFMD reference number

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FAO World Reference Laboratory for FMD Genotyping Report

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Serotype: O	Report date: 30/08/2012
WRLFMD Ref No: SUD/1/2010	Reported by: N.J. Knowles
Batch No: WRLFMD/2012/00028	Checked by: D.P. King
Sender Ref: 1/2010	
Location: Hilat Kuku, Khartoum, Sudan	Topotype: EA-3
Date collected: 11/01/2010	Genotype/strain: unnamed
Date received by WRLFMD: 20/07/2012	Sequence filename: SUD10-01.SEQ
Date received for sequencing: 28/08/2012	Date sequence last updated: 30/08/2012
Species: Cattle	No. of Nt determined: 639
Material used: BTy1	No. of ambiguities: 0
Region sequenced: VP1	Gene length: 639
RT-PCR primers: O-1C244F/EUR-2B52R	Total no. of comparisons: 3396
O-1C272F/EUR-2B52R	Min. no. of nt for comparison: 600
	Total turn-around time: 41 days
	Sequencing time: 2 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/1/2009	SUD09-01	639	636	0	99.53	0.47	EA-3	unnamed
2	O/SUD/2/2010	SUD10-02	639	636	0	99.53	0.47	EA-3	unnamed
3	O/SUD/3/2008 (GU566059)	SUD08-03	639	625	0	97.81	2.19	EA-3	unnamed
4	O/SUD/4/2008 (GU566060)	SUD08-04	639	625	0	97.81	2.19	EA-3	unnamed
5	O/SUD/5/2008 (GU566061)	SUD08-05	639	613	0	95.93	4.07	EA-3	unnamed
6	O/SUD/6/2008 (GU566062)	SUD08-06	639	612	0	95.77	4.23	EA-3	unnamed
7	O/SUD/25/2004 (GU566053)	SUD04-25	639	600	0	93.90	6.10	EA-3	unnamed
8	O/SUD/30/2004 (GU566055)	SUD04-30	639	600	0	93.90	6.10	EA-3	unnamed
9	O/SUD/9/2004 (GU566048)	SUD04-09	639	600	0	93.90	6.10	EA-3	unnamed
10	O/SUD/1/99 (DQ165076)	SUD99-01	639	599	0	93.74	6.26	EA-3	unnamed
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/2/86 (DQ165075)	SUD86-02	639	579	0	90.61	9.39	EA-3	unnamed
2	O/ETH/1/2007 (FJ798137)	ETH07-01	639	558	0	87.32	12.68	EA-3	unnamed
3	O/IND/53/79 (AF292107)	IND79A53	639	552	0	86.38	13.62	ME-SA	unnamed
4	O/ETH/3/2004 (FJ798109)	ETH04-03	639	548	0	85.76	14.24	EA-3	unnamed
5	O/K83/79* (AJ303511)	KEN79B83	638	546	1	85.58	14.42	EA-1	unnamed
6	O/UGA/17/98 (HM211075)	UGA98-17	639	546	0	85.45	14.55	EA-4	unnamed
7	O/UKG/35/2001 (AJ539141)	UKG01-35	639	546	0	85.45	14.55	ME-SA	PanAsia
8	O/GHA/5/93 (AJ303488)	GHA93-05	639	545	0	85.29	14.71	WA	unnamed
9	O/IRN/61/2001 (DQ164896)	IRN01-61	638	543	1	85.11	14.89	ME-SA	Irn-2001
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	543	0	84.98	15.02	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O WRLFMD Ref No: SUD/2/2010 Batch No: WRLFMD/2012/00028 Sender Ref: 5/2010 Location: Keriab, Khartoum North, Khartoum, Sudan Date collected: 12/01/2010 Date received by WRLFMD: 20/07/2012 Date received for sequencing: 28/08/2012 Species: Cattle Material used: BTy1 Region sequenced: VP1 RT-PCR primers: O-1C244F/EUR-2B52R O-1C272F/EUR-2B52R	Report date: 30/08/2012 Reported by: N.J. Knowles Checked by: D.P. King Topotype: EA-3 Genotype/strain: unnamed Sequence filename: SUD10-02.SEQ Date sequence last updated: 30/08/2012 No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639 Total no. of comparisons: 3396 Min. no. of nt for comparison: 600 Total turn-around time: 41 days Sequencing time: 2 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/1/2010	SUD10-01	639	636	0	99.53	0.47	EA-3	unnamed
2	O/SUD/1/2009	SUD09-01	639	635	0	99.37	0.63	EA-3	unnamed
3	O/SUD/3/2008 (GU566059)	SUD08-03	639	624	0	97.65	2.35	EA-3	unnamed
4	O/SUD/4/2008 (GU566060)	SUD08-04	639	624	0	97.65	2.35	EA-3	unnamed
5	O/SUD/5/2008 (GU566061)	SUD08-05	639	612	0	95.77	4.23	EA-3	unnamed
6	O/SUD/6/2008 (GU566062)	SUD08-06	639	611	0	95.62	4.38	EA-3	unnamed
7	O/SUD/25/2004 (GU566053)	SUD04-25	639	599	0	93.74	6.26	EA-3	unnamed
8	O/SUD/30/2004 (GU566055)	SUD04-30	639	599	0	93.74	6.26	EA-3	unnamed
9	O/SUD/9/2004 (GU566048)	SUD04-09	639	599	0	93.74	6.26	EA-3	unnamed
10	O/SUD/1/99 (DQ165076)	SUD99-01	639	598	0	93.58	6.42	EA-3	unnamed
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/2/86 (DQ165075)	SUD86-02	639	578	0	90.45	9.55	EA-3	unnamed
2	O/ETH/1/2007 (FJ798137)	ETH07-01	639	557	0	87.17	12.83	EA-3	unnamed
3	O/IND/53/79 (AF292107)	IND79A53	639	551	0	86.23	13.77	ME-SA	unnamed
4	O/ETH/3/2004 (FJ798109)	ETH04-03	639	547	0	85.60	14.40	EA-3	unnamed
5	O/K83/79* (AJ303511)	KEN79B83	638	545	1	85.42	14.58	EA-1	unnamed
6	O/UGA/17/98 (HM211075)	UGA98-17	639	545	0	85.29	14.71	EA-4	unnamed
7	O/UKG/35/2001 (AJ539141)	UKG01-35	639	545	0	85.29	14.71	ME-SA	PanAsia
8	O/IRN/61/2001 (DQ164896)	IRN01-61	638	544	1	85.27	14.73	ME-SA	Irn-2001
9	O/GHA/5/93 (AJ303488)	GHA93-05	639	542	0	84.82	15.18	WA	unnamed
10	O/OMN/7/2001 (DQ164941)	OMN01-07	639	542	0	84.82	15.18	ME-SA	Ind-2001b

nt, nucleotides

*, not a WRLFMD reference number

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Serotype: O WRLFMD Ref No: SUD/9/2011 Batch No: WRLFMD/2012/00028 Sender Ref: 28/2011 Location: Mwelain, Omdurmay, Khartoum, Sudan Date collected: 03/03/2011 Date received by WRLFMD: 20/07/2012 Date received for sequencing: 28/08/2012 Species: Cattle Material used: BTy1 Region sequenced: VP1 RT-PCR primers: O-1C244F/EUR-2B52R O-1C272F/EUR-2B52R	Report date: 30/08/2012 Reported by: N.J. Knowles Checked by: D.P. King Topotype: EA-3 Genotype/strain: unnamed Sequence filename: SUD11-09.SEQ Date sequence last updated: 30/08/2012 No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639 Total no. of comparisons: 3396 Min. no. of nt for comparison: 600 Total turn-around time: 41 days Sequencing time: 2 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/ERI/1/2011	ERI11-01	639	611	0	95.62	4.38	EA-3	unnamed
2	O/ERI/11/2011	ERI11-11	639	611	0	95.62	4.38	EA-3	unnamed
3	O/ERI/12/2011	ERI11-12	639	611	0	95.62	4.38	EA-3	unnamed
4	O/ERI/13/2011	ERI11-13	639	611	0	95.62	4.38	EA-3	unnamed
5	O/ERI/16/2011	ERI11-16	639	611	0	95.62	4.38	EA-3	unnamed
6	O/ERI/2/2011	ERI11-02	639	611	0	95.62	4.38	EA-3	unnamed
7	O/ERI/3/2011	ERI11-03	639	611	0	95.62	4.38	EA-3	unnamed
8	O/ETH/28/2011	ETH11-28	639	611	0	95.62	4.38	EA-3	unnamed
9	O/ETH/59/2011	ETH11-59	639	611	0	95.62	4.38	EA-3	unnamed
10	O/ERI/14/2011	ERI11-14	639	610	0	95.46	4.54	EA-3	unnamed
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/2/86 (DQ165075)	SUD86-02	639	577	0	90.30	9.70	EA-3	unnamed
2	O/ETH/1/2007 (FJ798137)	ETH07-01	639	552	0	86.38	13.62	EA-3	unnamed
3	O/UGA/3/2002 (DQ165077)	UGA02-03	639	550	0	86.07	13.93	EA-2	unnamed
4	O/MAL/1/98 (DQ165074)	MAL98-01	639	549	0	85.92	14.08	EA-2	unnamed
5	O/IND/53/79 (AF292107)	IND79A53	639	548	0	85.76	14.24	ME-SA	unnamed
6	O/IRN/61/2001 (DQ164896)	IRN01-61	638	542	1	84.95	15.05	ME-SA	Irn-2001
7	O/K83/79* (AJ303511)	KEN79B83	638	542	1	84.95	15.05	EA-1	unnamed
8	O/BHU/3/2009	BHU09-03	639	541	0	84.66	15.34	ME-SA	Ind-2001d
9	O/ETH/3/2004 (FJ798109)	ETH04-03	639	540	0	84.51	15.49	EA-3	unnamed
10	O/KUW/3/97 (DQ164904)	KUW97-03	639	540	0	84.51	15.49	ME-SA	Ind-2001a

nt, nucleotides

*, not a WRLFMD reference number

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FAO World Reference Laboratory for FMD Genotyping Report

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Serotype: O WRLFMD Ref No: SUD/11/2011 Batch No: WRLFMD/2012/00028 Sender Ref: 31/2011 Location: Mwelain, Omdurmay, Khartoum, Sudan Date collected: 03/03/2011 Date received by WRLFMD: 20/07/2012 Date received for sequencing: 28/08/2012 Species: Cattle Material used: BTy1 Region sequenced: VP1 RT-PCR primers: O-1C244F/EUR-2B52R O-1C272F/EUR-2B52R	Report date: 30/08/2012 Reported by: N.J. Knowles Checked by: D.P. King Topotype: EA-3 Genotype/strain: unnamed Sequence filename: SUD11-11.SEQ Date sequence last updated: 30/08/2012 No. of Nt determined: 639 No. of ambiguities: 0 Gene length: 639 Total no. of comparisons: 3396 Min. no. of nt for comparison: 600 Total turn-around time: 41 days Sequencing time: 2 days
Comments:	

Most Closely Related Viruses									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/8/2008 (GU566063)	SUD08-08	639	628	0	98.28	1.72	EA-3	unnamed
2	O/SUD/12/2004 (GU566049)	SUD04-12	639	617	0	96.56	3.44	EA-3	unnamed
3	O/SUD/25/2004 (GU566053)	SUD04-25	639	616	0	96.40	3.60	EA-3	unnamed
4	O/SUD/30/2004 (GU566055)	SUD04-30	639	616	0	96.40	3.60	EA-3	unnamed
5	O/SUD/9/2004 (GU566048)	SUD04-09	639	616	0	96.40	3.60	EA-3	unnamed
6	O/SUD/14/2004 (GU566050)	SUD04-14	639	615	0	96.24	3.76	EA-3	unnamed
7	O/SUD/15/2004 (GU566051)	SUD04-15	639	615	0	96.24	3.76	EA-3	unnamed
8	O/SUD/4/2004 (GU566047)	SUD04-04	639	615	0	96.24	3.76	EA-3	unnamed
9	O/SUD/1/2004 (GU566045)	SUD04-01	639	614	0	96.09	3.91	EA-3	unnamed
10	O/SUD/16/2004 (GU566052)	SUD04-16	639	614	0	96.09	3.91	EA-3	unnamed
Most Closely Related Reference Viruses									
(see http://www.wrlfmd.org/fmd_genotyping/prototypes.htm)									
Pos.	Virus name	Filename	No. nt comp.	No. nt match.	No. of ambig.	% Id.	% Diff.	Topotype	Strain
1	O/SUD/2/86 (DQ165075)	SUD86-02	639	581	0	90.92	9.08	EA-3	unnamed
2	O/ETH/1/2007 (FJ798137)	ETH07-01	639	553	0	86.54	13.46	EA-3	unnamed
3	O/IND/53/79 (AF292107)	IND79A53	639	551	0	86.23	13.77	ME-SA	unnamed
4	O/K83/79* (AJ303511)	KEN79B83	638	548	1	85.89	14.11	EA-1	unnamed
5	O/ETH/3/2004 (FJ798109)	ETH04-03	639	546	0	85.45	14.55	EA-3	unnamed
6	O/TAN/2/2004	TAN04-02	639	546	0	85.45	14.55	EA-2	unnamed
7	O/UGA/3/2002 (DQ165077)	UGA02-03	639	544	0	85.13	14.87	EA-2	unnamed
8	O/UKG/35/2001 (AJ539141)	UKG01-35	639	544	0	85.13	14.87	ME-SA	PanAsia
9	O/IND/R2/75* (AF204276)	IND75--A	639	543	0	84.98	15.02	ME-SA	unnamed
10	O/KEN/5/2002 (DQ165073)	KEN02-05	639	542	0	84.82	15.18	EA-2	Unnamed

nt, nucleotides

*, not a WRLFMD reference number

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Report on FMDV O in Sudan in 2009-2011

Batch: WRLFMD/2012/00028

◆ indicates viruses in this batch

Software: MEGA 5.0

Analysis

Analysis ----- Phylogeny Reconstruction

Scope ----- All Selected Taxa

Statistical Method ----- Neighbor-joining

Phylogeny Test

Test of Phylogeny ----- Bootstrap method

No. of Bootstrap Replications ----- 1000

Substitution Model

Substitutions Type ----- Nucleotide

Model/Method ----- Kimura 2-parameter model

Substitutions to Include ----- d: Transitions + Transversions

Rates and Patterns

Rates among Sites ----- Uniform rates

Pattern among Lineages ----- Same (Homogeneous)

Data Subset to Use

Gaps/Missing Data Treatment ----- Pairwise deletion

Codons Included ----- 1st+2nd+3rd+Non-Coding

No. of Sites : 642

No Of Bootstrap Reps = 1000

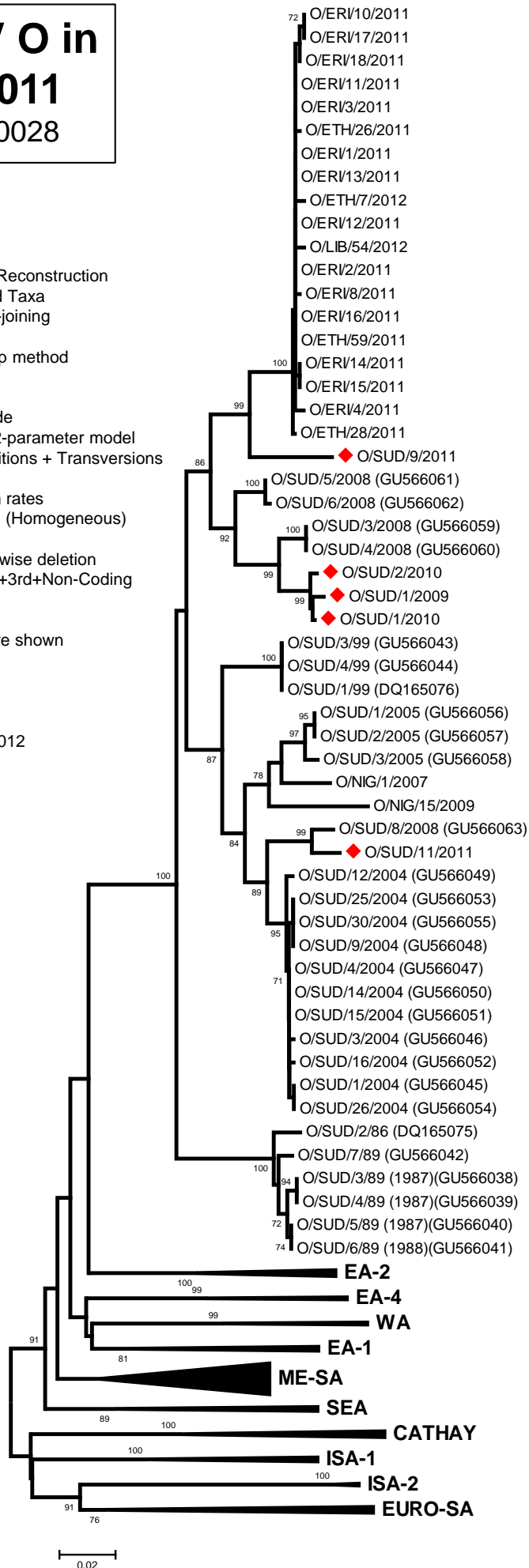
Only bootstrap values of 70% and above are shown

*, not a WRLFMD Ref. No.

N.J. Knowles & J. Wadsworth, 31 August 2012

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EA-3

0.02