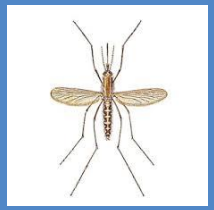
One Healthday Symposium
November, 2021

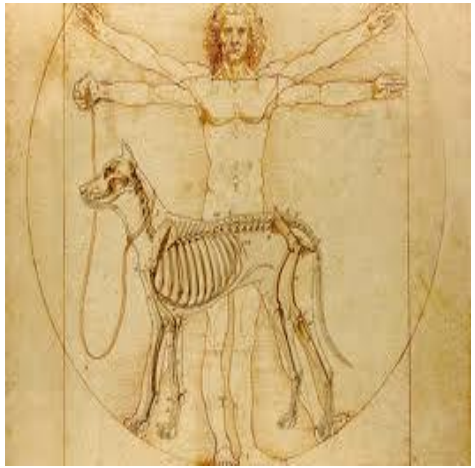

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of
Health Sciences

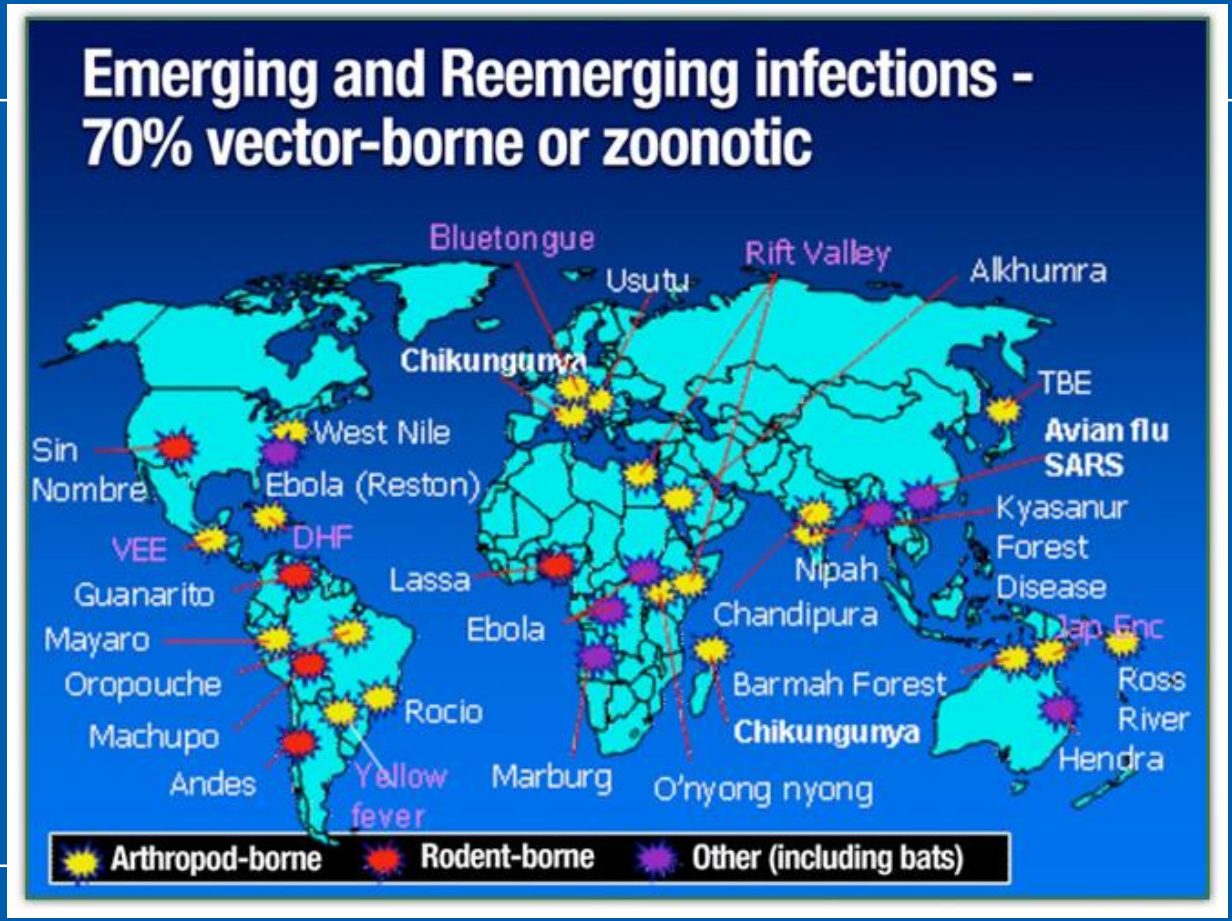
Fakulteit Gesondheidswetenskappe
Lefapha la Disaense tša Maphelo

The contribution of zoonotic arboviruses to Acute Fevers of unknown cause with or without neurological signs in humans and animals in Southern Africa

Prof Marietjie Venter (PhD)
Head: Zoonotic arbo and respiratory virus program
Centre for Viral Zoonoses
Department for Medical Virology



Make today matter



Zoonotic diseases: Modes of transmission

Insect vectors

Direct transmission through bodily fluids of animals or infected humans

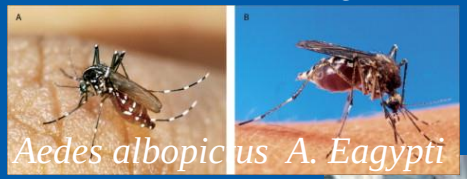
Aerosol/droplet transmission

Rickettsia,
Q-fever and Chrimean Congo-Crimean

Hyalomma ticks

SARS COV2?

Q-fever

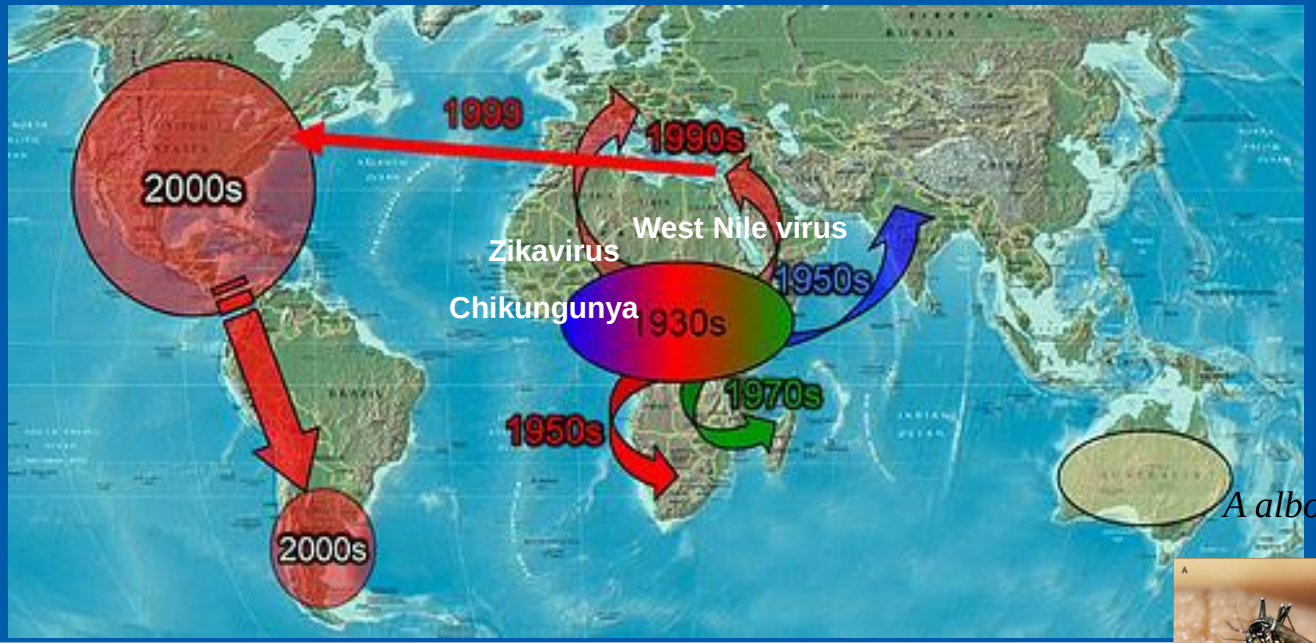


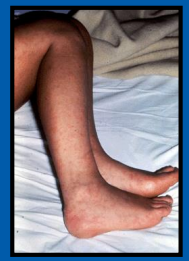
Dengue; Zika; Chikungunyavirus

Vectorborne viruses endemic to Africa, some of the most important emerging diseases in Western hemisphere:

West Nile virus

Zikavirus





Chikungunya

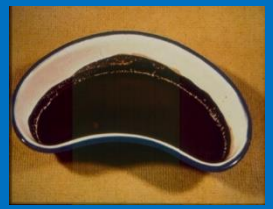
A albopictus Aedes Eagypti

Typical zoonotic Arbovirus symptoms

Chikungunya

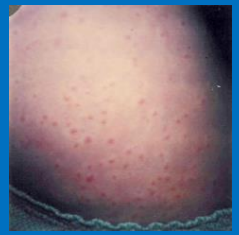
Dengue

RVF



Yellow fever

CCHF



Sindbis/WNV

WNV

- **Humans:**
  - Fever, headache, myalgia, arthralgia, morbilli-form rash and conjunctivitis.
  - Complications such as encephalitis, paralysis and haemorrhagic fever, death can also occur.
- **Animals**: Febrile; Abortion, encephalitis, paralysis, haemorrhagic manifestations, death
- zoonosis risk humans or insect vector transmitted

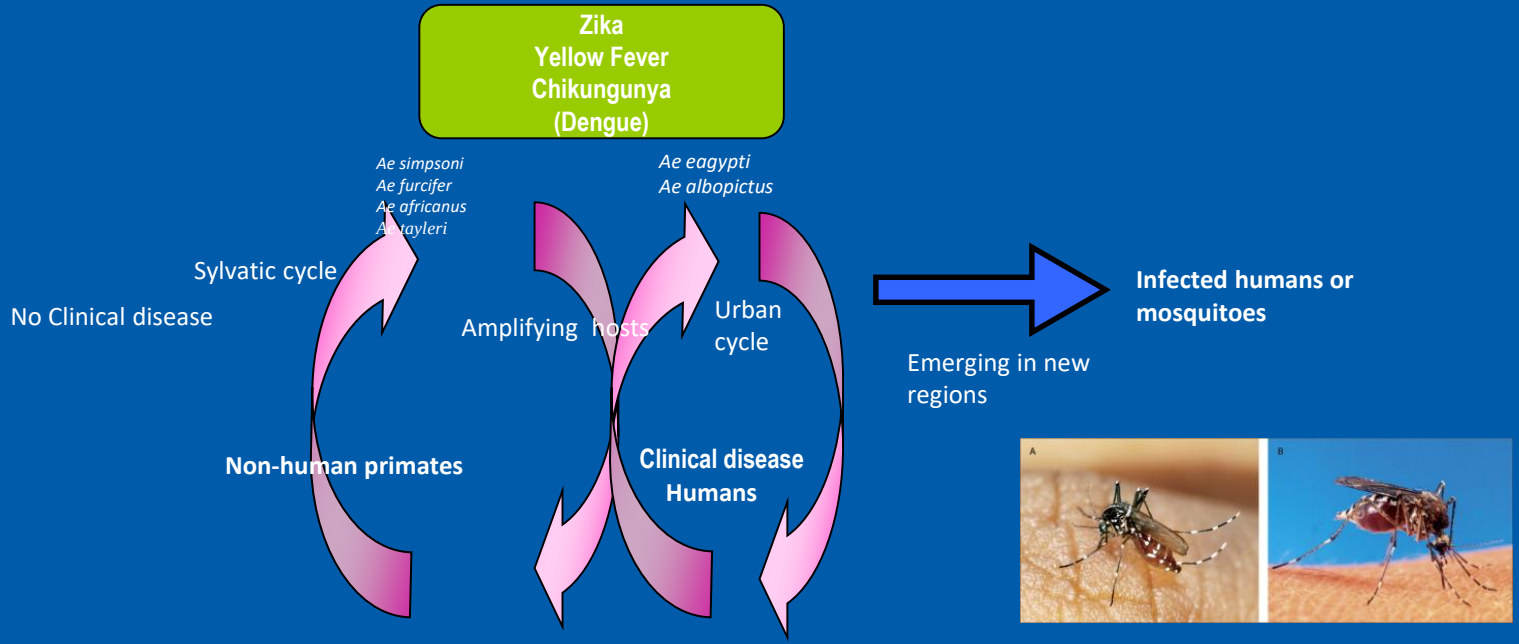
SELECTED ARBOVIRUSES OF MEDICAL (and veterinary) IMPORTANCE in Southern Africa				
Family	Virus (Examples)	Vector	Distribution	Clinical disease
Togaviridae (Genus: Alphavirus)	Chikungunya virus	Aedes mosquito	Africa, Asia, Caribbean, Americas	Polyarthritis & rash
	Sindbis virus	Culex mosquito	Europe, Africa, Asia	Acute fever ± skin rash
Flaviviridae *(Genus: Flavivirus)*	Zika virus	Aedes mosquito	Southeast Asia, Africa, Philippines, Americas	Acute fever ± skin rash, polyarthritis, neurological infections, microcephaly
	West Nile virus	Culex mosquito	Africa, Europe, North America, West Asia	Acute fever ± skin rash / Encephalitis
	Wesselsbron virus	Culex mosquito	Africa (China)	Meningitis/ hepatitis/abortions(animals)
	Yellow fever virus	Aedes mosquito	Tropical Africa, South America	Haemorrhagic fever
	Dengue virus	Aedes mosquito	Asia, Americas, Africa	Acute fever ± skin rash / Haemorrhagic fever
Bunyavirales: Phenuiviridae	Rift valley fever	Aedes mosquito	Africa Arabian peninsula	Retinitis/ encephalitis/ VHF Fever/meningoencephalites
Nairoviridae	Crimean-Congo haemorrhagic fever	Hyalomma tick	Africa, Middle East, Europe, Asia	Haemorrhagic fever
Peribunyaviridae (orthobunyavirus)	Shunivirus	Aedes/Culex/Cullicoides	Africa/Middle East	Neurological signs in humans/animals Abortions in livestock

Lesser known/Emerging Medically (and veterinary) important arboviral diseases of Southern Africa classified by virus family

Genus Major vector	virusses
Alphavirus (Mosquito borne)	Sindbis; Chikungunya; Middelburg virus (*Semlikiforrest; Ndumu; O'njong njong*)
Flavivirus (Mosquito borne)	West Nile; Wesselsbron; Banzi; Usutu, Bagaza *(dengue, yellow fever; Zika)*
Nairovirus (Tick borne)	Crimean-Congo hemorrhagic fever *Dugby, Nairobe sheep disease*
Phlebovirus (Mosquito borne)	Rift Valley fever
Orthobunya (Mosquitoes; cullicoides?)	*Shuni, Ngari, Bunyamwera, Ilesha, Shokwe, Germiston,*

ECOLOGY OF ARBOVIRUSES

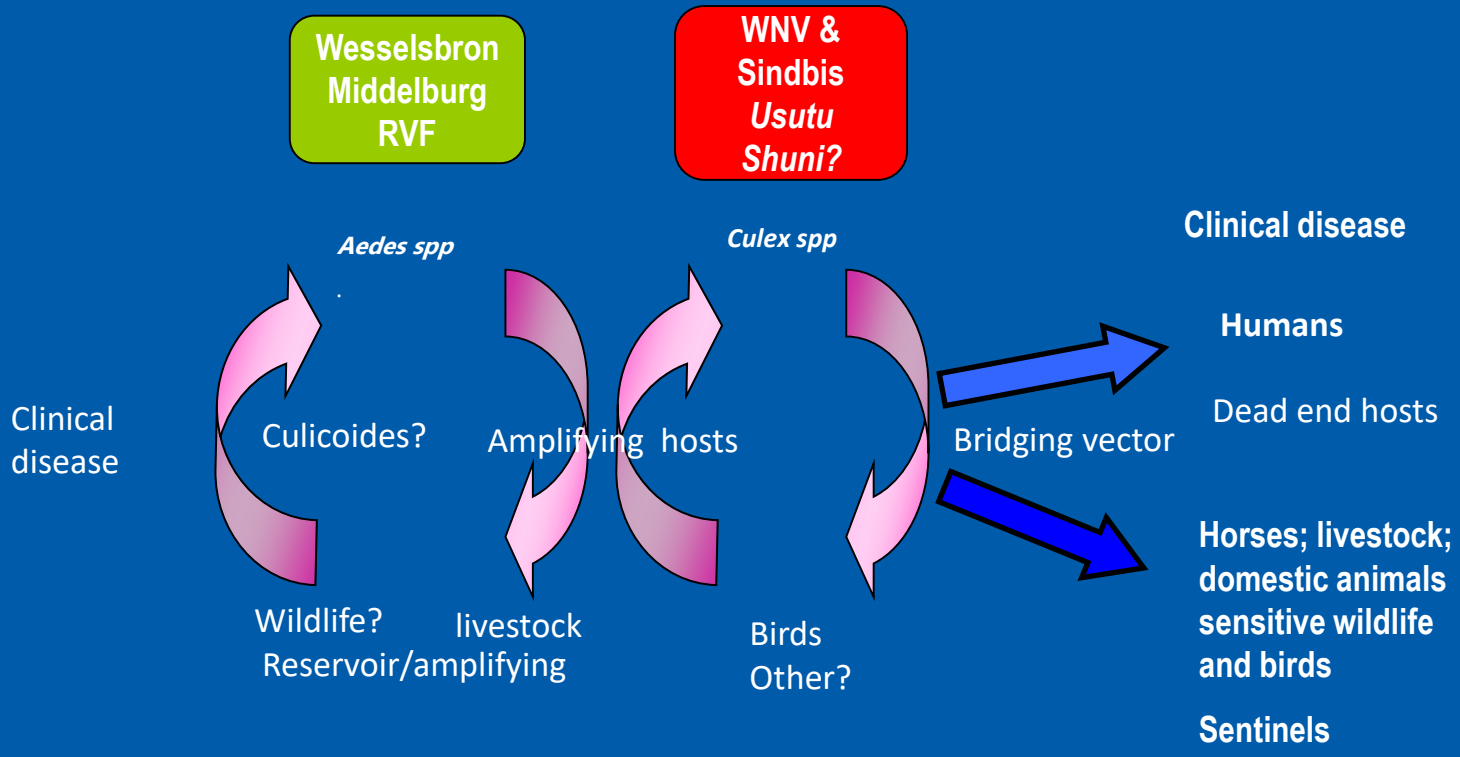
A. Yellow fever, chikungunya and Zikavirus utilise non-human primates as natural host in a sylvatic cycle with endemic *Aedes* mosquitoes but may use humans as only host in an urban cycle with competent vectors.



A albopictus
Aedes Eagypti

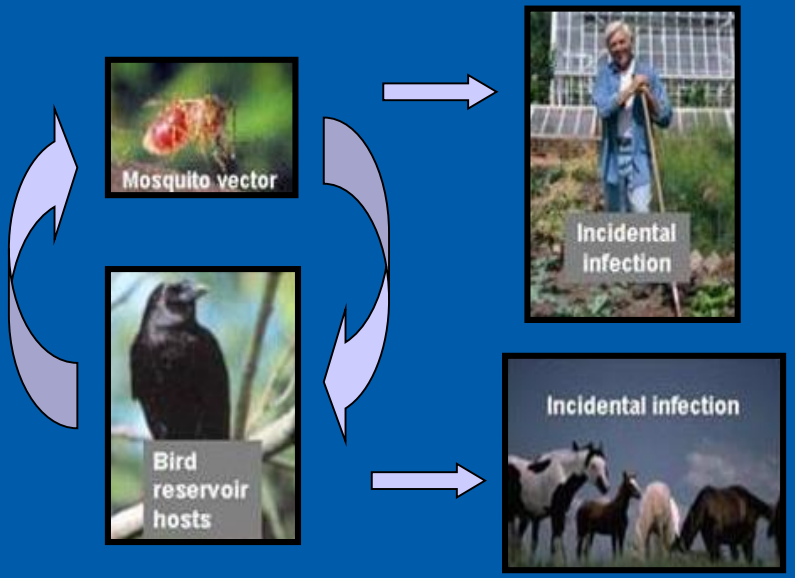
Available online at www.sciencedirect.com
ScienceDirect
Current Opinion in Virology
ELSEVIER
Assessing the zoonotic potential of arboviruses of African origin
Marietjie Venter
CrossMark

b. **Arboviruses with birds/ruminants/wildlife reservoirs and human /epizootic cycles**



Zoonotic/epizootic: follow climatic events, eg. floods; rainy year following drought

West Nile Virus/ Sindbis



Endemic: few bird deaths

- Circulate between Birds and *Culex* mosquitoes,
- Humans, horses and some other animals dead end hosts
- WNV/Sindbis majority human cases fever, headache, malaise, rash, pain in tendons & joints
- WNV: Severe neurological disease may occur in 90% of horses; 1-10% of humans
- Illness 3-10 days
- 1-10% WNV cases can develop meningo-encephalitis, Gullian Barre syndrome (WNV)
- Every year in the rainy season in SA, other?
- Likely under reported in Africa

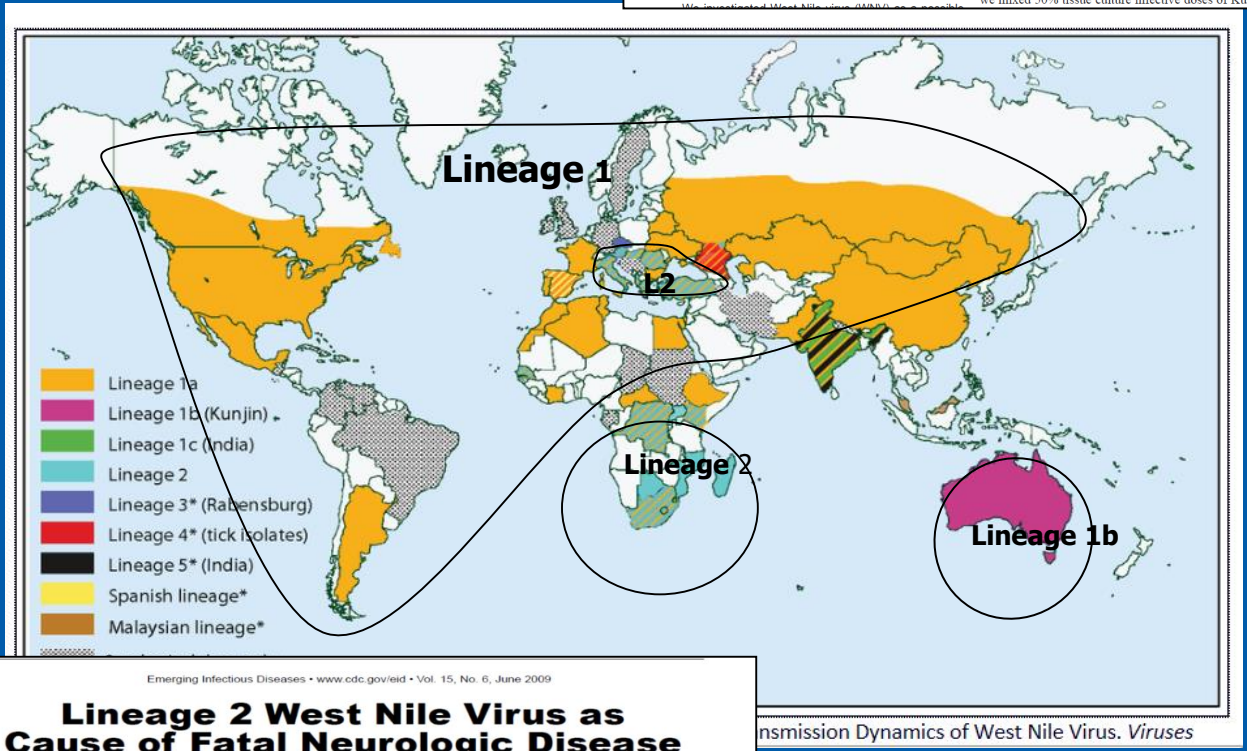
West Nile virus Global distribution

West Nile Virus Neurologic Disease in Humans, South Africa, September 2008–May 2009

Dewald Zaayman and Marietjie Venter

hospitals in northern South Africa. To select samples for testing, we reviewed laboratory submission requests for patients with clinical conditions consistent with WNV infection: fever, headache, rash, or neurologic signs (*7*,*8*). A total of 206 patient samples (15 CSF and 191 serum) were selected. During September 2008–May 2009, we screened samples for the presence of WNV by using real-time reverse transcription PCR (rRT-PCR) (*9*), virus neutralization assay, and IgM ELISA.

We detected WNV neutralizing antibodies in serum and CSF samples by using a modified method (*10*). In brief, we mixed 50% tissue culture infective doses of Kunjin vi-

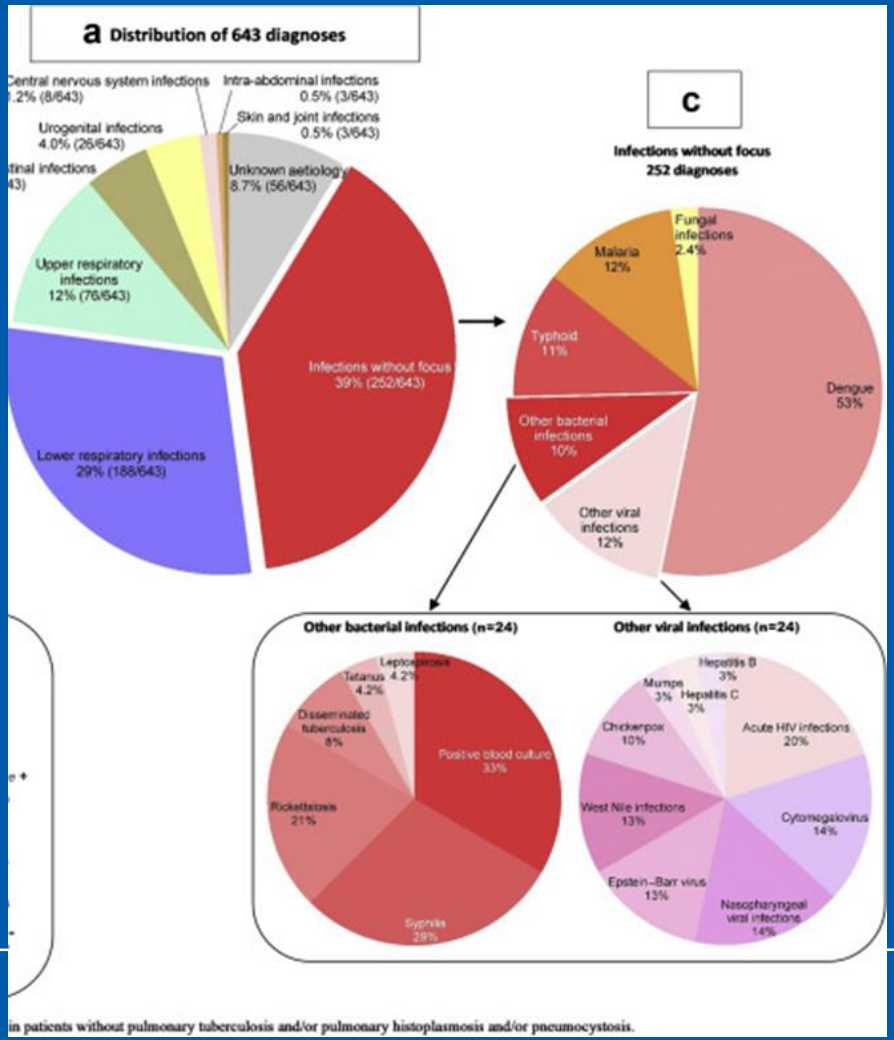


nsmission Dynamics of West Nile Virus. *Viruses*

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 15, No. 6, June 2009

Lineage 2 West Nile Virus as Cause of Fatal Neurologic Disease in Horses, South Africa

Marietjie Venter, Stacey Human, Dewald Zaayman, Gertruida H. Gerdes, June Williams, Johan Steyl, Patricia A. Leman, Janusz Tadeusz Paweska, Hildegard Setzkorn, Gavin Rous, Sue Murray, Rissa Parker, Cynthia Donnellan, and Robert Swanepoel



in patients without pulmonary tuberculosis and/or pulmonary histoplasmosis and/or pneumocystosis.

Clinical Microbiology and Infection 27 (2021) 913.e1–913.e7

Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

Original article

Causes of fever in Tanzanian adults attending outpatient clinics: a prospective cohort study

N. Boillat-Blanco [1, 2, 3, *], Z. Mbarack [4], J. Samaka [1], T. Mlaganile [1], T. Kazimoto [1], A. Mamin [5], B. Genton [2, 6], L. Kaiser [5], V. D'Acremont [2, 6]

Vector-Borne and Zoonotic Diseases VOL. 18, NO. 6 |

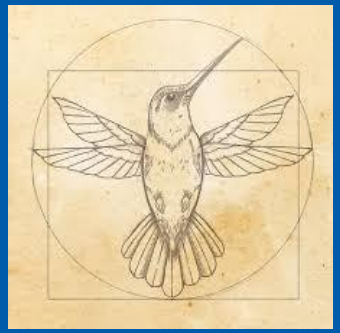
Prevalence of Selected Zoonotic Diseases and Risk Factors at a Human-Wildlife-Livestock Interface in Mpumalanga Province, South Africa

Gregory J.G. Simpson ; Vanessa Quan; , John Frean; , Darryn L. Knobel ; Jennifer Rossouw; , Jacqueline Weyer; , Tanguy Marcotty

Study group: Mnisi area of Bushbuckridge, Mpumalanga,
malaria-negative acute febrile illness (AFI) patients, at three clinics (n=74) & farmers, herders, and veterinary staff found at five government cattle dip-tanks, called dip-tanksters (n=64)
Methods: Blood samples tested by PCR (Bartonella spp.) and eight antibody-ELISAs

Results:. Bartonella spp. (PCR 9.5%), spotted fever group (SFG) Rickettsia spp. (IgM 24.1%), Coxiella burnetii. (IgM 2.3%), and Leptospira spp. (IgM 6.8%) were present in AFI patients.
Dip-tanksters and febrilers had evidence of past infection to Rickettsia spp. (IgG 92.2% and 63.4%, respectively) and C. burnetii (IgG 60.9% and 37.8%, respectively).
No Brucella infection or current Bartonella infection was found in the dip-tanksters, although they had higher levels of recent exposure to Leptospira spp. (IgM 21.9%) compared to the febrilers.
Low levels of West Nile and Sindbis, and no Rift Valley fever virus exposure were found in either groups

One Health strategy for zoonotic arbovirus surveillance at the ZARV program, University of Pretoria (2009-2021)

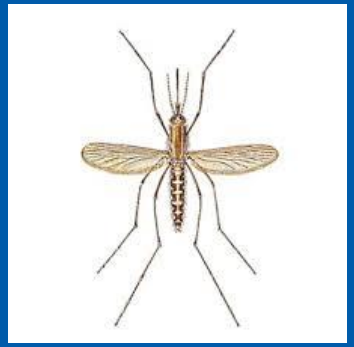


SENTINEL ANIMALS

Bird Fatalities

Neurological signs in horses livestock and wildlife

Abortion, death in young animals; VHF signs

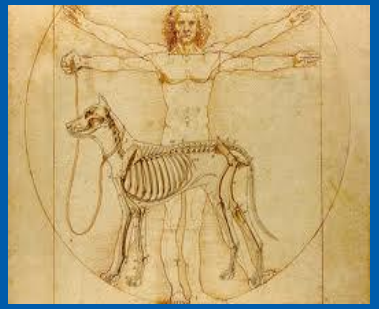


VECTOR SURVEILLANCE

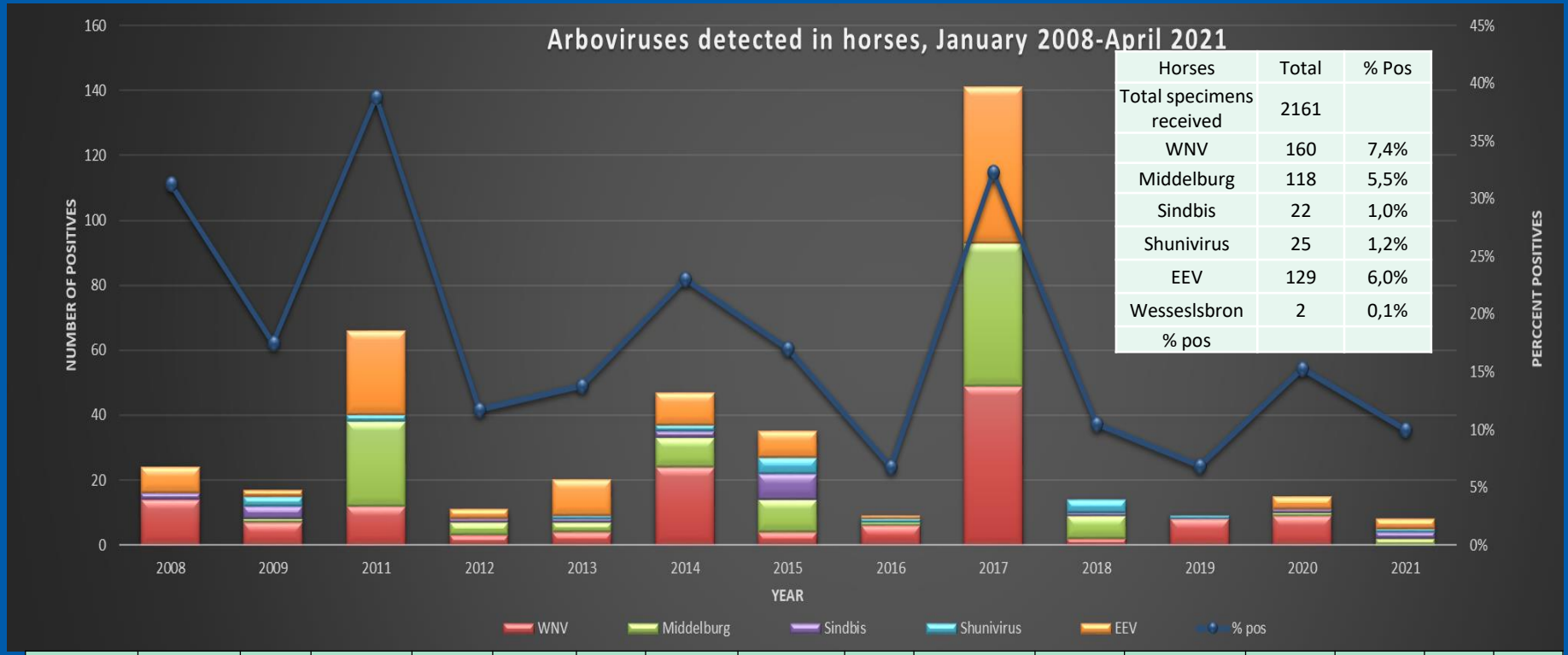
Ticks;
culicoides;
mosquitoes;
sandflies

HUMAN SYNDROMIC SURVEILLANCE

Febrile; arthralgia; rash neurological; VHF

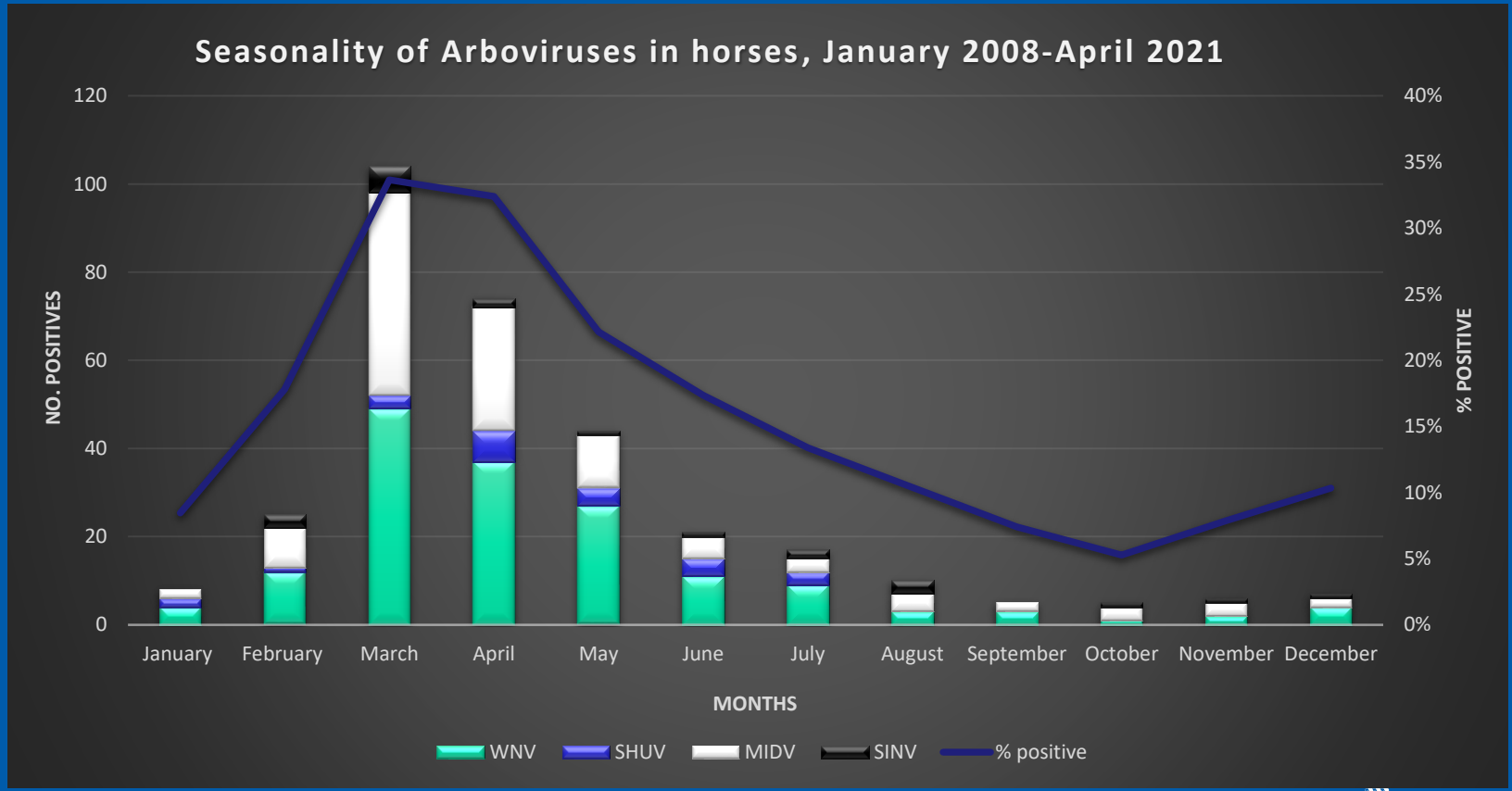


Arboviruses associated with febrile and neurological disease in horses 2008-2021



Horses	Total	% Pos
Total specimens received	2161	
WNV	160	7,4%
Middelburg	118	5,5%
Sindbis	22	1,0%
Shunivirus	25	1,2%
EEV	129	6,0%
Wesseslsbron	2	0,1%
% pos		

Horses	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total	% Pos
Total specimens received	83	97	150	170	94	145	204	206	133	437	133	131	98	80	**2161**	
WNV	14	7	18	12	3	4	24	4	6	49	2	8	9	0	**160**	7,4%


Seasonality of Arboviruses in horses, January 2008-April 2021
NO. POSITIVES
% POSITIVE
120
100
80
60
40
20
0
40%
35%
30%
25%
20%
15%
10%
5%
0%
January
February
March
April
May
June
July
August
September
October
November
December
MONTHS
WNV
SHUV
MIDV
SINV
% positive

Wildlife, livestock and domestic (2008-2021)												
Category	Species	Total	# of positives	% any positive	MIDV Positives N (%)	SINV Positives N (%)	SHUV/SHUV-like Positives N (%)	WNV Positives N (%)	EEV Positives N (%)	Co-infection	BAGV Positive N (%)
Wildlife	Buffalo	55	4	7,27	1 (2.1)	-	3 (6%)	-	-	-	-
	Rhinoceros	70	10	14,29	8 (9.52)	1 (1.58)	1 (1.58)	-	2 (3,17)	MIDV/EEV MIDV/SHUV	-
	Sable	52	5	9,62	2 (3,92)	2 (3,92)	1 (1,96)	-	-	-	-
	Warthog	21	3	14,29	2 (9.52)	-	1 (4.76)	-	-	-	-
	Lion	22	3	13,64	2 (16.67)	-	-	1 (8.33)	-	-	-
	Genet	2	2	100	1 (50.0)	1 (50.0)	-	-	-	MIDV/SINV	-
	Giraffe	7	2	28,57	-	1 (33,33)	1 (33,33)	1 (33,33)	-	WNV/SHUV	-
	Crocodile	28	1	3,57	-	-	1 (8.33)	-	-	-	-
	Deer	3	1	33,33	-	-	-	1 (33,33)	-	-	-
	Roan	61	3	4,92	1	-	-	2 (6,89)	-	-	-
	Avian	59	9	16,67	1 (1,69)	-	1 (1,69)	-	-	-	8 (13,55)
	Flamingo	3	2	66,67	-	-	-	2 (66.67)	-	-	-
	Other carnivores	18	-		-	-	-	-	-	-	-
	Seal	8	-	-	-	-	-	-	-	-	-
Livestock	Caprine	14	1	7,14	-	-	1	1 (10,00)	-	-	-
	Bovine	116	9	7,76	4 (4,21)	-	2 (1,05)	1 (1.05)	-	MIDV/WNV	-
	Ovine	2	1	50			1	1			
Domestic	Canine	23	4 (3 AHSV)	17,39	-	0	-	1 (4,76)	-	-	-
	Feline	2	-	-	-	-	-	-	-	-	-
	Total	**566**	**56**	**0,10**	**22**	**5**	**13**	**10**	**2**	**4**	**8**
%			**10**		39,29	8,93	23,21	17,86	3,57	7,14	14,29

pathogens

MDPI

Article

Epidemiology and Clinical Presentation of West Nile Virus Infection in Horses in South Africa, 2016–2017

Freude-Marié Bertram [1,†], Peter N. Thompson [1] and Marietjie Venter [2,*]

Table 4. Final logistic regression model of factors associated with WNV-infection in South African horses with acute febrile or neurological disease detected by the Zoonotic Arbo- and Respiratory Virus (ZARV) programme at the Centre for Viral Zoonoses (CVZ), 2016–2017.

Variable	Level	Odds Ratio	95% CI	*p*-Value
Month	January–February	5.4	0.6, 49.9	0.134
	March–April	18.0	2.2, 149.5	0.007
	May–June	4.2	0.4, 44.9	0.241
	July–December	1*	–	–
Altitude	16–1056 m	1*	–	–
	1057–1292 m	1.2	0.4, 3.9	0.807
	1293–1466 m	6.0	1.9, 19.1	0.003
	1467–1784 m	1.2	0.3, 4.3	0.764
WNV vaccinated	Yes vs. no	0.1	0.0, 1.0	0.047
Age in years	Continuous	0.9	0.9, 1.0	0.041
Breed	Highly Purebred	3.0	0.9, 9.7	0.068
	Intermediate Hybrid vigour	4.9	1.3, 18.2	0.019
	Mixed and Local	1*	–	–
Equine influenza virus vaccinated	Yes vs. no	2.1	0.8, 5.6	0.153

* Reference level.

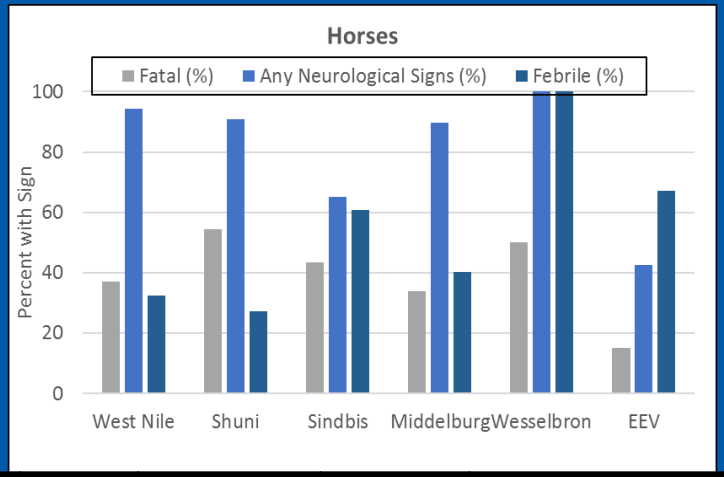
Clinical signs reported in equines submitted for West Nile virus diagnosis in 2017-2020, including odds ratios, 95% confidence interval and the associated p-value

Dutch warmblood: West Nile Lineage 2 case: tongue tied in due to tongue paralysis; horse eventually fell over dead after 3 days in hospital
- Dr June Williams

WNV Lineage 2: Outside Pretoria, backleg paralysis
Dr Hildegard Setzkorn

Symptom	WNV positive (N=77)	WNV negative (N=758)	Odds ratio [95% CI]	p-value
Fever only	5 (6.49%)	147 (19.39%)	0.28 [0.11-0.72]	**<0.05**
Neurological symptoms	71 (92.21%)	514 (67.81%)	**5.62 [2.40-13.10]**	**0**
Ataxia	49 (63.64%)	294 (38.79%)	2.76 [1.69-4.49]	0
Hyperreactive	2 (2.60%)	1 (0.13%)	20.18 [1.80-225.25]	**<0.05**
Icterus	15 (19.48%)	70 (1.01%)	23.81 [12.90-43.86]	0
Lethargy	4 (5.19%)	9 (1.19%)	4.56 [1.37-15.17]	**<0.05**
Muscle fasciculations	3 (3.90%)	1 (0.13%)	30.69 [3.15-298.77]	**<0.05**
Paralysis	10 (13.16%)	33 (4.35%)	3.32 [1.57-7.05]	**<0.05**
Paresis	23 (29.87%)	101 (13.93%)	2.63 [1.54-4.47]	0
Recumbency	25 (32.47%)	106 (14.62%)	2.81 [1.66-4.72]	0
Weak	2 (2.60%)	12 (1.66%)	1.58 [0.34-7.21]	0.6
Blindness	1 (1.30%)	9 (1.24%)	1.04 [0.13-8.37]	1
Congested mucous membranes	4 (5.19%)	37 (5.10%)	1.02 [0.35-2.93]	1
Depressed	2 (2.60%)	10 (1.32%)	1.99 [0.42-9.27]	0.3
Dyspnoea	1 (1.30%)	43 (5.93%)	0.20 [0.02-1.53]	0.11
Head tilt	1 (1.30%)	12 (1.66%)	0.78 [0.10-6.09]	1
Seizure	2 (2.60%)	36 (4.75%)	0.53 [1.2-2.26]	0.56
Tongue paralysis	1 (1.20%)	6 (0.79%)	1.62 [0.19-13.69]	0.49
Fatal	22 (28.57%)	227 (29.95%)	0.93 [0.55-1.57]	0.89
Vaccination present	1 (1.30%)	21 (2.77%)	0.46 [0.061-3.84]	0.71
No vaccination	76 (98.70%)	737 (97.23%)	2.17 [0.28-16.32]	0.71

Clinical presentation of arboviruses identified in horses with febrile and neurological disease 2008-2015



Virus	Number Positive	Fatal %	Any Neurological Signs %	Febrile %	% of Positives	%Total
West Nile	86	36,05	94,19	33,72	**33,33**	7,66
Shuni	18	44,44	88,89	33,33	**6,98**	1,60
Sindbis	18	27,78	55,56	72,22	**6,98**	1,60
Middelburg	62	22,58	87,1	46,77	**24,03**	5,52
Wesselbron	2	50	100	100	**0,78**	0,18
EEV	72	13,89	41,67	68,06	**27,91**	6,41
Total:	258					22,97

Complete paralysis Shuni

Hind leg paralysis: WNV

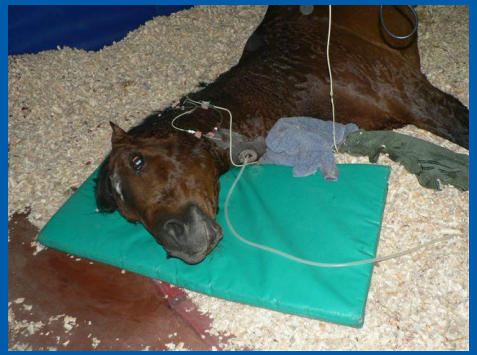
Tongue paralysis: WNV)

Clinical presentation of arboviruses identified in horses wildlife and cattle with febrile and neurological disease

Shunivirus in Rhino calf

Middelburg in Sable

WNV in exotic flamingo

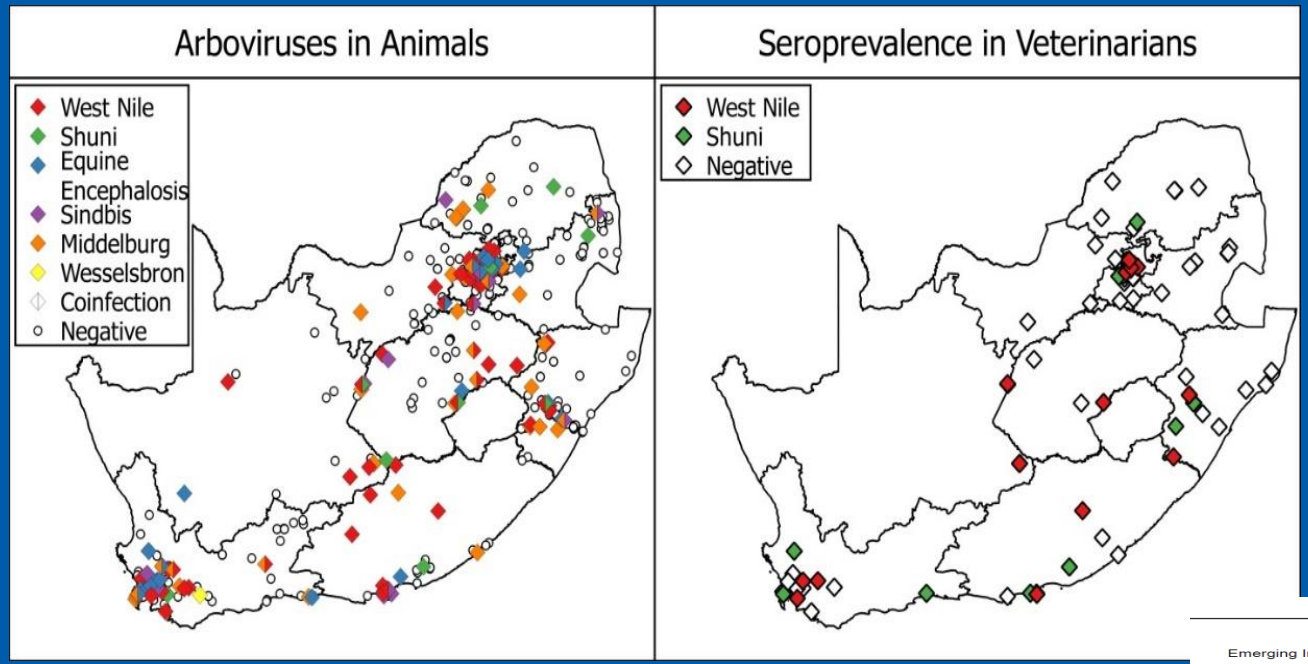


Complete paralysis Shuni

Middelburg in Nguni Cow

Hind leg paralysis: WNV

Arbovirus cases in animals relative to sero-prevelance in veterinarians (2008-2016)



WNV: 7.9%
Shunivirus:3,9%

LETTERS

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 20, No. 8, August 2014

Bosserman
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Antibodies against West Nile and Shuni Viruses in Veterinarians, South Africa

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 18, No. 12, December 2012

West Nile Virus Neurologic Disease in Humans, South Africa, September 2008–May 2009

Dewald Zaayman and Marietjie Venter

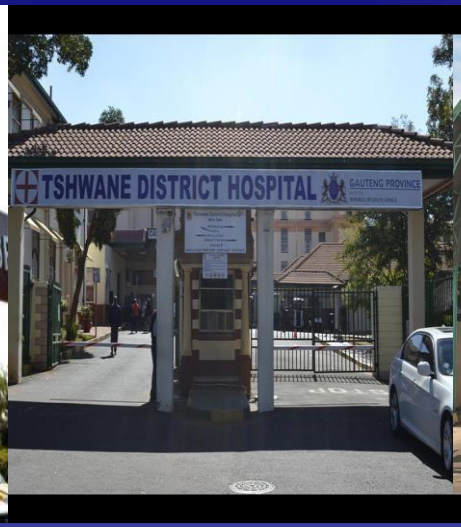
hospitals in northern South Africa. To select samples for testing, we reviewed laboratory submission requests for patients with clinical conditions consistent with WNV in-

Table 1. Clinical information for the 7 acutely ill patients that tested positive for WNV antigen or antibody (Zaayman and Venter, unpublished)

Sample no	Age (sex)	Result (sample type)	Clinical information
4562	45 (M)	Neutralization Pos (CSF)	Suspected HIV Encephalopathy or PML TPHA Neg HIV Neg Paraparesis
6208	35 (F)	Neutralization Pos (CSF)	Hepatomegaly, Lymphadenopathy Fever Vomiting Epigastric pain EBV IgM Neg, EBV IgG Pos Malaria Neg, Hepatitis Neg
8785	36 (M)	Neutralization Pos (CSF)	Acute paresis of lower limbs Delirium HSV-1 and 2 PCR Neg HTLV-1 Neg TPHA Neg
3111	5 (M)	Neutralization Pos (CSF)	Meningitis Enterovirus PCR Pos
0269	11 (M)	Neutralization Pos/ IgM Pos (Serum)	Rash Brucella PCR Neg CMV IgM Neg, CMV IgG Pos
0312	26 (M)	Neutralization Pos/ IgM Pos (Serum)	Severe headache *Rickettsia conorii* Neg EBV IgM Neg
5238	2 (M)	PCR Pos (CSF)	Decreased LOC Measles Neg Mumps Neg

Pos: Positive; Neg: Negative; LOC: Level of consciousness; CSF: Cerebrospinal fluid; HSV-1 and 2: Herpes simplex virus type 1 and 2; EBV: Epstein-Barr virus; CMV: Cytomegalovirus; HTLV: Human T-lymphotropic virus; HIV: Human immunodeficiency virus; TPHA: *Treponema pallidum* haemagglutination assay

Human surveillance for febrile disease of unknown origin and neurological infections



Government/ Public Hospitals in Gauteng and Mpumalanga

ANDEMIA: African network for improved diagnostics and epidemiology in Africa:
Funding: Robert Koch Institute (BMBF)

University of Pretoria Faculty of Health ethics committee protocol: 101/2017

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Investigation of arboviruses in humans in SA

NHLS pilot study:

- **CSF samples from patients with acute neurological symptoms, submitted to NHLS Tshwane virology lab, hospitals in the Tshwane region);**
- **January-June (Arbovirus season) 2017**
- **Screened for**
  - **flaviviruses nested real-time RT-PCR with WNV probes; Euromune WNV IgM ELISA;VNT**
  - **Sindbis/Middelburg: (Real time PCR); Sindbisvirus Euromune IgM IFA, VNT**
  - **Shunivirus: Sinbuvirus genus(ortbobunyavirus realtime PCR**

ANDEMIA: African Network for improved Diagnostics, Epidemiology and Management of Common Infectious Agents

- **Active surveillance in humans:**
- **3 Sentinel sites: 1x urban, Kalafong hospital (Gauteng province),**

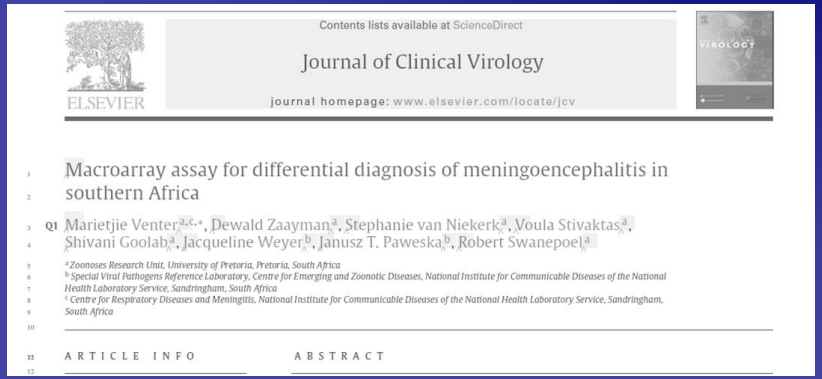
  2 x rural sites, in Mpumalanga (rural), namely Matikwana and Mapulaneng
- Both sites agricultural exposure, Zoonotic diseases/One Health in SA;
- Patients enrolled with informed consent; detailed case investigation forms with epidemiological information;
- **From January 2019 to December 2020**
- **Acute febrile disease of unknown cause (AFDUC) inclusion criteria:**

1. Fever (≥38°C) or history of fever in last 10 days
2. And/or Acute neurological signs or symptoms
3. No obvious cause, other suspicion of haemorrhagic fever or acute neurological disease
4. Any signs of myalgia/ arthralgia/ rash

The FEVER CHIP

Target Pathogen	
West Nile Virus	Mumps virus
Rift Valley Fever	Herpes simples virus-1
Chikungunya virus	Herpes simples virus-2
Sindbis virus	Varicella Zoster virus
Rubella virus	Rabies virus
CCHF	Epstein-Barr virus
Cytomegalo-virus	JC virus
Measles virus	Enterovirus

Target Pathogen	
Dengue virus	*Coxiella burnetti*
Ehrlichia	*Mycobacterium tuberculosis*
Rickettsia spp.	*Neisseria meningitides*
Borrelia burgdorferi	*Plasmodium falciparum*
Brucella spp.	Flavivirus genus
Adenovirus	Hepatitis A virus
Leptospira spp.	Hepatitis B virus



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Journal of Clinical Virology

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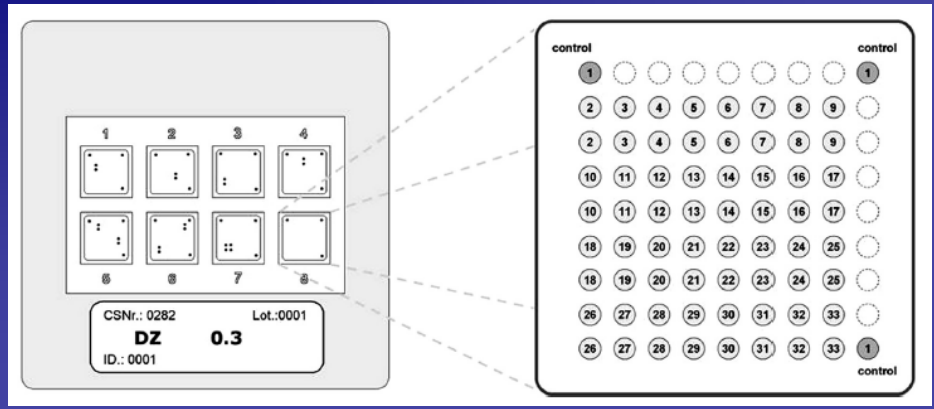
Macroarray assay for differential diagnosis of meningoencephalitis in southern Africa

Marietjie Venter[a,c,*], Dewald Zaayman[a], Stephanie van Niekerk[a], Voula Stivaktas[a], Shivani Goolab[a], Jacqueline Weyer[b], Janusz T. Paweska[b], Robert Swanepoel[a]

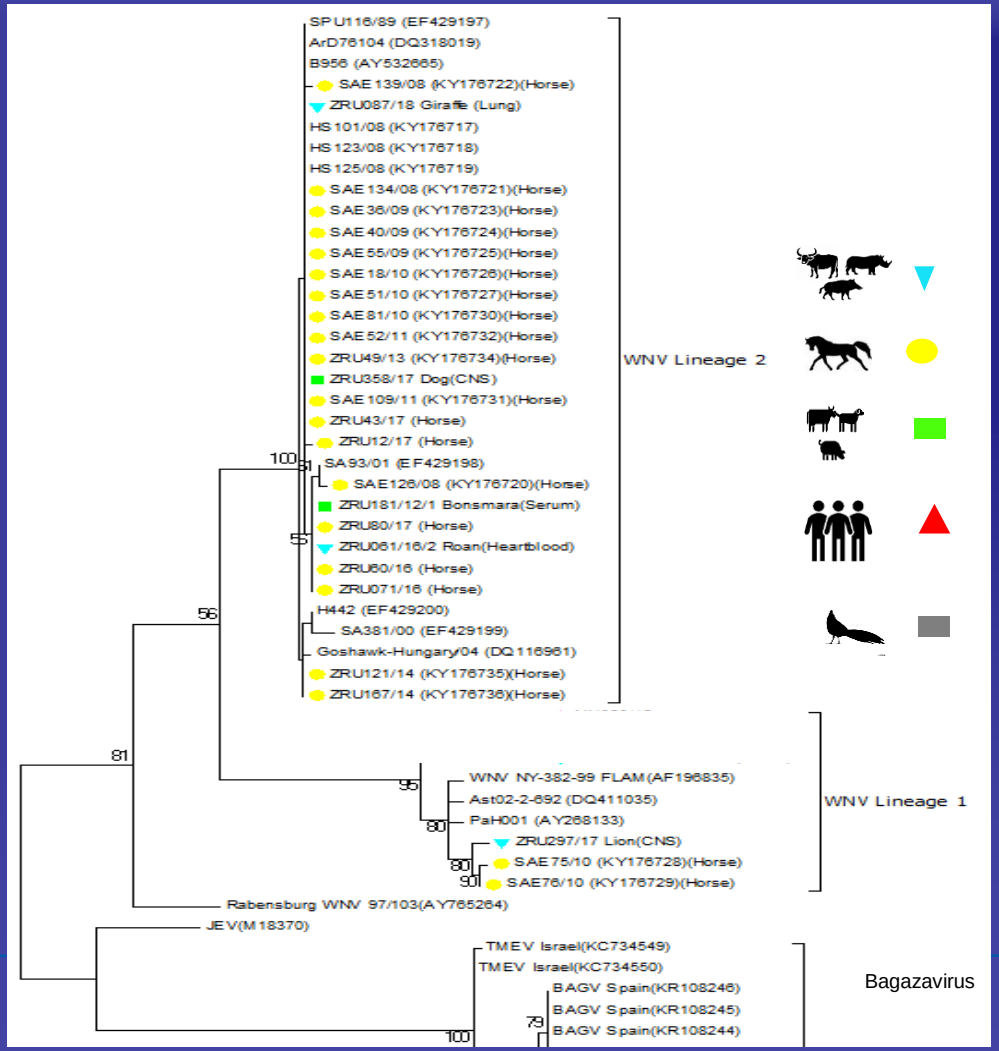
[a] Zoonoses Research Unit, University of Pretoria, Pretoria, South Africa
[b] Special Viral Pathogens Reference Laboratory, Centre for Emerging and Zoonotic Diseases, National Institute for Communicable Diseases of the National Health Laboratory Service, Sandringham, South Africa
[c] Centre for Respiratory Diseases and Meningitis, National Institute for Communicable Diseases of the National Health Laboratory Service, Sandringham, South Africa

ARTICLE INFO

ABSTRACT



West Nile virus strains detected in animals, and humans in South Africa



Maximum likelihood tree based on the NS5 gene, 1000bts, 58 taxa

West Nile Virus Lineage 2 in Horses and Other Animals with Neurologic Disease, South Africa, 2008–2015

Marietjie Venter, Marthi Pretorius, James A. Fuller, Elizabeth Botha, Mpho Rakgotho, Voula Stivaktas, Camilla Wever, Marco Romito, June Williams

WNV isolates are divided into 2 lineages (δ): lineage 1, which predominates in the Northern Hemisphere and Australia, and lineage 2, which is endemic to southern Africa and Madagascar and started emerging in central Europe in

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 23, No. 12, December 2017

CDC Centers for Disease Control and Prevention

EMERGING INFECTIOUS DISEASES

ISSN: 1080-60

EID Journal > Volume 25 > Number 12—December 2019 > Main Article

Volume 25, Number 12—December 2019

Dispatch

West Nile Virus in Wildlife and Nonequine Domestic Animals, South Africa, 2010–2018

Jumari Steyn, Elizabeth Botha, Voula I. Stivaktas, Peter Buss, Brianna R. Beechler, Jan G. Myburgh, Johan Steyl, June Williams, and Marietjie Venter

Author affiliations: University of Pretoria, Pretoria, South Africa (J. Steyn, E. Botha, V.I. Stivaktas, J.G. Myburgh, J. Steyl, J. Williams, M. Venter); South African National Parks, Kruger National Park, South Africa (P. Buss); Oregon State University, Corvallis, Oregon, USA (B.R. Beechler)

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f 17 Emerging Infectious Diseases

EMERGENCE OF LINEAGE 1 WEST NILE VIRUS IN SOUTH AFRICA ASSOCIATED WITH FATAL NEUROLOGICAL DISEASE AND ABORTION IN A HORSE

Marietjie Venter[1,2], Stacey Human[1], Stephanie van Niekerk[1], June Williams[1,4], Charmaine van Eeden[1] and Frank Freeman[3]

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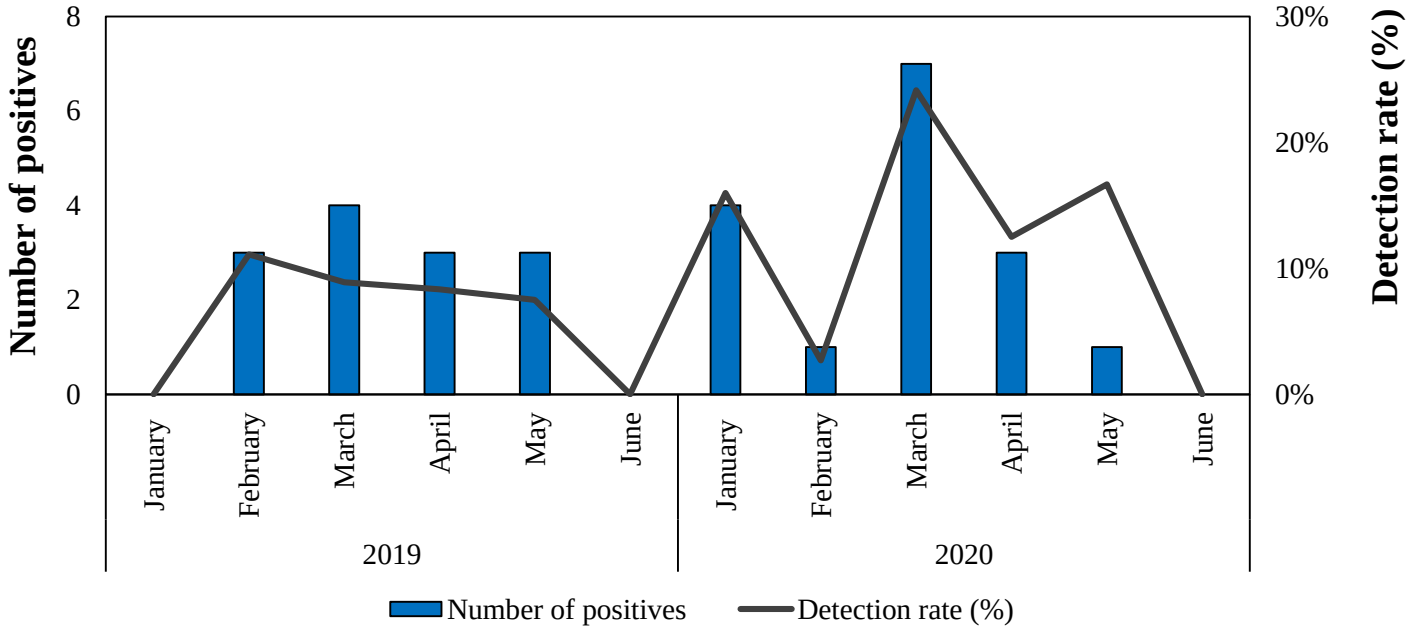
West Nile virus IgM positivity in patients experiencing acute febrile disease of unknown cause, South Africa (2019-2020)



Sindbis in ANDEMIA AFDUC patients (2019-2021)

	Gauteng		Mpumalanga		Total
	2019	2020	2019	2020	
Molecular tests					
N multiplex PCR tested (%)	263 (41.2)	162 (25.4)	148 (23.1)	66 (10.3)	639 (100)
N multiplex PCR positive	0	0	0	0	0
Serologic tests					
Enrolled Jan – June (%)	141 (37.3)	93 (24.6)	82 (21.7)	62 (16.4)	378 (100)
IFA IgM tested (%) [95% CI]	73 (52) [43.2-60.3]	47 (51) [40.0-61.1]	42 (51) [39.9-62.4]	35 (56 [43.3-69.0])	197 (52) [47.1-57.1]
IFA IgM positive (%) [95% CI]	14 (19.2) [10.9-30.1]	4 (8.5) [15.6-42.6]	13 (31.0) [17.6-47.1]	7 (20) [8.4-39.9]	38 (19.3) [14.0-25.5]
SINV micro-NTs					
Percentage positivity per samples (%) [95%CI]	10/73 (13,7) [6.8-23.8]	3/47 (6,4) [1.3-17.5]	9/42 (21.4) [10.3-36.8]	3/35 (8.6) [1.8-23.1]	25/197 (12,7) [8.4-18.2]

Sindbis in hospitalised AFDUC patients

Age (%)	
0-5	19/112 (17.0) [10.5-25.2]
6-29	5/27 (18.5) [6.3-38.1]
30-49	14/49 (28.6) [16.6-43.3]
50+	0/9 (0.0)
Sex (%)	
Female	24/104 (23.1) [15.4-32.4]
Male	14/93 (15.1) [8.5-23.9]
OR	1,69 [0.82-3,51], p=0,2

Table 3: Clinical symptoms reported in AFDUC patients upon enrolment from January to June, 2019-2020. The percentage (%), 95.0 % Confidence interval (CI) and P value is also indicated.

Sign	SINV positive N=38	SINV negative N=159	Odds ratio	[2]P-value
Fatigue	29 (76.3%)	109 (68.6%)	1.48[0.65-3.35]	0.3
Headache	22 (57.9%)	60 (37.7%)	2.27[1.11-4.66]	**<0.05**
Chills	9 (23.7%)	40 (25.2%)	0.92[0.40-2.12]	0.9
Weight loss	9 (23.7%)	50 (31.5%)	0.68[0.30-1.54]	0.3
Meningitis	21 (55.3%)	52 (32.7%)	2.54[1.24-5.22]	**<0.05**
Acute flaccid paralysis	2 (5.3%)	17 (10.7%)	0.46[0.10-2.10]	0.3
Seizure	11 (28.9%)	58 (36.5%)	0.71[3.33-1.54]	0.4
Arthralgia	8 (21.1%)	15 (9.4%)	2.56[1.00-6.58]	**<0.05**
[1]Dermatological signs	7 (18.4%)	22 (13.8%)	1.41[0.55-3.58]	0.5
Fever	15 (39.5%)	70 (44.0%)	0.83[0.4-1.71]	0.6
Nausea	8 (21.1%)	18 (11.3%)	2.09[0.83-5.25]	0.11
HIV positive	12 (31.8%)	37 (23.3%)	1.52[0.70-3.31]	0.3

[1]**Dermatological signs:** Pruritus (itching), Skin rash, Skin patches.

[2]**P-values** less than 0.05 is regarded as significant.

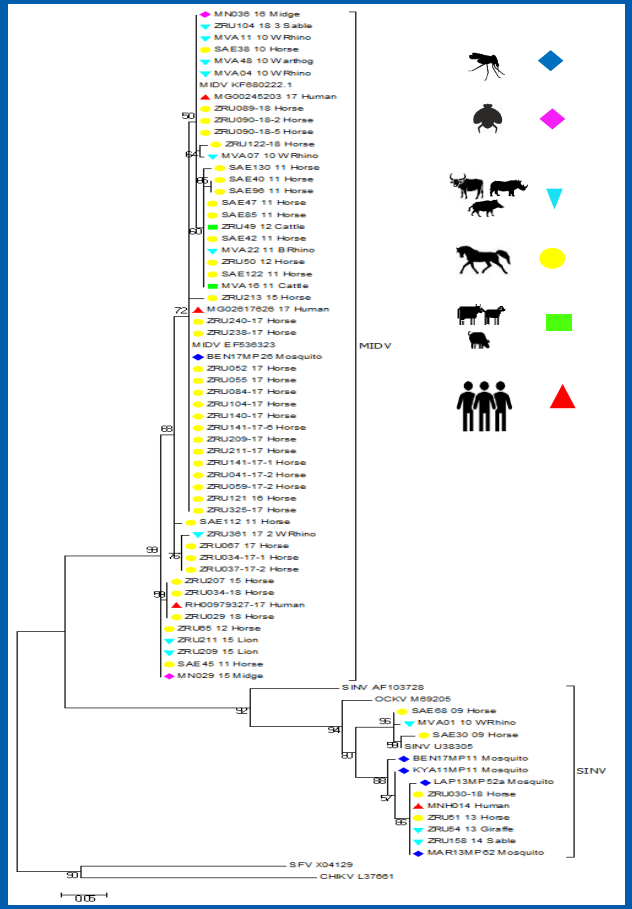
NHLS: Middelburg alphavirus in patients with neurological signs in Tshwane

- CSF samples from patients submitted for virus testing to the NHLS Virology laboratory during the arbovirus season
- (January –May 2017).
- **MIDV RTPCR +: (4/189) 2%**
- 3 from hospitalized patients submitted to NHLS
- 1 from 2 veterinary student referred to the infectious disease specialist at Steve Biko hospital, submitted directly to the ZARV, department of Medical Virology.

Table 1: Patient information for Middelburg virus positive human cases.

Sample ID	Sample collection	Age	Sex	Symptoms	Other diagnosis	HIV status	Other tests (result)	Location
ZRU 099/17	*Ad hoc* veterinary student	24	F	Cough, fever, neck stiffness, myalgia, nausea, severe headaches	None (history of brain tumour, in remission, no treatment at suspected time of infection)	(-):	Meningochip (31 pathogens Chipron LCD macroarray) (27) (all (-))	Vereeniging (weekends) Onderstepoort veterinary Faculty, Pretoria (weekdays)
ZRUH 177/17	Retrospective NHLS sample	49	M	Acute blindness, general weakness, body pains	VZV, syphilis, Devic's disease	(+)	VZV (+) syphilis (+) JC-virus (-)	Small holding Zwavelpoort, Pretoria East, Gauteng
ZRUH 248/17	Retrospective NHLS sample	30	F	(?)	(?)	(?)	HSV 1& 2 (-)	Unknown
ZRUH 399/17	Retrospective NHLS sample	2	M	Tonic-clonic seizures, diarrhoea, vomiting	Acute gastric enteritis, dysentery	(-):	Enterovirus (-) Shigella dysentery (+)	Centurion, Gauteng

Middelburgvirus and Sindbis cases detected in humans, animals and mosquitoes



Maximum Likelihood method on nsp4 gene, Model=Kimura 2 model 74 sequences, 129 nts, 1000bts

PLOS Neglected Tropical Diseases

1 **Title: Detection and genome characterization of Middelburg virus strains isolated from**

2 **CSF and whole blood samples of humans with neurological manifestations in South**

3 **Africa.**

4 **Authors**

5 Isabel Fourie, June Williams, Arshad Ismail, Petrus Jansen van Vuren, Marietjie Venter✉

EMERGING INFECTIOUS DISEASES®

ISSN: 1080-60

EID Journal > Volume 26 > Number 6—June 2020 > Main Article > Figure 3

Volume 26, Number 6—June 2020

Research

Zoonotic Alphaviruses in Fatal and Neurologic Infections in Wildlife and Nonequine Domestic Animals, South Africa

Jumari Steyn, Isabel Fourie, Johan Steyl, June Williams, Voula Stivaktas, Elizabeth Botha, Stefanie van Niekerk, Bjorn Reininghaus, and Marietjie Venter✉

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ISSN: 1080-6059

EID journal

December 2015

Sindbis and Middelburg Old World Alphaviruses Associated with Neurologic Disease in Horses, South Africa

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CDC > EID journal > December 2015

Volume 21, Number 12—December 2015

Dispatch

Sindbis and Middelburg Old World Alphaviruses Associated with Neurologic Disease in Horses, South Africa

Stephanie van Niekerk, Stacey Human, June Williams, Erna van Wilpe, Marthi Pretorius, Robert Swanepoel, and Marietjie Venter✉

Author affiliations: University of Pretoria, Pretoria, South Africa (S. van Niekerk, S. Human, J. Williams, E. van Wilpe, M. Pretorius, R. Swanepoel, M. Venter); US Centers for Disease Control and Prevention, Pretoria, South Africa (M. Venter).

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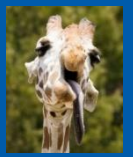
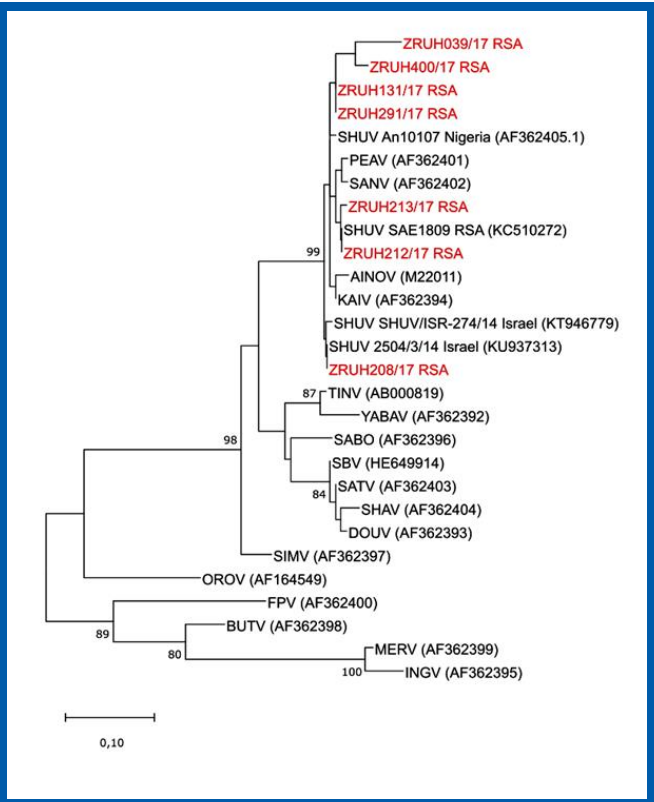


Shuni Virus in Cases of Neurologic Disease in Humans, South Africa

Thopisang P. Motlou, Marietjie Venter



(NHLS) CSF (2017) specimens from hospitals in Tshwane; 7/129=5.4%

Table 1. Demographic and clinical information of SHUV-positive CSF samples from 7 patients hospitalized with neurologic signs, Gauteng Province, South Africa, 2017*

Sample ID	Patient age/sex	Other symptoms	Clinical diagnoses	HIV status	Other tests	Vaccination	Reason for discharge	Location
ZRUNH 039/17	29 y/F	Not stated	Meningitis	Unknown	Not stated	Unknown	Unknown	JHB
ZRUNH 131/17	1 y 9 mo/M	Not stated	TB, meningitis	Unknown	Not stated	Unknown	Unknown	JHB
ZRUNH 219/17	6 mo/F	Vomiting, diarrhea, fine maculopapular rash	Acute gastroenteritis and shock	Mother (positive), on HAART/ PMTCT, ART (FDC); baby received nevirapine	*H. influenzae* Ag (negative), *N. meningitidis* ACV W135 (negative), *E. coli* (negative), *S. pneumonia* (negative), GBS (negative), cryptococcal Ag (negative)	Mother did not have clinic card	Stable	Eastlynne, Pretoria
ZRUNH 212/17	2 y 8 mo/M	Coughing blood, otitis media, simple febrile seizures, fever (38°C), difficulty breathing, vomiting, diarrhea; had second episode of seizure	Upper respiratory tract infection/ hemoptysis/ febrile convulsions	Mother negative; baby received nevirapine	Not stated	Up to date: BGG, polio+DPT (3–18 mo), DT (5 y) not done	Stable	Pretoria
ZRUNH 208/17	4 y 11 mo/M	Seizures, ICU patient, decreased LOC, vomiting, seizures, fever, diarrhea	Encephalitis and aspiration pneumonia	Negative	Microbiology: negative for bacteria	Incomplete: no polio+DPT (4,5 mo)	Not stated	Eastlynne, Pretoria
ZRUNH 213/17	13 d/F	ICU patient, baby delivered normally, neonatal encephalopathy, second-degree congenital sepsis/TORCH, poor sucking, premature, low birthweight, nonimmune, subcutaneous edema, abdominal distension (HC, chest, AC), abdominal U/S (ascites, bilateral dense kidneys)	Nonimmune hydrops fetalis	Not stated	HSV (positive; patient tested negative following treatment), rubella PCR (IgG positive, IgM negative), CMV (IgG positive, IgM negative)	Up to date	Stable	Mamelodi East, Pretoria
ZRUNH 400/17	4 mo/M	Respiratory distress, vomiting bile	Viral pneumonia	Not stated	Not stated	Up to date	Not stated	Olieven-houtbosch, Pretoria

*AC, abdominal circumference; Ag, antigen; BCG, bacille Calmette-Guérin; CMV, cytomegalovirus; DPT, diphtheria/pertussis/tetanus; *E. coli*, *Escherichia coli*; FDC, fixed-dose combination; GBS, group B *Streptococcus*; *H. influenzae*, *Haemophilus influenzae*; HAART, highly active antiretroviral therapy; HC, hepatitis C; HSV, herpes simplex virus; ICU, intensive care unit; ID, identification; JHB, Johannesburg; LOC, level of consciousness; *N. meningitis*, *Neisseria meningitidis*; PMTCT, prevention of mother-to-child transmission; SHUV, Shuni virus; TB, tuberculosis; TORCH, *Toxoplasma gondii*; U/S, ultrasound.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 18, No. 2, February 2012

DISPATCHES

Shuni Virus as Cause of Neurologic Disease in Horses

Charmaine van Eeden, June H. Williams, Truuske G.H. Gerdes, Erna van Wilpe, Adrianne Viljoen, Robert Swanepoel, and Marietjie Venter

To determine which agents cause neurologic disease in horses, we conducted reverse transcription PCR on isolates

The Study

In January 2009, a crossbreed yearling horse (case SAE 18/09) was found wandering aimlessly in its paddock in the Vaalwater District of Limpopo Province, South Africa. The horse became progressively ataxic and, when recumbent, was referred to the hospital at the Faculty of Veterinary Science, University of Pretoria. When examined, the horse was unaware of its surroundings and paddled constantly (front legs swinging inward in their trajectory). Sedation, including the use of ketamine as a last resort, failed to calm the animal. The yearling experienced several episodes of muscle spasm interspersed with tremors and was euthanized when its condition was deemed terminal. Cytologic examination of a cerebrospinal fluid sample taken

viruses 2021, 13, 937. https://doi.org/10.3390/v13050937 MDPI

Article

Epidemiology of Shuni Virus in Horses in South Africa

Thopisang P. Motlou [1], June Williams [2] and Marietjie Venter [1,*]

EMERGING INFECTIOUS DISEASES®

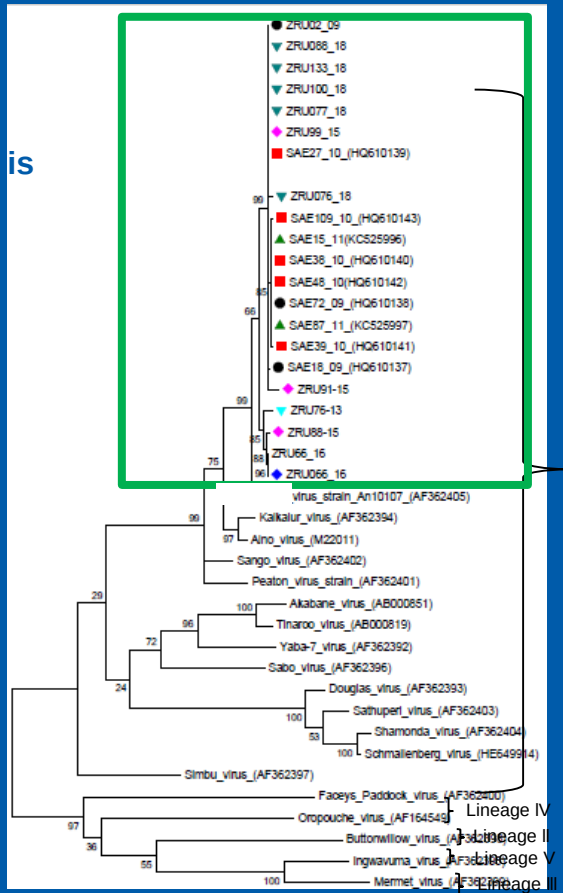
EID Journal > Volume 26 > Number 7—July 2020 > Main Article

Volume 26, Number 7—July 2020

Dispatch

Shuni Virus in Wildlife and Nonequine Domestic Animals, South Africa

Jumari Steyn, Pebetsi Motlou, Charmaine van Eeden, Marthi Pretorius, Voula I. Stivaktas, June Williams, Louwtjie P. Snyman, Peter E. Buss, Brianna Beechler, Anna Jolles, Eva Perez-Martin, Jan G. Myburgh, Johan Steyl, and Marietjie Venter



2009
2010
2011
2013
2015
2016
2018

Gail Foxcroft achieved national colours in both eventing and show jumping (Photo courtesy TB Images)

Discussion

- Aetiologies of AFDUC and Neurological disease often not identified due to many potential cause, lack of diagnostic tests.
- Both common pathogens and zoonotic diseases and arboviruses in diff diagnoses
- WNV, Sindbis and lesser known alpha (Middelburg); orthobunya (Shuni) missed as causes of febrile and neurological disease in humans and animals in SA
- During late summer and autumn, important missed cause of acute febrile disease of unknown origin and neurological signs.
- One Health approach of syndromic surveillance in animals and humans and arthropod vectors in areas where cases are detected effective in detecting outbreaks, reservoir hosts and vectors.
- Availability of specific diagnostic test, surveillance programs and awareness major limiting factors for detection

Acknowledgements

Dr Johan Steyl

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Poliomyelitis Research Foundation,
National Health Laboratory Services;
BMBF; G7

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marietjie.venter@up.ac.za

Main Collaborators SA:

- Dr Johan Steyl and Dr June Williams and, Prof Allan Guthrie, Faculty of Veterinary Science, Onderstepoort, South Africa.
- OVI, Dr Marco Romito, Allison Lusibi
- >150 Private and State vets that has supplied us with specimens across the country.
- Dr Leo Braack, Centre for Sustainable Malaria Control, UP
- CEZD, NICD: Prof Janusz Paweska; CRDM : Cheryl Cohen

International:

Dr Joel Montgomory, Rachel Eidex, Global Disease Detection, CDC

Dr Rosemary Sang, KEMRI; ISIPE; Kenya

ANDEMIA: Dr Fabian Leendertz, Robert Koch Institute and ANDEMIA network, DRC, Cote d'Ivore. Burkina Faso

Leap Agri: Dr Jeroen Kortekaas, Wageningen Bioveterinary Research, the Netherlands; Martin Groschup, FLI Germany

Dr Paulo Almeida, University of Lisbon; Dr Anton Cornel, UC Davis, California, Erin Gorsich , Briana Beechler, Oregon state University, Maarten Schrama, Institute of Environmental Sciences, University of Leiden, Leiden, NL

Ab Osterhaus, One Health Platform

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Emerging arbo and respiratory virus program

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