

Status: Probably not Arbovirus

SALS Level: 2

Antigenic Group: B

Taxonomic status: *Flavivirus*

Other Information: None.

Select Agent:  
SALS Basis: S

HEPA Filtration:

**Section I - Full Virus Name and Prototype Number****Full Virus Name:** Cowbone Ridge**Prototype Number:** W-10986**Information from:** Arbovirology Unit (1)

\* 10/22/1984

**Address:** Center for Disease Control, Atlanta, Georgia 30333, USA

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Reviewed by editor

**Section II - Original Source****Isolated by:** Dr. John Davie **at:** CDC, Atlanta, Georgia**Genus and species:** *Sigmodon hispidus* (cotton rat) **Sentinel** X**Age/Stage:** Adult **Sex:** M

Isolated From	Isolation detail
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**Signs and symptoms of illness:** None**Arthropod engorged** depleted gravid**Time held alive before inoculation:****Collection date:** 1/10/1965 **Method:** Box trap**Place collected:** Cowbone, Hendry County, Florida, USA**Latitude:** 26° 17' " N **Longitude:** 81° 5' " W**Macrohabitat:** Elevation=<25 feet; slash pine, palmettos, shrubs, grasses**Microhabitat:** Open sandy grassland, planted to slash pine; limestone outcrops**Method of storage until inoculated:** At -50dC in mechanical freezer**Footnotes:****Section III - Method of Isolation and Validity****Inoculation Date:** 3/8/1965**Animal:** nb mice **Embryonated egg:****Tissue Culture:**

(Details in Section VI - Biologic Char.)

**Route inoculated:** Intracerebral**Reisolation:** Yes**Other reasons:** Isolation from serum specimen from same cotton rat; no virus of this type in laboratory before.**Homologous antibody formation by source animal (See Section II):** Not tested**Test used:** HI CF NT**Other:****Footnotes:**

## Section IV - Virus Properties

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### Physicochemical:

RNA:      DNA:      Single Strand:      Double Strand:  
Pieces:      Infectivity:      Sedimentation coefficient(s): /strong>  
Percentage wt. of virion protein , lipid      carbohydrate  
Virion polypeptides:  
Number:      Details:  
Non-virion polypeptides:  
Number:      Details:  
Virion density:  
Nucleocapsid density      Sedimentation coefficient:  
Sedimentation coefficient:

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### Stability of infectivity (effects) pH

Lipid solvent:  
(ether) 1:5      After treatment titer 3.2 dex      Control titer 5.5 dex  
(chloroform)      After treatment titer      Control titer  
Detergent:  
(deoxycholate) 1:100 After treatment titer <2.0 dex      Control titer 8.5 dex  
Other (formalin, radiation):

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### Virion morphology:

Shape      Dimensions 38 nm  
Mean (nm)      range (nm)      how measured Electron microscopy  
Surface projections, envelope  
Nucleocapsid dimensions, symmetry

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### Morphogenesis:

Site of constituent formation in cell  
Site of virion assembly  
Inclusion bodies  
Other

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### Hemagglutination:

Hemagglutination Yes      Antigen source SMB ext. by sucrose-acetone  
Erythrocytes Goose      pH range 5.9-6.2      pH optimum 6.0  
Temperature optimum 37dC      range 4dC - 37dC  
Remarks Thus far only low titer hemagglutinin has been produced.  
Serologic methods recommended HI, CF, NT  
Footnotes: Thus far only low titer hemagglutinin has been produced.

**Section V - Antigenic Relationship And Lack of Relationship To Other Viruses**

	Cowbone Antigen				Cowbone Ascitic Fluid			
	HI		CF	NT	HI		CF	NT
	Ht/Ho	Ratio	Ht/Ho	Ht/Ho	Ht/Ho	Ratio	Ht/Ho	Ht/Ho
Cowbone	320	1:1	32	4.3 *	320	1:1	32	4.3 *
Dengue I	10/40	1:4	<8/32		<10/320	0	<8/32	
Dengue II	20/160	1:8	<8/32	0.6/3.5	10/320	1:32	<8/32	1.8/4.3
Dengue III	10/20	1:2	<8/32		<10/320	0	<8/32	
Dengue IV	10/80	1:8	<8/32		10/320	1:32	<8/32	
SLE	160/640	1:4	<8/51	2.5/4.8	20/320	1:16	8/32	4.6/4.3
MVE	40/160	1:4	<8/32		40/320	1:8	<8/32	
Ilheus	40/640	1:16	<8/32	1.2/4.0	40/320	1:8	<8/32	2.7/4.3
Yellow fever	10/80	1:8	<8/32	0.8/>4.5	10/320	1:32	<8/32	1.5/4.3
West Nile	40/160	1:4	<8/64	1.3/>4.5	10/320	1:32	<8/32	4.7/4.3
JBE	40/640	1:16	<8/64		40/320	1:8	<8/32	
Modoc	40/640	1:16	<8/64	1.3/>4.7	80/320	1:4	16/32	>4.8/4.3
Rio Bravo	<10/40	0	<8/32	0/>5.5	10/320	1:32	<8/32	2.1/4.3
Bussuquara	40/160	1:4	<8/256	0.2/>2.7	40/320	1:8	<8/32	3.8/4.3
Powassan	<10/40	0	-		<10/320	0	-	

\* LNI in dex

Cross immunity tests: Not related by HI or CF to EEE, WEE, California, Tensaw, Flanders, Bwamba, Anopheles A, Anopheles B, Turlock, Buttonwillow, Tacaribe, Sicilian Sandfly fever or Oropouche.

Recent cross-neutralization studies have placed Cowbone Ridge in a complex containing the additional flaviviruses Modoc, Sal Vieja, Jutiapa and San Perlita viruses [2] .

## Section VI - Biologic Characteristics

Virus source (all VERTEBRATE isolates): Heart (LV), lung (LV)

Lab Methods of Virus Recovery (ALL ISOLATIONS): Newborn mice

Susceptibility of Cell Culture Systems:

Cell system (a)	Virus passage history (b)	Evidence of Infection						
		CPE			PLAQUES		Growth Without CPE	
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	+/- (g)
CRKL	SMB 4	No CPE						
HeLa (CL)		No CPE						
BHK-21 (CL)		No CPE						
GMK (CL)		No CPE						
Vero (CL)		No CPE						
Vero (CL)	SMB 7				12	Plaques	4.2* (3)	
LLC-MK2 (CL)					6	Plaques	5.0 (3)	
Duck embryo (PC)						No plaques	<3.0 (3)	
Duck embryo (PC)	SMB 4	No CPE						
L. cells (CL)					10-14	Plaques	6.1	

\* Expressed in dex

## Section VII - Natural Host Range

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Mosquitoes	0/225,000		Hendry and Collier Co., S. Florida
Cotton rat	1/298	11/298 HI,NT	
Cotton mouse ( <i>Peromyscus gossypinus</i> )	0/210	1/210 HI,NT	
Rice rat ( <i>Oryzomys palustris</i> )	0/17	0/17 HI	
Bobcat	0/29	0/29 HI	
Raccoon	0/73	0/73 HI	
Opossum	0/58	0/58 HI	
Cottontail rabbit	0/24	0/24 HI	
Deer	0/6	0/6 HI	
Amphibia	0/8	0/8 HI	
Birds	0/151	0/151 HI	
Horses	0/33	0/33 HI	

## Section VIII - Susceptibility To Experimental Infection (Record Viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log10/ml		
Mice (nb)	SMB 4	ic 0.02	See below *	10	8.5		
Mice (nb)		ip					
Mice (nb)		sc					
Mice (wn)		ic 0.03	None				
Mice (wn)		ip					
hamster (2 day)		ic 0.02	None				
rats (2 day)		ic 0.02	None				
rats (3 wk)		ic 0.02	None				

\* Posterior paralysis of one or both limbs on day 7-9; increased respiration rate; motor nerve involvement. Dead or with symptoms 7-11 days after inoculation; death generally 1-2 days after symptoms appear.

## Section IX - Experimental Arthropod Infection And Transmission

Arthropod species & virus source(a)	Method of Infection log10/ml (b)	Incubation period (c)	Transmission by bite (d)	Assay of arthropod, log10/ml (e)	
Feeding	Injected	Days °C	Host	Ratio	Whole Organ System

## Section X - Histopathology

Character of lesions:

Inclusion bodies:

Cytoplasmic:(M) (LV) Intranuclear: (M)

Organs-tissues affected:

Category of tropism: Motor involvement with posterior paralysis and respiratory distress (nb mice).

## Section XI - Human Disease

Human disease:	In nature:	(S) (R)
	Death:	(S) (R)
	Residua:	(S) (R)
Laboratory infections:	Subclinical:	(S) (R)
	Overt Disease:	(S) (R)

Clinical manifestations:

Category: No. of cases:

## Section XII - Geographic Distribution

Known (virus):

Florida, USA

## Section XIII - References

1. Calisher, C.H., et al. 1969. Am. J. Epidemiol. 89:211-216.
2. Calisher, C.H., et al. 1984. To be submitted.
3. Varelas-Wesley, I. and Calisher, C.H. 1982. Am. J. Trop. Med. Hyg. 31:1273-1284.

## Section XIV - Remarks