

Virus Name: Cacao		Abbreviation: CACV
Status Probable Arbovirus	Select Agent No	SALS Level 2
SALS Basis Results of SALS surveys and information from the Catalogue.		
Other Information		
Antigenic Group Phlebovirus		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation VP-437R	Accession Number	Original Date Submitted 7/3/1984
Family Bunyaviridae	Genus Phlebovirus	
Information From Robert B. Tesh	Address Yale Arbovirus Research Unit	
Information Footnote Revised		

Section II - Original Source

Isolated By (name) R. Tesh and P. Peralta (1)	Isolated at Institute Middle America Research Unit	
Host Genus Lutzomyia trapidoi (pool of 58)	Species	Host Age/Stage Adult
Sex Female		
<u>Isolated From</u>	<u>Isolation Details</u>	
Signs and Symptoms of Illness	Arthropod Depleted	
Time Held Alive before Inoculation Two hours		
Collection Method Hand aspirator	Collection Date 12/4/1970	
Place Collected (Minimum of City, State, Country) El Aguacate, Panama Prov., El Aguacate, Panama Prov., Panama		
Latitude 8° 45' N	Longitude 79° 58' W	
Macrohabitat Secondary forest (abandoned coffee plantation)	Microhabitat Collected from human bait	Method of Storage until Inoculated Liquid nitrogen and mechanical freezer at -60dC
Footnotes		

Section III - Method of Isolation

Inoculation Date	
Animal (Details will be in Section 6) 16dec70 (Tissue Culture)	
Route Inoculated	Reisolation Not tried
Other Reasons	
Homologous Antibody Formation by <u>Source Animal</u>	
Test(s) Used	
Footnotes	

Section IV - Virus Properties

Physicochemical RNA, Single Strand		
Pieces (number of genome segments) 3	Infectivity	Sedimentation Coefficients(s) (S)
Percentage wt, of Virion Protein	Lipid	Carbohydrate
Virion Polypeptides: Number	Details	
Non-virion Polypeptides: Number	Details	
Virion Density	Sedimentation Coefficients(s) (S)	
Nucleocapsid Density	Sedimentation Coefficients(s) (S)	
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<u>Stability of Infectivity (effects)</u>		
pH (infective range)		
Lipid Solvent (ether - % used to test) 5%, 10 min	After Treatment Titer <3.0 dex	Control Titer 5.0 dex
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate)	After Treatment Titer	Control Titer
Other (formalin, radiation)		
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<u>Virion Morphology</u>		
Shape	Dimensions	
Mean nm	Range nm	
Measurement Method	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry

Morphogenesis

Site of Constituent Formation in Cell

Site of Virion Assembly

Site of Virion Accumulation

Inclusion Bodies

Other

Hemagglutination

Hemagglutination

Antigen Source

Erythrocytes (species used)

Not tried

pH Range

pH Optimum

Temperature Range

Temperature Optimum

Remarks

Serologic Methods Recommended

CF, NT

Footnotes

Despite repeated serial blind passages (ic) in newborn mice and hamsters, Cacao did not produce illness or death in these animals. To perform CF tests, adult hamsters were hyperimmunized with a Vero cell pool of virus and CF antigen was prepared from infected MA-111 cells. Homologous CF titers of Cacao in this system were 128/32.

Cacao CF antigen (infected MA-111 cells) did not react with immune sera for groups A, B, C, TCR, CAP, SIM, CAL, PHL, and BUN; or with specific antisera for ANA, ANB, TUR, MAN, SFN, SFS, PT, ICO, CDU, KAR, CHG, ANH, BUJ, GF, AMT, BUE, SAL, URU, FRI, NIQ, CHI, CAI, and AGU [2].

Cacao hyperimmune hamster serum did not react in CF tests with suckling hamster brain antigens for CHV, PAC, CGL, SFN, SFS, PT, CHG, ICO, CDU, ITP, KAR, ANH, BUJ, AMT, GF, BUE, SAL, URU, FRI, NIQ, CHI, CAI, and AGU [2].

Cross-neutralization (plaque method) tests using CAC virus and hyperimmune serum (homologous titer = 80) were done against each of the following viruses and specific immune reagents with negative results: AGU, ALE, ANH, AMT, BUE, BUJ, CAI, CDU, CHI, FRI, GF, TEH, TOS, ITA, ITP, NIQ, PAC, RVF, RG, SFN, SFS, TUR, and URU.

The following antigenic relationships were observed:

Antibody	Plaque NT [3]		Antiserum	CF Test [2]		
	Cacao	Virus Homologous		Cacao	Antigen Itaporanga	Urucuri
Cacao	80 ^a	80 ^a	Cacao	128/32 ^b	<4/4	8/4
Chagres	80	2560	Itaporanga	8/8	512/8	<4/<4
Gordil	20	10240	Urucuri	<4/<4	<4/<4	128/16
Icoaraci	20	1280				
Karimabad	320	80				
Punta Toro	10	10240				

^a Reciprocal of highest antibody dilution producing >90% plaque reduction.

^b Antibody titer/antigen titer.

Cacao immune serum inhibited hemagglutination of Icoraci (1:80) and Chagres (1:10) but not SFS, KAR, AMT or ITP antigens [2].

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Vero cell cultures

Cell system (a)	Virus passage history (b)	Evidence of Infection							Growth Without CPE +/- (g)
		CPE			PLAQUES				
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)		
Vero (CL)	Vero 3	3	3-4+		6-7	Plaques	4.8(c)(3)		
MA-111 (CL)		3	3-4+	5.0(c)(3)					
LLC-MK2 (CL)			3+ (3)						

(c) Expressed in dex

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Lutzomyia trapidoi (males)	1/9,906		Panama (1)
Lutzomyia trapidoi (females)	10/63,985		
Lutzomyia spp. (males)	1/70,043		
Lutzomyia spp. (females)	7/86,202		
Lutzomyia ylephilatrix (females)	0/24,376		
Man		13/177 NT	
Sentinel monkeys		7/pos. NT	

Section VIII - Susceptibility to Experimental Infection (include viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log ₁₀ /ml
Mice (nb)	Vero 3 VP-100%R	ic 0.02	No illness (3)		
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)		ic	No illness (3)		
Mice (wn)		ip			
hamster (nb)		ic 0.02	Antibody (3)		
hamster (ad)		ip 0.1			

Section IX - Experimental Arthropod Infection and Transmission

Arthropod species & virus source(a)	Method of Infection log ₁₀ /ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log ₁₀ /ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System
Cacao virus did not persist or multiply in Aedes albopictus or Culex quinquefasciatus after intrathoracic inoculation (4).									

Section X - Histopathology

Character of lesions (specify host)		
<u>Inclusion Bodies</u>	<u>Intranuclear</u>	
Organs/Tissues Affected		
Category of tropism		

Section XI - Human Disease

In Nature	Residual	Death
Subclinical	Overt Disease	
Clinical Manifestations		
Number of Cases	Category (i.e. febrile illness, etc.)	

Section XII - Geographic Distribution

Known (Virus detected) Panama
Suspected (Antibody only detected)

Section XIII - References

1. Tesh, R.B., et al. 1974. Am. J. Trop. Med. Hyg. 23:258-269. 2. Tesh, R.B., et al. 1975. Am. J. Trop. Med. Hyg. 24:135-144. 3. Tesh, R.B. Unpublished data. 4. Tesh, R.B. 1975. J. Med. Ent. 12:1-4.

Remarks
