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	Accession Number	Original Date Submitted
VP-437R		7/3/1984

Family	Genus
Bunyaviridae	**Phlebovirus**

Information From	Address
Robert B. Tesh	**Yale Arbovirus Research Unit**

Information Footnote
Revised

Section II - Original Source

Isolated By (name)	Isolated at Institute	
R. Tesh and P. Peralta (1)	**Middle America Research Unit**	
Host Genus	Species	Host Age/Stage
Lutzomyia trapidoi (pool of 58)		**Adult**

Sex
Female

Isolated From	Isolation Details
Signs and Symptoms of Illness	Arthropod **Depleted**

Time Held Alive before Inoculation
Two hours

Collection Method	Collection Date
Hand aspirator	**12/4/1970**

Place Collected (Minimum of City, State, Country)
El Aguacate, Panama Prov., El Aguacate, Panama Prov., Panama

Latitude	Longitude
8° 45' N	**79° 58' W**

Macrohabitat	Microhabitat	Method of Storage until Inoculated
Secondary forest (abondoned coffee plantation)	**Collected from human bait**	**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 Source Animal

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)	

Stability of Infectivity (effects)

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)

Virion Morphology

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

Hemaggiutination **Not tried**	Antigen Source	Erythrocytes (species used)
pH Range	pH Optimum	
Temperature Range	Temperature Optimum	
Remarks		
Serologic Methods Recommended **CF, NT**		
Footnotes		

Section V - Antigenic Relationship and Lack of Relationship to Other Viruses

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:

Plaque NT [3]			CF Test [2]			
	Virus			Antigen		
Antibody	Cacao	Homologous	Antiserum	Cacao	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							
		CPE			PLAQUES			Growth Without CPE	
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	+/- (g)	
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

Section VII - Natural Host Range (Additional text can be added below table)

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 log10/ml
Mice (nb)	Vero 3 VP-100%R	ic 0.02	No illness (3)		
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)		ic			
Mice (wn)		ip			
hamster (nb)		ic 0.02	No illness (3)		
hamster (ad)		ip 0.1	Antibody (3)		

Section IX - Experimental Arthropod Infection and Transmission

Arthropod species & virus source(a)	Method of Infection log10/ml (b)		Incubation period (c)		Transmision by bite (d)		Assay of arthropod, log10/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)

Inclusion Bodies — Intranuclear

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