

Virus Name: Punta Toro		Abbreviation: PTV
Status Probable Arbovirus	Select Agent No	SALS Level 2
SALS Basis Results of SALS surveys and information from the Catalogue.		
Other Information		
Antigenic Group Phlebotomus Fever		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation D-4021A	Accession Number	Original Date Submitted 7/6/1984
Family Bunyaviridae	Genus Phlebovirus	
Information From Robert B. Tesh	Address Yale Arbovirus Research Unit	
Information Footnote Revised		

Section II - Original Source

Isolated By (name) G.E. Sather (1)	Isolated at Institute Univ. of Pittsburgh, Sch. Pub. Hlth.	
Host Genus Man	Species	Host Age/Stage Adult
Sex Male		
<u>Isolated From</u> Serum/Plasma	<u>Isolation Details</u>	
Signs and Symptoms of Illness Fever, headache, back and retroorbital pain, splenomegaly (1)	Arthropod	
Time Held Alive before Inoculation		
Collection Method Patient bled in Pittsburgh hospital (1)	Collection Date 12/21/1966	
Place Collected (Minimum of City, State, Country) Canal Zone, Panama		
Latitude 9° 30' N	Longitude 79° 40' W	
Macrohabitat Probably infected in jungle warfare training center, Canal Zone, Panama	Microhabitat Moist tropical forest	Method of Storage until Inoculated Revco at -60dC
Footnotes		

Section III - Method of Isolation

Inoculation Date 1/6/1967	
Animal (Details will be in Section 6) nb mice	
Route Inoculated ic and ip	Reisolation Yes
Other Reasons	
Homologous Antibody Formation by <u>Source Animal</u> Yes	
Test(s) Used CF	
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 2 or 3	Details MW: 65 x 10³, 50 x 10³ and 23 x 10³ daltons (2)	
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)	After Treatment Titer	Control Titer
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) 1:500	After Treatment Titer 2.0 dex	Control Titer 6.4 dex
Other (formalin, radiation)		
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<u>Virion Morphology</u>		
Shape Spherical	Dimensions	
Mean 100 nmnm	Range 85-115 nmnm	
Measurement Method Electron microscopy (2)	Surface Projections/Envelope Surface projections (5-10 nm in size) anchored	Nucleocapsid Dimensions, Symmetry

Electron microscopy (3)

Surface projections (5-10 nm in size) anchored in a lipid bilayer

Symmetry

Morphogenesis

Site of Constituent Formation in Cell
Cytoplasm (3)

Site of Virion Assembly
Budding into membranous cisternae (3)

Site of Virion Accumulation
Cisternae of golgi and reticulum membranes (3)

Inclusion Bodies

Other

Hemagglutination

Hemagglutination
Yes

Antigen Source
SMB ext. by sucrose-acetone + sonication

Erythrocytes (species used)
Various

pH Range
6.0-6.8

pH Optimum
6.0 (4)

Temperature Range

Temperature Optimum
Not dependent

Remarks

Treatment of erythrocytes with trypsin enhances agglutination (4)

Serologic Methods Recommended

HI, CF, NT

Footnotes

Treatment of erythrocytes with trypsin enhances agglutination (4)

In HI tests Punta Toro antigen and/or immune serum reacted with AGU, ICO, ITA, AMT, KAR, RVF, SFN, CDU, CHG, SFS, SAL, and TEH antigens and/or immune sera [5], [6].

CF tests [5]:

Immune serum	Antigens		
	PT	BUE	NIQ
Punta Toro	64/256	8/32	<4/<4
Buenaventura	<4/<4	64/512	<4/<4
Nique	16/64	<4/<4	> 2048/512

Antibody titer/antigen titer.

In cross-CF tests (5) using PT, FRI, CAI, AGU, CAC, CHG, ICO, CDU, ITP, URU, PAC, ANH, BUJ, AMT, SFS, SFN, GF, SAL, and CHV antigens and immune reagent, no positive reactions were obtained.

Plaque neutralization tests [7]:

Immune reagents	Virus							
	ANH	BUE	CAC	CDU	FRI	ICO	PT	RVF
Anhanga	320*	0	0	0	0	0	0	0
Buenaventura	0	40	0	0	0	0	80	0
Cacao	0	0	80	0	0	0	0	0
Candiru	0	0	0	320	0	0	0	10
Frijoles	0	0	0	0	10240	0	0	0
Icoaraci	0	10	20	20	20	1280	320	0
Punta Toro	10	40	10	40	320	0	10240	40
Rift Valley Fever	0	0	0	0	20	0	0	5120

* Reciprocal of highest serum dilution producing >90% plaque reduction; 0 = <1:10

For additional NT results see References [5] and [6].

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (M)

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

Cell system (a)	Virus passage history (b)	Evidence of Infection						
		CPE			PLAQUES			Growth Without CPE +/- (g)
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
Vero (CL)	SM12, Vero 3	3-4	4+		5-6	1-2 mm	5.5** (7)	
LLC-MK2 (CL)	SM2				3-7	Plaques	4.5	
Hamster kidney (PC)	SM2				4-7	Plaques	5.5	

PT virus did not multiply or survive in *Toxorynchites amboinensis* cell cultures (8).

** Expressed in dex

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Man	2/2	40/180 NT	Panama (9)
Lutzomyia trapidoi (males)	2/9,906		
Lutzomyia trapidoi (females)	29/61,985		
Lutzomyia ylephilatrix(females)	1/24,376		
Lutzomyia sp. (males)	2/70,043		
Lutzomyia sp. (females)	15/86,202		

All isolates from Lutzomyia insects were Punta Toro-like (reacted in CF test with PT antiserum).

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)	P-2, D-4021A	ic 0.01	Illness and death	5-7	5.4
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)	P-11, D-4021A	ic	Antibody with survival	6-7	9.0
Mice (wn)		ip			
Mice (wn)	P-11, D-4021A	ic	Illness and death	6-7	9.0
guinea pig (ad)	P-2, D-4021A	ic	2/5 died. Fever and antibody		
hamster (nb)	P-22, D-4021A	ic	Death		

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

Punta Toro virus did not multiply or survive in *Aedes albopictus* or *Culex quinquefasciatus* following inoculation (10).

Isolations from male sandflies represent transovarial transmission.

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Section X - Histopathology

Character of lesions (specify host)

Inclusion Bodies

Intranuclear

Organs/Tissues Affected

Category of tropism

Section XI - Human Disease

In Nature
Reported

Residual

Death

Subclinical

Overt Disease

Clinical Manifestations

Fever, chills, myalgia, headache, retroorbital pain

Number of Cases

Two

Category (i.e. febrile illness, etc.)

Febrile illness

Section XII - Geographic Distribution

Known (Virus detected)

Panama

Suspected (Antibody only detected)

Section XIII - References

1. Berge, T.O., ed. International Catalogue of Arboviruses Including Certain Other Viruses of Vertebrates. Second edition. DHEW Pub. No. (CDC) 75-8301. Atlanta. 1975. pp. 590-591.
2. Robeson, G. 1979. J. Virol. 30:339-350.
3. Murphy, F.A., et al. 1973. Intervirology 1:297-316.
4. Gaidamovich, S.Ya. and Kurakhmedova, Sh.A. 1974. Arch. ges.Virusforsch. 45:177-184.
5. Tesh, R.B., et al. 1975. Am. J. Trop. Med. Hyg. 24:135-144.
6. Shope, R.E., et al. 1980. Lancet i:886-887.
7. Tesh, R.B. Unpublished data.
8. Tesh, R.B. 1980. J. Med. Ent. 17:338-343.
9. Tesh, R.B., et al. 1974. Am. J. Trop. Med. Hyg. 23:258-269.
10. Tesh, R.B. 1975. J. Med. Ent. 12:1-4.
11. Sidwell, R.W. et al. 1988. Antimicrobial Agents Chemother. 32:331-336.

Remarks

Ribavirin markedly inhibitory to 2 strains of Punta Toro virus in vitro but effective against only one of the strains in vivo in infected suckling mice (11).