Virus Name: Tembusu	Abbreviation: TMUV

Status
Probable Arbovirus

Select Agent
No

SALS Level
2

SALS Basis
Results of SALS surveys and information from the Catalogue.

Other Information

Antigenic Group
B

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
MM1775

Accession Number

Original Date Submitted
1/25/1985

Family
Flaviviridae

Genus
Flavivirus

Information From
Elisberg and Buescher

Address
Dept. of Virus Diseases, WRAIR, Washington, D.C. 20012

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
US Army Med. Res. Unit (1)

Isolated at Institute
Kuala Lumpur, Malaya, Malaysia

Host Genus
Culex (Culex) tritaeniorhynchus

Species

Host Age/Stage
Adult

Sex
Female

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation

Collection Method
Aspirated from cattle bait

Collection Date
7/20/1955

Place Collected (Minimum of City, State, Country)
Kuala Lumpur grazing grounds, Malaysia

Latitude
3° 14' N

Longitude
101° 49' E

Macrohabitat
Mixed pasture and upland tropical scrub

Microhabitat
Pasture near cattle shed and human habitations on outskirts of town

Method of Storage until Inoculated
Mosquitoes held alive for 48 hours

Footnotes

Section III - Method of Isolation

Inoculation Date
7/22/1955

Animal (Details will be in Section 6)
ad mice

Route Inoculated
Intracerebral

Reisolation
Yes

Other Reasons
Ultimately recognized as a new virus

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

Section IV - Virus Properties

Physicochemical

Pieces (number of genome segments)	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)	After Treatment Titer	Control Titer
Lipid Solvent (chloroform) **1:20**	After Treatment Titer **<2.6 dex**	Control Titer **7.3 dex**
Lipid Solvent (deoxycholate) **1:1000**	After Treatment Titer **<2.6 dex**	Control Titer **7.2 dex**

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	Antigen Source	Erythrocytes (species used)
Yes	**SMB ext. by sucrose-acetone**	**Goose**
pH Range	pH Optimum	
6.0-7.6	**6.4-6.8**	
Temperature Range	Temperature Optimum	
4dC - 37dC	**27dC**	

Remarks

Serologic Methods Recommended
HI, CF, NT

Footnotes

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

Immune Sera or Antigens	Tembusu Antigen				Tembusu Immune Sera			
	HI		CF		HI		CF	
	Ht/Ho	Ratio	Ht/Ho	Ratio	Ht/Ho	Ratio	Ht/Ho	Ratio
Ilheus	640/1280	1/2	32/256	1/8	<20/2560	>1/128	8/64	1/8
JE	80/640	1/8	16/256	1/16	<20/2560	>1/128	8/64	1/8
West Nile	80/320	1/4	8/128	1/16	NA		8/64	1/8
RSSE	40/640	1/16	4/256	1/64	NA		<4/64	>1/16
MVE	80/1280	1/16	4/128	1/32	160/2560	1/16	8/64	1/8
Dengue 1	320/2560	1/8	<4/64	>1/16	20/2560	1/128	<4/64	>1/16
Dengue 2	640/1280	1/2	<4/128	>1/32	20/2560	1/128	4/64	1/16
Ntaya	2560/>5120	>1/2	16/128	1/8	80/2560	1/32	8/64	1/8

NA = Not available

NEUTRALIZATION TEST

Tembusu virus is not neutralized by antisera to the following agents: WSL, JE, Ilheus, DEN-1, DEN-2, DEN-3, DEN-4, YF, MVE, Uganda S, WN, RSSE, and Entebbe bat virus.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Serum (M) (4)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice

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)	
PS (CL)	SM 11				8	Plaques	7.5* (7)		
Duck embryo(PC)						No plaques(7)			
Vero (CL)					16	1 mm	6.7 (5)		
LLC-MK2 (CL)					7	4 mm	5.2 (5)		

* 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
Cx tritaeniorhynchus	2/595 pools		Kuala Lumpur, Malaysia (1)
Cx gelidus	2/461 pools		
Aedes linneatopennis	1/11 pools		
Anopheles philippinensis	1/32 pools		
Cx gelidus	6		Thailand (3)
Cx tritaeniorhynchus	1		
Cx vishnui	1		
Cx sitiens	1		
Cx gelidus, Cx pseudovishnui, and Cx tritaeniorhynchus	11		Sarawak, Malaysia (4)
Cx vishnui	4		Malaysia (6)
Cx tritaeniorhynchus	1		
Man		60/97 NT	Kuala Lumpur, Malyasia
Sentinel chickens (serum)	2		

NT: LNI = >1.8 dex

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)	SM 8	ic 0.015	Death	4	>7.4
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)		ic 0.015	Death	5-8	>7.3
Mice (wn)		ip			
eggs (10 day)	SM 9, CAM 6	CAM 0.1	""Pocks""	3-5	6.1
guinea pigs (250 gm)	SM 9, CAM 3	ic 1.0	No disease		
rabbits (ad)	SM 8	ip 1 ml x 4	No disease		

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

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)
Malaysia (1,4,6), Thailand (3)

Suspected (Antibody only detected)

Section XIII - References

1. Director, Inst. Med. Res., Kuala Lumpur, Fed. of Malayasia. Personal communication. 1957.
2. Director, Rockefeller Foundation Laboratory. Personal communication. 1960.
3. Russel, P.K. Personal communication. 1972.
4. Simpson, D.I.H., et al. 1970. Ann. Trop. Med. Parasitol. 64:137-151.
5. Stim, T.B. 1969. J. Gen. Virol. 5:329-338.
6. Rudnick, A. Personal communication. 1976.
7. Calisher, C.H., et al. Personal communication. 1983.

Remarks