Virus Name: Turlock	Abbreviation: TURV

Status
Arbovirus

Select Agent
No

SALS Level
2

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

Other Information

Antigenic Group
Turlock

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
S 1954-847-32

Accession Number

Original Date Submitted
1/12/1985

Family
Bunyaviridae

Genus
Bunyavirus

Information From
Cal. Viral and Rickettsial Dis. Lab.

Address
2151 Berkeley Way, Berkeley, California

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
E.H. Lennette, et al. (1)

Isolated at Institute
Viral and Rickettsial Dis. Lab

Host Genus
Culex tarsalis (50 specimens)

Species

Host Age/Stage
Adult

Sex
Female

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation

Collection Method
Light trap, Station No. SA4

Collection Date
8/9/1954

Place Collected (Minimum of City, State, Country)
7/8 mile south of Sutter City, California, USA

Latitude
37° N

Longitude
121° W

Macrohabitat
Agricultural (irrigated pasture, rice, barley)

Microhabitat
Eaves of house and shrubbery around house

Method of Storage until Inoculated
CO2

Footnotes

Section III - Method of Isolation

Inoculation Date
8/18/1954

Animal (Details will be in Section 6)
(Embryonated Egg)

Route Inoculated
Intra-amniotic

Reisolation

Other Reasons

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 **Member of Bunyavirus genus (20)**	
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)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) **1:1000**	After Treatment Titer **<1.6 dex**	Control Titer **6.4 dex (2)**

Other (formalin, radiation)
Inactivated by treatment overnight at 4C with 0.5% beta- propiolactone (10)

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 **Yes**	Antigen Source **SMB ext. by sucrose-acetone**	Erythrocytes (species used) **Goose**
pH Range **6.0-6.4**	pH Optimum **6.2**	
Temperature Range **4dC, 22dC, 37dC**	Temperature Optimum	

Remarks
Maximum titer = 320

Serologic Methods Recommended
HI, CF, NT

Footnotes
Maximum titer = 320

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

Not related by NT to bluetongue, California encephalitis, Colorado tick fever, EMC (Col-SK and Mengo), Herpes simplex, JBE, SLE, Sindbis, trivittatus, WEE EEE, VEE, Anopheles A, Anopheles B, LCM, GD-VII.
Not related by CF to Marituba, Oriboca, WEE, EEE, VEE, Sindbis, Wyeomyia, Bunyamwera, Bwamba, California encephalitis, Colorado tick fever, dengue 1 and 2, JBE, RSSE, Ntaya, SLE, Ilheus, West Nile, yellow fever, Zika, Semliki forest, Uganda S, SF Naples, SF Sicilian [3] .
Related to Umbre virus, the latter isolated six times from mosquitoes in India [3] .

Related by CF test to M'Poko virus isolated from culicine mosquitoes in Central Africa [11] .

Turlock virus has been antigenically classified as a distinct virus type, and it has been placed in the Turlock complex, one of three complexes comprising the Turlock serogroup [21] , [22] .

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)

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)	
Chick embryo (PC)	MB 7				3	Plaques	4.9** (7)		
Chick embryo (PC)		4-7	CPE						
Hamster kidney (PC)			CPE (10)						
BHK-21 (CL)	MB 7				4	Plaques	6.9 (7)		
Vero (CL)	P-5				6	3 mm	6.6 (23)		
LLC-MK2 (CL)					7	8 mm	7.1 (23)		

** 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
Man		0/81 NT	California, USA (1)
Man		0/253 HI	Para, Brazil (2)
Wild birds	6	23/1,702 HI	Belem, Brazil (14, 15, 16)
House finch	3		Kern County, California (4, 12)
Passer domesticus	4		Hale Co., Texas, USA (17)
Lepus californicus	1		
Sentinel mice	3		IAN Forest, Brazil (2)
Sentinel chicks	1		Kern Co., Texas (4), 1 (5); Hale Co., Tex, 6 (17); Central Valley
Culex tarsalis	Many		Lubbock, Tex , 1 (5); Hale Co., Tex, 6(17); Central Valley, CA, many (12); Alberta, Canada, 1 (18)
Cs inornata	1		Alberta, Canada (18)
Cx peus	1		California (13)
Cx virgultus	1		Trinidad (8)
Cx tarsalis, Cx pipiens, Cx peus + Cx quinquefasciatus	164/4,985 pools		Kern; Stanislaus; and Sutter Counties, CA(1)
Cx portesi	1		Belem, Brazil (15)
Cx (Cux) declarator	1		Trinidad (19)

HI antibodies: California (12): Wild mammals 12/2,331; wild birds 141/4,868; horses 51/113; amphibians 0/111; reptiles 0/44.

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)		ic 0.02	Death	4-5	7.8
Mice (nb)		ip 0.02	Death	7-8	6.3
Mice (nb)		sc			
Mice (wn)		ic 0.02	Death	7	6.5
Mice (wn)		ip 0.02	Survived		1.0
hamsters (nb)		ic 0.03	Death (6)	4	
hamsters (6 wk)		ic 0.10	Immune sera (6)		4.0
guinea pigs (400 gm)		ic 0.20	Immune sera (6)		4.0
rabbits (2-2.5 kg)		ic 0.50	Immune sera (6)		4.0
chicks (1 day)		ic 0.03	Death (6)	6	3.0
emb. eggs (10-11 day)		am.s. 0.10	Death (6)	2-3	7.0
rhesus monkey (immature)	847-32	ic 0.5	Fever, antibody (10)		
house finch, English sparrow, brewers and tricolor blackbird, mourning dove	FSM-4783; DE-2	sc 0.1	Viremia; antibody response (9)		3.5-5.9
kangaroo rat (ad)	FSM-4783; DE-2	sc 0.1	Antibody, occasional viremia (9)		<1.0-2.0
deer mouse (ad)	FSM-4783; DE-2	sc 0.1	Antibody, no viremia (9)		

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
Culex tarsalis	Adult mosquitoes infected by feeding; after 21 days, virus titer = >4.0 dex.								

Section X - Histopathology

Character of lesions (specify host)
Mice: neuronal degeneration, gliosis and round cell infiltration, i.e., an encephalitis with secondary involvement of the meninges. Also lesions of skeletal and myocardial muscle fibers (L.B. Dias).

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)
California, Texas, New Mexico, USA; Brazil; Alberta, Canada; Trinidad

Suspected (Antibody only detected)

Section XIII - References

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Remarks