Virus Name: Warrego	Abbreviation: WARV

Status
Possible Arbovirus

Select Agent
No

SALS Level
2

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

Other Information

Antigenic Group
Warrego

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
Ch9935

Accession Number

Original Date Submitted
11/19/1984

Family
Reoviridae

Genus
Orbivirus

Information From
R.L. Doherty

Address
Queensland Institute of Medical Research, Brisbane, Q4006, AS

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
R.L. Doherty, et al.

Isolated at Institute
Brisbane

Host Genus
Culicoides spp.

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

Collection Date
2/13/1969

Place Collected (Minimum of City, State, Country)
Charleville, Queensland, Australia

Latitude
26° 10' S

Longitude
145° 50' E

Macrohabitat
Near Charleville, 965 feet, ann. rain 19.47 inches; open eucalypt forest and grassland

Microhabitat
Light trap near Warrego River on edge of town

Method of Storage until Inoculated
Overnight at 5dC, transported on liquid nitrogen, then at -60dC in Revco

Footnotes

Section III - Method of Isolation

Inoculation Date
3/26/1969

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
Yes

Other Reasons
Other isolations from Culicoides and mosquitoes collected in same region and period.

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) **50% final**	After Treatment Titer **4.5 dex**	Control Titer **3.8 dex**
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) **1:1000 final**	After Treatment Titer **3.5 dex**	Control Titer **3.9 dex**

Other (formalin, radiation)

Virion Morphology

Shape **Spherical; polygonal**	Dimensions **67 + 4; 71 + 4 nm**	
Mean nm	Range nm	
Measurement Method **Thin-section; neg contrast electron microscopy (4)**	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry **Core = 38 + 3 nm; obvious**

capsomeres uncertain

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)
No	**SMB, blood ext. by sucrose-acetone + protamine tr., sonication or trypsin**	**Goose**
pH Range **6.0-7.6**	pH Optimum	
Temperature Range	Temperature Optimum	
Remarks		
Serologic Methods Recommended **CF**		
Footnotes		

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

Studies at Queensland Institute of Medical Research:

No antigenic relationship was detected by complement-fixation or neutralization tests between Ch9935 antigen or antiserum and the following arboviruses or suspected arboviruses isolated or available in Australia: Group A (Sindbis, Ross River, Getah, Bebaru); Group B (Murray Valley encephalitis, Kunjin, Kokobera, Edge Hill, Stratford, Alfuy, JBE, SLE, dengue types 1, 2, 3, and 4); Koongol group (Koongol, Wongal); Mapputta group (Mapputta, Trubanaman, MK7532); Quaranfil group (Abal); Simbu group (Akabane, Aino [Samford]); Corriparta group (Corriparta); Eubenangee group (Eubenangee); Others (Kowanyama, Almpiwar, Upolu, ephemeral fever, Belmont, Wallal, Charleville, Wongorr and Ngaingan). Relationship to Mitchell River virus (MRM10434 strain), first observed by the International Reference Centre, was confirmed:

	Ch9935 Antigen			Ch9935 Immune Serum		
	CF		NT	CF		NT
Immune Serum or Antigen	Ht/Ho	Ratio	Ht/Ho	Ht/Ho	Ratio	Ht/Ho
Mitchell River (MRM 10434)	<8/64	<1/8	0.8/1.5	8/>128	1/>16	1.3/3.2

NT: LNI in dex.

Studies at International Reference Centre, Yale Arbovirus Unit:

Comparison by complement-fixation test with 24 solvent-resistant arboviruses [3] showed two Australian strains Ch9935 and MRM10434 were related to each other but distinct from others tested.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Weanling 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)	SMB 3					Plaques	6.1*		
BHK-21 (CL)			CPE	>5.0 *					
Vero (CL)			CPE	>5.0					
VSW (CL)			CPE	>5.0					

* 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
Culicoides spp.	6/25,894		Charleville, Queensland, AS, 1969-70 (1)
Wallaby		12/30	Queensland, AS (1)
Kangaroo		8/21	
Cattle		7/62	
Various vertebrate species		2/346	
Culicoides marksi	1		Charleville, Queensland, AS (1)
C. marksi	1		Beatrice Hill, No. Terr., AS (5)
C. dycei	1		Charleville, Queensland, AS (1)
Anopheles meraukensis	1		Kowanyama, Queensland, AS (6)
Cx annulirostris	1		Charleville, Queensland, AS (1)

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)	SMB 3	ic 0.015	Death	3-4	6.7
Mice (nb)		ip 0.03	No overt signs of infection		<3.5
Mice (nb)		sc			
Mice (wn)		ic 0.03	No overt signs of infection		<3.5
Mice (wn)		ip 0.1	Antibody production		

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
Aedes aegypti, SMB 5	Intrathoracically inoculated with 0.0006 ml (3 experiments 0.3-1.2 log10 per mosquito). Assay of virus content by titration in infant mice. Initial eclipse with no virus detectable at 0.5-1 days; increase to 3.9->5.8 log10 10-20 days after inoculation. (2)								

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)
Charleville, Queensland, Australia

Suspected (Antibody only detected)

Section XIII - References

1. Doherty, R.L., et al. 1973. Trans. R. Soc. Trop. Med. and Hyg. 67:536-543.
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3. Borden, E.C., et al. 1971. J. Gen. Virol. 13:261-271.
4. Schnagl. R.D. and Holmes, I.H. 1971. Aust. J. Biol. Sci. 24:1151-1162.
5. Mahoney, D.F., Chief, CSIRO Div. Animal Hlth. Personal communication. 1983.
6. Doherty, R.L., et al. 1979. Aust. J. Exp. Biol. Med. Sci. 57:509-520.

Remarks