

Status: Arbovirus

SALS Level: 3

Antigenic Group: A

Taxonomic status: *Alphavirus*

Other Information: USDA restricted.

Select Agent:

SALS Basis: A1

HEPA Filtration:

**Section I - Full Virus Name and Prototype Number****Full Virus Name:****Prototype Number:**Getah  
MM2021**Information from:** William F. Scherer**Date:**\*  
7/31/1984**Address:** Cornell University Medical College, 1300 York Avenue, New York, N.Y.10021

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Revised

**Section II - Original Source****Isolated by:** US Army Med. Res. Unit (1) **at:** Kuala Lumpur, Malaya, Malaysia**Genus and species:** Culex (Culex) gelidus **Sentinel X****Age/Stage:** Adult **Sex:** F

Isolated From	Isolation detail
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**Signs and symptoms of illness:****Arthropod engorged depleted gravid****Time held alive before inoculation:****Collection date:** 10/17/1955 **Method:** Cow-baited trap**Place collected:** Seaport Rubber Estate near Kuala Lumpur, Malaysia**Latitude:** 3° 13' " N **Longitude:** 101° 33' " E**Macrohabitat:** Rubber plantation**Microhabitat:** Under mature rubber tree canopy**Method of storage until inoculated:** Held alive 36 hours**Footnotes:****Section III - Method of Isolation and Validity****Inoculation Date:** 10/19/1955**Animal:** nb mice **Embryonated egg:** **Tissue Culture:**

(Details in Section VI - Biologic Char.)

**Route inoculated:** Intracerebral **Reisolation:** No**Other reasons:** Original isolate ultimately recognized as new for Malaya.**Homologous antibody formation by source animal (See Section II):****Test used:** HI CF NT**Other:****Footnotes:**

## Section IV - Virus Properties

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### Physicochemical:

RNA: X DNA: Single Strand: X Double Strand:  
Pieces: 1 Infectivity: Sedimentation coefficient(s): /strong>  
Percentage wt. of virion protein , lipid carbohydrate  
Virion polypeptides:  
Number: 3 Details: MW 56000, 54000, 000 (SDS PAGE) (12)  
Non-virion polypeptides:  
Number: Details:  
Virion density: Sedimentation coefficient:  
Nucleocapsid density Sedimentation coefficient:

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### Stability of infectivity (effects) pH

Lipid solvent:  
(ether) After treatment titer Control titer  
(chloroform) 1:20 After treatment titer <2.8 dex Control titer 7.7 dex  
Detergent:  
(deoxycholate) 1:1000 After treatment titer 4.7 dex Control titer 8.5 dex  
Other (formalin, radiation):

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### Virion morphology:

Shape Dimensions  
Mean (nm) range (nm) how measured  
Surface projections, envelope  
Nucleocapsid dimensions, symmetry

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### Morphogenesis:

Site of constituent formation in cell  
Site of virion assembly  
Inclusion bodies  
Other

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### Hemagglutination:

Hemagglutination Yes Antigen source SMB ext. by sucrose-acetone  
Erythrocytes Goose pH range 6.2-6.8 pH optimum  
Temperature optimum 23dC range 4-23dC  
Remarks  
Serologic methods recommended HI, CF, NT  
Footnotes:

## Section V - Antigenic Relationship And Lack of Relationship To Other Viruses

Antigenic relationships of Getah virus [2] .

Immune Seras	Getah Antigen					
	HI		CF		NT	
	Ht/Ho	Ratio		Ht/Ho	Ratio	Ht/Ho
Sagiyama	320/1280	1/4				>2.7/3.4
N544	2560/1280	2/1	512/256	2/1		
Bebaru	<10/320	>1/32	20/320	1/16	1.4/>4.4	
Mayaro	80/1280	1/16			1.1/>4.4	
Semliki	<10/640	>1/64	32/128	1/4	1.4/3.0	
Sindbis	<10/1280	>1/128	16/128	1/8	<0.4/3.3	
EEE	<10/2560	>1/256			<0.3/4.0	
WEE	<10/2560	>1/256			<0.3/3.6	
VEE	<10/10240	>1/1024			<1.2/>3.2	
Chikungunya	<10/320	>1/32	64/64	1	<1.0/2.4	
Middleburg	<10/1280	>1/128				

N544: Strain of Getah virus isolated in Australia.

Antigens	Getah Immune Seras					
	HI		CF		NT	
	Ht/Ho	Ratio		Ht/Ho	Ratio	Ht/Ho
Sagiyama			16/256	1/16	>3.3/4.5	
N544	80/320	1/4	256/256	1		
Bebaru	20/640	1/32	20/640	1/32	1.4/4.5	
Mayaro	<10/640	>1/64			2.4/4.5	
Semliki	160/640	1/4	32/256	1/8	1.3/4.5	
Sindbis	<10/640	>1/64	32/256	1/8	0.0/4.5	
EEE	<10/640	>1/64	<4/32	-	0.3/4.5	
WEE	<10/640	>1/64	<4/32	-	0.2/4.5	
VEE	<10/640	>1/64				
Chikungunya	<10/640	>1/64	64/256	1/4	0.8/4.5	
Middleburg	<10/640	>1/64				

NOTE: Sagiyama, Bebaru, and Ross River viruses have been proposed as subtypes of Getah. At least Sagiyama should be studied further to learn if it is a variety or subtype of Getah. See Ross River registration and Reference for further data on antigenic relationship among alphaviruses.

Getah virus has been placed in the SF complex of serogroup A. Sagiyama, Bebaru and Ross River viruses have been antigenically classified as subtypes of Getah virus in the SF complex [24] .

## Section VI - Biologic Characteristics

Virus source (all VERTEBRATE isolates): Blood (LV)

Lab Methods of Virus Recovery (ALL ISOLATIONS): Newborn mice

Susceptibility of Cell Culture Systems:

Cell system (a)	Virus passage history (b)	Evidence of Infection							
		CPE			PLAQUES				
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)		
Vero, LLC-MK2(CL)									
BHK-21 (CL)		1	extensive	3.6*	3	large	8.5* (12)		
C6/36 (CL)		1	moderate	3.2	4	large	8.1 (12)		

Produces CPE in human embryonic lung, monkey kidney (MA 104) equine fetal dermis, bovine embryonic kidney, swine embryonic kidney, Chinese hamster kidney, cow kidney, horse kidney and Hmlu (14) RK-13 (15).

\* Expressed in dex

## Section VII - Natural Host Range

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Culex (Culex) gelidus	1/461 (98,063 mosq.)		Kuala Lumpur, Malaysia
Cx (Cux) tritaeniorhynchus	1/585 (123,523 mosq.)		Kuantan, Malaysia
Cx tritaeniorhynchus	1		Cambodia (3); Osaka and Nagasaki, Japan(12, 13)
Cx bitaeniorhyncus	1		N. Queensland, AS (8)
An amictus	1		N. Queensland, AS (4)
Ae vexans nip.	3		Nagasaki area, Japan(6)
Cx vishnui	1		Philippines (23)
Man		39/97 NT	Kuala Lumpur, Malaysia
		27/74 NT	Kuantan, Malaysia
		33/98 NT	Rantau Panjang, Malaysia
Pigs	1		Japan (6)
Cattle		8/419 HI	N. Queensland, AS (9)
		4/31 NT	
Racehorses (blood)	62/209	172/281	Japan; 1978 (15, 17)
Racehorses	3/6	421/1,465 CF	Japan (16, 18)
Aedes, Anopheles hrycanus	4		S. Amur Region, USSR; 1972-73 (25)
Aedes vexans nipponii	1		

HI and NT antibody in Australia, possibly cross reactive with Ross River (4). Cattle antibody possibly Getah and not Ross River.

## Section VIII - Susceptibility To Experimental Infection (Record Viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log <sub>10</sub> /ml		
Mice (nb)	SM 2	ic 0.015	Death	4-7			
Mice (nb)		ip					
Mice (nb)		sc					
Mice (wn)	SM 3,4	ic 0.03	No disease				
Mice (wn)	SM 5	ip 0.2	No disease				
emb. eggs (10 day)	SM 6, YS 3	embryo 0.1	Death	3-4	<1.3		
""	SM 6, YS 2, CAM 3	CAM 0.1	Lesions	3-4	<1.3		
Macaca iris (yg ad)	SM 6, YS 2, CAM 4		No disease or infection				
rabbit (ad)	SM 2-7	ip 2.0	No disease: NT antibody produced				
horse	Horse plasma	im 2.0	Fever, rash, nasal discharge and edema (19)		3.8-5.8		
horse	Vero and RK-13,1-3	in 2.0	Fever, rash, nasal discharge and edema (21)		2.8-3.8		

Rabbit, rat, guinea pig, hamster, mouse; ip, sc, 4.5 dex, MI-110 str.; viremia, 1 day, HI antibodies (for rabbits and rats); viremia, 3 days, HI antibodies (for guinea pigs, hamsters and mice) (26).

Pregnant mice, sc inoc., viremia in mother and infection and death in some fetuses. Interuterine infection also resulted in reduction of litter size. High titers of virus detected in fetal brain and muscle (27).

## 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
Culex annulirostris	7.3/mosq.		7-15	25			7.8-8.3/mosq.		Baby mice, ic(10)	
Aedes vigilax	>5.8/mosq.		7-10	25			>5.8/mosq.		Baby mice, ic (10)	
Aedes funereus	4.8/mosq.		7-15	25			5.3/ mosq.		Baby mice, ic (11)	

## Section X - Histopathology

**Character of lesions:** In suckling mice following ic inoculation: diffuse encephalitis, focal necrosis of liver and brown fat, occasional myositis. In horses, im or in inoculation: lymphocytic hyperplasia in lymph node and spleen. Occasional inflammation in dermis (20).

### Inclusion bodies:

Cytoplasmic:(M)

(LV)

Intranuclear: (M)

(LV)

**Organs-tissues affected:** Brain (LV), liver (LV), skeletal muscles (LV)

### Category of tropism:

## Section XI - Human Disease

Human disease:	In nature:	(S) (R)
Death:		(S) (R)
Residua:		(S) (R)
Laboratory infections: Subclinical:		(S) (R)
Overt Disease:		(S) (R)
Clinical manifestations:		
Category:		No. of cases:

## Section XII - Geographic Distribution

### Known (virus):

Malaysia, Japan, Australia, Cambodia, Philippines (23)

## Section XIII - References

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## Section XIV - Remarks

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