Virus Name: Chenuda	Abbreviation: CNUV

Status
Possible Arbovirus

Select Agent
No

SALS Level
2

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

Other Information

Antigenic Group
Kemerovo

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
Ar 1170

Accession Number

Original Date Submitted
12/9/1984

Family
Reoviridae

Genus
Orbivirus

Information From
R.M. Taylor

Address
School of Public Health, Warren Hall, University of California, Berkeley, California

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
R.M. Taylor, et al. (1)

Isolated at Institute
NAMRU-3, Cairo, Egypt

Host Genus
Argas reflexus hermanni

Species

Host Age/Stage
Nymphs + adults

Sex
Not Answered

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation

Collection Method
By hand

Collection Date
2/4/1954

Place Collected (Minimum of City, State, Country)
Chenuda Village, Nile Delta, Egypt

Latitude
30° N

Longitude
32° E

Macrohabitat
Pigeon house

Microhabitat
Cracks in dried mud inner walls

Method of Storage until Inoculated
Live; at ambient temperature

Footnotes

Section III - Method of Isolation

Inoculation Date
2/5/1954

Animal (Details will be in Section 6)
nb mice

Route Inoculated
ic and sc

Reisolation
No

Other Reasons
New virus; isolation of identical virus from otherpools of same tick.

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)
Virus labile at pH 3.0 (9)

Lipid Solvent (ether - % used to test) **1:4**	After Treatment Titer **3.2 dex**	Control Titer **6.8 dex**
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) **1:1000**	After Treatment Titer **3.0 dex**	Control Titer **7.1 dex**

Other (formalin, radiation)
Relatively stable to lipid solvents

Virion Morphology

Shape **Orbivirus morphology**	Dimensions **65-80 nm**	
Mean nm	Range nm	
Measurement Method **By electron microscopy (8)**	Surface Projections/Envelope **No envelope present (8)**	Nucleocapsid Dimensions, Symmetry **Icosahedral symmetry (8)**

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 ext. by acetone-ether**	**Goose**
pH Range **6.0-7.0**	pH Optimum	
Temperature Range	Temperature Optimum	

Remarks

Serologic Methods Recommended
CF, NT

Footnotes

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

Has been examined by CF and found unrelated to following viruses [2] : trivittatus-7941 (64), Anopheles A (64), Anopheles B (128), bat virus-Burns (128), Rio Bravo (128), Bunyamwera (64), Bwamba (32), Cache Valley (64), California (BFS-283)(32), chikungunya (256), Colorado tick fever (Florio)(64), dengue (Hawaii)(>8), dengue (NGB)(64), EEE (85)(128), herpes simplex (8), herpes simplex (E. Johnson) (32), Ilheus (256), Jap. enc. (Nakayama)(128), LCM (512), Mayaro (64), mouse virus-FA-660 (16), mouse virus-GD-7 (16), MVE (128), Ntaya (128), Powassan (128), RSSE (8), Sandfly fever-Sicilian (128), Semliki Forest (>512), Sindbis (128), St. Louis (Parton)(128), Turlock (64), Uganda S (128), WEE (85)(128), Wyeomyia (>512), YF-Jungle (256), YF (17D)(32), Zika (128). Cross tests were made with Chenuda Ar-1170 (128). The numbers in parentheses represent the reciprocal of the dilution of immune serum required to obtain complete complement-fixation with the homologous antigen.
Though the prototype strains of Quaranfil (Ar-1113) and Chenuda (Ar-1170) and an Egyptian strain Ar-1304 used as prototype of Nyamanini did not show crossing by CF, two other Egyptian strains classed as Nyamanini did show slight one-way crossing with Quaranfil or Chenuda.
Casals [3] was unable to detect antigenic crossing of Quaranfil, Nyamanini and Chenuda, and has placed CNU in the Kemerovo group.
McIntosh [4] has reported isolation of a virus Ar-3441 from Argas peringueyi in South Africa which is very closely related if not identical with CNU.

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)	
Vero (CL)	SM 19				5	2 mm	6.9* (6)		
LLC-MK2 (CL)					6	1 mm	7.2 (6)		
BHK-21 (CL)	SM 18	2	4+	7.5* (5)					

Produces CPE and plaques in tissue culture. Grows best in duck kidney or embryo tissue culture (2), and BHK cells (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
Argas r. hermanni	16/60 [a] pools		Nile Delta, Egypt (1)
Man		0/191 CF	Lower Egypt (10)
Camels		5/137 CF	
Buffalo		3/108 CF	
Sheep		0/100 CF	
Pigs		2/101 CF	
Dogs		4/101 CF	
Donkeys		3/187 CF	
Rodents		1/94 CF	
Hyalomma asiaticum	1		Uzbekistan, USSR (11)

[a] Not all of 16 isolations of virus from hermanni ticks have been adequately studied for exact classification but three (Ar-1170, Ar-1152 and Ar-1733) have been typed by CF as Chenuda virus. One isolation from these ticks was typed as Quaranfil virus.

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)	Initial	ic 0.02	Paralysis, death	3-5	6.0
Mice (nb)		ip 0.02	None		
Mice (nb)		sc			
Mice (wn)		ic 0.03	None [b]		
Mice (wn)		ip			
emb. eggs (8 day)	P-3	ys	Death	2-4	6.0
chicks (3-10 day)	P-4 to P-5	sc 0.1	None		
pigeon squab(2 wk)		sc 0.1	None		
guinea pigs (yg ad)		sc 0.1	None		
hamsters (yg ad)		sc 0.1	None		

[b] After 6 to 8 passages, became adapted to adult mice and AST shortened to 2-3 days.

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
Argas arboreus, p-11 Ar 1152	Ar 1152, infected by puncture. Titer in triturated ticks inoc. into mice = 5.3 after 10 days; 3.7 after 11 days.								
A. hermanni	Infected by puncture with 13th pass. Ar 1152. Titer by mouse inoc. after 18 days 2.0.								

Efforts to infect ticks by feeding or to transmit by bite were unsatisfactory.

Section X - Histopathology

Character of lesions (specify host)
sm: CNS - congestion and edema, petechial hemorrhages, some focal necrosis, perivascular cuffing and degeneration of ganglion cells.

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)
Egypt and South Africa (1,4); USSR (11)

Suspected (Antibody only detected)

Section XIII - References

1. Taylor, R.M., et al. 1966. Am. J. Trop. Med. Hyg. 15:75.
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9. Borden, E.C., et al. 1971. J. Gen. Virol. 13:261-271.
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Remarks

Strain Ar-1152 was initially sent to the Rockefeller Foundation Virus Laboratory in New York and has been used by Casals as the prototype for this virus, but Ar-1170 was used mainly for Laboratory studies at NAMRU-3 and is therefore registered as the prototype strain. Ar-1152 and Ar-1170 in comparison with each other by both CF and NT appear to be identical.