

Virus Name: **Quaranfil**

Abbreviation: **QRFV**

Status: Arbovirus

SALS Level: 2

Antigenic Group: Quaranfil

Taxonomic status: *Not listed*

Other Information: None.

Select Agent:

SALS Basis: S

HEPA Filtration:

Section I - Full Virus Name and Prototype Number

Full Virus Name:

Quaranfil

Prototype Number:

Ar-1113

Information from: R.M. Taylor

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Date:

1/3/1985

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

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Reviewed by editor

Section II - Original Source

Isolated by: R.M. Taylor, et al. (1)

at: NAMRU-3, Cairo, Egypt

Genus and species: *Argas (Persicargas) arboreus*

Sentinel X

Age/Stage: Mostly nymphsSex:

Isolated From	Isolation detail
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Signs and symptoms of illness:

Arthropod engorged depleted gravid

Time held alive before inoculation:

Collection date: 12/8/1953 Method: By hand

Place collected: Nile barrage, near Cairo, Egypt

Latitude: 30° ' ' N

Longitude: 32° ' ' E

Macrohabitat: Grove of trees; egret (*Bubulcus ibis ibis*) rookery

Microhabitat: Bark of tree

Method of storage until inoculated: Alive; at ambient temperature

Footnotes:

Section III - Method of Isolation and Validity

Inoculation Date: 12/10/1953

Animal: nb mice

Embryonated egg:

Tissue Culture:

(Details in Section VI - Biologic Char.)

Route inoculated: ic and sc

Reisolation: No

Other reasons: New virus; repeated isolations from ticks, egrets, and pigeon squabs.

Homologous antibody formation by source animal (See Section II):

Test used: HI

CF

NT

Other:

Footnotes:

Section IV - Virus Properties

Physicochemical:

RNA: DNA: Single Strand: Double Strand:
Pieces: Infectivity: Sedimentation coefficient(s): /strong>
Percentage wt. of virion protein , lipid carbohydrate
Virion polypeptides:
Number: Details:
Non-virion polypeptides:
Number: Details:
Virion density: Sedimentation coefficient:
Nucleocapsid density Sedimentation coefficient:

Stability of infectivity (effects) pH

Lipid solvent:

(ether) 50%, 24 hours After treatment titer <2.0 dex Control titer 5.0 dex
(chloroform) After treatment titer Control titer

Detergent:

(deoxycholate) 1:1000 After treatment titer <2.0 dex Control titer 5.0 dex

Other (formalin, radiation): Can be desiccated without material loss in titer.

Virion morphology:

Shape Arenavirus-like (16) Dimensions 55+ nm ; 130-145 nm
Mean (nm) 140 range (nm) how measured Gradocol membrane filtration ; EM (16)
Surface projections, envelope
Nucleocapsid dimensions, symmetry

Morphogenesis:

Site of constituent formation in cell

Site of virion assembly

Inclusion bodies

Other

Hemagglutination:

Hemagglutination No Antigen source SMB ext. by acetone-ether
Erythrocytes Goose pH range 6.0-7.0 pH optimum
Temperature optimum range

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 Quaranfil-Ar-1113 (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. If this crossing is verified, it is suggested that Quaranfil, Chenuda and Nyamanini be placed in a group to be designated as Quaranfil [2] .

For antigenic classification of tick-borne viruses, see Casals [3] . Neither Casals nor Kaiser [4] was able to detect relationship between Quaranfil, Chenuda, and Nyamanini. There is, however, a close relationship between Quaranfil and Johnston Atoll virus; see Reference [3] and Johnston Atoll registration in Catalogue. For world-wide distribution of the tick-borne viruses, see Yunker [5] .

Section VI - Biologic Characteristics

Virus source (all VERTEBRATE isolates): Blood (M), spleen (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			Growth Without CPE +/- (g)
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
Vero (CL)	SM 17					No plaques (13)		
LLC-MK2 (CL)					10	1 mm	4.7*	
BHK-21 (CL)	SM 20	5	2+-3+	7.5* (12)				

Produces CPE and plaques in tissue culture. Grows best in duck kidney or embryo tissue culture (2). Also propagates in rabbit kidney tissue culture (10), BHK-21 (12), and LLC-MK2 (13).

* 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
Man	2/3,286	6/38 * NT	Egypt (1, 2)
Bubulcus ibis (cattle egret)	4/66	19/33 NT	
Pigeon (squabs; pigeon houses)	1/43	0-100% NT	
Pigeon (adult; pigeon houses)		37/49 NT	Egypt (1)
Argas arboreus	48/5		Egypt (1, 2, 4)
Argas arboreus	Several		South Africa (6)
Argas (A.) hermanni	6		Afghanistan (7)
Argas (P.) arboreus	16		Nigeria (8)
Argas (A.) hermanni	1/60		Egypt (1, 2)
Argas vulgaris	4/15 pools		Iran (15)
Man		2.6%/191 CF	Lower Egypt (14)
Camels		12/137 CF	
Buffalo		24/108 CF	
Sheep		0/100 CF	
Pigs		12/101 CF	
Dogs		7/101 CF	
Donkeys		15/187 CF	
Rodents		0/94 CF	

* NT antibodies found in 6/38 children in village in which there was an infected rookery but only 18/214 in samplings elsewhere. All NT positives in pigeons were found in large pigeon houses known to be infected. No positive NT found in miscellaneous samplings of chickens, ducks, geese, crows, and pigeons not in large dove-cotes. Abdel-Wahab (11) was unable to associate QRF virus with 133 encephalitis cases investigated in Egypt.

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 ₁₀ /ml
Mice (nb)		ic 0.02	Paralysis, death	4-6	6.0
Mice (nb)		ip 0.02	Paralysis, death	5-6	5.0
Mice (nb)		sc			
Mice (wn)		ic 0.03	Paralysis, death	5-6	6.0
Mice (wn)		ip 0.03	Irregular		
emb. eggs		ys 0.1	Death	2-3	4.0
young chicks		sc 0.1	Death		
guinea pigs		ip 0.1	Death		
hamsters		ip 0.1	Death		
rabbits		ip 0.1	None		

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
Argas arboreus adults and nymphs infected by feeding or puncture transmitted by bite to 1-3 day chicks after extrinsic incubation periods of 12-57 days. Successful transmission experiments also with A. hermanni and Ornithodoros savignyi ticks.									
Can be propagated in serial passage by inoculation in Ornithodoros savignyi and larva of Indian meal moth (Plodia interpunctella) but not in Culex tarsalis and several other arthropods tested (9).									

Section X - Histopathology

Character of lesions: sm: not well studied. Produces lesions in brains of mice similar to most encephalitic arboviruses; edema, congestion, petechial hemorrhages, perivascular cuffing, ganglion cell degeneration and focal necrosis.

Inclusion bodies:

Cytoplasmic:(M) (LV) X **Intranuclear:** (M) (LV)

Organs-tissues affected:

Category of tropism:

Section XI - Human Disease

Human disease: **In nature:** (S) (R) X

Death: (S) (R)

Residua: (S) (R)

Laboratory infections: Subclinical: (S) (R)

Overt Disease: (S) (R)

Clinical manifestations: Fever (R), prostration (R)

Category: Febrile illness **No. of cases:** Two

Section XII - Geographic Distribution

Known (virus):

Egypt, South Africa, Afghanistan, Nigeria, Iran (15)

Section XIII - References

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Section XIV - Remarks

In the first registration of Quaranfil, information on the isolation of a strain from the blood of a child was given as this was the first isolation of this virus. But this was not identified until some time after the isolation of the virus from ticks. As most of the laboratory work at NAMRU-3 was done on Ar-1113, this strain is designated as the prototype (2) and its source and isolation recorded in this reregistration. However, another strain (Ar-1095) which was indeed the first strain isolated from A. arboreus and initially sent to Casals at RFVL has been used by him as the prototype of Quaranfil in his studies. Ar-1113 and Ar-1095 appear to be antigenically identical.