

<b>Virus Name: Colorado tick fever</b>		<b>Abbreviation: CTFV</b>
Status <b>Arbovirus</b>	Select Agent <b>No</b>	SALS Level <b>2</b>
SALS Basis <b>Results of SALS surveys and information from the Catalogue.</b>		
Other Information		
Antigenic Group <b>Colorado Tick Fever</b>		

**SECTION I - Full Virus Name and Prototype Number**

Prototype Strain Number / Designation	Accession Number	Original Date Submitted <b>2/1/1985</b>
Family <b>Reoviridae</b>	Genus <b>Orbivirus</b>	
Information From <b>Carl M. Eklund, M.D.</b>	Address <b>Rocky Mountain Laboratory, Hamilton, Montana</b>	
Information Footnote <b>Reviewed by editor</b>		

**Section II - Original Source**

Isolated By (name) <b>Lloyd Florio, M.D. (1)</b>	Isolated at Institute <b>Colorado Med. School, Denver, Colorado</b>	
Host Genus <b>Man</b>	Species	Host Age/Stage
Sex <b>Male</b>		
<u>Isolated From</u>	<u>Isolation Details</u>	
<b>Serum/Plasma</b>		
Signs and Symptoms of Illness <b>Headache, backache, muscle, joint pains, anorexia, deep ocular pain, photophobia</b>	Arthropod	
Time Held Alive before Inoculation		
Collection Method <b>Venipuncture</b>	Collection Date <b>1/1/1943</b>	
Place Collected (Minimum of City, State, Country) <b>Univ. of Colorado Med. School Hospital, Denver, CO</b>		
Latitude <b>40° N</b>	Longitude <b>105° W</b>	
Macrohabitat	Microhabitat	Method of Storage until Inoculated <b>Frozen in ice compartment of refrigerator</b>
Footnotes		

**Section III - Method of Isolation**

Inoculation Date  
**1/1/1943**

Animal (Details will be in Section 6)  
**Hamsters**

Route Inoculated <b>Intraperitoneal</b>	Reisolation <b>Not tried</b>
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Other Reasons  
**Hamster material produced disease in human volunteers.**

Homologous Antibody Formation by Source Animal  
**Not tested**

Test(s) Used

Footnotes

**Section IV - Virus Properties**

Physicochemical  
**RNA, Double Strand**

Pieces (number of genome segments) <b>12 (24)</b>	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)	

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**Stability of Infectivity (effects)**

pH (infective range)  
**Labile at pH 3.0 (20)**

Lipid Solvent (ether - % used to test)	After Treatment Titer	Control Titer
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate)	After Treatment Titer	Control Titer

Other (formalin, radiation)  
**Relatively resistant to lipid solvents and sodium deoxycholate(20)**

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**Virion Morphology**

Shape <b>Orbivirus morphology</b>	Dimensions <b>80 nm</b>	
Mean nm	Range nm	
Measurement Method <b>Gradacol membrane; electron microscopy (16, 17)</b>	Surface Projections/Envelope <b>No envelope; occasionally pseudoenvelope</b>	Nucleocapsid Dimensions, Symmetry <b>Round shaped capsid; diameter =</b>

(10,17)

pseudoenvelopes

Round-shaped capsid, diameter – 50 nm

**Morphogenesis**

Site of Constituent Formation in Cell	Site of Virion Assembly	Site of Virion Accumulation
Inclusion Bodies	Other	

**Hemagglutination**

Hemagglutination <b>No</b>	Antigen Source <b>SMB and serum ext. by acetone-ether</b>	Erythrocytes (species used) <b>Chick</b>
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pH Range	pH Optimum
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Temperature Range	Temperature Optimum
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Remarks

Serologic Methods Recommended  
**CF and NT**

Footnotes

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

In complement-fixation tests with Groups A, B, and California antigens, results were negative with CTF antisera.

Group A, B, California, Bunyamwera (Cache Valley), Quarantfil and Chenuda virus antisera gave negative results when tested by complement-fixation against Colorado tick fever virus antigen.

By CF and NT, CTF is closely related to Eyach virus (see Eyach virus registration). Together, these two viruses comprise the CTF serogroup.

**Section VI - Biologic Characteristics**

Virus Source (all VERTEBRATE isolates)  
 Blood (M)(LV)

Lab Methods of Virus Recovery (ALL ISOLATIONS)  
 Newborn mice and hamsters; human; hamster and mouse cell lines; primary chick embryo cell cultures

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)
KB (CL)	Isol. fr. ticks and blood clot	3-5	CPE	4.0-5.0*				
Vero (CL)	P-6				9	1 mm	5.7* (26)	
LLC-MK2 (CL)						No plaques (26)		
BHK-21 (CL)		6	3+	5.7 (27)				

\* 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
Golden mantled ground squirrel	56/131	1/28 NT	Northwestern U.S., and western Canada  (represents experience at RML)
Columbian ground squirrel	35/264	0/110 NT	
Chipmunks	15/70	0/1 NT	
Pine squirrels	1/4		
Deer mice	1/6		
Porcupine	1/2	1/9 NT	
Dermacentor andersoni	716/36,808		
Dermacentor occidentalis	3/2,291		

Dermacentor parumapertus	3/1,915		
Dermacentor albopictus	1/1,768		
Otobius lagophilus	1/28 nymphs		
Otobius lagophilus	0/175 larvae		
Otobius lagophilus	0/3 adults		
Man (blood) *	Numerous		Northwestern USA
Lepus californicus	1	31IFA,PRNT	Medocino Cty, CA (24)
Deer (Odocoileus hemionus)		21 PRNT	
Sheep (Ovis aries)		1	
Coyotes (Canis latrans)		2 PRNT	
Ground squirrels (Spermophilus beecheyi)		3 PRNT	
CA meadow mice (Microtus californicus)		2 PRNT	
Wood rats (Neotoma fuscipes)		2 PRNT	
Deer mouse (Peromyscus maniculatus)		1 PRNT	

\* Virus in red blood cells of man up to 110 days after onset (18)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log <sub>10</sub> /ml
Mice (nb)	Recently isol.	ic 0.02	Death	6-9	5-7.5
Mice (nb)	tick or human	ip 0.05	Death	6-9	5-7.5
Mice (nb)		sc			
Mice (wn)	Florio-mouse adapt	ic 0.03	Death	3-6	7.0
Mice (wn)		ip			
chick embryo(7 day)		ys 0.25	Titration in mice *		4.5
hamster(ad)	Recent isolate	sc 0.05	Viremia 24-96 hours		3.0
chicks(1 day)	Recent isolate	sc 0.05	Viremia 24-96 hours		3.0
rhesus monkey (5 lb)	Florio	sc 1.0	Viremia 1-128 days		3.8
		im			
		iv			
porcupine (ad)	Tick strain	tick bite	Viremia to 45 days		5.0
Columbian gr. squirrel (ad)		---	Viremia 15-20 days		1.7
Golden mantled ground squirrel(ad)		---	Viremia 15-20 days		3.8
chipmunk (ad)		---	Viremia 15 20 days		6.2
deer mice (ad)		---	Viremia 15-20 days		3.0
man (ad)		sc 4.0	Typical clinical and blood picture (15,16)		

\* Virus present in central nervous system only.

**Section IX - Experimental Arthropod Infection and Transmission**

Arthropod species & virus source(a)	Method of Infection log <sub>10</sub> /ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log <sub>10</sub> /ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System

**Section X - Histopathology**

Character of lesions (specify host)

**Mice, hamsters, guinea pigs (5): necrosis in the brain and myocardium (3). Bone marrow - distinct maturation arrest in the granulocytic series (4).**

Inclusion Bodies

Intranuclear

Organs/Tissues Affected

**Brain (LV), heart (LV), marrow (M)**

Category of tropism

**Section XI - Human Disease**

In Nature  
**Significant**

Residual

Death

Subclinical

Overt Disease  
**Significant**

Clinical Manifestations

**Fever (S), headache (S), prostration (S), conjunctival inflammation (R), stiff neck (R), myalgia (S), CNS signs (including encephalitis)(R), hemorrhagic signs (R), leukopenia(S), CNS pleocytosis (R), rash (R), vomiting (R), pericarditis (20).**

Number of Cases

**at least 200 to 300 cases**

Category (i.e. febrile illness, etc.)

**Endemic disease**

**Section XII - Geographic Distribution**

Known (Virus detected)

**Corresponds essentially with the distribution of D. andersoni. (Northwestern USA; Alberta, and British Columbia, Canada (21,22)**

Suspected (Antibody only detected)

**Because of ease of isolation of virus from patients and ticks, geographical distribution has been determined by actual virus isolation.**

Section XIII - References

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Remarks