Virus Name: Bovine Ephemeral Fever	Abbreviation: BEFV

Status
Possible Arbovirus

Select Agent
No

SALS Level

SALS Basis

Other Information

Antigenic Group
Bovine Ephemeral Fever

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation

Accession Number

Original Date Submitted
8/22/1984

Family
Rhabdoviridae

Genus

Information From
R.L. Doherty

Address
Institute of Medical Research, Herston Rd, Herston, 4006, Qld., Australia

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
Doherty, Standfast and Clark

Isolated at Institute
Brisbane

Host Genus
Bos taurus

Species

Host Age/Stage
Calf

Sex
Not Answered

Isolated From	Isolation Details
Serum/Plasma	

Signs and Symptoms of Illness
Febrile after experimental inoculation with BEF cattle-passage material

Arthropod

Time Held Alive before Inoculation

Collection Method
Venipuncture

Collection Date
2/5/1968

Place Collected (Minimum of City, State, Country)
Charters Towers, North Queensland, Australia

Latitude
20° S

Longitude
146° E

Macrohabitat

Microhabitat

Method of Storage until Inoculated
Nil

Footnotes

Section III - Method of Isolation

Inoculation Date
2/5/1968

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
Yes

Other Reasons
Virus clearly distinct from any available in the laboratory

Homologous Antibody Formation by Source Animal
Yes

Test(s) Used
NT

Footnotes

Section IV - Virus Properties

Physicochemical
RNA

Pieces (number of genome segments)	Infectivity	Sedimentation Coefficients(s) (S)
Percentage wt, of Virion Protein	Lipid	Carbohydrate
Virion Polypeptides: Number	Details **Unconfirmed work suggests double-stranded RNA genome (24)**	
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%**	After Treatment Titer **2.0 dex**	Control Titer **4.0 dex**
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) **1:1000**	After Treatment Titer **2.0 dex**	Control Titer **3.4 dex**

Other (formalin, radiation)

Virion Morphology

Shape **Rhabdovirus; some conical (16, 18)**	Dimensions **70 x 145 mn**
Mean nm	Range nm

Measurement Method **Electron microscopy (11,14)**	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry

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 sucrose-acetone**	**Gander**
pH Range	pH Optimum	
6.0-7.6		
Temperature Range	Temperature Optimum	
	37dC	

Remarks
Bovine ephemeral fever, recognized in Africa from 1867 (2), was transmitted to cattle in 1907 (1) and the agent studied in that system before 1940 (17). Its adaptation to mice in South Africa (28) and to hamsters, mice and cell cultures in Japan (13)

Serologic Methods Recommended
CF; NT in BHK-21 (19) and Vero (4) cell cultures o

Footnotes
Bovine ephemeral fever, recognized in Africa from 1867 (2), was transmitted to cattle in 1907 (1) and the agent studied in that system before 1940 (17). Its adaptation to mice in South Africa (28) and to hamsters, mice and cell cultures in Japan (13)

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

No relation was shown by neutralization or complement-fixation tests to arboviruses isolated in Australia [7] . Strains of bovine ephemeral fever isolated in Australia, South Africa and Japan were shown indistinguishable [7] , [12] , [19] .
Three recently registered viruses isolated in Australia, were shown to be antigenically related to BEF virus by CF, IFA, and NT. Those three viruses, Adelaide River, Berrimah and Kimberly, plus BEF virus now comprise the newly- formed BEF serogroup. For additional information, see Reference [32] and the registration cards for Adelaide River, Berrimah and Kimberly viruses.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (LV)

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) Mouse adapted strains of bovine ephemeral fever virus can readily

BHK 21 (CL) be adapted to give CPE in Vero and BHK 21 cells (4,10,13,18,19).

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
Cattle	Numerous isolates from cattle with disease		Australia, South Africa, Japan (7,13,19,21,28)
Cow (blood)	2		Ibaden, Nigeria (29)
Cattle (blood)	1		Iran (30)
Midges (mixed pool of 4,000 Chironomidae	1/10		Kenya (5)
Culicoides kingi, C. nivosus,			
C. bedfordi, C. pallidipennis,			
C. cornutus)			
Anopheles bancroftii	1		Beatrice Hill, N.Terr., Australia (31)
Mixed mosq. spp.	1		Rockhampton, Queensland Australia (31)
Cattle		93/168 NT	Eastern Australia (6)
Cattle		104/295 NT	Australia (8)

Cattle		0/47 NT	New Guinea (8)
Cattle		494/2,656 NT	Australia (20)
Horse		0/36 NT	Eastern Australia (6)
Sheep		0/36 NT	
Wallaby Macropus		1/75 NT	
Kangaroo		0/40 NT	
Rat		0/10 NT	
Bandicoot		0/31 NT	
Domestic fowl		0/49 NT	
Man		0/115 NT	
Water buffalo		109/1,009 NT	N. Terr., Australia(23)
Cattle	4		Taiwan (33)

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 5	ic 0.015	Death	5-6	6.6
Mice (nb)		ip 0.03	None		
Mice (nb)		sc			
Mice (wn)		ic 0.03	None		
Mice (wn)		ip 0.03	Antibody production		
cattle	Experimental transmission of virus from field infections is widely used and is the only available method of studying unadapted virus (1,17). Effects of route of infection (intracerebral (25), intracervical (3) to the foetus (27)) or age (26) have also been defined.				
sheep	Some strains at least have been shown to produce subclinical infection in sheep (9). References cited in (9) list earlier unsuccessful attempts.				

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 vigilax Culex quinquefasciatus	Evidence of virus survival and multiplication after intrathoracic inoculation (7).								
Culex annulirostris	Evidence of multiplication after ingestion of virus through membrane (15,22).								

Section X - Histopathology

Character of lesions (specify host)
In natural disease in cattle, endothelial hyperplasia and perivascular neutrophil infiltrates in venules and capillaries in synovial membranes, tendon sheaths, muscles fascia and skin (2). Experimentally infected mice show necrotic encephalomylitis with no extraneural involvement (18).

Inclusion Bodies — Intranuclear

Organs/Tissues Affected
Brain (LV), blood vessels (LV), skeletal muscles (LV)

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)
South Africa, Kenya, Australia, Japan, Nigeria, Iran (30)

Suspected (Antibody only detected)

Section XIII - References

1. BEVAN, L.E.W. 1907. J. Comp. Path. 20:104.
2. BURGESS, G.W. 1971. Vet. Bull. 41:887.
3. BURGESS, G.W. 1973. Aust. Vet. J. 49:341.
4. BURGESS, G.W. 1974. Aust. J. Exp. Biol. Med. Sci. 52:851.
5. DAVIES, F.G. and WALKER, A.R. 1974. Vet. Rec 95:63.
6. DOHERTY, R.L., et al. 1972. Aust. Vet. J. 48:81.
7. DOHERTY, R.L., et al. 1969. Aust. J. Sci. 31:365.
8. DOHERTY, R.L., et al. 1973. Aust. Vet. J. 49:574.
9. HALL, W.T., et al. 1975. Aust. Vet. J. 51:344.
10. HEUSCHELE, W.F. 1970. Arch. ges. Virusforsch. 30:195.
11. HOLMES, I.H. and Doherty, R.L. 1970. J. Virol. 5:91.
12. INABA, Y., et al. 1969. Jap. J. Microbiol. 13:388.
13. INABA, Y., et al. 1968. Jap. J. Microbiol. 12:457.
14. ITO, Y., et al. 1969. Nat. Inst. Anim. Health Quarterly (Tokyo) 9:35.
15. KAY, B.H., et al. 1975. J. Med. Ent. 12:279.
16. LECATSAS, G., et al. 1969. Onderstepoort J. Vet. Res. 36:325.
17. MACKERRAS, I.M. and MACKERRAS, M.J. 1940. Bull. Commonwealth Sci. Ind. Res. Org. No. 136.
18. MURPHY, F.A., et al. 1972. Arch. ges. Virusforsch. 38:234.
19. SNOWDON, W.A. 1970. Aust. Vet. J. 46:258.
20. SNOWDON, W.A. 1971. Aust. Vet. J. 47:312.
21. SPRADBROW, P.D. and Francis, J. 1969. Aust. Vet. J. 48:181.
22. STANDFAST, H.A. 1975. Personal communication.
23. ST. GEORGE, T.D. 1975. Personal communication.
24. TANAKA, Y., et al. 1972. Jap. J. Microbiol. 16:95.
25. TZIPORI, S. 1975. Aust. Vet. J. 51:251.
26. TZIPORI, S. 1975. Aust. Vet. J. 51:254.
27. TZIPORI, S. and Spradbrow, P.D. 1975. Aust. Vet. J. 51:64.
28. VAN DER WESTHUIZEN, B. 1967. Onderstepoort J. Vet. Res. 34:29.
29. KEMP, G.E., et al. 1973. Vet. Record. 94:107-108.
30. HAZARTI, A., et al. 1975. Arch. Inst. Razi. 27:81.
31. STANDFAST, H.A., et al. 1976. Aust. Vet. J. 52:242.
32. CYBINSKI, D.H. and ZAKRZEWSKI, H. 1983. Vet. Microbiol. 8:221-235.
33. CHIU, S.Y. 1986. J. China Soc. Vet. Sci. 12:275-288.

Remarks