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Wallace, D.B. and Viljoen, G.J. (2002). Importance of thymidine kinase activity for normal growth of lumpy skin disease virus (SA-Neethling). *Archives of Virology*, **147**, 659-663.

Wallace, D.B. and Viljoen, G.J. (2005). Immune responses to recombinants of the South African vaccine strain of lumpy skin disease virus generated by using thymidine kinase gene insertion. *Vaccine*, 23, 3061-3067.

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Thirteenth Congress of the South African Biochemical Society. Bloemfontein, UOFS. 2-5 April, 1995.

Title: Construction and generation of recombinant lumpy skin disease viruses expressing African horsesickness virus VP2.

Fick, W.C., Wallace, D.B. and Viljoen, G.J.

Thirteenth Congress of the South African Biochemical Society. Bloemfontein, UOFS. 2-5 April, 1995.

Title: Generation of recombinant vaccinia viruses expressing African horsesickness virus genes. Wallace, D.B., Fick, W.C. and Viljoen, G.J.

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Title: Generation and characterisation of a stable lumpy skin disease virus (Neethling) recombinant expressing B-galactosidase.

Wallace, D.B. and Viljoen, G.J.

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Title: Generation and characterisation of a homogeneous lumpy skin disease virus recombinant expressing the structural glycoprotein of bovine ephemeral fever virus.

Wallace, D.B. and Viljoen, G.J. (2000).



Fourteenth International Poxvirus and Iridovirus Symposium, Lake Placid, USA, 20-24 September 2002.

Title: Lumpy skin disease virus (SA-Neethling) recombinants elicit neutralising antibody production and protective immune responses in small-animal trials.

Wallace, D.B. and Viljoen, G.J.

## REFERENCES

Abraham, A. and Zissman, A. (1991). Isolation of lumpy skin disease virus from cattle in Israel. Israel Journal of Veterinary Medicine, 46, 20-23.

Ahn, B.Y. and Moss, B. (1989). Capped poly(A) leader of variable lengths at the 5' ends of vaccinia virus late mRNAs. *Journal of Virology*, 63, 226-232.

Alexander, R. A., Plowright, W. and Haig, D. A. (1957). Cytopathogenic agents associated with Lumpy-skin Disease of Cattle. *Bulletin epizootic diseases of Africa* 5: 489-492.

Ali, A.A., Esmat, M., Attia, H., Selim, A. and Abdel-Hamid, Y.M. (1990). Clinical and pathological studies on Lumpy Skin Disease in Egypt. *The Veterinary Record*, 127, 549-550.

Amano, H., Morikawa, S., Shimizu, H., Shoji, I., Kurosawa, D., Matsuura, Y., Miyamura, T., and Ueda, Y. (1999). Identification of the canarypox virus thymidine kinase gene and insertion of foreign genes. *Virology*, **256**, 280-290.

Anderson, G.W. Jr, Lee, J.O., Anderson, A.O., Powell, N., Mangiafico, J.A. and Meadors, G. (1991). Efficacy of a Rift Valley fever virus vaccine against an aerosol infection in rats. *Vaccine*, 9 (10), 710-714.

Anderson, J.B., Smith, S.A., van Wijk, R., Chien, S. and Kotwal, G.J. (2003). Vaccinia virus complement control protein inhibits hyperacute xenorejection in a guinea pig-to-rat heterotropic cervical cardiac xenograft model by blocking both xenoantibody binding and complement pathway activation. *Transplant Immunology*, **11** (2), 129-135.

Andrew, M.E., Coupar, B.E.H. and Boyle, D.B. (1989). Humoral and cell-mediated immune responses to recombinant vaccinia viruses in mice. *Immuology and Cell Biology*, **67**, 331-337.

Aspden, K., van Dijk, A.A., Bingham, J., Cox, D., Passmore, J-A and Williamson, A-L. (2002). Immunogenicity of a recombinant lumpy skin disease virus (Neethling vaccine strain) expressing the rabies virus glycoprotein in cattle. *Vaccine*, 20, 2693-2701.

Aspden, K., Passmore, J-A., Tiedt, F. and Williamson, A-L. (2003). Evaluation of lumpy skin disease virus, a capripoxvirus, as a replication-deficient vaccine vector. *Journal General Virology*, **84**, 1985-1996.

Baldick, C.J., Keck, J.G. and Moss, B. (1992). Mutational analysis of the core, spacer, and initiator regions of vaccinia virus intermediate-class promoters. *Journal of Virology*, **66**, 4710-4719.

Baldick, C.J. and Moss, B. (1993). Characterisation and temporal regulation of mRNAs encoded by vaccinia virus intermediate-stage genes. *Journal of Virology*, 67, 3515-3527.

**Ball, L.A. (1987).** High frequency homologous recombination in vaccinia virus DNA. *Journal of Virology*, **61**, 1788-1795.

Banham, A.L. and Smith, G.L. (1992). Vaccinia virus gene B1R encodes a 34-kDa serine/threonine protein kinase that localizes in cytoplasmic factories and is packaged into virions. *Virology*, 191, 803-812.

Baroudy, B.M., Venkatesan, S. and Moss, B. (1982). Incompletely base-paired flip-flop terminal loops link the two DNA strands of vaccinia virus genome into one uninterrupted polynucleotide chain. *Cell*, **28**, 315-324.

Basson, P.A., Pienaar, J.G. and van der Westhuizen, B. (1970). The pathology of ephemeral fever: A study of the experimental disease in cattle. *Journal of the South African Veterinary and Medical Association*, **40** (4), 385-397.

Baxby, D. and Paoletti, E. (1992). Potential use of non-replicating vectors as recombinant vaccines. Vaccine, 10, 8-9.

Belle Isle, H., Venkatesan, S. and Moss, B. (1981). Cell-free translation of early and late mRNAs selected by hybridisation to cloned DNA fragments derived from the left 14 million to 72 million daltons of the vaccinia virus genome. *Virology*, 112, 306-317.

Bello, L.J., Whitbeck, J.C. and Lawrence, W.C. (1987). Map location of the thymidine kinase gene of bovine herpesvirus I. *Journal of Virology*, 61, 4023-4025.

Berhe, G., Minet, C., Le Goff, C., Barrett, T., Ngangnou, A., Grillet, C., Libeau, G., Fleming, M., Black, D.N. and Diallo, A. (2003). Development of a dual recombinant vaccine to protect small ruminants against peste-des-petits-ruminants virus and capripoxvirus infection. *Journal of Virology*, 77, 1571-1577.

Berns, K.I. and Silverman, C. (1970). Natural occurrence of vaccinia virus deoxyribonucleic acid. *Journal of Virology*, **5**, 299-304.

Bevan, L.E.W. (1912). Ephemeral fever, or three days' sickness of cattle. Veterinary Journal, 68, 458-461.

Bhanuprakash, V., Indrani, B.K., Hedge, R., Kumar, M.M. and Moorthy, A.R. (2004). A classical live attenuated vaccine for sheep pox. *Tropical Animal Health and Production*, **36** (4), 307-320.

Binepal, Y.S., Ongadi, F.A. and Chepkwony, J.C. (2001). Alternative cell lines for the propagation of lumpy skin disease virus. *Onderstepoort Journal of Veterinary Research*, **68**, 151-153.

Birnboim, H.C. and Doly, J. (1979). A rapid alkaline extraction procedure for screening recombinant plasmid DNA. *Nucleic Acids Research*, 7, 1513-1523.

Bishop, D.H.L., Calisher, C., Casals, J., Chumakov, N.P., Gaidamovich, S.Y.A., Hannoun, C., Lvov, D.K., Marshall, I.D., Okerblom, N., Pettersson, R.F., Porterfield, J.S., Russel, P.K., Shope, R.E., and Westaway, E.G. (1980). Bunyaviridae. *Intervirology*, 14, 125-143.

Black, D.N., Hammond, J.M. and Kitching, R.P. (1986). Genomic relationship between Capripoxviruses. Virus Research, 5, 277-292.

Blanchard, T.J., Alcami, A., Andrea, P. and Smith, G.L. (1998). Modified vaccinia virus Ankara undergoes limited replication in human cells and lacks several immunomodulatory proteins: implications for use as a human vaccine. *Journal of General Virology*, **79** (5), 1159-1167.

Blancou, J., Kieny, M.P., Lathe, R., Lecocq, J.P., Pastoret, P.P., Soulebot, J.P. and Desmettre, P. (1986). Oral vaccination of the fox against rabies using a live recombinant vaccinia virus. *Nature*, 322, 373-375.

- Boone, R.F. and Moss, B. (1977). Methylated 5' terminal sequences of vaccinia virus mRNA species made in vivo at early and late times after infection. Virology, 79, 67-80.
- Boyle, D. B. and Coupar, B.E.H. (1986). Responses of cattle, sheep and poultry to a recombinant vaccinia virus expressing a swine influenza haemagglutinin. Research in Veterinary Science, 41, 40-44.
- Boyle, D.B., Coupar, B.E.H., Gibbs, A.J., Seigman, L.J. and Both, G.W. (1987). Fowlpoxvirus thymidine kinase: nucleotide sequence and relationships to other thymidine kinases. *Virology*, **156**, 355-365.
- Boyle, D.B., Anderson, M-A., Amos, R., Voysey, R. and Coupar, B.E.H. (2004). Construction of recombinant fowlpox viruses carrying multiple vaccine antigens and immunomodulatory molecules. *BioTechniques*, 37 (1), 104-111.
- Brakel, C. and Kates, J.R. (1974). Poly(A) polymerase from vaccinia virus-infected cells, I. Partial purification and characterisation. *Journal of Virology*, 14, 715-723.
- Brand, E. (1993). Selectable markers for recombinant poxviruses. Masters thesis. University of Cape Town, Cape Town.
- Brochier, B., Kieny, M.P., Costy, F., Coppons, P., Baudin, B., Lecocq, J.P., Lanquet, B., Chappuis, G., Desmettre, P., Afiademanyo, K., Libois, R. and Pastoret, P.P. (1991). Large-scale eradication of rabies using recombinant vaccinia-rabies vaccine. Nature, 354, 520-522.
- Brochier, B. and Pastoret, P.P. (1993). Rabies eradication in Belgium by fox vaccination using vaccinia-rabies recombinant virus. *Onderstepoort Journal of Veterinary Research*, **60**, 469-475.
- **Broyles, S.S. and Moss, B. (1986).** Homology between RNA polymerases of poxviruses, prokaryotes and eukaryotes: nucleotide sequence and transcriptional analysis of vaccinia virus genes encoding 147-kDa and 22-kDa subunits. *PNAS*, **83**, 3141-3145.
- Broyles, S.S. and Moss, B. (1988). DNA-dependant ATPase activity associated with vaccinia virus early transcription factor. *Journal of Biological Chemistry*, **263**, 10761-10765.
- Broyles, S.S. and Pennington, M.J. (1990). Vaccinia virus gene encoding a 30 kDa subunit of the viral DNA-dependant RNA polymerase. *Journal of Virology*, **64**, 5376-5382.
- Broyles, S.S., Yuen, L., Shuman, S. and Moss, B. (1988). Purification of a factor required for transcription of vaccinia virus early genes. *Journal of Biological Chemistry*, **263**, 10754-10760.
- Buller, R.M., Chakrabarti, S. and Cooper, J.A. (1988). Cell proliferative response to vaccinia virus is mediated by VGF. Virology, 164, 182-192.
- Buller, R.M. and Palumbo, G.J. (1991). Poxvirus pathogenesis. *Microbiological Reviews*, 55, 80-122.
- Burdin, M.L. (1959). The use of histopathological examinations of skin material for the diagnosis of lumpy skin disease in Kenya. Bulletin epizootic diseases of Africa, 7, 27-36.
- Burdin, M.L. and Prydie, J. (1959). Observations on the first outbreak of lumpy skin disease in Kenya. *Bulletin epizootic diseases of Africa*, **7**, 21-26.



Cadoz, M., Strady, A., Meigner, B., Taylor, J., Tartaglia, J., Paoletti, E. and Plotkin, S. (1992). Immunisation with canarypox virus expressing rabies glycoprotein. *Lancet*, 339, 1429-1432.

Cameron, C.M., Barnard, B.J.H., Erasmus, E. and Botha, W.J.S. (1987). Antibody response in cattle to oil emulsion rabies and ephemeral fever vaccines. Onderstepoort Journal of Veterinary Research, 54, 157-158.

Cao, J.X., Gershon, P.D. and Black, D.N. (1995). Sequence analysis of *HindIII* Q2 fragment of capripoxvirus reveals a putative gene encoding a G-protein-coupled chemokine receptor homologue. *Virology*, 209, 207-212.

Cao, J.X., Teoh, M.L.T., Moon, M., McFadden, G. and Evans, D.H. (2002). Leporipoxvirus Cu-Zn superoxide dismutase homologs inhibit cellular superoxide dismutase, but are not essential for virus replication or virulence. *Virology*, **296**, 125-135.

Capstick, P.B. (1959). Lumpy Skin Disease- experimental infection. Bulletin epizootic diseases of Africa, 7, 51-62.

Capstick, P. B. and Coakley, W. (1961). Protection of cattle against lumpy skin disease. I. Trials with a vaccine against Neethling type infection. Research in Veterinary Science, 2, 362-368.

Carn, V.M. (1993). Control of Capripoxvirus infections. Vaccine, 11, issue 13, 1275-1279.

Carn, V.M., Kitching, R.P., Hammond, J.M. and Chand, P. (1994a). Use of a recombinant antigen in an indirect ELISA for detecting bovine antibody to capripoxvirus. *Journal of Virological Methods*, 49, 285-294.

Carn, V.M., Timms, C.P., Chand, P., Black, D.N. and Kitching, R.P. (1994b). Protection of goats against capripox using a subunit vaccine. *Veterinary Record*, 135, 434-436.

Carn, V.M. (1995). An antigen trapping ELISA for the detection of capripoxvirus in tissue culture supernatant and biopsy samples. Journal of Virological Methods, 51, 95-102.

Carn, V.M. and Kitching, R.P. (1995a). The clinical response of cattle experimentally infected with lumpy skin disease (Neethling) virus. *Archives of Virology*, **140**, 503-513.

Carn, V.M. and Kitching, R.P. (1995b). An investigation of possible routes of transmission of lumpy skin disease virus (Neethling). *Epidemiology and Infection*, 114, 219-226.

Carn, V.M. (1996). The role of dipterous insects in the mechanical transmission of animal viruses. British Veterinary Journal, 152, 377-393.

Caver, T.E., Lockey, T.D., Sriniva, R.V., Webster, R.G. and Hurwitz, J.L. (1999). A novel Vaccine regimen utilizing DNA, vaccinia virus and protein immunizations for HIV-1 envelope presentation. *Vaccine*, 17, 1567-1572.

Chakrabarti, S., Brechling, K., and Moss, B. (1985). Vaccinia virus expression vector: Coexpression of β-galactosidase provides visual screening of recombinant virus plaques. *Molecular and Cellular Biology*, **5**, 3403-3409.

Chakrabarti, S., Sisler, J.R., and Moss, B. (1997). Compact, synthetic, vaccinia virus early/late promoter for protein expression. *Biotechniques*, 23 (6), 1094-1097.

Chand, P., Kitching, R.P. and Black, D.N. (1994). Western blot analysis of virus-specific antibody responses for capripox and contagious pustular dermatitis viral infections in sheep. *Epidemiology and Infection*, 113, 377-385.

Charilberg, M.D. and Englund, P.T. (1979). Purification and properties of the deoxyribonucleic acid polymerase induced by vaccinia virus. *Journal of Biological Chemistry*, **254**, 7812-7819.

Cheng, L., Fu, J., Tsukamoto, A., and Hawley, R.G. (1996). Use of green fluorescence protein variants to monitor gene transfer and expression in mammalian cells. *Nature Biotechnology*, 14, pp. 606-609.

Chihota, C.M., Rennie, L.F., Kitching, R.P. and Mellor, P.S. (2001). Mechanical transmission of lumpy skin disease virus by *Aedes aegypti* (Diptera: Culicidae). *Epidemiology and Infection*, 126, 317-321.

Chihota, C.M., Rennie, L.F., Kitching, R.P. and Mellor, P.S. (2003). Attempted mechanical transmission of lumpy skin disease virus by biting insects. *Medical and Veterinary Entomology*, 17, 294.

Coackley, W. and Capstick, P.B. (1961). Protection of cattle against lumpy skin disease. II. Factors affecting small scale production of a tissue culture propagated virus vaccine. Research in Veterinary Science, 2, 369-374.

Cochran, M.A., Puckett, C. and Moss, B. (1985). In vitro mutagenesis of the promoter region for a vaccinia virus gene: Evidence for tandem early and late regulatory signals. *Journal of Virology*, **54**, 30-37.

Coetzer, J.A.W. and Barnard, B.J.H. (1977). Hydrops amnii in sheep associated with hydranencephaly and arthrogryposis with Wesselsbron disease and Rift Valley fever viruses as aetiological agents. Onderstepoort Journal of Veterinary Research, 44, 119-126.

Collett, M.S., Keegan, K., Hu, S-L., Sridhar, P., Purchio, A.F., Ennis, W.H., and Dalrymple, J.M. (1987). Protective subunit immunogens to Rift Valley fever virus from bacteria and recombinant vaccinia virus. From "The Biology of Negative Strand Viruses". Mahy and Kolakofsky (Eds.). Chapter 43, 321-329.

Coupar, B.E., Andrew, M.E., Both, G.W., and Boyle, D.B. (1986). Temporal regulation of influenza haemagglutin expression in vaccinia virus recombinants and effects of the immune response. *European Journal of Immunology*, **16**, 1479-1487.

Coupar, B.E., Teo, T. and Boyle, D.B. (1990). Restriction endonuclease mapping of the fowlpox virus genome. *Virology*, 179, 159-167.

Cybinski, D.H., Walker, P.J., Byrne, K.A., and Zakrzewski, H. (1990). Mapping of antigenic sites on the bovine ephemeral fever virus glycoprotein using monoclonal antibodies. *Journal of General Virology*, 71, 2065-2072.

Dabbagh, K., Xiao, Y., Smith, C., Stepick-Biek, P., Kim, S.G., Lamm, W.J.E., Liggitt, D.H. and Lewis, D.B. (2000). Local blockade of allergic airway hypersensitivity and inflammation by the poxvirus-derived pan-cc-chemokine inhibitor vCCI. *The Journal of Immunology*, 165, 3418-3422.

Dales, S. (1963). The uptake and development of vaccinia virus in strain L cells followed with labelled deoxyribonucleic acid. *Journal of Cellular Biology*, 18, 51-71.

Dales, S. and Kajioka, R. (1964). The cycle of multiplication of vaccinia virus in Earle's strain L cells. Uptake and penetration. *Virology*, 24, 278-294.

**Dales, S. and Pogo, B.G.T. (1981).** The virus particles – elementary bodies. *Biology of Poxviruses*, p. 10. Edited by D.W. Kingsbury and H. Zur Hausen, Published by Springer-Verlag, New York.

Davies, F.G., Krauss, H., Lund, J. and Taylor, M. (1971). The laboratory diagnosis of lumpy skin disease virus. Research in Veterinary Science, 12, 123-127.

Davies, F.G., Shaw, T. and Ochieng, P. (1975). Observations on the epidemiology of ephemeral fever in Kenya. *Journal of Hygiene, Cambridge*, 75, 231-235.

**Davies, F.G. (1976).** Characteristics of a virus causing a pox disease in sheep and goats in Kenya, with observations on the epidemiology and control. *Journal of Hygiene, Cambridge*, **76**, 163-171.

Davies, F.G. and Otema, C. (1981). Relationships of capripox viruses found in Kenya with two Middle Eastern strains and some orthopox viruses. Research in Veterinary Science, 31, 252-255.

Davies, F.G. (1982). Observations on the epidemiology of lumpy skin disease in Kenya. Journal of Hygiene, Cambridge, 82, 95-102.

Davies, F.G. (1991). Lumpy skin disease, an African capripox virus disease of cattle. British Veterinary Journal, 147, 489-503.

Davies, F.G. and Martin, V. (2003). Recognising Rift Valley fever virus. FAO Animal Health Manual, 17.

Davison, A.J. and Moss, B. (1989). The structure of vaccinia virus early promoters. *Journal of Molecular Biology*, **210**, 749-769.

**Davison, A.J., and Moss, B. (1990).** New vaccinia virus recombination plasmids incorporating a synthetic late promoter for high level expression of foreign proteins. *Nucleic Acids Research*, **18**, 4285-4286.

De Boom, H.P.A. (1947). Lumpy skin disease: a short overview (Afrikaans). South African Science, 1, 44-46.

De Lange, M. (1959). The histology of the cytopathogenic changes produced in monolayer epithelial cultures by viruses associated with lumpy skin disease. Onderstepoort Journal of Veterinary Research, 28, 245-255.

**Della-Porta, A.J. and Brown, F. (1979).** The physico-chemical characterisation of bovine ephemeral fever virus as a member of the family Rhabdoviridae. *Journal of General Virology*, **44**, 99-112.

Diesel, A.M. (1949). The epizootiology of lumpy skin disease in South Africa. Proceedings of the 14th International Veterinary Congress, London, 2, 492-500.

**Drillien, R. and Spehner, D. (1983).** Physical mapping of vaccinia virus temperature-sensitive mutantions. *Virology*, **131**, 385-393.

Dubbs, D.R. and Kit, S. (1964). Isolation and properties of vaccinia mutants deficient in thymidine kinase-inducing activity. Virology, 22, 214-225.

Easterday, B.C. (1965). Rift Valley Fever. Advances in Veterinary Science, 10, 65-127.

Esposito, J., Condit, R. and Obijeski, J. (1981). The preparation of Orthopoxvirus DNA. Journal of Virological Methods. 2, 175-179.

Esposito, J. and Knight, J.C. (1985). Orthopoxvirus DNA restriction profiles and maps. Virology, 143(1), 230-251.

Essajee, S. and Kaufman, H.L. (2004). Poxvirus vaccines for cancer and HIV therapy. Expert Opinions on Biological Therapy, 4 (4), 575-588.

Essani, K., Dugre, R. and Dales, S. (1982). Biogenesis of vaccinia: involvement of spicules in the envelope during virion assembly examined by means of conditional lethal mutants and serology. *Virology*, **118**, 279-292.

Evans, D.H., Stuart, D., and McFadden, G. (1988). High levels of genetic recombination among cotransfected plasmid DNAs in poxvirus-infected mammalian cells. *Journal of Virology*, 62, no. 2, 367-375.

Falkner, F.G. and Moss, B. (1988). Escherichia coli gpt provides dominant selection for vaccinia virus open reading frame expression vectors. Journal of Virology, 62, 1849-1854.

Falkner, F.G. and Moss, B. (1990). Transient dominant selection of recombinant vaccinia viruses. *Journal of Virology*, **64**, 3108-3111.

Fick, W.C. and Viljoen, G.J. (1994). Early and late transcriptional phases in the replication of lumpy skin disease virus. Onderstepoort Journal of Veterinary Research, 61, 255-261.

Fick, W.C. (1998). Doctoral thesis. A molecular investigation of transcriptional control in lumpy skin disease virus. University of Pretoria, Pretoria.

Fick, W.C., and Viljoen, G.J. (1999). Identification and characterisation of an early/late bidirectional promoter of the capripoxvirus, lumpy skin disease virus. *Archives of Virology*, **144**, 1229-1239.

Fogelsong, P.D. and Bauer, W.R. (1984). Effects of ATP and inhibitory factors on the activity of vaccinia virus type-1 topisomerase. *Journal of Virology*, 49, 1-8.

Flanagan, K., Glover, R.T., Horig, H., Yang, W. and Kaufman, H.L. (2004). Local delivery of recombinant vaccinia virus expressing secondary lymphoid chemokine (SLC) results in a CD4 T-cell dependent antitumour response. *Vaccine*, 22 (21-22), 2894-2903.

Freshney, R.I. (1987). Chapter 9, Disaggregation of the tissue and Primary Culture, pp. 107-126. In "Culture of animal cells: A manual of basic technique". Published and edited by Alan R. Liss, Inc., New York, U.S.A.

Fries, L.F., Tartaglia, J., Taylor, J., Kauffman, E.K., Meignier, B., Paoletti, E. and Plotkin, S. (1996). Human safety and immunogenicity of a canarypox-rabies glycoprotein recombinant vaccine: an alternative poxvirus vector system. *Vaccine*, 14, 428-434.

Gaffar Elamin, M.A. and Spradbrow, P.B. (1979). Bovine ephemeral fever virus vaccines in mice. Zbl. Vet. Med. B, 26, 773-778.

Gershelin, P. and Berns, K.I. (1974). Characterisation and localisation of the naturally occurring cross-links in vaccinia virus DNA. *Journal of Molecular Biology*, **88**, 785-796.

Gershon, P.D. and Black, D.N. (1987). Physical characterization of the genome of a cattle isolate of Capripoxvirus. Virology, 160, 473-476.

Gershon, P.D. and Black, D.N. (1988). A comparison of the genomes of Capripoxvirus isolates of sheep, goats and cattle. *Virology*, 164, 341-349.

Gershon, P.D. and Black, D.N. (1989a). The nucleotide sequence around the Capripoxvirus thymidine kinase gene reveals a gene shared specifically with Leporipoxvirus. *Journal of General Virology*, **70**, 525-533.

Gershon, P.D. and Black, D.N. (1989b). A capripoxvirus pseudogene whose only intact homologs are in other poxvirus genomes. *Virology*, 172, 350-354.

Gershon, P.D., Ansell, D.M. and Black, D.N. (1989a). A comparison of the genome organisation of a Capripoxvirus with that of the Orthopoxviruses. *Journal of Virology*, **63**, 4703-4708.

Gershon, P.D., Kitching, R.P., Hammond, J.M. and Black, D.N. (1989b) Poxvirus genetic recombination during natural virus transmission. *Journal of General Virology*, **70**, 485-489.

Ghildyal, N., Schnitzlein, W.M. and Tripathy, D.N. (1989). Genetic and antigenic differences between fowlpox and quailpox viruses. *Archives of Virology*, **106**, 85-92.

Gillard, S., Spehner, D., and Drillien, R. (1985). Mapping of a vaccinia host range sequence by insertion into the viral thymidine kinase gene. *Journal of Virology*, **53**, 316-318.

Goebel, S.J., Johnson, G.P., Perkus, M.E., Davis, S.W., Winslow, J.P. and Paoletti, E. (1990). The complete DNA sequence of vaccinia virus. *Virology*, 179, 247-266.

Green, H.F. (1959). Lumpy Skin Disease- its effect on hides and leather and a comparison in this respect with some other skin diseases. *Bulletin of Epizootic Diseases of Africa*, **7**, 63-74.

Greth, A., Calvez, D., Vassart, M. and Lefevre, P.C. (1992a). Serological survey for bovine bacterial and viral pathogens in captive Arabian oryx (*Oryx leucoryx* Pallas, 1776). *Revue Scientifique et Technique*, **11** (4), 1163-1168.

Greth, A., Gourreau, J.M., Vassart, M., Nguyen-Ba-Vy, Wyers, M., and Lefevre, P.C. (1992b). Capripoxvirus Disease in an Arabian Oryx (Oryx leucoryx) from Saudi Arabia. Journal of Wildlife Diseases, 28 (2), 295-300.

Griffiths, G., Wepf, R., Wendt, T., Krijnse-Locker, Cyrklaff, M. and Roos, N. (2001). Structure and assembly of intracellular mature vaccinia virus: isolated-particle analysis. *Journal of Virology*, **75**, 11034-11055.

Gubser, C., Hue, S., Kellam, P. and Smith, G.L. (2004). Poxvirus genomes: a phylogenetic analysis. *Journal of General Virology*, **85**, 105-117.

Guo, P., Goebel, S., Davis, S., Perkus, M.E., Lanquet, B., Desmettre, P., Allen, G. and Paoletti, E. (1989). Expression in recombinant vaccinia virus of the equine herpesvirus 1 gene encoding glycoprotein gp13 and protection of immunized animals. *Journal of Virology*, **63** (10), 4189-4198.

- Haig, D. A. (1957). Lumpy skin disease. Bulletin of epizootic diseases of Africa, 5, 421-430.
- Hamblin, C., Anderson, E.C., Jago, M., Mlengeya, T. and Hirji, K. (1990). Antibodies to some pathogenic agents in free living wild species in Tanzania. *Epidemiology and Infection*, **105**, 585-594.
- Hansen, S.G., Cope, T.A., Hruby, D.E. (2002). BiZyme: a novel protein-mediating selection of vaccinia virus recombinants by fluorescence and antibiotic resistance. *BioTechniques*, **32** (5), 1178-1187.
- Harford, C.G., Hamblin, A. and Riders, E. (1966). Electron microscopic autoradiography of DNA synthesis in cells infected with vaccinia virus. Experimental Cell Research, 42, 50-57.
- Harte, M.T., Haga, I.R., Maloney, G., Gray, P., Reading, P.C., Bartlett, N.W., Bowie, A. and O'Neill, L.A. (2003). The poxvirus protein A52R targets Toll-like receptor signalling complexes to suppress host defense. *Journal of Experimental Medicine*, 197 (3), 343-351.
- Hedger, R.S. and Hamblin, C. (1983). Neutralising antibodies to lumpy skin disease in African wildlife. Comparative Immunology, Microbiology and Infectious Diseases, 6 (3), 209-213.
- Heine, H.G., Stevens, M.P., Foord, A.J. and Boyle, D.B. (1999). A capripoxvirus detection PCR and antibody ELISA based on the major antigen P32, the homolog of the vaccinia virus H3L gene. *Journal of Immunological Methods*, **227**, 187-196.
- Hel, Z., Nacsa, J., Tsai, W-P., Thornton, A., Giuliani, L., Tartaglia, J. and Franchini, G. (2002). Equivalent immunogenicity of the highly attenuated poxvirus-based ALVAC-SIV and NYVAC-SIV vaccine candidates in SIVmac251-infected macaques. *Virology*, **304**, 125-134.
- Henning, M.W. (1949). Knopvelsiekte, Lumpy-skin Disease. In "Animal Diseases in South Africa" 2<sup>nd</sup> edition. Central News Agency, Cape Town. pp. 772-784.
- Hertig, C., Pye, A.D., Hyatt, A.D., Davis, S.S., McWilliam, S.M., Heine, H.G., Walker, P.J., and Boyle, D.B. (1995). Vaccinia virus-expressed bovine ephemeral fever virus G but not G<sub>NS</sub> glycoprotein induces neutralizing antibodies and protects against experimental infection. *Journal of General Virology*, 77, 631-640.
- Hollinshead, M., Vanderplasschen, A., Smith, G.L. and Vaux, D.J. (1999). Vaccinia virus intracellular mature virions contain only one lipid membrane. *Journal of Virology*, **73** (2), 1503-1517.
- Hosamani, M., Mondal, B., Tembhurne, P.A., Bandyopadhyay, S.K., Singh, R.K. and Rasool, T.J. (2004a). Differentiation of sheep pox and goat poxviruses by sequence analysis and PCR-RFLP of P32 gene. *Virus Genes*, 29 (1), 73-80.
- Hosamani, M., Nandi, S., Mondal, B., Singh, R.K., Rasool, T.J. and Bandyopadhyay, S.K. (2004b). A Vero cell-attenuated Goatpox virus provides protection against virulent virus challenge. *Acta Virol*, 48 (1), 15-21.
- House, J.A., Wilson, T.M., el Nakashly, S., Karim, I.A., Isamail, I., el Danaf, N., Moussa, A.M. and Ayoub, N.N. (1990). The isolation of lumpy skin disease virus and bovine herpesvirus-4 from cattle in Egypt. *Journal of Veterinary Diagnostic Investigation*, 2 (2), 111-115.



Hunter, P. and Wallace, D. (2001). Lumpy skin disease in southern Africa: a review of the disease and aspects of control. *Journal of the South African Veterinary Association*, **72** (2), 68-71.

Ichihashi, Y., Matsumoto, S. and Dales, S. (1971). Biogenesis of poxviruses: Role of A-type inclusion bodies and host cell membranes in virus dissemination. *Virology*, **46**, 507-532.

Inoue, H., Nojima, H. and Okayama, H. (1990). High efficiency transformation of Escherichia coli with plasmids. , Gene, 96, 23-28.

Inui, K., Barrett, T., Kitching, R.P. and Yamanouchi, K. (1995). Long-term immunity in cattle vaccinated with a recombinant rinderpest vaccine. *The Veterinary Record*, **137**, 669-670.

Ireland, D.C. and Binepal, Y.S. (1998). Improved detection of capripoxvirus in biopsy samples by PCR. *Journal of Virological Methods*, **74**, 1-7.

Irons, P.C., Tuppurainen, E.S. and Venter, E.H. (2005). Excretion of lumpy skin disease virus in bull semen. *Theriogenology*, **63** (5), 1290-1297.

Ish-Horowicz, D. and Burke, J.F. (1981). Mini- and maxi-plasmid preparation. *Nucleic Acids Research*, 9, 2989-2999.

Jackson, R.J., Ramsay, A.J., Christensen, C.D., Beaton, S., Hall, D.F. and Ramshaw, I.A. (2001). Expression of mouse interleukin-4 by a recombinant ectromelia virus suppresses cytolytic lymphocyte responses and overcomes genetic resistance to mousepox. *Journal of Virology*, **75** (3), 1205-1210.

Jahrling, P.B., Hensley, L.E., Martinez, M.J., LeDuc, J.W., Rubins, K.H., Relman, D.A. and Huggins, J.W. (2004). Exploring the potential of variola virus infection of cynomigus macaques as a model for human smallpox. *PNAS*, **101** (42), 15196-15200.

Janeczko, R.A., Rodriguez, J.F. and Esteban, M. (1987). Studies on the mechanism of entry of vaccinia virus in animal cells. Archives of Virology, 92, 135-150.

Johnson, G.P., Goebel, S.J. and Paoletti, E. (1993). An update on the vaccinia virus genome. Virology, 196, 381-401.

Johnston, J.B. and McFadden, G. (2003). Poxvirus immunomodulatory strategies: current perspectives. *Journal of Virology*, 77 (11), 6093-6100.

Johnston, J.B. and McFadden, G. (2004). Technical knockout: understanding poxvirus pathogenesis by selectively deleting viral immunomodulatory genes. *Cell Microbiology*, **6** (8), 695-705.

Jungwirth, C. and Launer, J. (1968). Effects of poxvirus infection on host cell deoxyribonucleic acid synthesis. *Virology*, **2**, 401-408.

Kara, P.D., Afonso, C.L., Wallace, D.B., Kutish, G.F., Abolnik, C., Lu, Z., Vreede, F.T., Taljaard, L.C.F., Zsak, A., Viljoen, G.J., and Rock, D.L. (2003). Comparative sequence analysis of the South African Vaccine Strain and Two Virulent Field Isolates of *Lumpy Skin Disease Virus. Archives of Virology*, 148 (7), 1335-1356.

Karaca, K., Sharma, J.M., Winslow, B.J., Junker, D.E., Reddy, S., Cochran, and McMillen, J. (1998). Recombinant fowlpox viruses coexpressing chicken type I IFN and Newcastle disease virus HN and F genes: influence of IFN on protective efficacy and humoral responses of



chickens following in ovo or post-hatch administration of recombinant viruses. Vaccine, 16, 1496-1503.

Khalafalla, A.I., Gaffar Elamin, M.A., and Abbas, Z. (1993). Lumpy skin disease: Observations on the recent outbreaks of the disease in the Sudan. Revue Elev. Med. vet. Pays trop., 46 (4), 548-550.

Kieny, M.P., Lathe, R., Drillien, R., Spehner, D., Skory, S., Schmitt, D., Wiktor, T., Koprowski, H. and Lecocq, J.P. (1984). Expression of rabies virus glycoprotein from a recombinant vaccinia virus. *Nature*, 312, 163-166.

Kirmse, P. (1969). Host specificity and pathogenicity of poxviruses from wild birds. Bulletin of the Wildlife Disease Association, 5, 376-386.

Kitching, R.P. (1983). Progress towards sheep and goat pox vaccines. Vaccine, 1, 4-9.

Kitching, R.P. and Taylor, W.P. (1985). Clinical and antigenic relationship between isolates of sheep and goat poxviruses. *Tropical Animal Health and Production*, 17, 64-74.

**Kitching, R.P.** (1986a). Passive protection of sheep against Capripoxvirus. Research in Veterinary Science, 41, 247-250.

**Kitching, R.P. (1986b).** The control of sheep and goat pox. Revues in Science and Technology Office-International Epizootics, **5** (2), 503-511.

Kitching, R.P., Hammond, J.M. and Black, D.N. (1986). Studies on the major common precipitating antigen of Capripoxvirus. *Journal of General Virology*, 67, 139-148.

Kitching, R.P. and Mellor, P.S. (1986). Insect transmission of Capripoxvirus. Reseach in Veterinary Science, 40, 255-258.

Kitching, R.P., Hammond, J.M. and Taylor, W.P. (1987). A single vaccine for the control of Capripox infection in sheep and goats. Research in Veterinary Science, 42, 53-60.

Kitching, R.P., Bhat, P.P. and Black, D.N. (1989). The characterisation of African strains of Capripoxvirus. *Epidemiology and Infections*, 102, 335-343.

**Kitching, R.P. (1996).** Lumpy skin disease. In "Manual of standards for diagnostic tests and vaccines" (3<sup>rd</sup> edition). Office International des Epizooties, Paris, France. 93-101.

Konishi, E., Pincus, S., Paoletti, E., Laegried, W.W., Shope, R.E., and Mason, P.W. (1992). A highly attenuated host range-restricted vaccinia virus strain, NYVAC, encoding the prM, E, and NS1 genes of Japanese encephalitis virus prevents JEV viremia in swine. *Virology*, 190, 454-458.

Kow, D. (1992). M.Sc thesis. "Characterisation of Avipoxviruses for use in recombinant vaccines". University of Cape Town, South Africa.

Kumar, S., and Boyle, D.B. (1990). A poxvirus bidirectional promoter element with early/late and late functions. *Virology*, 179, 151-158.

Kwak, H., Mustafa, W., Speirs, K., Abdool, A.J., Paterson, Y. and Isaacs, S.N. (2004). Improved protection conferred by vaccination with a recombinant vaccinia virus that incorporates a foreign antigen into the extracellular enveloped virion. *Virology*, **322**, 337-348.

Lanar, D.E., Tine, J.A., de Taisne, C., Seguin, M.C., Cox, W.I., Winslow, J.P., Ware, L.A., Kauffman, E., Gordon, D., Ballou, W.R., Paoletti, E., and Sadoff, J.C. (1996). Attenuated vaccinia virus-circumsporozoite protein recombinants confer protection against rodent malaria. *Infection and Immunity*, 64, 1666-1671.

**Lennette, E.H. and Schmidt, N.J. (1969).** In "Diagnostic procedures for viral and rickettsial infections." 4<sup>th</sup> edition. Published by American Public Health Association. p. 120.

Letellier, C. (1993). Role of the TK+ phenotype in the stability of Pigeonpox virus recombinant. Archives of Virology, 131, 431-439.

Li, J. and Broyles, S.S. (1993). The DNA-dependant ATPase activity of vaccinia virus early gene transcription factor is essential for its transcription activation function. *Journal of Biological Chemistry*, 268, 20016-20021.

Lorenzo, M.D.M. and Blasco, R. (1998). PCR-based method for the introduction of mutations in genes cloned and expressed in vaccinia virus. *BioTechniques*, **24** (2), 308-313.

MacFarlane, I.S. and Haig, D.A. (1955). Some observations on three-day stiffsickness in the Transvaal in 1954. Journal of the South African Veterinary and Medical Association, 26, 1-7.

Mackett, M., Smith, G.L. and Moss, B. (1982). Vaccinia virus: A selectable eukaryotic cloning and expression vector. *Proceedings of the National Academy of Sciences*, **79**, 7415-7419.

Mackett, M., Smith, G.L. and Moss, B. (1985). The construction and characterisation of vaccinia virus recombinants expressing foreign genes. In "DNA Cloning: A practical approach, Volume 2.", pp. 191-211. Edited by D.M. Glover. Published by IRL Press, Washington D.C., U.S.A.

MacOwan, K.D.S. (1959). Observations on the epizootiology of lumpy skin disease during the first year of its occurrence in Kenya. Bulletin epizootic diseases of Africa, 7, 7-20.

Mahr, A. and Roberts, B.E. (1984). Arrangement of late RNAs transcribed from a 7.1 kilobase *EcoRI* vaccinia virus DNA fragment. *Journal of Virology*, 49, 510-520.

Markoulatos, P., Mangana-Vougiouka, O., Koptopoulos, G., Nomikou, K. and Papadopoulos, O. (2000). Detection of sheep poxvirus in skin biopsy samples by a multiplex polymerase chain reaction. *Journal of Virological Methods*, **84**, 161-167.

Martrenchar, A., Zoyem, N. and Diallo, A. (1997). Experimental study of a mixed vaccine against peste des petits ruminants and capripox infection in goats in northern Cameroon. Small Ruminant Research, 26, 39-44.

Mason, P.W., Pincus, S., Fournier, M.J., Mason, T.L., Shope, R.E. and Paoletti, E. (1991). Japanese encephalitis virus-vaccinia recombinants produce particulate forms of the structural membrane proteins and induce high levels of protection against lethal JEV infection. *Virology*, 180, 294-305.

Massung, R.F. and Moyer, R.W. (1991). The molecular biology of swinepox virus. Virology, 180, 347-354.

Matthews, R.E.F. (1982). "Classification and nomenclature of viruses". Intervirology. S. Karger. Mechanical and Scientific Publishers, New York.

McAuslan, B.R. (1963). The induction and repression of thymidine kinase in the poxvirus-infected HeLa cell. Virology, 21, 383-389.

Medzon, E.L. and Bauer, H. (1970). Structural features of vaccinia virus revealed by negative staining. Virology, 40, 860-867.

Meegan, J.M., Hoogstraal, H. and Moussa, M.I. (1979). An epizootic of Rift Valley fever in Egypt in 1977. Veterinary Record, 105, 124-125.

Merchlinsky, M. and Moss, B. (1992). Introduction of foreign DNA into the vaccinia virus genome by *in vitro* ligation: Recombination-independent selectable cloning vectors. *Virology*, 190, 522-526.

Merchlinsky, M., Eckert, D., Smith, E., and Zauderer, M. (1997). Construction and characterisation of vaccinia virus direct ligation vectors. *Virology*, 238, 444-451.

Morrill, J.C., Jennings, G.B., Caplen, H., Turell, M.J., Johnson, A.J. and Peters, C.J. (1987). Pathogenicity and immunogenicity of a mutagen-attenuated Rift Valley fever virus immunogen in pregnant cows. *American Journal of Veterinary Research*, 48 (7), 1042-1047.

Morrill, J.C., Carpenter, L., Taylor, D., Ramsburg, H.H., Quance, J. and Peters, C.J. (1991). Further evaluation of a mutagen-attenuated Rift Valley fever vaccine in sheep. *Vaccine*, 9 (1), 35-41.

Morrill, J.C., Mebus, C.A. and Peters, C.J. (1997a). Safety and efficacy of a mutagenattenuated Rift Valley fever virus vaccine in cattle. *American Journal of Veterinary Research*, **58** (10), 1104-1109.

Morrill, J.C., Mebus, C.A. and Peters, C.J. (1997b). Safety and efficacy of a mutagenattenuated Rift Valley fever virus vaccine in fetal and neonatal bovids. *American Journal of Veterinary Research*, 58 (10), 1110-1114.

Morris, J.P.A. (1931) Pseudo Urticaria of Cattle. Department of Animal Health Annual report, Northern Rhodesia (1930), p. 20.

Moss, B. and Filler, R. (1970). Irreversible effects of cycloheximide during the early period of vaccinia virus replication. *Journal of Virology*, **5**, 99-108.

Moss, B., Gershowitz, A., Wei, C. and Boone, R. (1976). Formation of the guanylated and methylated 5'-terminus of vaccinia virus mRNA. *Virology*, **72**, 341-351.

Moss, B. (2001). Poxviridae: the viruses and their replication. In "Fields Virology", 4<sup>th</sup> edition, pp 2849-2883. Edited by D.M. Knipe and P.M. Howley. Lippincott Williams and Wilkins, Philadelphia, U.S.A.

Mountain, A. (2000). Gene therapy: the first decade. Trends in Biotechnology, 18, 119-128.

Moussa, M.I., Abdel-Wahab, K.S. and Wood, O.L. (1986). Experimental infection and protection of lambs with a minute plaque variant of Rift Valley fever virus. *American Journal of Tropical Medicine and Hygiene*, **35** (3), 660-662.

Munz E K, Owen N C (1966). Electron microscopic studies on Lumpy Skin Disease virus type "Neethling". Onderstepoort Journal of Veterinary Research, 33 (1): 3-8.

Nagington, J. and Horne, R.W. (1962). Morphological studies of orf and vaccinia viruses. Virology, 16, 248-260.

Nandi, S. and Negi, B.S. (1999). Bovine ephemeral fever: a review. Comparative Immunology, Microbiology and Infectious Diseases, 22, 81-91.

Nash, P., Barrett, J., Cao, J.X., Hota-Mitchell, S., Lalani, A.S., Everett, H., Robichaud, X., Hnatiuk, S., Ainslie, C., Seet, B.T., and McFadden, G. (1999). Immunomodulation by viruses: the myxoma virus story. *Immunology Reviews*, 168, 103-120.

Nawathe, D.R., Gibbs, E.P.J., Asagba, M.O. and Lawman, M.J.P. (1978). Lumpy skin disease in Nigeria. *Tropical Animal Health and Production*, 10, 49-54.

Nazerian, K. and Dhawale, S. (1991). Structural analysis of unstable intermediate and stable forms of recombinant fowlpox virus. *Journal of General Virology*, **72**, 2791-2795.

Nevins, J.R. and Joklik, W.K. (1977). Isolation and properties of the vaccinia virus DNA-dependant RNA polymerase. *Journal of Biological Chemistry*, **252**, 6930-6938.

Ngichabe, C.K., Wamwayi, H.M., Barrett T., Ndungu E.K., Black D.N., and Bostock C.J. (1997). Trial of a capripoxvirus-rinderpest recombinant vaccine in African cattle. *Epidemiology and Infection*, 118 (1), 63-70.

Painter, G.R. and Hostetler, K.Y. (2004). Design and development of oral drugs for the prophylaxis and treatment of smallpox infection. *Trends in Biotechnology*, 22 (8), 423-427.

Panicali, D., Grzelecki, A., and Huang, C. (1986). Vaccinia virus vectors utilising the  $\beta$ -galactosidase assay for rapid selection of recombinant viruses and measurement of gene expression. *Gene*, 47, 193-199.

Paoletti, E. (1996). Applications of pox virus vectors to vaccination: An update. Proceedings of the National Academy of Science USA, 93, 11349-11353.

Paoletti, E. and Plotkin, S. (1996). Human safety and immunogenicity of a canarypox-rabies glycoprotein recombinant vaccine: an alternative poxvirus vector system. Vaccine, 14, 428-434.

Pasamontes, L., Gubser, J., Wittek, R. and Viljoen, G.J. (1991). Direct identification of recombinant vaccinia virus plaques by PCR. Journal of Virological Methods, 35, 137-141.

Paweska, J.T., Burt, F.J., Anthony, F., Smith, S.J., Grobbelaar, A.A., Croft, J.E., Ksiazek, T.G. and Swanepoel, R. (2003a). IgG-sandwich and IgM-capture enzyme-linked immunosorbent assay for the detection of antibody to Rift Valley fever virus in domestic ruminants. *Journal of Virological Methods*, 113, 103-112.

Paweska, J.T., Smith, S.J., Wright, I.M., Williams, R., Cohen, A.S., van Dijk, A.A., Grobbelaar, A.A., Croft, J.E., Swanepoel, R. and Gerdes, G.H. (2003b). Indirect enzymelinked immunosorbent assay for the detection of antibody against Rift Valley fever virus in domestic and wild ruminant sera. *Onderstepoort Journal of Veterinary Research*, 70, 49-64.

Payne, L.G. and Kristensson, K. (1985). Extracellular release of enveloped vaccinia virus from mouse nasal epithelial cells in vitro. Journal of General Virology, 66, 643-646.

Pedley, S. and Cooper, R.J. (1987). The inhibition of HeLa cell RNA synthesis following infection with vaccinia virus. *Journal of General Virology*, 65, 1687-1697.

Pennington, T.H. and Follet, E.A. (1974). Vaccinia virus replication in enucleated BSC-1 cells: particle production and synthesis of viral DNA and proteins. *Journal of Virology*, **13**, 488-493.

Perkus, M.E., Limbach, K., and Paoletti, E. (1989). Cloning and expression of foreign genes in vaccinia virus using a host range selection system. *Journal of Virology*, **63** (9), 3829-3836.

Perkus, M.E., Goebel, S.J., Davis, S.W., Johnson, G.P., Norton, E.K., and Paoletti, E. (1991). Deletion of 55 open reading frames from the termini of vaccinia virus. *Virology*, 180, 406-410.

Perlman, L.J. (1993). Masters thesis. Molecular characterisation of the lumpy skin disease virus genome. University of Cape Town, Cape Town.

Pfleiderer, M., Falkner, F.G., and Dorner, F. (1995). A novel vaccinia virus expression system allowing construction of recombinants without the need for selection markers, plasmids and bacterial hosts. *Journal of General Virology*, **76**, 2957-2962.

Plowright, W. and Witcomb, M.A. (1959). The growth in tissue cultures of a virus derived from lumpy-skin disease of cattle. *Journal of Pathology and Bacteriology*, **78**, 397-407.

Prideaux, C.T., Kumar, S. and Boyle, D.B. (1990). Comparative analysis of vaccinia virus promoter activity in fowlpox and vaccinia virus recombinants. Virus Research, 16, 43-58.

Prozesky, L. and Barnard, B.J.H. (1982). A study of the pathology of lumpy skin disease in cattle. Onderstepoort Journal of Veterinary Research, 49, 167-175.

Prydie, J. and Coackley, W. (1959). Lumpy skin disease – tissue culture studies. Bulletin epizootic diseases of Africa, 7, 37-50.

Ramirez, J.C., Gherardi, M.M., Rodriquez, D., and Esteban, M. (2000). Attenuated modified vaccinia virus Ankara can be used as an immunizing agent under conditions of pre-existing immunity to the vector. *Journal of Virology*, 74, 7651-7655.

Ramisse, J., Serres, H. and Rakotondramary, E. (1969). Isolation of viruses associated with bovine lumpy skin disease in Madagascar. Revue d'Elevage et de Medicina Veterinaire Pays les Tropicaux, 22 (3), 357-362.

Rao, T.V.S. and Bandyopadhyay, S.K. (2000). A comprehensive review of goat pox and sheep pox and their diagnosis. *Animal Health Research Reviews*, 1 (2), 127-136.

Ravanello, M.P. and Hruby, D.E. (1994). Conditional lethal expression of the vaccinia virus L1R myristylated protein reveals a role in virion assembly. *Journal of Virology*, **68** (10), 6401-6410.

Richmond, J.F.L., Mustafa, F., Lu, S., Santoro, J.C., Weng, J., O'Connell, M, Fenyo, E.M., Hurwitz, J.L., Montefiori, D.C., and Robinson, H.L. (1997). Screening of HIV-1 Env Glycoproteins for the Ability to Raise Neutralising Antibody Using DNA Immunisation and Recombinant Vaccinia Virus Boosting. *Virology*, 230, 265-274.

Robinson, A.J., Barns, G., Fraser, K., Carpenter, E. and Mercer, A.A. (1987). Conservation and variation in Orf virus genomes. *Virology*, 157, 13-23.

Romero, C.H., Barrett, T., Evans, S.A., Kitching, R.P., Gershon, P.D., Bostock, C. and Black, D.N. (1993). Single Capripoxvirus recombinant vaccine for the protection of cattle against Rinderpest and Lumpy Skin Disease. *Vaccine*, 11 (7), 737-742.

- Romero, C.H., Barrett, T., Kitching, R.P., Carn, V.M., and Black, D.N. (1994a). Protection of cattle against rinderpest and lumpy skin disease with a recombinant capripoxvirus expressing the fusion protein gene of rinderpest virus. *Veterinary Record*, 135, 152-154.
- Romero, C.H., Barrett, T., Chamberlain, R.W., Kitching, R.P., Fleming, M., and Black, D.N. (1994b). Recombinant capripoxvirus expressing the hemagglutinin protein gene of rinderpest virus: protection of cattle against rinderpest and lumpy skin disease viruses. *Virology*, 204, 425-429.
- Romero, C.H., Barrett, T., Kitching, R.P., Bostock, C., and Black, D.N. (1995). Protection of goats against peste des petits ruminants with recombinant capripoxviruses expressing the fusion and haemagglutinin protein genes of rinderpest virus. *Vaccine*, 13, 36-40.
- Roos, N., Cyrklaff, M., Cudmore, S., Blasco, R., Krijnse-Locker, J. and Griffiths, G. (1996). A novel immunogold cryoelectron microscopic approach to investigate the structure of the intracellular and extracellular forms of vaccinia virus. *The EMBO Journal*, **15**, 2343-2355.
- Rupprecht, C.E., Blass, L., Smith, K., Orciari, L.A., Niezgoda, M., Whitfield, S.G., Gibbons, R.V., Guerra, M., and Hanlon, C.A. (2001). Human infection due to recombinant vaccinia—rabies glycoprotein virus. New England Journal of Medicine, 345, 582-586.
- Saluzzo, J.F. and Smith, J.F. (1990). Use of reassortment viruses to map attenuating and temperature-sensitive mutations of the Rift Valley fever virus MP-12 vaccine. *Vaccine*, 8 (4), 369-375.
- Sam, C.K. and Dumbell, K.R. (1981). Expression of poxvirus DNA in coinfected cells and marker rescue of thermosensitive mutants by subgenomic fragments of DNA. *Annales de Virology*, 132 E, 135-150.
- Sambrook, J., Fritsch, E.F. and Maniates, T. (1989). In "Molecular Cloning: A Laboratory Manual.". Chris Nolan (Ed.) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York, USA. Appendix E: pp. 12-15.
- Scheiflinger, F., Dorner, F. and Falkner, F.G. (1992). Construction of chimeric vaccinia viruses by molecular cloning and packaging. *Proceedings of the National Academy of Science, USA*, 89, 9977-9981.
- Scheiflinger, F., Falkner, F.G., and Dorner, F. (1996). Evaluation of the thymidine kinase (tk) locus as an insertion site in the highly attenuated vaccinia MVA strain. *Archives of Virology*, 141, 663-669.
- Scheiflinger, F., Falkner, F.G., and Dorner, F. (1997). Role of the fowlpox virus thymidine kinase gene for the growth of FPV recombinants in cell culture. *Archives of Virology*, **142**, 2421-2431.
- Scheiflinger, F., Dorner, F., and Falkner, F.G. (1998). Transient marker stabilisation: a general procedure to construct marker-free recombinant vaccinia virus. *Archives of Virology*, 143, 467-474.
- Schmaljohn, C.S., Parker, M.D., Ennis, W.H., Dalrymple, J.M., Collett, M.S., Suzich, J.A. and Schmaljohn, A.L. (1989). Baculovirus expression of the M genome segment of Rift Valley fever virus and examination of antigenic and immunogenic properties of the expressed proteins. *Virology*, 170 (1), 184-192.

- Schmelz, M., Sodeik, B., Ericsson, M., Wolffe, E.J., Shida, H., Hiller, G. and Griffiths, G. (1994). Assembly of vaccinia virus: the second wrapping cisterna is derived from the trans golgi network. *Journal of Virology*, **68**, 130-147.
- Shoemaker, T., Boulianne, C., Vincent, M.J., Pezzanite, L., Al-Qahtani, M.M., Al-Mazrou, Y., Kahn, A.S., Rollin, P.E., Swanepoel, R., Ksiazek, T.G., and Nichol, S.T. (2002). Genetic analysis of viruses associated with emergence of Rift Valley Fever virus in Saudi Arabia and Yemen, 2000-1. *Emerging Infectious Diseases*, 8 (12), 1415-1420.
- Shuman, S., Broyles, S.S. and Moss, B. (1987). Purification and characterisation of a transcription termination factor from vaccinia virions. *Journal of Biological Chemistry*, **262**, 12372-12380.
- Smith, G.L., and Moss, B. (1983). Infectious poxvirus vectors have capacity for at least 25 000 base pairs of foreign DNA. Gene, 25, 21-28.
- Smith, G.L., Murphy, B.R., and Moss, B. (1983a). Construction and characterisation of an infectious vaccinia virus recombinant that expresses the influenza hemaglutinin gene and induces resistance to influenza virus infection in hamsters. *Proceedings of the National Academy of Sciences*, 80, 7155-7159.
- Smith, G.L., Mackett, M., and Moss, B. (1983b). Infectious vaccinia virus recombinants that express hepatitis B virus surface antigen. *Nature*, 302, 490-495.
- Smith, K.A., Stallard, V., Roos, J.M., Hart, C., Cormier, N., Cohen, L.K., Roberts, B.E., and Payne, L.G. (1993). Host range selection of vaccinia recombinants containing insertions of foreign genes into non-coding sequences. *Vaccine*, 11 (1), 43-53.
- Smith, V.P., Bryant, N.A. and Alcami, A. (2000). Ectromelia, vaccinia and cowpox viruses encode secreted interleukin-18-binding proteins. *Journal of General Virology*, 81, 1223-1230. Smithburn, K.C. (1949). Rift Valley fever; the neurotropic adaptation of the virus and the experimental use of this modified virus as a vaccine. *British Journal of Experimental Pathology*, 30, 1-16.
- Sordeik, B., Doms, R.W., Ericsson, M., Hiller, G., Machamer, C.E., van't Hof, W., van Meer, G., Moss, B. and Griffiths, G. (1993). Assembly of vaccinia virus: Role of the intermediate compartment between the endoplasmic reticulum and the Golgi stacks. *Journal of Cellular Biology*, 121, 521-541.
- Spehner, D., Gillard, S., Drillien, R. and Kirn, A. (1988). A cowpox virus gene required for multiplication in Chinese hamster ovary cells. *Journal of Virology*, 62, 1297-1304.
- Stannard, L.M., Marais, D.M., Kow, D. and Dumbell, K.R. (1998). Evidence for incomplete replication of a penguin poxvirus in cells of mammalian origin. *Journal of General Virology*, 79, 1637-1646.
- **Stern, W. and Dales, S. (1976).** Biogenesis of vaccinia: Isolation and characterisation of a surface component that elicits antibodies suppressing infectivity and cell-cell fusion. *Virology*, **75**, 232-241.
- **St George, T.D. (2004).** Bovine ephemeral fever. In "Infectious Diseases of Livestock with Special Reference to Southern Africa.", Volume 2 (ed. by J.A.W. Coetzer, and R.C. Tustin), pp. 1183-1193. Oxford University Press, Cape Town.

Stone-Marschat, M.A., Moss, S.R., Burrage, G., Barber, M.L., Roy, P. and Laegreid, W.W. (1996). Immunization with VP2 is sufficient for protection against lethal challenge with African horsesickness virus type 4. *Virology*, 220, 219-222.

Swanepoel, R., and Coetzer, J.A.W. (2004). Rift Valley Fever. In "Infectious Diseases of Livestock." Volume 2 (ed. by J.A.W. Coetzer, and R.C. Tustin), pp. 1037-1070. Oxford University Press, Cape Town.

Takehara, K., Min, M.K., Battles, J.K., Sugiyama, K., Emerv, V.C., Dalrymple, J.M. and Bishop, D.M. (1989). Identification of mutations in the M RNA of a candidate vaccine strain of Rift Valley fever virus. *Virology*, 169 (2), 452-457.

Taylor, J. and Paoletti, E. (1988). Fowlpox virus as a vector in non-avian species. Vaccine, 6, 466-467.

Taylor, J., Weinberg, R., Languett, B., Desmettre, P. and Paoletti. (1988). Recombinant fowlpox virus inducing protective immunity in non-avian species. *Vaccine*, **6**, 497-503.

Taylor, J., Weinberg, R., Tartaglia, J., Richardson, C., Alkhatib, G., Briedis, D., Appel, M., Norton, E. and Paoletti, E. (1992). Nonreplicating viral vectors as potential vaccines: Recombinant canarypox virus expressing measles virus fusion (F) and hemagglutinin (HA) glycoproteins. *Virology*, 187, 321-328.

Theodoridis, A. (1969). Fluorescent antibody studies on ephemeral fever virus. Onderstepoort Journal of Veterinary Research, 36 (2), 187-190.

Theodoridis, A., Boshoff, S.E.T. and Botha, M.J. (1973). Studies on the development of a vaccine against bovine ephemeral fever. *Onderstepoort Journal of Veterinary Research*, 40, 77-82.

Thomas, A.D. and Mare, C.V.E. (1945). "Knopvelsiekte". Journal of the South African Veterinary Medical Association, 16, 36-43.

Timiryasova, T.M., Chen, B., Fodor, N., and Fodor, I. (2001). Construction of recombinant vaccinia viruses using PUV-inactivated virus as a helper. *BioTechniques*, 31, 534-540.

**Timoney, P.J. (1996)** Equine viral arteritis. In "Manual of standards for diagnostic tests and vaccines" (3<sup>rd</sup> edition). Office International des Epizooties, Paris, France. 440-448.

Tooze, J., Hollinshead, M., Reis, B., Radsak, K. and Kern, H. (1993). Progeny vaccinia and human cytomegalovirus particles utilize early endosomal cisternae for their envelopes. *European Journal of Cell Biology*, **60**, 163-178.

Traktman, P. Sridhar, R., Condit, R.C. and Roberts, B. (1984). Transcriptional mapping of the DNA polymerase gene of vaccinia virus. *Journal of Virology*, 49, 125-131.

Tulman, E.R., Afonso, C.L., Lu, Z., Zsak, L., Kutish, G.F., and Rock, D.L. (2001). Genome of Lumpy Skin Disease Virus. *Journal of Virology*, **75**, 7122-7130.

Tulman, E.R., Afonso, C.L., Lu, Z., Zsak, L., Sur, J-H., Sandybaev, N.T., Kerembekova, U.Z., Zaitsev, G.F., Kutish, G.F., and Rock, D.L. (2002). The genomes of sheepoox and goatpox viruses. *Journal of Virology*, **76**, 6054-6061.



Uren, M.F., Walker, P.J., Zakrzewski, H., St George, T.D. and Byrne, K.A. (1994). Effective vaccination of cattle using the virion G protein of bovine ephemeral fever virus as an antigen. *Vaccine*, **12**, 945-950.

Vanderplasschen, A., Hollinshead, M. and Smith, G.L. (1998). Intracellular and extracellular vaccinia virions enter cells by different mechanisms. *Journal of General Virology*, **79** (4), 877-887.

Van der Westhuizen, B. (1967). Studies on bovine ephemeral fever. 1. Isolation and preliminary characterisation of a virus from natural and experimentally produced cases of bovine ephemeral fever. Onderstepoort Journal of Veterinary Research, 34 (1), 29-40.

Van Kleef, M., Gunter, N.J., Macmillan, H., Allsopp, B.A., Shkap, V. and Brown, W.C. (2000). Identification of *Cowdria ruminantium* antigens that stimulate proliferation of lymphocytes from cattle immunised by infection and treatment or with inactivated organisms. *Infection and Immunity*, **68**, 603-614.

Van Rooyen, P.J., Munz, E.K. and Weiss, K.E. (1969). The optimal conditions for the multiplication of Neethling-type LSDV in embryonated eggs. *Onderstepoort Journal of Veterinary Research*, **36** (2), 165-174.

Vanselow, B.A., Abetz, I. And Trenfield, K. (1985). A bovine ephemeral fever vaccine incorporating adjuvant Quil A: A comparative study using adjuvants Quil A, aluminium hydroxide gel and dextran sulphate. *Veterinary Record*, 117, 37-43.

Vanselow, B.A., Walthall, J.C. and Abetz, I. (1995). Field trials of ephemeral fever vaccines. *Veterinary Microbiology*, 46, 117-130.

Van Slyke, J.K., Franke, C.A. and Hruby, D.E. (1991). Proteolytic maturation of vaccinia virus core proteins: identification of a conserved motif at the N terminal of the 4b and 25K virion proteins. *Journal of General Virology*, 72, 411-416.

**Vazquez-Blomquist, D., Gonzalez, S. and Duarte, C.A. (2002).** Effect of promoters on cellular immune response induced by recombinant fowlpox virus expressing multi-epitope polypeptides from HIV-1. *Biotechnology and Applied Biochemistry*, **36** (3), 171-179.

**Venter, G.J., Hamblin, C. and Paweska, J.T. (2003).** Determination of the oral susceptibility of South African livestock-associated biting midges, *Culicoides* species, to bovine ephemeral fever virus. *Medical and Veterinary Entomology*, **17**, 133-137.

Viljoen, G.J., Mans, J., Taljaard, L.F., Romito, M., Graham, A. and Bisschop, S. (2003). Control of Newcastle disease in South Africa. Final report of Innovation Fund, project number: 41230. Appendix, p. xxiii.

**Von Backstrom, U. (1945).** Ngamiland cattle Disease: Preliminary report on a new disease, the etiological agent being probably of an infectious nature. *Journal of South African Veterinary Medical Association*, **16**, 29-35.

Vos, J.C. and Stunnenberg, H.G. (1988). Derepression of a novel class of vaccinia virus genes upon DNA replication. *EMBO Journal*, **7**, 3487-3492.

Wade-Evans, A.M., Romero, C.H., Mellor, P., Takamatsu, H., Anderson, J., Thevasagayam, J., Fleming, M.J., Mertens, P.P.C., and Black, D.N. (1996). Expression of the major core structural protein (VP7) of bluetongue virus, by a recombinant capripoxvirus, provides partial



protection of sheep against a virulent heterotypic bluetongue virus challenge. Virology, 220, 227-231.

Walker, P.J., Byrne, K.A., Riding, G.A., Cowley, J.A., Wang, Y. and McWilliam, S. (1991). The genome of bovine ephemeral fever rhabdovirus contains two related glycoprotein genes. *Virology*, 191, 49-61.

Walker, P.J., Byrne, K.A., Cybinski, D.H., and Wang, Y. (1991a). Proteins of bovine ephemeral fever virus. *Journal of General Virology*, 72, 67-74.

Walker, P.J. (2005). Bovine ephemeral fever in Australia and the world. Current Topics in Microbiology and Immunology, 292, 57-80.

Wallace, D.B. (1994). Masters thesis. Characterisation of southern African strains of capripox and avipox viruses", University of Cape Town, Cape Town.

Wallace, D.B. and Viljoen, G.J. (2002). Importance of thymidine kinase activity for normal growth of lumpy skin disease virus (SA-Neethling). Archives of Virology, 147, 659-663.

Wallace, D.B. and Viljoen, G.J. (2005). Immune responses to recombinants of the South African vaccine strain of lumpy skin disease virus generated by using thymidine kinase gene insertion. *Vaccine*, 23, 3061-3067.

Weir, J.P., Bajszar, G., and Moss, B. (1982). Mapping of the vaccinia virus thymidine kinase gene by marker rescue and by cell-free translation of selected mRNA. *Proceedings of the National Academy of Sciences*, 79, 1210-1214.

Weir, J.P. and Moss, B. (1984). Regulation of expression of and nucleotide sequence of a late vaccinia virus gene. *Journal of Virology*, 51, 662-669.

Weiss, K.E. and Geyer, S.M. (1959). The effect of lactalbumin hydrolysate on the cytopathogenesis of lumpy skin disease virus in tissue culture. *Bulletin of epizootic Diseases in Africa*, 7, 243-254.

Weiss, K..E. (1963). Lumpy Skin Disease. Emerging Diseases of Animals, FAO Agricultural Studies, 61, 179-201.

Weiss, K..E. (1968). Lumpy Skin Disease virus. Virology Monographs, 3, 111-131.

Westwood, J.C.N., Harris, W.J., Zwartouw, H.T., Titmus, D.H.J. and Appelyard, G. (1964). Studies on the structure of vaccinia virus. *Journal of General Microbiology*, 34, 67-78.

Williamson, J.D., Cox, P. (1968). Use of a new buffer in the culture of animal cells. *Journal of General Virology*, **2**, 309-312.

Winterfield, R.W. and Reed, W. (1985). Avianpox: Infection and immunity with quail, psittacine, fowl and pigeon poxviruses. *Poultry Science*, **64**, 65-70.

Winters, E., Baroudy, B.M. and Moss, B. (1985). Molecular cloning of the terminal hairpin of vaccinia virus DNA as an imperfect palindrome in an *Escherichia coli* plasmid. *Gene*, **37**, 221-228.

Wittek, R., Menna, A., Muller, K., Schumperli, D., Bosley, P.G. and Wyler, R. (1978). Inverted terminal repeats in rabbit poxvirus and vaccinia virus DNA. *Journal of Virology*, 28, 171-181.

Wolffe, E.J., Isaacs, S.N. and Moss, B. (1993). Deletion of the vaccinia virus B5R gene encoding a 42 kilodalton membrane glycoprotein inhibits extracellular virus envelope formation and dissemination. *Journal of Virology*, **67**, 4732-4741.

Woods, J.A. (1988). Lumpy skin disease – a review. Tropical Animal Health and Production, 20 (1), 11-17.

Woods, J.A., Herring, J.A., Nettleton, P.F., Kreuger, N., Scott, F.M.M. and Reid, H.W. (1996). Isolation of bovine herpesvirus-2 (BHV-2) from a case of pseudo-lumpy skin disease in the United Kingdom. *The Veterinary Record*, 138, 113 – 114.

Wright, C.F. and Moss, B. (1987). Identification of factors specific for transcription of the late class of vaccinia virus genes. *Journal of Virology*, **63**, 4224-4233.

Yang, Z-Y., Wyatt, L.S., Kong, W-P., Moodie, Z., Moss, B., and Nabel, G.J. (2003). Overcoming immunity to a viral vaccine by DNA priming before vector boosting. *Journal of Virology*, 77, 799-803.

Yeruham, I., Perl, S., Nyska, A., Abraham, A., Davidson, M., Haymovitch, M., Zamir, O. and Grinstein, H. (1994). Adverse reactions in cattle to a capripoxvirus vaccine. *Veterinary Record*, 135 (14), 330-332.

Yeruham, I., Nir, O., Braverman, Y., Davidson, M., Grinstein, H., Haymovitch, M., and Zamir, O. (1995). Spread of lumpy skin disease in Israeli dairy herds. *The Veterinary Record*, 137, 91-93.

Young, E., Basson, P.A. and Weiss, K.E. (1970). Experimental infection of game animals with Lumpy Skin Disease virus (prototype strain Neethling). *Onderstepoort Journal of Veterinary Research*, 37 (2), 79-88.

Young, P.L. and Spradbrow, P.B. (1981). The pathogenesis of bovine ephemeral fever virus infection of adult mice. Comparative Pathology, 91, 369-379.

Yuen, L. and Moss, B. (1987). Oligonucleotide sequence signalling transcriptional termination of vaccinia virus early genes. *PNAS*, **55**, 352-356.

Yuwen, H., Cox, J.H., Yewell, J.W., Bennink, J.R. and Moss, B. (1993). Nuclear localisation of a double-stranded RNA-binding protein encoded by the vaccinia virus E3L gene, *Virology*, 195, 732-744.

Zhi, H., Ren, J., Tian, H., Luo, W., Liang, Y. and Ruan, L. (2002). Construction of recombinant vaccinia virus co-expressing E6 plus E7 proteins and detection of its immunogenicity and antitumor response. Zhonghua Shi Yan He Lin Chuang Bing Du Xue Za Zhi, 16 (4), 341-344.