HIERHOLZER,J.C., STONE,Y.O., AND BRODERSON,J.R. (1991). Antigenic relationships among the 47 human adenoviruses determined in reference horse antisera. *Arch.Virol.* **121:** 179-197.

HILLEMAN,M.R., AND WERNER,J.H. (1954). Recovery of new agent from patients with acute respiratory illness. *Proc.Soc.Exp.Biol.Med.* **85:** 183-188.

HITT,M.M., AND GRAHAM,F.L. (1990). Adenovirus E1a under the control of heterologous promoters: wide variation in E1a expression levels has little effect on virus replication. *Virology* **179:** 667-678.

HOEFFLER,W.K., AND ROEDER,R.G. (1985). Enhancement of RNA polymerase III transcription by the E1a gene product of adenovirus. *Cell* **41:** 955-963.

HOEFFLER,W.K., KOVELMAN,R., AND ROEDER,R.G. (1988). Activation of transcription factor IIIC by the adenovirus E1a protein. *Cell* **53:** 907-920.

HORVATH,J., PALKONYAY,L., AND WEBER,J. (1986). Group C adenovirus DNA sequences in human lymphoid cells. *J.Virol.* **59:** 189-192.

HORWITZ,M.S., SCHARFF,M.D., AND MAIZEL,J.V. (1969). Synthesis and assembly of adenovirus 2. I. Polypeptide synthesis, assembly of capsomers and morphogenesis of the virion. *Virology* **39:** 682-694.

HOSAKAWA,K., AND SUNG,M.T. (1976). Isolation and characterization of an extremely basic protein from adenovirus type 5. *J.Virol.* **17:** 924-934.

HOUWELING,A., VAN DEN ELSEN,P.J., AND VAN DER EB,A.J. (1980). Partial transformation of primary rat cells by the leftmost 4.5% fragment of adenovirus 5 DNA. *Virology* **105:** 537-550.

HU,S.-L., AND MANLEY,J.L. (1981). DNA sequence required for initiation of transcription *in vitro* from the major late promotor of adenovirus 2. *Proc.Natl.Acad.Sci.U.S.A.* **78:** 820-824.

HUANG,M.-M., AND HEARING,P. (1989). The adenovirus early region 4 open reading frame 6/7 protein regulates the DNA binding activity of the cellular transcription factor, E2F, through a direct complex. *Genes Dev.* **3:** 1699-1710.

HUEBNER,R.J. (1959). Newly recognized viruses in man. *Publ.Hlth.Rep.(Wash)* **74:** 6-12.

HUEBNER,R.J. (1967). Adenovirus-directed tumor and T-antigens. In: Poliard,M. (ed). *Perspectives in Virology, Vol.V,* Academic Press, New York, pp 147-166.

HURST,H.C., AND JONES,N.C. (1987). The identification of factors that interact with the E1a-inducible adenovirus E3 promoter. *Genes Dev.* **1:** 1132-1146.

IBANEZ,C.E., SCHRIER,R., GHAZAL,P., WILEY,C., AND NELSON,J.A. (1991). Human cytomegalovirus productively infects primary differentiated macrophages. *J.Virol.* **65:** 6581-6588.

IMPERIALE,M.J., AND NEVINS,J.R. (1984). Adenovirus 5 E2 transcription unit: an E1a-inducible promoter with an essential element that functions independently of position or orientation. *Mol.Cell.Biol.* **4:** 875-882.

IMPERIALE,M.J., FELDMAN,L.T., AND NEVINS,J.R. (1983). Activation of gene expression by adenovirus and herpes virus regulatory genes acting in *trans* and by a *cis*-acting adenovirus enhancer element. *Cell* **35:** 127-136.

IMPERIALE,M.J., KAO,H-T., FELDMAN,L.T., NEVINS,J.R., AND STRICKLAND,S. (1984). Common control of the heat-shock gene and adenovirus genes: Evidence for a cellular E1a-like activity. *Mol.Cell.Biol.* **4:** 867-874.

IMPERIALE,M.J., HART,R.P., AND NEVINS,J.R. (1985). An enhancer-like element in the adenovirus E2 promoter contains sequences essential for uninduced and E1a-induced transcription. *Proc.Natl.Acad.Sci.U.S.A.* **82:** 381-385.

ISAACS,A. (1957). Particle counts and infectivity titrations for animal viruses. *Adv.Virus Res.* **8:** 319-378.

ISHINO,M., SAWADA,Y., YAEGASHI,T., DEMURA,M., AND FUJINAGA,K. (1987). Nucleotide sequence of the adenovirus type 40 inverted terminal repeat: close relationship to that of adenovirus type 5. *Virology* **156:** 414-416.

ISHINO,M., OHASHI,Y., EMOTO,T., SAWADA,Y., AND FUJINAGA,K. (1988). Characterization of adenovirus type 40 E1 region. *Virology.* **165:** 95-102.

JACOBSSON,P.A., JOHANSSON,M.E., AND WADELL,G. (1979). Identification of an enteric adenovirus by immunoelectroosmophoresis (IEOP) technique. *J.Med.Virol.* **3:** 307-312.

JANIK,J.E., HUSTON,M.M., AND ROSE,J.A. (1981). Locations of adenovirus genes required for the replication of adeno-associated virus. *Proc.Natl.Acad.Sci.U.S.A.* **78:** 1925-1929.

JAWETZ,E., MELNICK,J.L., AND ADELBERG,E.A. (1987). *Review of Medical Microbiology, 7th edn.*, Appleton and Lange, Connecticut, California, pp 495-501.

JEFFRIES,B.C., BRANDT,C.D., KIM,H.W., RODRIGUEZ,W.J., ARROBIO,J.O., AND PARROTT,R.H. (1988). Diarrhea-associated adenovirus from the respiratory tract. *J.Infect.Dis.* **157:** 1275.

JOHANSSON,M.E., UHNOO,I., KIDD,A.H., MADELEY,C.R., AND WADELL,G. (1980). Direct identification of enteric adenoviruses, a candidate new serotype, associated with infantile gastroenteritis. *J.Clin.Microbiol.* **12:** 95-100.

JOHANSSON,M.E., UHNOO,I., SVENSSON,L., PETTERSSON,C.A., AND WADELL,G. (1985). Enzyme-linked immunosorbent assay for detection of enteric adenovirus 41. *J.Med.Virol.* **17:** 19-27.

JONCAS,J., MOISAN,A., AND PAVILANIS,V. (1962). Incidence of adenovirus infection: A family study. *Can.Med.Assoc.J.* **87:** 52-58.

JONES,K.W., KINROSS,J., AND MAITLAND,N. (1979). Normal human tissues contain RNA and antigens related to infectious adenovirus type 2. *Nature* **277:** 274-279.

JONES,N., AND SHENK,T. (1979a). An adenovirus type 5 early gene function regulates expression of other early viral genes. *Proc.Natl.Acad.Sci.U.S.A.* **76:** 3665-3669.

JONES,N., AND SHENK,T. (1979b). Isolation of host range deletion mutants defective for transformation of rat embryo cells. *Cell* **17:** 683-689.

JONES,N.C. (1986). Genetic elements governing adenoviral gene expression. In: Doerfler,W. (ed). *Adenovirus DNA. The Viral Genome and its Expression.* Martinus Nijhoff Publishing, Boston, Dordrecht, pp 161-191.

JONES,N.C., RIGBY,P.W.J., AND ZIFF,E.B. (1988). *Trans*-acting protein factors and the regulation of eukaryotic transcription: lessons from studies on DNA tumor viruses. *Genes Dev.* **2:** 267-281.

JÖRNVALL,H., AKUSJÄRVI,G., ALESTRÖM,P., VAN BAHR-LINDSTRÖM,H., PETTERSSON,U., APELLA,E., FOWLER,A.V., AND PHILIPSON,L. (1981). The adenovirus hexon protein: The primary structure of the polypeptide and its correlation with the hexon gene. *J.Biol.Chem.* **256:** 6181-6186.

JUNGMANN,R.A., AND RUSSELL,D.H. (1977). Cyclic AMP, cyclic AMP-dependent protein kinase, and the regulation of gene expression. *Life Sci.* **20:** 1787-1797.

KADONAGA,J.T., JONES,K.A., AND TJIAN,R. (1986). Promoter-specific activation of RNA polymerase II transcription by SP1. *Trends Biochem.Sci.* **11:** 20-24.

KAO,H.-T., AND NEVINS,J.R. (1983). Transcriptional activation and subsequent control of the human heat shock gene during adenovirus infection. *Mol.Cell.Biol.* **3:** 2058-2065.

KAO,H.-T., CAPASSO,O., HEINTZ,N., AND NEVINS,J.R. (1985). Cell cycle control of the human HSP70 gene: implications for the role of a cellular E1a-like function. *Mol.Cell.Biol.* **5:** 628-633.

KAPIKIAN,A.Z., YOLKEN,R.H., GREENBERG,H.B., WYATT,R.G., KALICA,A.R., CHANOCK,R.M., AND WHA KIM,H. (1979). Gastroenteritis viruses. In: Lennette,E.H., and Schmidt,N.J. (eds). *Diagnostic Procedures for Viral, Rickettsial and Chlamydial Infections.* American Public Health association, Washington DC, pp 927-995.

KAUFMAN,R.J., AND MURTHA,P. (1987). Translational control mediated by eucaryotic initiation factor-2 is restricted to specific mRNAs in transfected cells. *Mol.Cell.Biol.* **7:** 1568-1571.

KELLY,T.J. (1984). Adenovirus DNA replication. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum Press, New York, London, pp 271-308.

KIDD,A.H. (1984). Genome variants of adenovirus 41 (subgroup G) from children with dirrhoea in South Africa. *J.Med.Virol.* **14:** 49-59.

KIDD,A.H., AND ERASMUS,M.J. (1989). Sequence characterization of the adenovirus 40 fiber gene. *Virology* **172:** 134-144.

KIDD,A.H., AND MADELEY, C.R. (1981). *In vitro* growth of some fastidious adenoviruses from stool specimens. *J.Clin.Pathol.* **34:** 213-216.

KIDD,A.H., COSGROVE,B.P., BROWN,R.A., AND MADELEY,C.R. (1982). Faecal adenoviruses from Glasgow babies. Studies on culture and identity. *J.Hyg.(Lond)* **88:** 463-474.

KIDD,A.H., BANATVALA,J.E., AND DE JONG,J.C. (1983). Antibodies to fastidious faecal adenoviruses (species 40 and 41) in sera from children. *J.Med.Virol.* **11:** 333-341.

KIDD,A.H., BERKOWITZ,F.E., BLASKOVIC,P.J., AND SCHOUB,B.D. (1984). Genome variants of human adenovirus 40 (subgroup F). *J.Med.Virol.* **14:** 235-246.

KIDD,A.H., HARLEY,E.H., AND ERASMUS,M.J. (1985). Specific detection and typing of adenovirus types 40 and 41 in stool specimens by dot blot hybridization. *J.Clin.Microbiol.* **22:** 934-939.

KIDD,A.H., ROSENBLATT,A., BESSELAAR,T.G., ERASMUS,M.J., TIEMESSEN,C.T., BERKOWITZ,F.E., AND SCHOUB,B.D. (1986). Characterization of rotaviruses and subgroup F adenoviruses from acute summer gastroenteritis in South Africa. *J.Med.Virol.* **18:** 159-168.

KIDD,A.H., ERASMUS,M.J., AND TIEMESSEN,C.T. (1990). Fiber sequence heterogeneity in subgroup F adenoviruses. *Virology* **179:** 139-150.

KIDD,A.H., CHROBOCZEK,J., CUSACK,S., AND RUIGROK,R.W.H. (1992). Adenovirus type 40 virions contain two distinct fibres. Submitted.

KIM,K-H., YANG,J-M., JOO,S-I., CHO,Y-G, GLASS,R.I., AND CHO,Y-J. (1990). Importance of rotavirus and adenovirus types 40 and 41 in acute gastroenteritis in Korean children. *J.Clin.Microbiol.* **28:** 2279-2284.

KINGSTON,R.E., KAUFMAN,R.J., AND SHARP,P.A. (1984). Regulation of transcription of the adenovirus EII promoter by E1a gene products: absence of sequence specificity. *Mol.Cell.Biol.* **4:** 1970-1977.

KITAJEWSKI,J., SCHNEIDER,R.J., SAFER,B., MUNEMITSU,S.M., SAMUEL,C.E., THIMMAPPAYA,B., AND SHENK,T. (1986a). Adenovirus VAI RNA antagonizes the antiviral action of interferon by preventing activation of the interferon-induced eIF-2α kinase. *Cell* :**45:** 195-200.

KITAJEWSKI,J., SCHNEIDER,R.J., SAFER,B., AND SHENK,T. (1986b). An adenovirus mutant unable to express VAI RNA displays different growth responses and sensitivity to interferon in various host cell lines. *Mol.Cell.Biol.* **6:** 4493-4498.

KITCHINGMAN,G.R. (1985). Sequence of the DNA binding protein of a human subgroup E adenovirus (type 4): Comparisons with subgroup A (type 12), subgroup B (type 7), and subgroup C (type 5). *Virology* **146:** 90-101.

KJELLEN,L. (1961). A study of adenovirus-host cell system by the plaque technique. *Virology* **14:** 234-239.

KLEIN,H., MALTZMAN,W., AND LEVINE,A.J. (1979). Structure function relationships of the adenovirus DNA binding proteins. *J.Biol.Chem.* **254:** 11051-11060.

KLEINSCHMIDT,A.M., AND PEDERSON,T. (1990). RNA processing and ribonucleoprotein assembly studied *in vivo* by RNA transfection. *Proc.Natl.Acad.Sci.U.S.A.* **87:** 1283-1287.

KLESSIG,D.F. (1977). Isolation of a variant of human adenovirus serotype 2 that multiplies efficiently on monkey cells. *J.Virol.* **21:** 1243-1246.

KLESSIG,D.F. (1984). Adenovirus-simian virus 40 interactions. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum Press, New York, London, pp 399-449.

KLESSIG,D.F., AND HASSELL,J.A. (1978). Characterization of a variant of human adenovirus 2 which multiplies efficiently in simian cells. *J.Virol.* **28:** 945-956.

KNEBEL-MÖRSDORF,D., ACHTEN,S., LANGNER,K.-D., RUGER,R., FLECKENSTEIN,B., AND DOERFLER,W. (1988). Reactivation of the methylation-inhibited late E2a promoter of adenovirus type 2 by a strong enhancer of human cytomegalovirus. *Virology* **166:** 166-174.

KOSTURKO,L.D., AND VANECH,M. (1986). *In vitro* encapsidation of plasmid DNA into human adenovirus empty capsids. *Virus Res.* **6:** 123-132.

KOTLOFF,K.L., WASSERMAN,S.S., STECIAK,J.Y. (1988). Acute diarrhea in Baltimore children attending an outpatient clinic. *Pediatr.Infect.Dis.J.* **7:** 753-759.

KOTLOFF,K.L., LOSONSKY,G.A., MORRIS,J.G.JR., WASSERMAN,S.S., SINGH-NAZ,N., AND LEVINE,M.M. (1989). Enteric adenovirus infection and childhood diarrhea: an epidemiological study in three clinical settings. *Pediatrics* **84:** 219-225.

KOVESDI,I., REICHEL,R., AND NEVINS,J.R. (1986). Identification of a cellular transcription factor involved in E1a trans-activation. *Cell* **45:** 219-228.

KOVESDI,I., REICHEL,R., AND NEVINS,J.R. (1987). Role of an adenovirus E2 promoter binding factor in E1a-mediated coordinate gene control. *Proc.Natl.Acad.Sci.U.S.A.* **84:** 2180-2184.

KRUCZEK,I., AND DOERFLER,W. (1982). The unmethylated state of the promoter/leader and 5'-regions of integrated adenovirus genes correlates with gene expression. *EMBO J.*, **1:** 409-414.

KRUIJER,W., VAN SCHAIK,F.M.A., AND SUSSENBACH,J.S. (1981). Structure and organization of the gene coding for the DNA binding protein of adenovirus type 5. *Nucleic Acids Res.* **9:** 4439-4457.

KRUIJER,W., VAN SCHAIK,F.M.A., AND SUSSENBACH,J.S. (1982). Nucleotide sequence of the gene encoding adenovirus type 2 DNA binding protein. *Nucleic Acids Res.* **10:** 4493-4500.

KRUIJER,W., VAN SCHAIK,F.M.A., SPEIJER,J.G., AND SUSSENBACH,J.S. (1983). Structure and function of the adenovirus DNA binding protein: Comparison of the amino acid sequences of the Ad5 and Ad12 proteins derived from the nucleotide sequence of the corresponding genes. *Virology* **128:** 140-153.

KVIST,S., ÖSTBERG,L., PERSSON,H., PHILIPSON,L., AND PETERSON,P.A. (1978). Molecular association between transplantation antigens and cell surface antigen in adenovirus-transformed cell line. *Proc.Natl.Acad.Sci.U.S.A.* **75:** 5674-5678.

KWOK,S., KELLOGG,D.E., MCKINNEY,N., SPASIC,D., GODA,L., LEVENSON,C., AND SNINSKY,J.J. (1990). Effects of primer-template mismatches on the polymerase chain reaction: Human immunodeficiency virus type 1 model studies. *Nucleic Acids Res.* **18:** 999-1005.

LAIFATT,R.B., AND MAK,S. (1982). Mapping of an adenovirus function involved in the inhibition of DNA degradation. *J.Virol.* **42:** 969-977.

LAND,H., PARADA,L.F., AND WEINBERG,R.A. (1983). Tumorigenic conversion of embryo fibroblasts requires at least two cooperating oncogenes. *Nature* **304:** 596-602.

LANGNER,K.-D., WEYER,U., AND DOERFLER,W. (1986). *Trans* effect of the expression of a prokaryotic gene in mammalian cells: Resistance to 5'-CCG 3' methylation. *Proc.Natl.Acad.Sci.U.S.A.* **83:** 1598-1602.

LASSAR,A.B., MARTIN,P.L., AND ROEDER,R.G. (1983). Transcription of class III genes: formation of preinitiation complexes. *Science* **222:** 740-748.

LAVER,W.G., YOUNGHUSBAND,H.B., AND WRIGLEY,N.G. (1971). Purification and properties of chick embryo lethal orphan virus (an avian adenovirus). *Virology* **45:** 598-614.

LAWRENCE,C.B., AND JACKSON,K.J. (1982). Translation of adenovirus serotype 2 late messenger RNAs. *J.Mol.Biol.* **162:** 317-334.

LAZARIDIS,I., BABICH,A., AND NEVINS,J.R. (1988). Role of the adenovirus 72KDa DNA binding protein in the rapid decay of early viral mRNA. *Virology* **165:** 438-447.

LECHNER,R.L., AND KELLY,T.J.,JR. (1977). The structure of replicating adenovirus 2 DNA molecules. *Cell* **12:** 1007-1020.

LEE,K.A.W., AND GREEN,M.R. (1987). A cellular transcription factor E4F1 interacts with an E1a-inducible element and modifies constitutive enhancer functions *in vitro*. *EMBO J.* **6:** 1345-1353.

LEE,R.F., CONCINO,M.F., AND WEINMANN,R. (1988). Genetic profile of the transcription signals from the adenovirus major late promoter. *Virology* **165:** 51-56.

LEITE,J.P.G., PEREIRA,H.G., AZEREDO,R.S., AND SCHATZMAYR,H.G. (1985). Adenoviruses in faeces of children with acute gastroenteritis in Rio de Janeiro, Brazil. *J.Med.Virol.* **15:** 203-209.

LEITE,J.P.G., NIEL,C., AND D'HALLUIN,J.C. (1986). Expression of the chloramphenicol acetyl transferase gene in human cells under the control of early adenovirus subgroup C promoters: effect of E1a products from other subgroups on gene expression. *Gene* **41:** 207-215.

LEITE,J.P.G., COUSIN,C., HEYSEN,A., AND D'HALLUIN,J.C. (1989). Negative effect of a *cis*-acting pBR322 element on adenovirus E1a gene expression. *Gene* **82:** 351-356.

LENGYEL,P. (1982). Biochemistry of interferons and their actions. *Ann.Rev.Biochem.* **51:** 251-282.

LEVINE,A.J., AND GINSBERG,H.S. (1967). Mechanism by which fiber antigen inhibits multiplication of type 5 adenovirus. *J.Virol.* **1:** 747-757.

LEW,J.F., MOE,C.L., MONROE,S.S., ALLEN,J.R., HARRISON,B.M., FORRESTER,B.D., STINE,S.E., WOODS,P.A., HIERHOLZER,J.C., HERRMANN,J.E., BLACKLOW,N.R., BARTLETT,A.V., AND GLASS,R.I. (1991). Astrovirus and adenovirus associated with diarrhea in children in day care settings. *J.Infect.Dis.* **164:** 673-678.

LEWIN,B. (1990). *Genes IV.* Oxford University Press, Oxford, New York; Cell Press, Cambridge, pp 366-368.

LEWIS,A.M.JR., RABSON,A.S., AND LEVINE,A.S. (1974). Studies of nondefective adenovirus 2-simian virus 40 hybrid viruses. Transformation of hamster kidney cells by adenovirus 2 and the nondefective hybrid viruses. *J.Virol.* **13:** 1291-1301.

LEWIS,E.D., AND MANLEY,J.L. (1985). Control of the adenovirus late promoter expression in two human cell lines. *Mol.Cell.Biol.* **5:** 2433-2442.

LEWIS,J.B., AND ANDERSON,C.W. (1983). Proteins encoded near the adenovirus late messenger RNA leader segments. *Virology* **127:** 112-123.

LEWIS,J.B., ANDERSON,C.W., AND ATKINS,J.F. (1977). Further mapping of late adenovirus genes by cell-free translation of RNA selected by hybridization to specific DNA fragments. *Cell* **12:** 37-44.

LEZA,M.A., AND HEARING,P. (1989). Independent cyclic AMP and E1a induction of adenovirus early region 4 expression. *J.Virol.* **63:** 3057-3064.

LICHY,J.H., HORWITZ,M.S., AND HURWITZ,J. (1981). Formation of a covalent complex between the 80,000-dalton adenovirus terminal protein and 5′-dCMP *in vitro*. *Proc.Natl.Acad.Sci.U.S.A.* **76:** 2678-2682.

LICHY,J.H., FIELD,J., HORWITZ,M.S., AND HURWITZ,J. (1982). Separation of the adenovirus terminal protein precursor from its associated DNA polymerase: Role of both proteins in the initiation of adenovirus DNA replication. *Proc.Natl.Acad.Sci.U.S.A.* **79:** 5225-5229.

LILLIE,J.W., GREEN,M., AND GREEN,M.R. (1986). An adenovirus E1a protein region required for transformation and transcriptional repression. *Cell* **46:** 1043-1051.

LILLIE,J.W., LOEWENSTEIN,P.M., GREEN,M.R., AND GREEN,M. (1987). Functional domains of adenovirus type 5 E1a proteins. *Cell* **50:** 1091-1100.

LINDENBAUM,J.O., FIELD,J., AND HURWITZ,J. (1986). The adenovirus DNA binding protein and adenovirus DNA polymerase interact to catalyze elongation of primed DNA templates. *J.Biol.Chem.* **261:** 10218-10227.

LINNENBACH,A., HUEBNER,K., AND CROCE,C.M. (1980). DNA transformed murine teratocarcinoma cells: regulation of expression of Simian virus 40 tumor antigens in stem versus differentiated cells. *Proc.Natl.Acad.Sci.U.S.A.* **77:** 4875-4879.

LUCAS,J.J., AND GINSBERG,H.S. (1971). Synthesis of virus-specific ribonucleic acid in KB cells infected with type 2 adenovirus. *J.Virol.* **8:** 203-218.

LUFTIG,R.B., PIENIAZEK,D., AND PIENIAZEK,N.J. (1990). Update on viral pathogenesis. *ASM News* **56:** 366-368.

LURIA,S.E. (1940). Methodes statistiques appliquees a l'etude du mode d'action des ultravirus. *Ann.Inst.Pasteur* **64:** 415-438.

LURIA,S.E., DARNELL,J.E., BALTIMORE,D., AND CAMPBELL,A. (1978). *General Virology, 3rd edn.* Wiley, New York, pp 21-25.

LUTON,P. (1973). Rapid adenovirus typing by immunoelectron microscopy. *J.Clin.Pathol.* **26:** 914-917.

LYONS,S.F., SCHOUB,B.D., CHIU,M-N., AND CRESPI,M. (1982). An indirect radioimmunoassay for interferon. *J.Virol.Methods* **5:** 93-100.

MADELEY,C.R. (1986). The emerging role of adenoviruses as inducers of gastroenteritis. *Ped.Infect.Dis.* **5:** 63-74.

MADELEY,C.R., COSGROVE,B.P., BELL, E.J., AND FALLON, R.J. (1977). Stool viruses in babies in Glasgow. 1. Hospital admissions with dirrhoea. *J.Hyg.Camb.* **78:** 261-273.

MAIZEL,J.V.JR, WHITE,D.O., AND SCHARFF,M.D. (1968a). The polypeptides of adenovirus. I. Evidence for multiple protein components in the virion and a comparison of types 2,7, and 12. *Virology* **36:** 115-125.

MAIZEL,J.V., WHITE,D.O., AND SCHARFF,M.D. (1968b).The polypeptides of adenovirus. II. Soluble proteins, core, top components and the structure of the virion. *Virology* **36:** 126-136.

MAK,S. (1969). Transcription and replication of viral deoxyribonucleic acid in cells coinfected with adenovirus types 2 and 12. *J.Virol.* **4:** 651-656.

MANIATIS,T., FRITSCH,E.F., AND SAAMBROOK,J. (1982). *Molecular Cloning: a Laboratory Manual.* Cold Spring Harbor Laboratory, Cold Spring Harbor, New York.

MANLEY,J.L., SHARP,P.A., AND GEFTER,M.L. (1982). RNA synthesis in isolated nuclei processing of adenovirus serotype 2 late messenger RNA precursors. *J.Mol.Biol.* **159:** 582-595.

MARTON,M.J., BAIM,S.B., ORNELLES,D.A., AND SHENK,T. (1990). The adenovirus E4 17-kilodalton protein complexes with the cellular transcription factor E2F, altering its DNA-binding properties and stimulating E1a-independent accumulation of E2 mRNA. *J.Virol.* **64:** 2345-2359.

MATHEWS,M.B. (1975). Genes for VA-RNA in Ad2. *Cell* **6:** 223-229.

MATHEWS,M.B., AND SHENK,T. (1991). Adenovirus virus-associated RNA and translation control. *J.Virol.* **65:** 5657-5662.

MAUTNER,V., AND BOURSNELL,M.E.G. (1983). Recombination in adenovirus: DNA sequence analysis of crossover sites in intertypic recombinants. *Virology* **131:** 1-10.

MAUTNER,V., AND MACKAY,N. (1984). Recombination in adenovirus: analysis of crossover sites in intertypic overlap recombinants. *Virology* **139:** 43-52.

MAUTNER,V., AND MACKAY,N. (1991). Enteric adenovirus type 40: Complementation of the E4 defect in Ad2 *dl*808. *Virology* **183:** 433-436.

MAUTNER,V., MACKAY,N., AND STEINTHORSDOTTIR,V. (1989). Complementation of enteric adenovirus type 40 for lytic growth in tissue culture by E1b 55K function of adenovirus types 5 and 12. *Virology* **171:** 619-622.

MAUTNER,V., MACKAY,N., AND MORRIS,K. (1990). Enteric adenovirus type 40: Expression of E1b mRNA and proteins in permissive and nonpermissive cells. *Virology* **179:** 129-138.

MAY,J.T., ROBINSON,A.J., AND EATON,B.T. (1975). A study of the sequences of the chicken lethal orphan (CELO) virus DNA present in a transformed hamster cell line with use of specific fragments of the virus genome. *Virology* **68:** 483-489.

MCDONOUGH,J.S., AND REKOSH,D.M. (1982). Differential complementation of adenovirus type 5 temperature-sensitive early mutants by adenovirus types 3 and 12. *Virology* **120:** 383-398.

MCDOUGALL,I., AND MAUTNER,V. (1987). An adenovirus type 3 host range variant with mutations in the E1a and E3 early gene regions. *J.Gen.Virol.* **68:** 1361-1371.

MCGROGAN,M, AND RASKAS,H.J. (1977). Species identification and genome mapping of cytoplasmic type 2 RNAs synthesized late in infection. *J.Virol.* **23:** 240-249.

MCGROGAN,M., AND RASKAS,H.J. (1978). Two regions of the adenovirus genome specify families of late polysomal RNA's containing common sequences. *Proc.Natl.Acad.Sci.U.S.A.* **75:** 625-629.

MCMAHON,M., AND KERR,M. (1983). The biochemistry of the antiviral state. In: Burke,D.C., and Morris,A.G. (eds). *Interferons: from Molecular Biology to Clinical Application.* Cambridge University Press, Cambridge, London, New York, pp 89-108.

MEISTERERNST,M., HORIKOSHI,M., AND ROEDER,R.G. (1990). Recombinant yeast TFIID, a general transcription factor, mediates activation by the gene-specific factor USF in a chromatin assembly assay. *Proc.Natl.Acad.Sci.U.S.A.* **87:** 9153-9157.

MILLER,S.J., RICCIARDI,R.P., ROBERTS,B.E., PATERSON,B.M., AND MATHEWS,M.B. (1980). Arrangement of messenger RNAs and protein coding sequences in the major late transcription unit of adenovirus type 2. *J.Mol.Biol.* **142:** 455-488.

MISTCHENKO,A.S., AND FALCOFF,R. (1987). Recombinant human interferon-γ inhibits adenovirus multiplication *in vitro*. *J.Gen.Virol.* **68:** 941-944.

MISTCHENKO,A.S., DIEZ,R.A., AND FALCOFF,R. (1987). Recombinant human interferon-γ inhibits adenovirus multiplication without modifying viral penetration. *J.Gen.Virol.* **68:** 2675-2679.

MISTCHENKO,A.S., DIEZ,R.A., AND FALCOFF,R. (1989). Inhibitory effect of interferon-γ on adenovirus replication and late transcription. *Biochem.Pharmacol.* **38:** 1971-1978.

MOFFETT,H.L., SHULENBERGER,H.K., AND BURKHOLDER,E.R.(1968). Epidemiology and aetiology of severe infantile diarrhea. *J.Pediatr.* **72:** 1-14.

MONCOLLIN,V., KEMPF,A., AND EGLY,J.-M. (1990). The mammalian upstream element factor recognizes two sites in the adenovirus type 2 IVa_2-major late promoter intergenic region and stimulates both promoters. *J.Virol.* **64:** 3199-3206.

MONTELL,C., FISHER,E.F., CARUTHERS,M.H., AND BERK,A.J. (1983). Inhibition of RNA cleavage but not polyadenylation by a point mutation in mRNA 3′ consensus sequence. *Nature* **305:** 600-605.

MONTELL,C., FISHER,E.F., CARUTHERS,M.H., AND BERK,A.J. (1984a). Control of adenovirus E1b mRNA synthesis by a shift in the activities of RNA splice sites. *Mol.Cell.Biol.* **4:** 966-972.

MONTELL,C., GENEVIÈVE,C., ENG,C., AND BERK,A.J. (1984b). Complete transformation by adenovirus 2 requires both E1a proteins. *Cell* **36:** 951-961.

MORAN,E., AND MATHEWS,M.B. (1987). Multiple functional domains in the adenovirus E1a gene. *Cell* **48:** 177-178.

MORAN,E., GRODZICKER,T., ROBERTS,R.J., MATHEWS,M.B., AND ZERLER,B. (1986). Lytic and transforming functions of individual products of the adenovirus E1a gene. *J.Virol.* **57:** 765-775.

MORGAN,C., ROSENKRANZ,H.S., AND MEDNIS,B. (1969). Structure and development of viruses as observed in the electron microscope. X. Entry and uncoating of adenovirus. *J.Virol.* **4:** 777-796.

MORTENSSON-EGNUND,K., AND KJELDSBERG,E. (1986). Improved ELISA for the detection of adenovirus antigen in faeces extracts by the biotin/streptavidin interaction. *J.Virol.Methods* **14:** 57-63.

MUNEMITSU,S.M., BERRY,M.J., KITAJEWSKI,J., SHENK,T., AND SAMUEL,C.E. (1986). Adenovirus VAI RNA facilitates protein synthesis by preventing activation of the interferon-induced P1/eIF-2α kinase. In: Friedman,R.M., Merigan,T., Sreevalsan,T, (eds). *Interferons as Cell Growth Inhibitors and Antitumour Factors.* Alan R. Liss, Inc., New York, pp 87-100.

NAGATA,K., GUGGENHEIMER,R.A., ENOMOTO,T., LICHY,J.M., AND HURWITZ,J. (1982). Adenovirus DNA replication *in vitro:* identification of a host factor that stimulates synthesis of the preterminal protein dCMP complex. *Proc.Natl.Acad.Sci.U.S.A.* **79:** 6438-6442.

NAGATA,K., GUGGENHEIMER,R.A., AND HURWITZ,J. (1983). Specific binding of a cellular DNA replication protein to the origin of replication of adenovirus DNA. *Proc.Natl.Acad.Sci.U.S.A.* **80:** 6177-6181.

NASCIMENTO,J.P., LEITE,J.P.G., WINTER,N., AND D'HALLUIN,J.C. (1990). Adenovirus transformed monkey cell lines permissive to enteric adenovirus type 40. *J.Virol.Methods* **28:** 321-326.

NATARAJAN,V., MADDEN,M.J., AND SALZMAN,N.P. (1985). Positive and negative control sequences within the distal domain of the adenovirus IVa_2 promoter overlap with the major late promoter. *J.Virol.* **55:** 10-15.

NATARAJAN,V., MADDEN,M.J., AND SALZMAN,N.P. (1987). Identification of a transcription factor which interacts with the distal domain of the adenovirus IVa_2 promoter. *J.Virol.* **61:** 646-652.

NEILL,S.D., HEMSTRÖM,C., VIRTANEN,A., AND NEVINS,J.R. (1990). An adenovirus E4 gene product *trans*-activates E2 transcription and stimulates stable E2F binding through a direct association with E2F. *Proc.Natl.Acad.Sci.U.S.A.* **87:** 2008-2012.

NERMUT,M.V. (1979). Structural elements in adenovirus cores. *Arch.Virol.* **62:** 101-116.

NEVINS,J.R. (1981). Mechanism of activation of early viral transcription by the adenovirus E1a gene product. *Cell* **26:** 213-220.

NEVINS,J.R. (1982). Induction of the synthesis of a 70,000 dalton mammalian heat shock protein by the adenovirus E1a gene product. *Cell* **29:** 913-919.

NEVINS,J.R. (1991). Utilization of cellular transcription factors for adenovirus-induced transcription. *Virus Res.* **20:** 1-10.

NEVINS,J.R., AND DARNELL,J.E. (1978a). Groups of adenovirus type 2 mRNAs derved from a large primary transcript: Probably nuclear origin and possible common 3'-ends. *J.Virol.* **25:** 811-823.

NEVINS,J.R., AND DARNELL,J.E.JR. (1978b). Steps in the processing of Ad2 mRNA: poly(A)+ nuclear sequences are conserved and poly(A) addition precedes splicing. *Cell* **15:** 1477-1493.

NEVINS,J.R., AND JENSEN-WINKLER,J.J. (1980). Regulation of early adenovirus transcription: A protein product of early region 2 specifically represses region 4 transcription. *Proc.Natl.Acad.Sci.U.S.A.* **77:** 1893-1897.

NEVINS,J.R., AND WILSON,M.C. (1981). Regulation of adenovirus-2 gene expression at the level of transcriptional termination and RNA processing. *Nature* **290:** 113-118.

NEVINS,J.R., GINSBERG,H.S., BLANCHARD,J.M., WILSON,M.C., AND DARNELL,J.E.JR. (1979). Regulation of the primary expression of the early adenovirus transcription units. *J. Virol.* **32:** 727-733.

NIEL,C., GOMES,S.A., LEITE,J.P.G., AND PEREIRA,H.G. (1986). Direct detection and differentiation of fastidious and nonfastidious adenoviruses in stools by using a specific non-radioactive probe. *J.Clin.Microbiol.* **24:** 785-789.

NORRBY,E. (1969). The structural and functional diversity of adenovirus capsid components. *J.Gen.Virol.* **5:** 221-236.

NORRBY,E., AND GOLLMAR,Y. (1971). Mosaics of capsid components produced by cocultivation of certain human adenoviruses *in vitro*. *Virology* **44:** 383-395.

NORRBY,E., AND GOLLMAR,Y. (1977). Mosaics of capsid components by cocultivation of certain human adenoviruses *in vitro*. *Virology* **44:** 383-395.

NORRBY,E., MARUSYK,H.L., AND HAMMARSKJÖLD,M.-L. (1969). The relationship between the soluble antigens and the virion of adenovirus type 3. V. Identification of antigen specificities available at the surface of virions. *Virology* **38:** 477-482.

NORRBY,E., BARTHA,A., BOULANGER,P., DREIZIN,R.S., GINSBERG,H.S., KALTER,S.S., KAWAMURA,H., ROWE,W.P., RUSSELL,W.C., SCHLESINGER, R.W., AND WIGAND,R. (1976). Adenoviridae. *Intervirology* **7:** 117-125.

O'MALLEY,R.P., MARIANO,T.M., SIEKIERKA,J., MATHEWS,M.B. (1986). The control of protein synthesis by adenovirus VA RNAI. *Cancer Cells* **4:** 291-301.

O'MALLEY,R.P., DUNCAN,R.F., HERSHEY,J.W.B., AND MATHEWS,M.B. (1989). Modification of protein synthesis initiation factors and the shut-off of host protein synthesis in adenovirus-infected cells. *Virology* **168:** 112-118.

OOSTEROM-DRAGON,E.A., AND ANDERSON,C.W. (1983). Polypeptide structure and encoding location of the adenovirus serotype 2 late, nonstructural 33K protein. *J.Virol.* **45:** 251-263.

OOSTEROM-DRAGON,E.A., AND GINSBERG,H.S. (1981). Characterization of two temperature-sensitive mutants of type 5 adenovirus with mutations in the 100,000-dalton protein gene. *J.Virol.* **40:** 491-500.

OSBORNE,T.F., AND BERK,A.J. (1983). Far upstream initiation sites for adenovirus early region 1a transcription are utilized after the onset of viral DNA replication. *J. Virol.* **45:** 594-599.

OSBORNE,T.F., ARVIDSON,D.N., TYAU,E.S., DUNSWORTH-BROWNE,M., AND BERK,A.J. (1984). Transcription control region within the protein-coding portion of adenovirus E1a genes. *Mol. Cell. Biol.* **4:** 1293-1305.

PAEZ,E., AND ESTEBAN,M. (1984). Resistance of Vaccinia virus to interferon is related to an interference phenomenon between the virus and the interferon system. *Virology* **134:** 12-28.

PARASKEVA,C., BROWN,K.W., AND GALLIMORE,P.H. (1982). Adenovirus-cell interactions early after infection. *In vitro* characteristics and tumorigenicity of adenovirus type 2-transformed rat liver epithelial cells. *J. Gen. Virol.* **58:** 73-81.

PERRICAUDET,M., AKUSJÄRVI,G., VIRTANEN,A., AND PETTERSSON,U. (1979). Structure of two spliced mRNAs from the transforming region of human subgroup C adenoviruses. *Nature* **281:** 694-696.

PERRON-HENRY,D.M., HERRMANN,J.E., AND BLACKLOW,N.R. (1988). Isolation and propagation of enteric adenoviruses in HEp-2 cells. *J. Clin. Microbiol.* **26:** 1445-1447.

PERSSON,H., PETTERSSON,U., AND MATHEWS,M.B. (1978). Synthesis of a structural polypeptide in the absence of viral DNA replication. *Virology* **90:** 67-79.

PERSSON,H., MATHISEN,B., PHILIPSON,L., AND PETTERSSON,U. (1979). A maturation protein in adenovirus morphogenesis. *Virology* **93:** 198-208.

PERSSON,H., KATZE,M.G., AND PHILIPSON,L. (1982). Purification of a native membrane-associated adenovirus tumor antigen. *J. Virol.* **42:** 905-917.

PETRIC,M., KRAIDIN,S., DOWBNIA,N., AND MIDDLETON,P.J. (1982). Enteric adenoviruses. *Lancet* **i:** 1074-1075.

PETRUSKA,J., GOODMAN,M.F., BOOSALIS,M.S., SOWERS,L.C., CHEONG,C., AND TINOCO,I. (1988). Comparison between DNA melting thermodynamics and DNA polymerase fidelity. *Proc. Natl. Acad. Sci. U.S.A.* **85:** 6252-6256.

PETTERSSON,U. (1984). Structural and non-structural proteins. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum press, New York, London, pp 205-270.

PETTERSSON,U., AND PHILIPSON,L. (1975). Location of sequences on the adenovirus genome coding for the 5.5S RNA. *Cell* **6:** 1-4.

PETTERSSON,U., TIBBETTS,C.T., AND PHILIPSON,L. (1976). Hybridization maps of early and late messenger RNA sequences on the adenovirus type 2 genome. *J.Mol.Biol.* **101:** 479-501.

PHILIPSON,L. (1979). Adenovirus proteins and their messenger RNAs. *Adv.Virus Res.* **25:** 357-405.

PHILIPSON,L. (1984). Adenovirus assembly. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum Press, New York, London, pp 309-337.

PHILIPSON,L., AND LINDBERG,U. (1974). Reproduction of adenoviruses. In: Fraenkel-Conrat,H., Wagner,R.R. (eds). *Comprehensive Virology, vol.3.* Plenum Press, New York, pp143-227.

PHILIPSON,L., LONBERG-HOLM,K., AND PETTERSSON,U. (1968). Virus receptor interaction in an adenovirus system. *J.Virol.* **2:** 1064-1075

PIENIAZEK,D., PIENIAZEK,N.J., MACEJAK,D., COWARD,J., RAYFIELD,M., AND LUFTIG,R.B. (1990a). Differential growth of human enteric adenovirus 41 (Tak) in continuous cell lines. *Virology* **174:** 239-249.

PIENIAZEK,D., PIENIAZEK,N.J., MACEJAK,D., AND LUFTIG,R.B. (1990b). Enteric adenovirus 41 (Tak) requires low serum for growth in human primary cells. *Virology* **178:** 72-80.

PIENIAZEK,N.J., SLEMENDA,S.B., PIENIAZEK,D., VELARDE JR,J., AND LUFTIG,R.B. (1989a). Sequence of human enteric adenovirus type 41 Tak fiber protein gene. *Nucleic Acids Res.* **17:** 9474.

PIENIAZEK,N.J., VELARDE JR,J., PIENIAZEK,D., AND LUFTIG,R.B. (1989b). Nucleotide sequence of human enteric adenovirus type 41 hexon-associated protein VIII precursor (pVIII) including the early region E3 promoter. *Nucleic Acids Res.* **17:** 5398.

PIENIAZEK,N.J., SLEMENDA,S.B., PIENIAZEK,D., VELARDE JR,J., AND LUFTIG,R.B. (1990). Human enteric adenovirus type 41 (Tak) contains a second fiber protein gene. *Nucleic Acids Res.* **18:** 1901.

PILDER,S., LOGAN,J., AND SHENK,T. (1984). Deletion of the gene encoding the adenovirus 5 early region 1b 21,000 molecular weight polypeptide leads to degradation of viral and host cell DNA. *J.Virol.* **52:** 664-671.

PILDER,S., MOORE,M., LOGAN,J., AND SHENK,T. (1986). The adenovirus E1b 55K transforming polypeptide modulates transport or cytoplasmic stabilization of viral and host cell mRNAs. *Mol.Cell.Biol.* **6:** 470-476.

POLLARD,J.W., LUQMANI,Y., BATESON,A., AND CHOTAI,K. (1984). DNA transformation of mammalian cells. In: Walker,J.M. (ed). *Methods in Molecular Biology, vol.2, Nucleic Acids.* Humana Press, Clifton, New Jersey, pp 321-332.

PRUYN,G.J.M., VAN DRIEL,W., AND VAN DER VLIET,P.C. (1986). Nuclear factor III: a novel sequence-specific DNA-binding protein from HeLa cells stimulating adenovirus DNA replication. *Nature* **322:** 656-659.

QUINN,C.O., AND KITCHINGMAN,G.R. (1984). Sequence of the DNA-binding protein gene of a human subgroup B adenovirus (type 7). Comparisons with subgroup C (type 5) and subgroup A (type 12). *J.Biol.Chem.* **259:** 5003-5009.

RAYCHAUDHURI,P., ROONEY,R., AND NEVINS,J. (1987). Identification of an E1a-inducible cellular factor that interacts with regulatory sequences within the adenovirus E4 promoter. *Eur.Molec.Biol.Org.J.* **6:** 4073-4081.

RAYCHAUDHURI,P., BAGDI,S., NEILL,S.D., AND NEVINS,J.R. (1990). Activation of the E2F transcription factor in adenovirus-infected cells involves E1a-dependent stimulation of DNA-binding activity and induction of cooperative binding mediated by an E4 gene product. *J.Virol.* **64:** 2702-2710.

REACH,M., XU,L-X., AND YOUNG,C.S.H. (1991). Transcription from the adenovirus major late promoter uses redundant activating elements. *EMBO J.* **10:** 3439-3446.

REICH,N., PINE,R., LEVY,D., AND DARNELL JR,J.E. (1988). Transcription of interferon-stimulated genes is induced by adenovirus particles but is suppressed by E1a gene products. *J.Virol.* **62:** 114-119.

REICHEL,P.A., MERRICK,W.C., SIEKIERKA,J., AND MATHEWS,M.B. (1985). Adenovirus VA RNAI regulates the activity of a protein synthesis initiator factor. *Nature* **313:** 196-200.

REICHEL,R., KOVESDI,I., AND NEVINS,J.R. (1987). Developmental control of a promoter-specific factor that is also regulated by the E1a gene product. *Cell* **48:** 501-506.

REICHEL,R., NEILL,S.D., KOVESDI,I., SIMON,M.C., RAYCHAUDHURI,P., AND NEVINS,J.R. (1989). The adenovirus E4 gene, in addition to the E1a gene, is important for *trans*-activation of E2 transcription and for E2F activation. *J.Virol.* **63:** 3643-3650.

REKOSH,D.M.K., RUSSEL,W.C., BELLETT,A.J.D., AND ROBINSON,A.J. (1977). Identification of a protein linked to the ends of adenovirus DNA. *Cell* **11:** 283-295.

RETTER,M., MIDDLETON,P.J., TAM,J.S., AND PETRIC,M. (1979). Enteric adenoviruses: detection, replication, and significance. *J.Clin.Microbiol.* **10:** 574-578.

RICHARDSON,W.D., AND WESTPHAL,H. (1981). A cascade of adenovirus early functions is required for expression of adeno-associated virus. *Cell* **27:** 133-141.

RICHARDSON,W.D., AND WESTPHAL,H. (1983). Adenovirus early gene regulation and the adeno-associated virus helper effect. *Curr.Top.Microbiol.Immunol.* **109:** 147-165.

RICHARDSON,W.D., AND WESTPHAL,H. (1984). Requirement for either early region [illegible] early region 1b adenovirus gene products in the helper effect for adeno[illegible]ated virus. *J.Virol.* **51:** 404-410.

RICHARDSON,W.D., CARTER,B.J., AND WESTPHAL,H. (1980). Vero cells injected with adenovirus type 2 mRNA produce authentic viral polypeptide patterns: Early mRNA promotes growth of adenovirus-associated virus. *Proc.Natl.Acad.Sci.U.S.A.* **77:** 931-935.

RICHMOND,S.J., CAUL,E.O., DUNN,S.M., ASHLEY,C.R., CLARKE, S.K.R., AND SEYMOUR,N.R. (1979). An outbreak of gastroenteritis in young children caused by adenoviruses. *Lancet* **i:** 1178-1180.

RIGBY,P.W.J., DIECKMANN,M., RHODES,C., AND BERG,P. (1977). Labelling deoxyribonucleic acid to high specific activity *in vitro* by nick translation with DNA polymerase I. *J.Mol.Biol.* **113:** 237-251.

RIJNDERS,A.W.M., VAN BERGEN,B.G.M., VAN DER VLIET,P.C., AND SUSSENBACH,J.S. (1983). Specific binding of the adenovirus terminal protein precursor-DNA polymerase complex to the origin of DNA replication. *Nucleic Acids Res.* **11:** 8777-8789.

ROBERTS,R.J., AKUSJÄRVI,G., ALESTRÖM,P., GELINAS,R.E., GINGERAS,T.R., SCIAKY,D., AND PETTERSSON,U. (1986). A consensus sequence for the adenovirus-2 genome. In: Doerfler,W. (ed). *Adenovirus DNA. The Viral Genome and Its Expression.* Martinus Nijhoff Publishing, Boston, Dordrecht, Lancaster, pp 1-51.

ROBINSON,A.J., YOUNGHUSBAND,H.B., AND BELLETT,A.J.D. (1973). A circular DNA-protein complex from adenoviruses. *Virology* **56:** 54-69.

ROBINSON,C.C., AND TIBBETTS,C. (1984). Polar encapsidation of adenovirus DNA: evolutionary variants reveal dispensable sequences near the left ends of the Ad3 genomes. *Virology* **137:** 276-286.

ROESLER,W.J., VANDENBARK,G.R., AND HANSON,R.W. (1988). Cyclic AMP and induction of eukaryotic gene transcription. *J.Biol.Chem.* **263:** 9063-9066.

ROSEN,L. (1960). A hemagglutination-inhibition technique for typing adenoviruses. *Am.J.Hyg.* **71:** 120-128.

ROSENTHAL,A., WRIGHT,S., QUADE,K., GALLIMORE,P., CEDAR,H., AND GROSVELD,F. (1985). Increased MHC H-2K gene transcription in cultured mouse embryo cells after adenovirus infection. *Nature* **315:** 579-581.

ROWE,D.T., AND GRAHAM,F.L. (1981). Complementation of adenovirus type 5 host range mutants by adenovirus type 12 in coinfected HeLa and BHK-21 cells. *J.Virol.* **38:** 191-197.

ROWE,D.T., GRAHAM,F.L., AND BRANTON,P.E. (1983). Intracellular localization of adenovirus type 5 tumor antigens in productively infected cells. *Virology* **129:** 456-468.

ROWE,W.P. (1957). Some interactions of defective animal viruses. In: Pollard,M. (ed). *Perspectives in Virology, vol.5.* Academic Press, New York, pp 123-146.

ROWE,W.P., HUEBNER,R.J., GILMORE,L.K., PARROTT,R.H., AND WARD,T.G. (1953). Isolation of a cytopathogenic agent from human adenoids undergoing spontaneous degeneration in tissue culture. *Proc.Soc.Exp.Biol.Med.* **84:** 570-573.

RULEY,H.E. (1983). Adenovirus early region 1a enables viral and cellular transforming genes to transform primary cells in culture. *Nature* **304:** 602-606.

RUSSELL,W.C., AND PRECIOUS,B. (1982). Nucleic acid-binding properties of adenovirus structural polypeptides. *J.Gen.Virol.* **63:** 69-79.

RUSSELL,W.C., MCINTOSH,K., AND SKEHEL,J.J. (1971). The preparation and properties of adenovirus cores. *J.Gen.Virol.* **11:** 35-46.

SAMBROOK,J.F., SLEIGH,M., ENGLER,J.A., AND BROKER,T.R. (1980). The evolution of the adenovirus genome. *Ann.N.Y.Acad.Sci.* **354:** 426-452.

SARNOW,P., HO,Y-S., WILLIAMS,J., AND LEVINE,A.J. (1982). Adenovirus E1b 58kd tumor antigen and SV40 large tumor antigen are physically associated with the same 54kd cellular protein in transformed cells. *Cell* **28:** 387-394.

SARNOW,P., HEARING,P., ANDERSON,C.W., HALBERT,D.N., SHENK,T., AND LEVINE,A.J. (1984). Adenovirus early region 1b 58,000-dalton tumor antigen is physically associated with an early region 4 25,000-dalton protein in productively infected cells. *J.Virol.* **49:** 692-700.

SAWADOGO,M., AND ROEDER,R.G. (1985). Interaction of a gene-specific transcription factor with the adenovirus major late promoter upstream of the TATA box region. *Cell* **44:** 165-175.

SCHICK,J., BACZKO,K., FANNING,E., GRONEBERG,J., BURGER,H., AND DOERFLER,W. (1976). Intracellular forms of adenovirus DNA: Integrated form of adenovirus DNA appears early in productive infection. *Proc.Natl.Acad.Sci.U.S.A.* **73:** 1043-1047.

SCHMIDTZ,H., WIGAND,R., AND HEINRICH,W. (1983). Worldwide epidemiology of human adenovirus infections. *Am.J.Epidemiol.* **117:** 455-466.

SCHNEIDER,R.J., SAFER,B., MUNEMITSU,S.M., SAMUEL,C.E., AND SHENK,T. (1985). Adenovirus VAI RNA prevents phosphorylation of the eukaryotic initiation factor 2α subunit subsequent to infection. *Proc.Natl.Acad.Sci.U.S.A.* **82:** 4321-4325.

SCHOUB,B.D., KOORNHOF,H.J., LECATSAS,G., PROZESKY,O.W., FREIMAN,I., HARTMAN,E., KASSEL,H. (1975). Viruses in acute summer gastroenteritis in black infants. *Lancet* **i:** 1093-1094.

SCHRIER,P.I., BERNARDS,R., VAESSEN,R.T.M.J., HOUWELING,A., AND VAN DER EB,A.J. (1983). Expression of class I major histocompatibility antigens switched off by highly oncogenic adenovirus 12 in transformed cells. *Nature* **305:** 771-775.

SCOTT,J.V., DREESMAN,G.R., SPIRA,G., AND KASEL,J.A. (1975). Radioimmunoassay of human serum antibody specific for adenovirus type 5-purified fiber. *J.Immunol.* **115:** 124-128.

SEGAL,S. AND KHOURY,G. (1979). Differentiation as a requirement for Simian virus 40 gene expression in F9 embryonal carcinoma cells. *Proc.Natl.Acad.Sci.U.S.A.* **76:** 5611-5615.

SEN,G.C. (1984). Biochemical pathways in interferon action. In: Pestka,S. (ed). *Pharmac.Ther, vol.24.*, Permagon Press Ltd, Great Britain, pp 235-257.

SENEAR,A.W., AND LEWIS,J.B. (1986). Morphological transformation of established rodent cell lines by high-level expression of the adenovirus type 2 E1a gene. *Mol.Cell.Biol.* **6:** 1253-1260.

SETH,P., FITZGERALD,D., GINSBERG,H., WILLINGHAM,M.C., AND PASTAN,I. (1984). Evidence that the penton base of adenovirus is involved in potentiation of toxicity of *Pseudomonas* exotoxin conjugated to epidermal growth factor. *Mol.Cell.Biol.* **4:** 1528-1533.

SETH,P., PASTAN,I., AND WILLINGHAM,M.C. (1985). Adenovirus-dependent increase in cell membrane permeability. *J.Biol.Chem.* **260:** 9598-9602.

SETH,P., FITZGERALD,D., WILLINGHAM,M.C., AND PASTAN,I. (1986). Pathway of adenoviruses into cells. In: Crowell,R.L., and Lonberg-Holm,K. (ed). *Virus Attachment and Entry into Cells.* American Society for Microbiology, Washington,D.C., pp 191-195.

SEVERINSSON,L., AND PETERSON,P.A. (1985). Abrogation of cell surface expression of human class I transplantation antigens by an adenovirus protein in *Xenopus laevis* oocytes. *J.Cell.Biol.* **101:** 540-547.

SHARP,P.A., PETTERSSON,U., AND SAMBROOK,J. (1974). Viral DNA in transformed cells. I. A study of the sequences of adenovirus 2 DNA in a line of transformed rat cells using specific fragments of the viral genome. *J.Mol.Biol.* **86:** 709-726.

SHARP,P.A., GALLIMORE,P.H., AND FLINT,S.J. (1975). Mapping of adenovirus 2 RNA sequences in lytically infected cells and transformed cell lines. *Cold Spring Harb.Symp.Quant.Biol.* **39:** 457-474.

SHARP,P.A., MOORE,C., AND HAVERTY J. (1976). The infectivity of adenovirus 5 DNA-protein complex. *Virology* **75:** 442-456

SHAW,A., AND ZIFF,E.B. (1980). Transcripts from the adenovirus 2 major late promoter yield a single early family of 3'coterminal mRNAs and five late families. *Cell* **22:** 905-916.

SHINAGAWA,M., ISHIYAMA,T., PADMANABHAN,R., FUJINAGA,K., KAMADA,M., AND SATO,G. (1983). Comparitive sequence analysis of the inverted terminal repetition in the genomes of animal and avian adenoviruses. *Virology* **125:** 491-495.

SHINOZAKI,T., ARAKI,K., USHIJIMA,H., AND FUJII,R. (1987). Antibody response to enteric adenovirus types 40 and 41 in sera from people in various age groups. *J.Clin.Microbiol.* **25:** 1679-1682.

SHIROKI,K., OHSHIMA,K., FUKAI,Y., AND ARIGA,H. (1986). The adenovirus type 12 early region 1b 58,000-M, gene product is required for viral DNA synthesis and for initiation of cell transformation. *J.Virol.* **57:** 792-801.

SIGNÄS,C., AKUSJÄRVI,G., AND PETTERSSON,U. (1986). Region E3 of human adenoviruses: differences between the oncogenic adenovirus-3 and the non-oncogenic adenovirus-2. *Gene* **50:** 173-184.

SIMON,C.M., KITCHENER,K., KAO,H-T., HICKEY,E., WEBER,L., VOELMY,R., HEINTZ,N., AND NEVINS,J.R. (1987). Selective induction of human heat shock gene transcription by the adenovirus E1a gene products, including the 12S E1a product. *Mol.Cell.Biol.* **7:** 2884-2890.

SINGH-NAZ,N., RODRIGUEZ,W.J., KIDD,A.H., AND BRANDT,C.D. (1988). Monoclonal antibody enzyme-linked immunosorbent assay for specific identification and typing of subgroup F adenoviruses. *J.Clin.Microbiol.* **26:** 297-300.

SIVARAMAN,L., AND THIMMAPPAYA,B. (1987). Two promoter-specific host factors interact with adjacent sequences in an E1a-inducible adenovirus promoter. *Proc.Natl.Acad.Sci.U.S.A.* **84:** 6112-6116.

SIVARAMAN,L., SUBRANANIAN,S., AND THIMMAPPAYA,B. (1986). Identification of a factor in HeLa cells specific for an upstream transcriptional control sequence of an E1a-inducible adenovirus promoter and its relative abundance in infected and uninfected cells. *Proc.Natl.Acad.Sci.U.S.A.* **83:** 5914-5918.

SLEMEND[illegible],S.B., PIENIAZEK,N.J., VELARDE JR,J., PIENIAZEK,D., AND LUFTIG,R.B. (1990). Nucleotide sequence of the region coding for 100K and 33K proteins of human enteric adenovirus type 41 (Tak). *Nucleic Acids Res.* **18:** 3069.

SMART,J.E., AND STILLMAN,B.W. (1982). Adenovirus terminal protein precursor: Partial amino acid sequence and the site of covalent linkage to virus DNA. *J.Biol.Chem.* **257:** 13499-13505.

SMITH,K.O., TROUSDALE,M., AND GEHLE,W. (1965). Adenovirus-antibody agglutination reaction. *J.Immunol.* **95:** 810-817.

SÖDERLUND,H., PETTERSSON,U.,VENNSTRÖM,B., PHILIPSON,L., AND MATHEWS,M.B. (1976). A new species of virus-coded low molecular weight RNA from cells infected with Ad2. *Cell* **7:** 585-593.

SPECTOR,D.J., MCGROGAN,M., AND RASKAS,H.J. (1978). Regulation of the appearance of cytoplasmic RNAs from region 1 of the adenovirus 2 genome. *J.Mol.Biol.* **126:** 395-414.

SPECTOR,D.J.,CROSSLAND,L.D.,HALBERT,D.N.,AND RASKAS,H.J.(1980). A 28K polypeptide is the translation product of 9S RNA encoded by region 1a of adenovirus 2. *Virology* **102:** 208-221.

SPERGEL,J.M., AND CHEN-KIANG,S. (1991). IL-6 enhances a cellular activity which functionally substitutes for E1a in transactivation. *Proc.Natl.Acad.Sci.U.S.A.* **88:** 6472-6476.

SPERGEL,J.M., HSU,W., AKIRA,S., THIMMAPPAYA,B., KISHIMOTO,T., AND CHEN-KIANG,S. (1992). NF-IL6, a member of the C/EBP family, regulates E1a-responsive promoters in the absence of E1a. *J.Virol.* **66:** 1021-1030.

STAEHELI,P. (1990). Interferon-induced proteins and the antiviral state. *Adv.virus Res.* **38:** 147-200.

STÅLHANDSKE,P., PERSSON,H., PERRICAUDET,M., PHILIPSON,L., AND PETTERSSON,U. (1983). Structure of three spliced mRNAs from region E3 of adenovirus type 2. *Gene* **22:** 157-165.

STÅLHANDSKE,P., HYYPIA,T., ALLARD,A., HALONEN,P., AND PETTERSSON,U. (1985). Detection of adenoviruses in stool specimens by nucleic acid spot hybridization. *J.Med.Virol.* **16:** 213-218.

STEELE,A.D., ALEXANDER,J.J., AND HAY,I.T. (1986). Rotavirus-associated gastroenteritis in black infants in South Africa. *J.Clin.Microbiol.* **213:** 992-994.

STEIN,R., AND ZIFF,E.B. (1984). HeLa cell β-tubulin gene transcription is stimulated by adenovirus 5 in parallel with viral early genes by an E1a-dependent mechanism. *Mol.Cell.Biol.* **4:** 2792-2801.

STEINTHORSDOTTIR,V., AND MAUTNER,V. (1991). Enteric adenovirus type 40: transcription map and identification of novel E1a-E1b cotranscripts in lytically infected cells. *Virology* **181:** 139-149.

STEPHENS,C., AND HARLOW,E. (1987). Differential splicing yields novel adenovirus 5 E1a mRNAs that encode 30kd and 35kd proteins. *EMBO J.* **6:** 2027-2035.

STEWART,C.L., STUHLMANN,H., JAHNER,D., AND JAENISCH,R. (1982). *De novo* methylation, expression and infectivity of retroviral genomes introduced into embryonal carcinoma cells. *Proc.Natl.Acad.Sci.U.S.A.* **79:** 4098-4102.

STEWART II,W.E. (1979). *The Interferon System.* Springer-Verlag, Wien, New York, pp 196-222.

STILLMAN,B.W., LEWIS,J.B., CHOW,L.T., MATHEWS,M.B., AND SMART,J.E. (1981). Identification of the gene and mRNA for the adenovirus terminal protein precursor. *Cell* **23:** 497-508.

STILLMAN,B.W., TAMANOI,F., AND MATHEWS,M.B. (1982a). Purification of an adenovirus-coded DNA polymerase that is required for initiation of DNA replication. *Cell* **31:** 613-623.

STILLMAN,B.W., TOPP,W.C., AND ENGLER,J.A. (1982b). Conserved sequences at the origin of adenovirus DNA replication. *J.Virol.* **44:** 530-537.

STRAUS,S.E. (1984). Adenovirus infections in humans. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum Press, New York, London, pp 451-496.

SUBRAMANIAN,T., KUPPUSWAMY,M., GYSBERS,J., MAK,S., AND CHINNADURAI,G. (1984). 19kDa tumor antigen coded by early region E1b of adenovirus 2 is required for efficient synthesis and for protection of viral DNA. *J.Biol.Chem.* **259:** 11777-11783.

SUSSENBACH,J.S. (1984). The structure of the genome. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum Press, New York, London, pp 35-124.

SUTTER,D., WESTPHAL,M., AND DOERFLER,W. (1978). Patterns of integration of viral DNA sequences in the genomes of adenovirus type 12-transformed hamster cells. *Cell* **14:** 569-585.

SVENSSON,C., AND AKUSJÄRVI,G. (1984). Adenovirus 2 early region 1a stimulates expression of both viral and cellular genes. *EMBO J.* **3:** 789-794.

SVENSSON,C., AND AKUSJÄRVI,G. (1985). Adenovirus VA RNAI mediates a translational stimulation which is not restricted to the viral mRNAs. *EMBO J.* **4:** 957-964.

SVENSSON,L., WADELL,G., UHNOO,I., JOHANSSON,M., AND VON BONDORFF,C.H. (1983). Cross-reactivity between enteric adenoviruses and adenovirus 4: analysis of epitopes by solid-phase immune electron microscopy. *J.Gen.Virol.* **64:** 2517-2520.

SVENSSON,U. (1985). Role of vesicles during adenovirus 2 internalization into HeLa cells. *J.Virol.* **55:** 442-449.

SVENSSON,U., AND PERSSON,R. (1984). Entry of adenovirus 2 into HeLa cells. *J.Virol.* **51:** 687-694.

SVENSSON,U., PERSSON,R., AND EVERITT,E.J. (1981). Virus-receptor interaction in the adenovirus system. I. Identification of virion attachment proteins of the HeLa cell plasma membrane. *Virology* **38:** 70-81.

TAKIFF,H.E., AND STRAUS,S.E. (1982). Early replicative block prevents the efficient growth of fastidious diarrhea-associated adenoviruses in cell culture. *J.Med.Virol.* **9:** 93-100.

TAKIFF,H.E., STRAUS,S.E., AND GARON,C.F. (1981). Propagation and *in vitro* studies of previously non-cultivable enteral adenoviruses in 293 cells. *Lancet* **ii:** 832-834.

TAKIFF,H.E., REINHOLD,W., GARON,C.F., AND STRAUS,S.E. (1984). Cloning and physical mapping of enteric adenoviruses (candidate types 40 and 41). *J.Virol.* **51:** 131-136.

TAKIFF,H.E., SEIDLIN,M., KRAUSE,P., ROONEY,J., BRANDT,C., RODRIQUEZ,W., YOLKEN,R., AND STRAUS,S.E. (1985). Detection of enteric adenoviruses by dot-blot hybridization using a molecularly cloned viral probe. *J.Med.Virol.* **16:** 107-118.

TAMANOI,F. (1986). On the mechanism of adenovirus DNA replication. In: Doerfler,W. (ed). *Adenovirus DNA. The Viral Genome and Its Expression.* Martinus Nijhoff Publishing, Boston, Dordrecht, pp 97-128.

TAMANOI,F., AND STILLMAN,B.W. (1982). Function of adenovirus terminal protein in the initiation of DNA replication. *Proc.Natl.Acad.Sci.U.S.A.* **79:** 2221-2225.

TAMANOI,F., AND STILLMAN,B.W. (1983). Initiation of adenovirus DNA replication *in vitro* requires a specific DNA sequence. *Proc.Natl.Acad.Sci.U.S.A.* **80:** 6446-6450.

TARODI,B., METZ,D.H., DOUGLAS,A., AND RUSSELL,W.C. (1977). A study of events in chick cells infected with human adenovirus type 5 and their relationship to the induction of interferon. *J.Gen.Virol.* **36:** 425-436.

THACORE,H.R., AND YOUNGNER,J.S. (1973). Rescue of vesicular stomatitis virus from interferon-induced resistance by superinfection with vaccinia virus. 1. Rescue in cell cultures from different species. *Virology* **56:** 505-511.

THIMMAPPAYA,B., WEINBERGER,C., SCHNEIDER,R.J., AND SHENK,T. (1982). Adenovirus VAI RNA is required for efficient translation of viral mRNAs at late times after infection. *Cell* **31:** 543-551.

THOMAS,G.P., AND MATHEWS,M.B. (1980). DNA replication and the early to late transition in adenovirus infection. *Cell* **22:** 523-533.

THOMASSET,N., AND CHARDONNET,Y. (1980). Properties of human adenoviruses 5 and 7 grown in guinea-pig cells. *Arch.Virol.* **66:** 353-358.

TIBBETTS,C. (1977). Physical organization of subgroup B human adenoviruses genomes. *J.Virol.* **24:** 564-579.

TIEMESSEN,C.T., WEGERHOFF,F.O., ERASMUS,M.J., AND KIDD,A.H. (1989). Infection by enteric adenoviruses, rotaviruses, and other agents in a rural African environment. *J.Med.Virol.* **28:** 176-182.

TOLUN,A., AND PETTERSSON,U.J. (1975). Termination sites for adenovirus type 2 DNA replication. *J.Virol.* **16:** 759-766.

TOOGOOD,C.I.A., AND HAY,R.T. (1988). DNA sequence of the adenovirus type 41 hexon gene and predicted structure of the protein. *J.Gen.Virol.* **69:** 2291-2301.

TOOGOOD,C.I.A., MURALI,R., BURNETT,R.M., AND HAY,R.T. (1989). The adenovirus type 40 hexon: sequence, predicted structure and relationship to other adenovirus hexons. *J.Gen.Virol.* **70:** 3203-3214.

TOOZE,J. (1981). *Molecular Biology of Tumor Viruses. 2 edn. DNA Tumor Viruses.* Cold Spring Harbor Laboratory, New York, pp 937-1036.

TOTH,M., BACKAY,B., TARODI,S., PUSZTAI,I., AND BÈLÁDI,I. (1983). Different interferon-inducing ability of human adenovirus types in chick embryo cells. *Acta Virol.* **27:** 337-343.

TOTH,M.I., ARYA,B., PUSZTAI,R., SHIROKI,K., AND BÈLÁDI,I. (1987). Interferon induction by adenovirus type 12: stimulatory function of early region 1a. *J.Virol.* **61:** 2326-2330.

TRENTIN,J.J., VAN HOOSIER,G.L., AND SAMPER,L. (1968). The oncogenicity of human adenoviruses in hamsters. *Proc.Soc. Exp.Biol.Med.* **127:** 683-689.

TYTELL,A.A., TOROP,H.A., AND MCCARTHY,F.J. (1962). Adenovirus plaque formation in grivet monkey kidney cells. *Proc.Soc.Exp.Biol.Med.* **109:** 916-918.

UHNOO,I., WADELL,G., SVENSSON,L., AND JOHANSSON,M.E. (1983). Two new serotypes of enteric adenovirus causing infantile diarrhoea. *Dev.Biol.Stand.* **53:** 311-318.

UHNOO,I., WADELL,G., SVENSSON,L., AND JOHANSSON,M.E. (1984). Importance of enteric adenoviruses 40 and 41 in acute gastroenteritis in infants and young children. *J.Clin.Microbiol.* **20:** 365-372.

UJFALUSI,M., KIDD,A.H., AND SCHOUB,B.D. (1984). EM study of fastidious adenovirus type 40 replication *in vitro*. *Arch.Virol.* **79:** 307-309.

VALES,L.D., AND DARNELL,J.E. (1989). Promoter occlusion prevents transcription of adenovirus polypeptide IX mRNA until after DNA replication. *Genes Dev.* **3:** 49-59.

VALENTINE,R.C., AND PEREIRA,H.G. (1965). Antigens and structure of the adenovirus. *J.Mol.Biol.* **13:** 13-20.

VAN DEN ELSEN,P., HOUWELING,A., AND VAN DER EB,A.J. (1983). Expression of region E1b of human adenovirus in the absence of region E1a is not sufficient for complete transformation. *Virology* **128:** 377-390.

VAN DER AVOORT,H.G.A.M., WERMENBOL,A.G., ZOMERDIJK,T.P.L., KLEIJNE,J.A.F.W., VAN ASTEN, J.A.A.M., JENSMA,P., OSTERHAUS,A.D.M.E., KIDD,A.H., AND DE JONG,J.C. (1989). Characterization of fastidious adenovirus types 40 and 41 by DNA restriction enzyme analysis and by neutralizing monoclonal antibodies. *Virus Res.* **12:** 139-158.

VAN DER EB,A.J., VAN KESTEREN,L.W., AND VAN BRUGGEN,E.F.J. (1969). Structural properties of adenovirus DNAs. *Biochim.Biophys.Acta.* **182:** 530-541.

VAN LOON,A.E., MAAS,R., VAESSEN,R.T.M.J., REEMST,A.M.C.B., SUSSENBACH,J.S., AND ROZIJN,T.H. (1985a). Cell transformation by the left terminal regions of the adenovirus 40 and 41 genomes. *Virology* **147:** 227-230.

VAN LOON,A.E., ROZIJN,T.H., DE JONG,J.C., AND SUSSENBACH,J.S. (1985b). Physicochemical properties of the DNAs of the fastidious adenovirus species 40 and 41. *Virology* **140:** 197-200.

VAN LOON,A.E., GILARDI,P., PERRICAUDET,M., ROZIJN.T.H., AND SUSSENBACH,J.S. (1987a). Transcriptional activation by the E1a regions of adenovirus types 40 and 41. *Virology* **160:** 305-307.

VAN LOON,A.E., LIGTENBERG,M., REEMST,A.M.C.B., SUSSENBACH, J.S., AND ROZIJN,T.H. (1987b). Structure and organization of the left-terminal DNA regions of fastidious adenovirus types 40 and 41. *Gene* **58:** 109-126.

VAN ORMONDT,H., AND GALIBERT,F. (1984). Nucleotide sequences of adenovirus DNAs. *Curr.Top.Microbiol.* **110:** 73-142.

VAN ORMONDT,H., AND HESPER,B. (1983). Comparison of the nucleotide sequences of early region 1b DNA of human adenovirus types 12, 7 and 5 (subgroups A, B and C). *Gene* **21:** 217-226.

VARGA,M.J., WEIBULL,C., AND EVERITT,E. (1991). Infectious entry pathway of adenovirus type 2. *J.Virol.* **65:** 6061-6070.

VAYDA,M.E., ROGERS,A.E., AND FLINT,S.J. (1983). The structure of nucleoprotein cores released from adenovirions. *Nucleic Acids Res.* **11:** 441-460.

VELCICH,A., AND ZIFF, E. (1988). Adenovirus E1a *ras* cooperation activity is separate from its positve and negative transcription regulatory functions. *Mol.Cell.Biol.* **8:** 2177-2183.

VELICER,L.F., AND GINSBERG,H.S. (1970). Synthesis, transport and morphogenesis of type 5 adenovirus capsid proteins. *J.Virol.* **5:** 338-352.

VESIKARI,T., MAKI,M., SARKKINEN,H.K., ARSTILA,P.P., AND HALONEN,P.E. (1981). Rotavirus, adenovirus and non-viral enteropathogens in diarrhoea. *Arch.Dis.Child.* **56:** 264-270.

VIRTANEN,A., AND PETTESSON,U. (1983). The molecular structure of the 9S mRNA from early region 1a of adenovirus serotype 2. *J.Mol.Biol.* **165:** 496-499.

VIRTANEN,A., AND PETTERSSON,U. (1985). Organization of early region 1b of human adenovirus type 2: Identification of four differentially spliced mRNAs. *J.Virol.* **54:** 383-391.

VIRTANEN,A., GILARDI,P., NÄSLUND,A., LEMAILLET,J.M., PETTERSSON,U., AND PERRICAUDET,M. (1984). mRNAs from human adenovirus 2 early region 4. *J.Virol.* **51:** 822-831.

VOS,H.L., VAN DER LEE,F.M., REEMST, A.M.C.B., VAN LOON,A.E., AND SUSSENBACH,J.S. (1988). The genes encoding the DNA binding protein and the 23K protease of adenovirus types 40 and 41. *Virology* **163:** 1-10.

WADELL,G. (1979). Classification of human adenoviruses by SDS-polyacrylamide gel electrophoresis of structural polypeptides. *Intervirology* **11:** 47-57.

WADELL,G. (1984). Molecular epidemiology of human adenoviruses. *Curr.Top.Micro.Immunol.* **110:** 191-220.

WADELL,G., HAMMARSKJÖLD,M.L., WINBURG,G., VARSANYI,T.W., AND SUNDELL,G. (1980). Genetic variability of adenoviruses. *Ann.N.Y.Acad.Sci.* **354:** 16-42.

WADELL,G., ALLARD,A., EVANDER,M., AND LI,Q-G. (1986). Genetic variability and evolution of adenoviruses. *Chemica Scripta* **26B:** 325-335.

WEBER,J. (1976). Genetic analysis of adenovirus type 2. III. Temperature-sensitivity of processing of viral proteins. *J.Virol.* **17:** 462-471.

WEBER,J., BLANCHARD,J.-M., GINSBERG,H.S., AND DARNELL,J.E.JR. (1980). Order of polyadenylic acid addition and splicing events in early adenovirus mRNA formation. *J.Virol.* **33:** 286-296.

WEINBERG,D.H., AND KETNER,G. (1983). A cell line that supports the growth of a defective early region 4 deletion mutant of human adenovirus type 2. *Proc.Natl.Acad.Sci.U.S.A.* **80:** 5383-5386.

WEINBERG,D.H., AND KETNER,G. (1986). Adenoviral early region 4 is required for efficient viral DNA replication and for late gene expression. *J.Virol.* **57:** 833-838.

WEINMANN,R., BRENDLER,T.G., RASKAS,H.J., AND ROEDER,R.G. (1976). Low molecular weight viral RNAs transcribed by RNA polymerase III during adenovirus 2 infection. *Cell* **7:** 557-566.

WEISSHAAR,B., LANGNER,K.-D., JÜTTERMANN,R., MULLER,U., ZOCK,C., KLIMKAIT,T., AND DOERFLER,W. (1988). Reactivation of the methylation-inactivated late E2a promoter of adenovirus type 2 by E1a (13S) functions. *J.Mol.Biol.* **202:** 255-270.

WHITE,D.O., AND FENNER,F. (1986) *Medical Virology, 3rd Edn.* Academic Press, New York, London, pp 389-400.

WHITE,D.O., SCHARFF,M.D., AND MAIZEL,J.V.JR. (1969). The polypeptides of adenoviruses. III. Synthesis in infected cells. *Virology* **38:** 395-406.

WHITE,E., AND CIPRIANI,R. (1989). Specific disruption of intermediate filaments and the nuclear lamina by the 19KDa product of the adenovirus E1b oncogene. *Proc.Natl.Acad.Sci.U.S.A.* **86:** 9886-9890.

WHITE,E., AND CIPRIANI,R. (1990). Role of adenovirus E1b proteins in transformation: altered organization of intermediate filaments in transformed cells that express the 19-kilodalton protein. *Mol.Cell.Biol.* **10:** 120-130.

WHITE,E., AND STILLMAN,B.W. (1987). Expression of adenovirus E1b mutant phenotypes is dependent on host cell and on synthesis of E1a proteins. *J.Virol.* **61:** 426-435.

WHITE,E., GRODZICKER,T., AND STILLMAN,B.W. (1984). Mutations in the gene encoding the adenovirus early region 1b 19,000 molecular-weight tumor antigen cause the degradation of chromosomal DNA. *J.Virol.* **52:** 410-419.

WHITE,E., FAHA,B., AND STILLMAN,B.W. (1986). Regulation of adenovirus gene expression in human WI38 cells by an E1b-encoded tumor antigen. *Mol.Cell.Biol.* **6:** 3763-3773.

WHITE,E., DENTON,A., AND STILLMAN,B.W. (1988). Role of the adenovirus E1b 19,000-dalton tumor antigen in regulating early gene expression. *J.Virol.* **62:** 3445-3454.

WHITE,G.B.B., AND STANCLIFFE,D. (1975). Viruses and gastroenteritis. *Lancet* **ii:** 703.

WHITELAW,A., DAVIES,H., AND PARRY,J. (1977). Electron microscopy of fatal adenovirus gastroenteritis. *Lancet* **i:** 361.

WHYTE,P., BUCHKOVICH,J.J., HOROWITZ,J.M., FRIEND,S.H., RAYBUCK,M., WEINBERG,R.A., AND HARLOW,E. (1988a). Association between an oncogene and an anti-oncogene: the adenovirus E1a proteins bind to the retinoblastoma gene product. *Nature* **334:** 124-129.

WHYTE,P., RULEY,H.E., AND HARLOW,E. (1988b). Two regions of the adenovirus early region 1a proteins are required for transformation. *J.Virol.***62:** 257-265.

WHYTE,P., WILLIAMSON,N.M., AND HARLOW,E. (1989). Cellular targets for transformation by the adenovirus E1a proteins. *Cell* **56:** 67-75.

WIGAND,R., AND ADRIAN,T. (1986). Classification and epidemiology of adenoviruses. In: Doerfler,W. (ed). *Adenovirus DNA. The Viral Genome and Its Expression.* Martinus Nijhoff Publishing, Boston, Dordrecht, pp 409-441.

WIGAND,R., BAUMEISTER,H.G., MAASS,G., KUHN,J., AND HAMMER,H.J. (1983). Isolation and identification of enteric adenoviruses. *J.Med.Virol.* **11:** 233-240.

WIGAND,R., ADRIAN,T.H., AND BRICOUT,F. (1987). A new human adenovirus of subgenus D: Candidate adenovirus type 42. *Arch.Virol.* **94:** 283-286.

WILLIAMS,J.F. (1986). Adenovirus genetics. In: Doerfler,W. (ed). *Adenovirus DNA. The Viral Genome and Its Expression.* Martinus Nijhoff Publishing, Boston, Dordrecht, pp 247-309.

WILLIAMS,J.F., YOUNG,C.S.H., AND AUSTIN,P.E. (1974). Genetic analysis of human adenovirus type 5 in permissive and nonpermissive cells. *Cold Spring Harb. Sympos.Quant.Biol.* **39:** 427-437.

WILLIAMS,J.F., YOUNG, C.S.H., AND AUSTIN,P.E. (1975). Complementation of human adenovirus type 5 *ts* mutants by human adenovirus type 12. *J.Virol.* **15:** 675-678.

WILLIAMS,J.F., HO,Y-S., AND GALOS,R. (1981). Evidence for functional relatedness of products encoded by the transforming sequences of human adenovirus types 5 and 12. *Virology* **110:** 208-212.

WILSON,M.C., AND DARNELL, J.E.JR. (1981). Control of messenger RNA concentration by differential cytoplasmic half-life. Adenovirus messenger RNAs from transcription units 1a and 1b. *J.Mol.Biol.* **148:** 231-251.

WILSON,M.C., FRASER,N.W., AND DARNELL,J.E.JR. (1979a). Mapping of RNA initiation sites by high doses of UV irradiation: evidence for three independent promoters within the left 11% of the Ad2 genome. *Virology* **94:** 175-194.

WILSON,M.C., NEVINS,J.R., BLANCHARD,J.-M., GINSBERG,H.S., AND DARNELL,J.E. (1979b). Metabolism of mRNA from the transforming region of adenovirus 2. *Cold Spring Harb.Symp.Quant.Biol.* **44:** 447-455.

WINNACKER,E.L. (1978). Adenovirus DNA: structure and function of a novel replicon. *Cell* **14:** 761-773.

WINTER,N., AND D'HALLUIN,J-C. (1991). Regulation of the biosynthesis of subgroup C adenovirus protein IVa_2. *J.Virol.* **65:** 5250-5259.

WITT,D.J., AND BOUSQUET,E.B. (1988). Comparison of enteric adenovirus infection in various human cell lines. *J.Virol.Methods* **20:** 295-308.

WOLD,W.S.M., CLADARAS,C., DEUTSCHER,S.L., AND KAPOOR,Q.S. (1985). The 19-kDa glycoprotein coded by region E3 of adenovirus: Purification, characterization, and structural analysis. *J.Biol.Chem.* **260:** 2424-2431.

WOLFSON,J., AND DRESSLER,D. (1972). Adenovirus 2 contains an inverted terminal repitition. *Proc.Natl.acad.Sci. U.S.A.* **69:** 3054-3057.

WOOD,D.J. AND BAILEY,A.S. (1987). Detection of adenovirus types 40 and 41 in stool specimens by immune electron microscopy. *J.Med.Virol.* **21:** 191-199.

WU,B.J., HURST,H.C., JONES,N.C., AND MORIMOTO,R.I. (1986). The E1a 13S product of adenovirus 5 activates transcription of the cellular human HSP70 gene. *Mol.Cell.Biol.* **6:** 2994-2999.

WU,L., ROSSER,D.S.E., SCHMIDT,M.C., AND BERK,A.J. (1987). A TATA box implicated in E1a transcriptional activation of a simple adenovirus 2 promoter. *Nature* **326:** 512-515.

YANCOPOULOS,G.D., NISEN,P.D., TESFAYE,A., KOHL,N.E., GOLDFARB,M.P., AND ALT,F.W. (1985). N-*myc* can cooperate with *ras* to transform normal cells in culture. *Proc.Natl.Acad.Sci.U.S.A.* **82:** 5455-5459.

YEE,S.-P., AND BRANTON,P.E. (1985). Analysis of multiple forms of human adenovirus type 5 E1a polypeptides using an anti-peptide antiserum specific for the amino terminus. *Virology* **146:** 315-322.

YEH-KAI,L., AKUSJÄRVI,G., ALESTRÖM,P.,PETTERSSON,U., TREMBLAY,M., AND WEBER,J. (1983). Genetic identification of an endoproteinase encoded by the adenovirus genome. *J.Mol.Biol.* **167:** 217-222.

YOLKEN,R.H.,LAWRENCE,F.,LEISTER,F.,TAKIFF,H.E.,AND STRAUS,S.E. (1982). Gastroenteritis associated with enteric type adenovirus in hospitalised infants. *J.Paed.* **101:** 21-26.

YOSHIDA,K.L., VENKATESH,M., KUPPUSWAMY,M., AND CHINNADURAI,G. (1987). Adenovirus transforming 19-kD T antigen has an enhancer dependent *trans*-activation function and relieves enhancer repression mediated by viral and cellular genes. *Genes. Dev.* **1:** 645-658.

YOSHINAGA,S., DEAN,N., HAN,M., AND BERK,A.J. (1986). Adenovirus stimulation of transcription by RNA polymerase III. Evidence for an E1a-dependent increase in transcription factor TIIC concentration. *Eur.Molec.Biol.Org.J.* **5:** 343-354.

YOUNG,J.F., AND MAJOR,H.D. (1979). Adeno-associated virus - an extreme state of viral defectiveness. *Prog.Med.Virol.* **25:** 113-132.

YOUNG,C.S.H., SHENK,T., AND GINSBERG,H. (1984). The Genetic System. In: Ginsberg,H.S. (ed). *The Adenoviruses.* Plenum Press, New York, London, pp 125-172.

ZAIN,S., SAMBROOK,J., ROBERTS,R.J., KELLER,W., FRIED,M., AND DUNN,A.R. (1979). Nucleotide sequence analysis of the leader segments in a cloned copy of adenovirus 2 fiber mRNA. *Cell* **16:** 851-861.

ZERLER,B., MORAN,B., MARUYAMA,K., MOOMAW,J., GRODZICKER,T., AND RULEY,H.E. (1986). Adenovirus E1a coding sequences that enable *ras* and *pmt* oncogenes to transform cultured primary cells. *Mol.Cell.Biol.* **6:** 887-899.

ZIFF,E.B. (1980). Transcription and RNA processsing by the DNA tumour viruses. *Nature* **287:** 491-499.

ZIFF,E.B., AND EVANS,R.M. (1978). Coincidence of the promoter and capped 5′ terminus of RNA from the adenovirus 2 major late transcription unit. *Cell* **15:** 1463-1475.

ZIFF,E.B., AND FRASER,N. (1978). Adenovirus type 2 late mRNA; Structural evidence for 3′-coterminal species. *J.Virol.* **25:** 897-906.

APPENDIX A: Abbreviations

A	ampere
AAV	adeno-associated virus
Ad	adenovirus
Ad-pol	adenovirus polymerase
Ala	alanine
AMV	avian myeloblastosis virus
ATP	adenosine triphosphate
BHK	baby hamster kidney
BMV	Brome mosaic virus
bp	base pair
BCIP	bromochloroindolyl phosphate
BRK	baby rat kidney
BSA	bovine serum albumin
°C	degrees celsius
C	cytosine
cAMP	cyclic adenosine monophosphate
cDNA	complementary deoxyribonucleic acid
CEF	chicken embryo fibroblasts
CPE	cytopathic effect
cpm	counts per minute
CTL	cytotoxic T lymphocyte
dATP	deoxy-adenosine triphosphate
DBP	DNA binding protein
dCMP	deoxy-cytidine monophosphate
dCTP	deoxy-cytidine triphosphate
DEAE-dextran	diethylaminoethlyl-dextran
DEP	diethyl pyrocarbonate
dGTP	deoxy-guanidine triphosphate

DIG	digoxigenin
DNA	deoxyribonucleic acid
DNase	deoxyribonuclease
DMSO	dimethyl sulphoxide
DOTMA	N-[1-(2,3-dioleyloxy)propyl]-N,N,N-trimethylammoniumchloride
dTTP	deoxy-thymidine triphosphate
EBV	Epstein-Barr virus
EDTA	ethylenediaminetetra-acetic acid
EM	electron microscopy
EMEM	Earle's minimal essential medium
EtBr	ethidium bromide
FCS	foetal calf serum
FFU	flourescent focus-forming unit
g	gravitational force
G	guanine
Gly	glycine
GMK	Green monkey kidney
HA	haemagglutination
H_20	water
HeBS	Hepes buffered saline
HEF	human embryo fibroblasts
HSV	herpes simplex virus
IFN	interferon
IL-6	interleukin-6
ITR	inverted terminal repitition
K/kDa	kiloDalton
kbp	kilobase pair
LA	Luria agar
LB	Luria broth
M	molar
mA	milliAmpere
MAb	monoclonal antibody

Met	methionine
mCi	milliCurie
MLP	major late promoter
mM	millimolar
m.o.i.	multiplicity of infection
mRNA	messenger RNA
m.u.	map unit
MW	molecular weight
NF	nuclear factor
nm	nanometre
NP40	nonidet P40
NTB	nitroblue tetrazolium salt
OD	optical density
ORF	open reading frame
PAGE	polyacrylamide gel electrophoresis
PBS	phosphate buffered saline
PCR	polymerase chain reaction
PEG	polyethylene glycol
PFU	plaque forming units
pg	picogram
p.i.	post-infection
pmol	picomole
pTP	precursor terminal protein
R	amino acid residues
R.I.	refractive index
R.I.P.A.	radioimmunoprecipitation assay
RNA	ribonucleic acid
RNase	ribonuclease
RNAsin	RNAse inhibitor
rpm	revolutions per minute
rRNA	ribosomal RNA
RT-PCR	reverse transcription - polymerase chain reaction

S	Svedberg unit
SDS	sodium dodecyl sulphate
s.i.	single infection
SV40	simian virus 40
TBS	Tris buffered saline
TCA	trichloroacetic acid
TEMED	N,N,N′,N′,-Tetramethylethylenediamine
TF	transcription factor
Tris	Tris-(hydroxymethyl)-aminoethane
Triton X100	polyethyleneglycol (9-10)-p-t-octylphenol
tRNA	transfer RNA
μCi	microCurie
μg	microgram
μl	microlitre
μm	micron
UV	ultraviolet
VA	virus-associated
Val	valine
VSV	vesicular stomatitis virus
WHO	World Health Organization
w.r.t.	with respect to

APPENDIX B: Compositions of buffers and media

1. Reagents for ELISA

Carbonate buffer pH 9.6

0.15M Na_2CO_3, 0.35M $NaHCO_3$. Make up before use in deionized distilled water.

Substrate solution

0.04% o-phenylamine diamine, 0.7% di-sodium tetraborate, 0.36% succinic acid, 0.08% urea hydroxide (all w/v).

Make up a fresh solution in deionized distilled water before use and keep in the dark until required.

3N HCl

Dilute fuming HCl 1:10 in deionized distilled water.

2. Preparation of glassware, plasticware and solutions for nucleic acid work

For work with DNA samples, sterilize all pipette tips, eppendorf micro-centrifuge tubes, SW40 polyallomer and SS34 centrifuge tubes by autoclaving.

Cleaning and acetylation of glass coverslips is carried out as follows: Dip coverslips 1M HCl, wash in distilled water, dip in 95% ethanol and wipe dry with gauze. Soak coverslips for 3 hours in Denhardt's medium (0.02% w/v BSA, 0.02% w/v polyvinylpyrrolidone, 0.02% w/v Ficoll, 3xSSC) at 65°C. Transfer to ethanol-acetic acid (3:1 v/v) for 20 minutes and allow to air dry. Acetylate as follows: Dip in 0.1M triethanolamine pH 8.0. Add acetic anhydride to 0.25% v/v and mix thoroughly for 10 minutes. Wash twice in water and once in 95% ethanol, air dry and store at room temperature until use.

For work with RNA samples siliconize glassware, plasticware and glass wool by soaking in 5% dichlorodimethylsilane in chloroform and then rinse several times with sterile water. Autoclave plasticware and glass wool, and bake glassware at 180°C for two hours before use. Soak eppendorf micro-centrifuge tubes and pipette tips in 0.1% v/v DEP in distilled water overnight, dry and autoclave to inactivate DEP.

Treat solutions required for RNA work with 0.1% v/v DEP and leave overnight. As Tris inactivates DEP, the solution without Tris must first be DEP-treated and autoclaved. The Tris solution must be filter sterilized and added to the solution after autoclaving. Heat SDS stock solutions to 60°C for two hours.

3. Spectrophotometric quantitation of nucleic acids

A reading at a wavelength of 260nm allows calculation of the concentration of nucleic acid in the sample. An OD of 1 corresponds to about 50μg/ml for double-stranded DNA, 40μg/ml for single-stranded DNA and RNA, and about 20μg/ml for single-stranded oligonucleotides. A ratio between the readings at 260nm and 280nm (OD_{260}/OD_{280}) gives an indication of the purity of the nucleic acid. OD_{260}/OD_{280} values of 1.8 and 2.0 are obtained for pure preparations of DNA and RNA respectively.

4. Antibiotics

Ampicillin

Stock solution: 25mg/ml of the sodium salt of ampicillin in water. Filter through a disposable 0.22μm filter and store in 1ml aliquots at -20°C.

Tetracycline

Stock solution: 12.5mg/ml tetracycline hydrochloride in ethanol/water (50% v/v). Store in 1ml aliquots at -20°C.

Kanamycin

Stock solution: 25mg/ml in water. Sterilize by filtration and store in 1ml aliquots at -20°C.

5. Reagents for bacterial cultivation and DNA extraction

Luria-Bertani broth (LB broth)

Tryptone	10g/l
Yeast extract	5g/l
NaCl	5g/l*
Glucose	1g/l*

*The NaCl concentration is half of that in the original recipe and glucose is additional. Dissolve in distilled water, adjust the pH to 7.5 with NaOH, and sterilize by autoclaving.

Luria-Bertani agar (LB agar)

Recipe as for LB broth with the addition of 15g/l of Bacto-agar.

STE

0.1M NaCl, 10mM Tris-Cl pH 7.4, 1mM EDTA

GET

50mM glucose, 25mM Tris-Cl pH 8.0, 10mM EDTA

Potassium acetate

Add 11.5ml glacial acetic acid and 28.5ml water to 60ml 5M potassium acetate. This solution is 3M w.r.t. potassium and 5M w.r.t. acetate.

6. Reagents for PAGE

Acrylamide stock solution

Acrylamide-bisacrylamide (30:0.8). Make up in distilled water, add 5g Amberlite MB1 to 100ml acrylamide solution and stir for 60 minutes. Pour through a scinterred glass funnel to remove the Amberlite resin. Store at 4°C in the dark.

Stacking gel buffer

0.5M Tris-Cl pH 6.8. Autoclave and store at 4°C.

Resolving gel buffer

1.5M Tris-Cl pH 8.8. Autoclave and store at 4°C.

10% SDS

10% ammonium persulphate

Make up fresh before use.

Reservoir buffer stock

0.25M Tris-Cl pH 8.3, 1.92M glycine, 1% w/v SDS. Store at 4°C.

5x Sample dissociation buffer

10% w/v SDS, 10% v/v 2-mercaptoethanol, 40% v/v glycerol, 0.02% w/v bromophenol blue in 1.25M Tris-Cl pH 6.8. Add a 1/5 volume of dissociation buffer to each sample and heat to 95°C for 10 minutes before loading into wells.

Recipe for 12% resolving gel (50ml)

water	16.75ml
1.5M Tris-Cl pH 8.8	12.5ml
10% w/v SDS	0.5ml
Acrylamide-bisacrylamide (30:0.8)	20.0ml
10% w/v ammonium persulphate	250μl
TEMED	25μl

Recipe for 3.9% stacking gel (10ml)

water	6.1ml
0.5M Tris-Cl pH 6.8	2.0ml
10% w/v SDS	50μl
Acrylamide-bisacrylamide (30:0.8)	1.3ml
10% w/v ammonium persulphate	50μl
TEMED	10μl

Gel fixative

40% v/v methanol, 7% v/v acetic acid in distilled water.

7. Reagents for agarose gel electrophoresis

TAE buffer (1x)

40mM Tris-Cl, pH 8.0, 20mM sodium acetate, 2.5mM EDTA.

TBE buffer (1x)

89mM Tris-borate, 89mM boric acid, 2mM EDTA, pH 8.0.

DNA sample loading buffer (10x)

Prepare a saturated sucrose solution containing 2% w/v SDS, 100mM EDTA, and 0.1% w/v bromophenol blue. Add a 1/10 volume of loading buffer to the DNA sample before loading into the wells of an agarose gel.

[illegible]nts for DNA transfections

2 x Hepes-buffered saline (HeBs)

NaCl	16.4 g/l
Hepes acid	11.9 g/l
Na_2HPO_4	0.21 g/l

Adjust pH to 7.05 with 5M NaOH and filter sterilize.

Tris-buffered saline (TBS)

Solution A		Solution B	
NaCl	80 g/l	$CaCl_2$	15g/l
KCl	3.8 g/l	$MgCl_2$	10 g/l
Na_2HPO_4	2 g/l		
Tris base	30 g/l		

Adjust pH to 7.5

Filter sterilize both solutions and store at -20°C.

For 100 ml, add 10 ml solution A to 89 ml water. While stirring rapidly, add 1 ml solution B slowly, drop by drop. Filter sterilize and store at 4°C. Mix well before use.

9. Stock solutions for hybridizations

20xSSC

Dissolve 175.3g of NaCl and 88.2g of citric acid in 800ml of distilled water. Adjust the pH to 7.0 using a 10N solution of NaOH. Adjust the volume to 1 litre, dispense into 200ml aliqouts and sterilize by autoclaving.

20xSSPE

Dissolve 174g of NaCl, 27.6g $NaH_2PO_4.H_2O$, and 7.4g of EDTA in 800ml of distil water. Adjust the pH to 7.4 with a 10N solution of NaOH. Adjust the volume to 1 litre, dispense into 200ml aliquots and sterilize by autoclaving.

50x Denhardt's solution

Ficoll	5g
polyvinylpyrrolidone	5g
BSA (pentax fraction V)	5g
H_2O	to 500ml

Filter through a 0.45μm disposable millipore filter. Aliqout in 30ml volumes and store at -20°C.

Deionized formamide

Mix 50ml formamide and 5g of Amberlite MB1 resin and stir for 30 minutes at room temperature. Filter twice through Whatman No. 1 filter paper to remove the resin. Store 1ml amd 10ml aliquots at -20°C.

APPENDIX C: List of suppliers

Item	Manufacturer
Plasticware	
6 well multidishes (9.6cm^2)	A/S Nunc, Denmark
24 well multidishes (1.9cm^2)	Nunc
50mm dishes	Sterilin Ltd, U.K.
90mm dishes	Sterilin
25cm^2 tissue culture flasks	Sterilin
75cm^2 tissue culture flasks	Sterilin
150cm^2 tissue culture flasks	Sterilin
72 well Nunc-Immuno plates	Sterilin
micro-centrifuge tubes, 1.5ml	Eppendorf GmbH, Germany
Falcon polypropylene tubes 15ml, 50ml	Becton Dickinson Inc. U.S.A.
Ultracentrifuge tubes	
Polyallomer centrifuge tubes	Beckman Instruments Inc. U.S.A.
Ultra clear™	Beckman Instruments
Sorvall SS34 tubes	Du Pont, de Nemours GmbH, Germany

Antibodies

Fluorescein isothyanate conjugated rabbit anti-mouse immunoglobulin	Dakopatts A/S, Denmark
Fluorescein isothyanate conjugated rabbit anti-horse IgG	Nordic Biochemicals BV, The Netherlands
Anti-digoxigenin-fluorescein Fab fragments	Boehringer Mannheim GmbH, Germany
Polyclonal antiserum to Ad5 hexon	Wellcome Diagnostics Ltd., U.K.
Peroxidase-conjugated rabbit immunoglobulins to mouse immunoglobulins	Dakopatts
Peroxidase-conjugated rabbit immunoglobulins to guinea pig immunoglobulins	Dakopatts

Antibiotics

Ampicillin, sodium salt	Sigma Chemical Company, U.S.A.
Tetracycline hydrochloride	Sigma
Kanamycin A	Sigma

Nucleic acids

Plasmids pBR322, pSPT18, pSPT19	Boehringer Mannheim
pMAM-neo	Clontech Inc., U.S.A.
Primers	Department of Biochemistry, UCT, RSA
Bacteriophage lambda DNA	Boehringer Mannheim
DNA from herring sperm	Boehringer Mannheim
yeast tRNA	Boehringer Mannheim

Radioisotopes

Phosphorus-32, carrier free, 370MBq/ml, 10mCi/ml	Amersham International plc, U.K.
Deoxycytidine 5′-[α-^{32}] triphosphate, triethylammonium salt, 370MBq/ml, 10mCi/ml (>400Ci/mmol)	Amersham International
L-[^{35}S]Methionine *in vivo* cell labelling grade, 370MBq/ml, 10mCi/ml (>1000Ci/mmol)	Amersham International
L-[^{35}S]Methionine, 555MBq/ml, 15mCi/ml (>1000Ci/mmol)	Amersham International
[methyl,1′,2′-^{3}H]Thymidine 37MBq/ml, 1mCi/ml (100-130Ci/mmol)	Amersham International
Rainbow™ protein molecular weight markers: ^{14}C-labelled mw range 14,300-200,000, 148kBq/ml, 4μCi/ml	Amersham international

Membranes and filter paper

Hybond™-C nitrocellulose membrane (pore size 0.45μm)	Amersham International
Hybond™-N nylon membrane (pore size 0.45 μm)	Amersham International
Hybond™-C gridded membranes	Amersham International
BA85 nitrocellulose membrane filters, 25mm (pore size 0.45μm)	Schleicher and Schuell GmbH, Germany
DE-81 membrane filters, 23mm	Whatman International, U.K.

Whatman no.1 filter paper	Whatman International

Photographic materials

Ilford FP4 medium speed (125ASA) black and white film, 35mm	Ciba Geigy (Pty) Ltd, Switzerland
Hyperfilm-MP	Amersham International
Hyperfilm-βmax	Amersham International
Ilford ID11 developer	Ciba Geigy
Ilford Ilfospeed developer	Ciba Geigy
Ilford Hypam fixer	Ciba Geigy
Adefo X-ray developer and fixer	Adefo chemicals GmbH, Germany

Chromatography

Sephadex G-50	Pharmacia Fine Chemicals AB, Sweden
Sephacryl S-1000	Pharmacia
Oligo(dT) cellulose	Boehringer Mannheim
Protein-A-Sepharose CL-4B	Sigma

Enzymes

Restriction endonucleases	Amersham International and Boehringer Mannheim
Lysozyme	Boehringer Mannheim
Pronase	Boehringer Mannheim
Proteinase K	Boehringer Mannheim
Alkaline phosphatase from calf intestine (CIP)	Boehringer Mannheim

DNA polymerase, T4	Boehringer Mannheim
DNA polymerase, Taq	New England Biolabs Inc, U.S.A.
Klenow enzyme, DNA polymerase I large fragment	Boehringer Mannheim
DNA ligase, T4	Boehringer Mannheim
Nuclease S1	Boehringer Mannheim
Avian myeloblastosis virus (AMV) reverse transcriptase	Boehringer Mannheim
RNase-free DNase	Boehringer Mannheim
DNase	Boehringer Mannheim
RNase	Boehringer Mannheim
*Bal*31	Boehringer Mannheim
cycloheximide	Boehringer Mannheim
trypsin	Sigma

<u>Miscellaneous reagents</u>

Mouse monoclonal antibody isotyping kit	Amersham International
Nick translation kit	Amersham International
DIG nucleic acid detection kit	Amersham International
Geneclean™ kit	Bio 101 Inc., U.S.A.
Rabbit reticulocyte lysate	Amersham International
Human placental ribonuclease inhibitor (RNasin)	Boehringer Mannheim
Dithiothreitol (DTT)	Boehringer Mannheim
Deoxyribonucleotide triphosphates (dNTPs)	Boehringer Mannheim
Bovine serum albumin (BSA)	Boehringer Mannheim

Blocking reagent for nucleic acid hybridizations	Boehringer Mannheim
spermidine	Boehringer Mannheim
'Amberlite' monobed resin MB-1	BDH Chemicals Ltd., U.K.

Organic chemicals

Acetone	Merck GmbH, Germany
Acetic acid (Glacial)	Merck
Acetic anhydride	Merck
2-butanol	Merck
Chloroform	Merck
Dichlordimethylsilane	Merck
Ethanol	Merck
Formaldehyde	Merck
Formamide	Merck
Freon 113	Merck
Hydrochloric acid	Merck
Isoamylalcohol	Merck
2-Mercaptoethanol	BDH
Isopropanol	Merck
Methanol	Merck
Phenol	Merck
Piperidine	BDH
Polyethylene glycol 1000	Merck
Polyethylene glycol 6000	BDH
1,1,2-Trichloro-Trifluoroethane	Sigma
Triethanolamine	Merck

Reagents for electrophoresis

Agarose	Bio-Rad Inc., U.S.A.
Nu-Sieve^{R} agarose	FMC Bioproducts Inc., U.S.A.
SeaKem^{R} GTG agarose	FMC Bioproducts
Acrylamide	Bio-Rad
Bis-acrylamide	Bio-Rad
TEMED	Bio-Rad
Ammonium persulphate	Bio-Rad

General chemicals

Ammonium acetate	Merck GmbH, Germany
Bacto-agar	Difco Laboratories Inc., U.S.A.
Boric acid	Merck
Calcium chloride	Sigma
Cesium chloride	Boehringer Mannheim
Citric acid, trisodium salt	Sigma
EDTA (Ethylenediaminetetra-acetic acid)	BDH
Ethidium bromide	Boehringer Mannheim
Formamide, GR	Merck
Ficoll, type 400-DL	Sigma
Glycine, GR	Merck
x-D(+)Glucose	Sigma
HEPES (2-[-4-(2-hydroxyethyl) -1-piperazinyl]-ethanesulfonic acid	Merck
N-Lauroylsarcosine, free acid	Sigma
Magnesium chloride, GR	Merck

Magnesium Sulphate, GR	Merck
Paraffin liquid	Tedro products, South Africa
Potassium chloride, Analar	BDH
Polyvinylpyrrolidone PVP-40, pharmaceutical grade	Sigma
di-Sodium hydrogen orthophosphate	BDH
di-Sodium tetraborate, Analar	BDH
Sodium acetate anhydrous, GR	Merck
SDS (n-Dodecylsulfate sodium salt)	Merck
Sodium hydroxide pellets, Analar	BDH
Sodium hydrogen carbonate, Analar	BDH
Sodium carbonate, Analar	BDH
Succinic acid, Analar	BDH
Sucrose, grade 1	Sigma
Tris(hydroxymethyl)aminomethane	Boehringer Mannheim
Tris(hydroxymethyl)aminomethane hydrochloride	Boehringer Mannheim
Tween^{R} 20 (Polyoxyethylene sorbitan monolaurate)	Merck
Tryptone	Oxoid Ltd., U.K.
Tablets of Urea, hydrogen peroxide	BDH
Yeast extract	Sigma

All reagents used were of the highest quality available.

APPENDIX D: Statistical evaluation of results

1. Wilcoxon's signed rank sum test

The Wilcoxon's signed rank sum test is a distribution-free or non-parametric statistical test i.e. no assumption is made about the distribution as in the student's t-test. The hypotheses to be tested usually relate to the nature of the distribution as a whole rather than to the values assumed by some of its parameters, hence the term non-parametric to describe the test. If the population distributions are normal with the same variance, the t-test is the most efficient test, but the rank test (Wilcoxon, Mann-Whitney, or Kendall) has a relative efficiency of 0.96. If the distributions, however, are not normal, the relative efficiency of the rank test is never less than 0.86 and may be infinitely high. For detecting a shift in location, therefore, the rank test is never much worse than the t-test, and can be very much better.

This test was chosen as the sample sizes were small and there may be possible non-normality.

One-sample test for location

Null hypothesis: the distribution of a random variable x is symmetric about zero. The Wilcoxon's signed rank sum test works as follows: The observations are put is ascending order of magnitude, ignoring the sign, and given the ranks 1 to n' (zero values being ignored). Let T_+ be the sum of the ranks of the positive values and T_- that of the negative. On the null hypothesis T_+ and T_- would not be expected to differ greatly; their sum $T_+ + T_-$ is $\frac{1}{2}n'(n'+1)$, so an appropriate test would consist in

evaluating the probability of a value of, say, T_+ equal to or more extreme than that observed. For large values of n', T_+ and T_- are approximately normally distributed with variance $n'(n'+1)(2n'+1)/24$, and a standardized normal deviate, with continuity correction, is given by

$$\frac{-|T+-\frac{1}{4}n'(n'+1)|-\frac{1}{2}}{\sqrt{\{n'(n'+1)(2n'+1)/24\}}}$$

Tied ranks equal to the mean are given to numerically equal observations. This feature reduces the variance of T_+ by $(t_3-t)/48$ for each group of tied ranks.

Data was stored in Edlin files and the relevant 2 files containing 4 items (4 replicates) each compared using a computer software statistics package TADPOLE version III. Ten observations (all possible combinations of differences between 2 groups of 4 values each) for each comparison were signed and ranked by the Wilcoxon's signed-ranks matched-pairs test and the significance determined at the 5% level ($P<0.05$).

2. Linear regression analysis

A computer programme was compiled by Z.Berkowitz to plot linear regression slopes and to determine the statistical variance between slopes. For equations see Armitage (1977). The explanation below applies to the use of 4 replicates/y values for each x dose.

Analysis of variance for each regression slope

A variance ratio (VR) was determined and compared with the f distribution on 2 and 12 degrees of freedom. The statistic F is a variance ratio that handles large variations

of means from the regression line, and this value was compared with the *f* distribution at 1 and 2 degrees of freedom.

A statistic *G* was calculated which compares variance between two slopes. This statistic does not assume a common residual variance. This value compared with a chi-square value at 1 degree of freedom indicates significance (α=0.01).

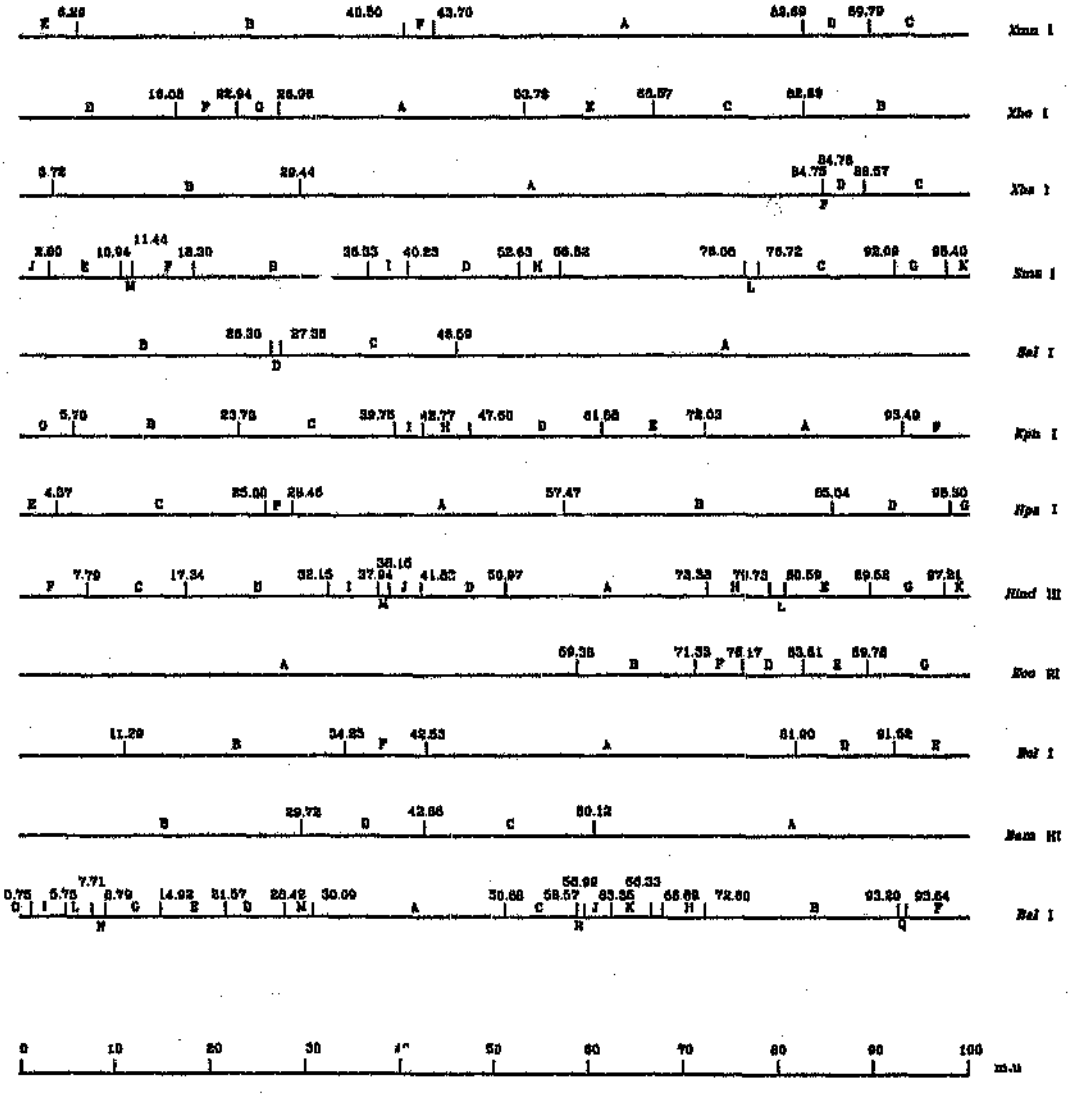
Analysis of variance between regression slopes assuming a common residual variance

The VR for the sum of squares between slopes was compared with the *f* distribution at 1 and 28 degrees of freedom. The statistic *T* provides a comparison of two slopes. Significance is determined by comparison with the *t* distribution at 28 degrees of freedom (α=0.01).

APPENDIX E: Restriction enzyme maps

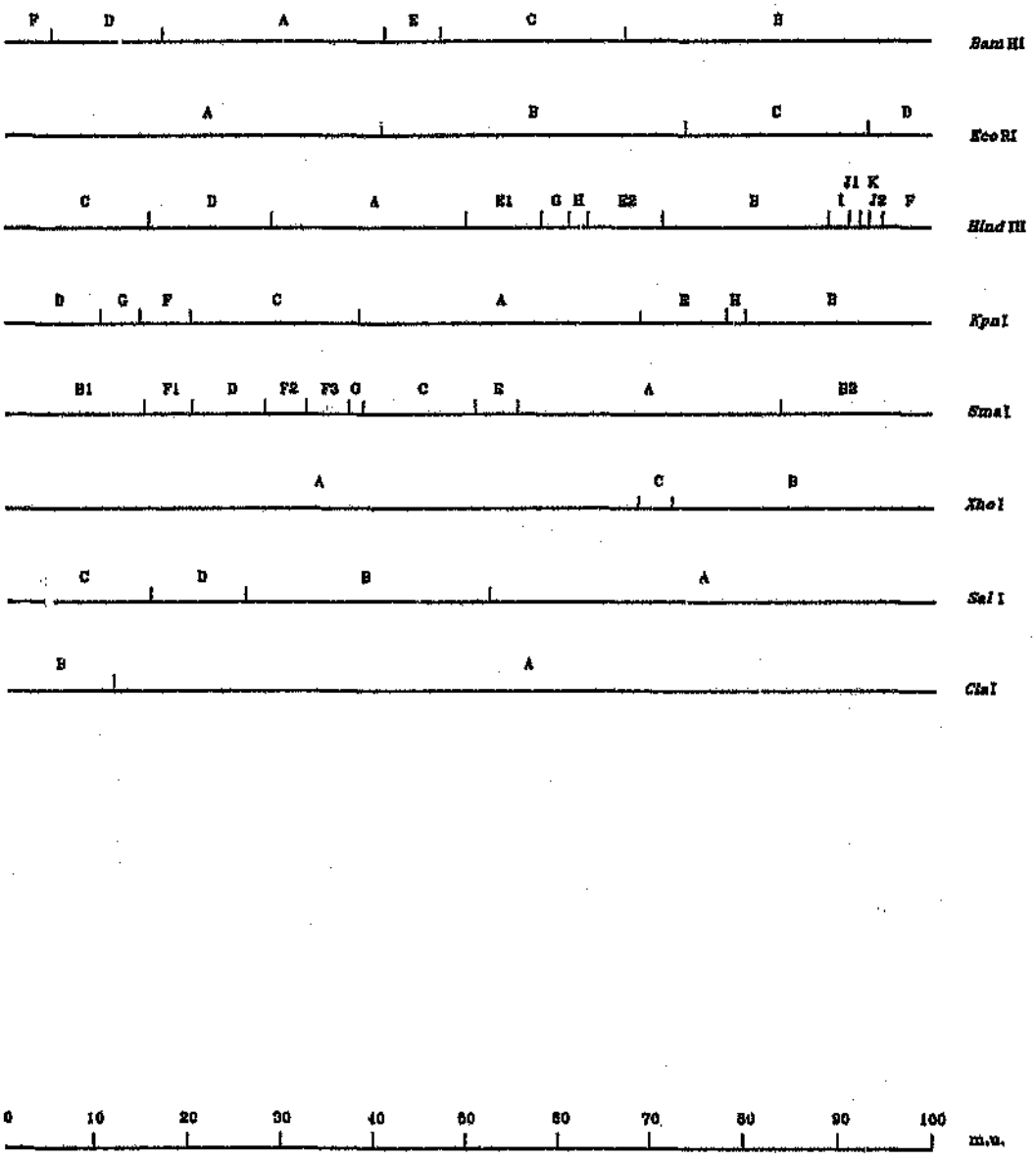
1. Adenovirus 2

(From Broker *et al*, 1984)



2. Adenovirus 40 genome type D1 (strain Hovi-X)

(From van der Avoort *et al*, 1989; *Sal*I and *Cla*I maps from van Loon *et al*, 1985b (genome type D4 strain Dugan))



3. Adenovirus 41 genome type D2 (strains N597 and 26341-77)

(From van der Avoort *et al*, 1989; *Sal*I and *Hpa*I maps from Allard *et al*, 1985 (strain D389); *Cla*I map from van Loon *et al*, 1985b (genome type D1 strain Tak))