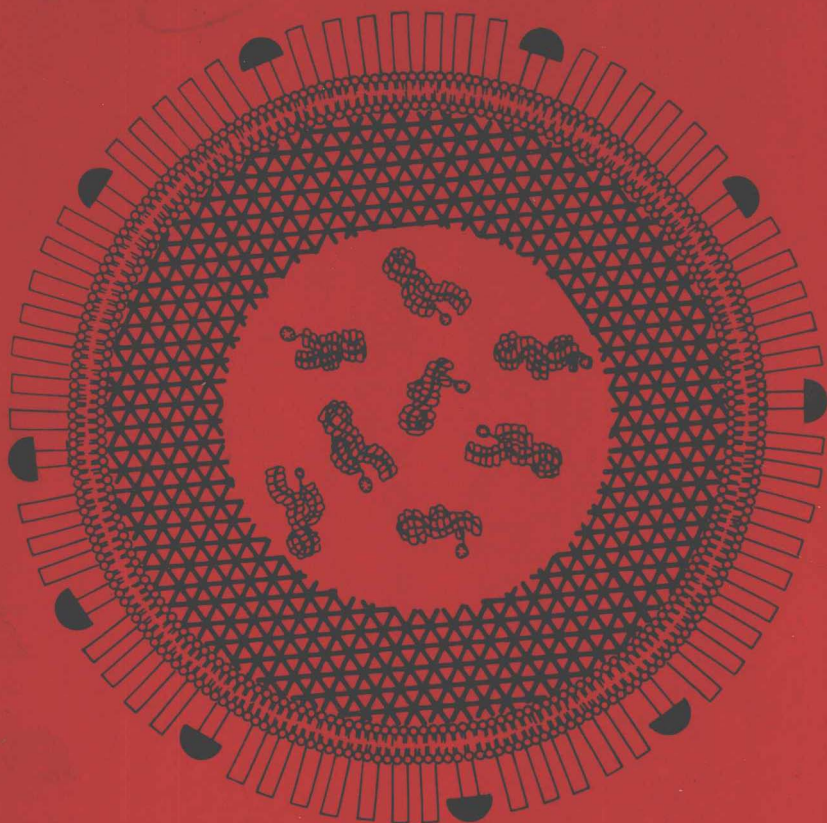


# A Dictionary of Virology

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## Abbreviations

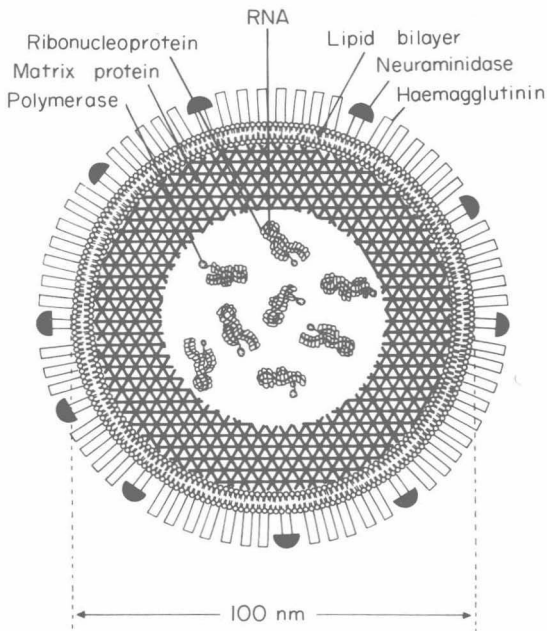
APD	Average pore diameter
CAM	Chorioallantoic membrane
CFT	Complement fixation test
CNS	Central nervous system
CPE	Cytopathic effect
CSF	Cerebrospinal fluid
EM	Electron microscopy
HA	Haemagglutination
HAI	Haemagglutination inhibition
i/c	Intracerebral
i/d	Intradermal
i/m	Intramuscular
i/p	Intraperitoneal
i/v	Intravenous
mRNA	Messenger RNA
rRNA	Ribosomal RNA
s/c	Subcutaneous
tRNA	Transfer RNA

All other abbreviations are in accordance with the rules of *The Biochemical Journal*.

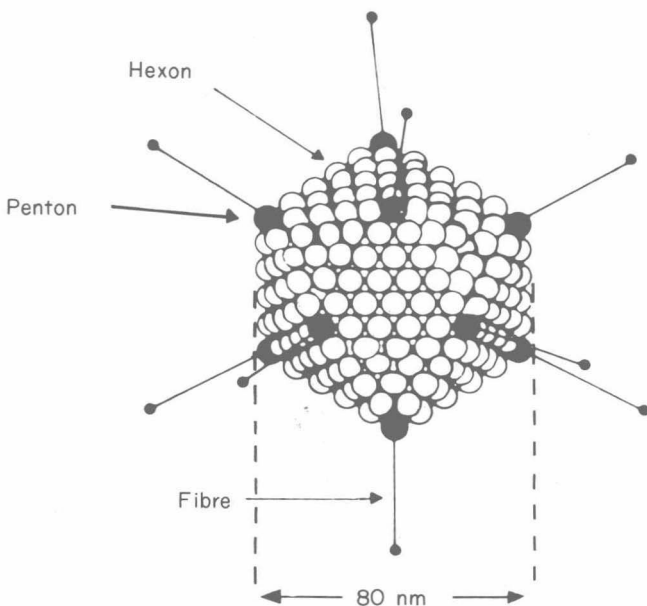
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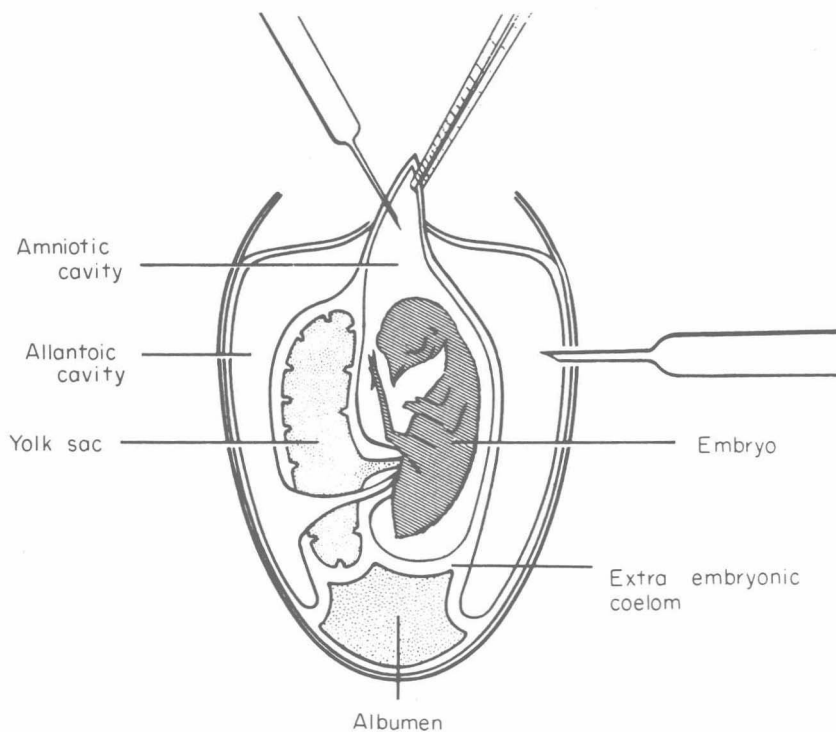
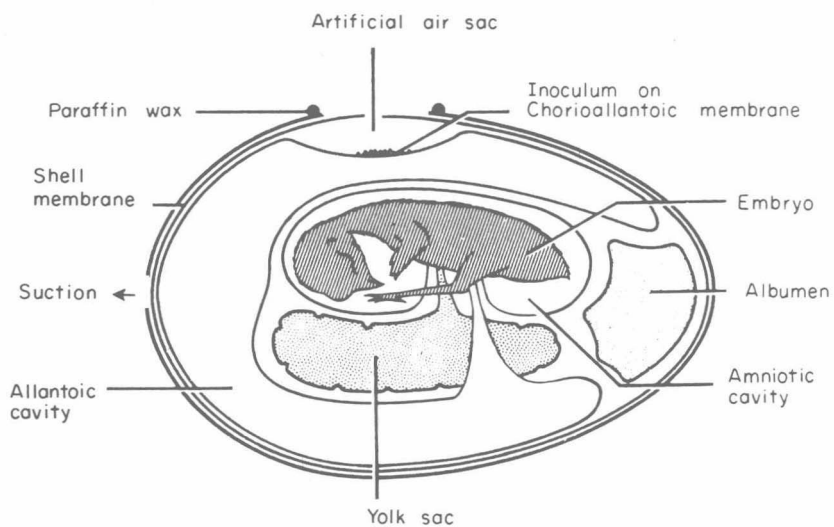
Words printed in SMALL CAPITALS within any entry appear elsewhere in the dictionary as entries in their own right.

### Influenza virus



### Adenovirus





## Introduction

Virologists are drawn from different branches of science – human and veterinary clinical practice, nucleic acid chemistry, genetics, electron microscopy and so on – and this dictionary is designed to aid them as well as others from outside virology to understand the specialist terminology which has developed as the subject has progressed and become diversified. It contains brief definitions of terms unique to virology or which have a particular usage in the subject. Terms common to other branches of science and which have no special virological connotation have been excluded. An attempt has also been made to include all those names which have been used in English language papers to identify specific viruses.

Virus nomenclature has been the active concern of the International Committee on Nomenclature of Viruses and its successor, the International Committee for the Taxonomy of Viruses (I.C.T.V.) since 1966, though it is still very much in its infancy. With regard to the viruses listed in this dictionary, we have proceeded as follows:

- 1 The *main entry* for each virus is made under the name approved by the I.C.T.V. and includes a list of synonyms, where these exist.
- 2 Where there is no approved name, the entry is made under a name which accords with I.C.T.V. rules. For example, the Herpesvirus Study Group has recommended that herpesviruses should be provisionally named after the taxonomic unit (family or subfamily) to which the primary natural host belongs. Thus the virus variously known as 'duck enteritis virus', 'duck-plague virus' and 'anatid herpesvirus' takes the name 'anserid herpesvirus' after the *Anseridae*, the family to which the duck belongs. Where more than one herpesvirus has been isolated from the same host family, a numbered series is created, e.g. cercopithecoid herpesvirus 1, 2, 3, 4, 5 and 6.
- 3 Herpesviruses which have not yet been named officially have been given names by us, according to these rules.
- 4 Where no rules have been laid down for the naming of any particular virus, we have entered it under what seems to us to be the most suitable name, though in some cases this is not the one in common use.
- 5 With certain exceptions synonyms have also been entered separately, and each refers the reader to the appropriate main entry. Since many permutations can and have been made of names such as 'acute infectious gastro-enteritis virus of foals' we have not included all possible variations. In this example the entry is made under 'gastro-enteritis of foals virus'.
- 6 Words such as 'mouse' and 'murine', 'cat' and 'feline' are often used interchangeably in virus names without regard to their strict meaning. In

## Introduction

this instance we have followed common usage, and if a particular virus cannot be found under one name the other should be tried.

**7** Virus entries begin with the taxonomic status (family, genus or species) if this has been determined, and it is thus possible to trace a species back to its genus and family. Family characteristics are not repeated in the entry for the genus, and generic characteristics are not given for the species. To determine the properties of a species, both genus and family entries should be consulted where they exist.

**8** Entries whose titles consist entirely of figures, e.g. 127 virus, are placed at the front of the dictionary, otherwise the order is strictly alphabetical. For this purpose, numbers forming only part of a title are disregarded except where they differentiate between otherwise identical names.

**9** Chemicals are entered according to the initial letter of the first full syllable of the name, and prefixes such as Greek letters and numbers are ignored.

**10** Prefix letters in the names of cell lines are always taken into account.

This dictionary is not in any way intended to serve the function of a virus textbook but rather as a data source, and many entries commence with references (not more than three) which are intended as a starting point for further reading. Where possible these are review articles or papers containing a good discussion of the subject. Preference has been given to recent publications rather than original descriptions, and to papers with a useful list of references.

We are indebted to the following for advice and assistance:

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**127 virus** See egg drop syndrome 1976-associated virus.

**2060 virus** Classified originally as Echovirus 28. Now designated HUMAN RHINOVIRUS 1A.

**AAV** Abbreviation for ADENO-ASSOCIATED VIRUS.

**Abelson leukaemia virus**

Risser R. *et al.* (1978) *J. exp. Med.* **148**, 714

A strain of MOUSE TYPE C ONCOVIRUS isolated from prednisolone-treated BALB/c mice inoculated with MOLONEY LEUKAEMIA VIRUS. It has a short latent period and produces lymphoid leukaemia of B-cell type. It can transform 3T3 mouse cells *in vitro*. Requires a HELPER VIRUS for complete virus replication.

**ABOB**

Melander B. (1960) *Antibiotics Chemother.* **10**, 35

N1, N1-anhydrobis-( $\beta$ -hydroxyethyl) biguanide-HCl. An antiviral drug claimed to be effective in the treatment of influenza infection in man.

**abortive infection** Infection in which some or all virus components are synthesized but no infective virus is produced. Also termed non-productive infection. Usually occurs because the host cell is NON-PERMISSIVE. May also result from infection with DEFECTIVE VIRUSES; in these cases it may be possible to rescue the virus by co-infection with a HELPER VIRUS or by co-cultivation.

**abortive transformation** TRANSFORMATION which is unstable. A few generations after transformation the cells revert to normal.

**Absettarov virus** A strain of TICK-BORNE ENCEPHALITIS VIRUS (CENTRAL EUROPEAN SUBTYPE). Isolated from a 3-year-old boy with biphasic fever and signs of meningitis. Found in Sweden, Finland, Poland, Czechoslovakia, Hungary, Austria, Bulgaria and western parts of U.S.S.R. Cannot be distinguished antigenically from HANZALOVA VIRUS or HYPR VIRUS, but causes a milder disease in man and is pathogenic in rhesus monkeys.

**Abu Hammad virus** An unclassified ARBOVIRUS serologically related to DERA GHAZI KHAN VIRUS. Isolated from a tick *Argas hermanni* in Egypt. Not reported to cause disease in humans.

**Acado virus** A species in the genus ORBIVIRUS. With CORRIPARTA VIRUS it forms the Corriparta antigenic group. Isolated from *Culex antennatus* and *C. univittatus neavi* in Ethiopia. Not reported to cause human disease.

**Acara virus** A species in the genus BUNYAVIRUS, serologically belonging to the CAPIM ANTIGENIC GROUP. Isolated from SENTINEL MICE, *Culex* sp. and the rodent *Nectomys squamipes* in Para, Brazil and in Panama. Not reported to cause human disease.

**acetoxycycloheximide** A glutarimide antibiotic. A potent reversible inhibitor of protein synthesis in animal cells.

**2,3-bis-(acetylmercaptomethyl)quinoxalin**

Bucchini D, and Girard M. (1975/76) *Intervirology* **6**, 285

An antiviral agent. Inhibits poliovirus RNA synthesis *in vitro* and *in vivo*. Inhibits HUMAN (ALPHA) HERPESVIRUS 1 multiplication *in vitro*. Does not interfere with ATTACHMENT, PENETRATION or DNA synthesis, but interrupts a late stage in virus assembly and/or maturation.

**aciclovir** W.H.O.-approved name for ACYCLOGUANOSINE.

**acridine orange** A fluorescent derivative of acridine which will bind to NUCLEIC ACIDS in cells or within the VIRION. When exposed to ultra-violet light, the dye fluoresces orange

## acriflavine

if the nucleic acid is single-stranded; green if it is double-stranded. *See also* photodynamic inactivation.

**acriflavine** A photoreactive dye. *See* photodynamic inactivation.

**acronym** (Greek: *acro* = extreme + *onoma* = name) A special case of SIGLA. A word created from the initial letters of the principal words in a compound term. *See* CELO virus and ELIZA as examples.

**actidione** Synonym for cycloheximide.

**actinomycin D** A polypeptide antibiotic produced by the fungi *Streptomyces chrysomallus* and *S. antibioticus*. Inhibits TRANSCRIPTION. Interacts only with helical deoxypolynucleotides containing guanine. Not readily reversible by removal of drug from the culture medium. Blocks INTERFERON production by inhibiting mRNA synthesis. 1–5 µg/ml blocks DNA-dependent RNA synthesis, but apart from RETROVIRIDAE and INFLUENZAVIRUS, single-stranded RNA viruses are not affected.

SYN: dactinomycin; meractinomycin.

**Acute anterior poliomyelitis virus** Synonym for human poliovirus

**Acute epidemic gastroenteritis virus of humans**

Flewitt T.H. (1977) *Recent Adv. clin. Virol.* **1**, 151

An unclassified FAECAL VIRUS of type 1. Causes diarrhoea and vomiting in children and adults. There are at least 3 serological types: NORWALK, HAWAII, and WOLLAN. Virus particles are 27 nm in diameter, and are ether- and acid-stable. Found in the faeces by EM. Antibodies can be demonstrated in patients. The virus is very difficult to propagate *in vitro*. *See also* gastro-enteritis viruses of humans.

**Acute haemorrhagic conjunctivitis virus**

Yoshii T. *et al.* (1977) *J. gen. Virol.* **36**, 377

A species in the genus ENTEROVIRUS, designated ENTEROVIRUS 70. Causes acute haemorrhagic conjunctivitis in humans in all parts of the world except the Americas and Australia. The prototype strain J670/71 isolated in Japan multiplies optimally at 32–34° in monkey kidney cell cultures, but failed to replicate at 39°. A low temperature should be used for isolation, though the virus can be adapted to higher temperatures.

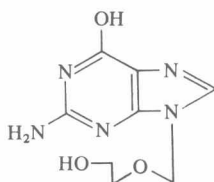
**Acute laryngo-tracheo-bronchitis virus** Synonym for parainfluenza virus type 2.

**acycloguanosine**

Jones B.R. *et al.* (1979) *Lancet* **i**, 243

Schaeffer H.J. *et al.* (1978) *Nature, Lond.* **272**, 583

9-(2-hydroxyethoxymethyl)guanine. A NUCLEOSIDE analogue. An antiviral agent with a potent and highly specific action against HUMAN HERPESVIRUS 1 and 2 both *in vitro* and in animal models of skin, eye and brain infections. The drug is selectively phosphorylated by herpesvirus-induced thymidine kinase, and once phosphorylated is a potent inhibitor



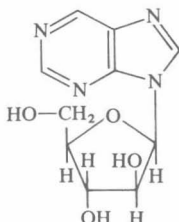
of herpesvirus-induced DNA polymerase. In a clinical study, 24 patients with dendritic corneal epithelial ulcers were treated by minimal wiping debridement, 12 then receiving the drug topically as eye ointment, the others being given a placebo. Seven of the placebo group showed recurrence of herpetic corneal lesions within a week. There was no recurrence in the patients receiving acycloguanosine. Acute toxicity studies have shown that the drug has a very low toxicity.

SYN: Wellcome 248U; aciclovir; acyclovir; Zovirax.

**acyclovir** U.S.A.N.-approved name for ACYCLOGUANOSINE.

**1-adamantanamine hydrochloride** See amantadine hydrochloride.

**adenine arabinoside** 9- $\beta$ -D-arabinofuranosyladenine. An anti-viral agent. Synthesized in 1960, it was subsequently found as a naturally occurring NUCLEOSIDE in culture filtrates of *Streptomyces antibioticus*. Mode of action unclear but it probably inhibits viral DNA POLYMERASE. It neither directly inactivates virus nor prevents ATTACHMENT. In the body



it is speedily converted to the hypoxanthine, with a decline to less than 50% of the original anti-viral activity. It is active against HERPESVIRUS and poxvirus; less so against adenovirus and PAPOVAVIRUS. With the exception of oncovirus the drug has no action against RNA viruses. Studies of its effect in viral encephalitis suggest that useful blood levels can be obtained with doses small enough to avoid toxicity. In some patients tremors, nausea, vomiting and toxic encephalopathy have been reported, particularly at high doses. It may be given i/v but is irritating on injection i/m. Also used as a 3% ophthalmic ointment. It is teratogenic in rats and rabbits.

SYN: vidarabine

#### **adenine arabinoside monophosphate**

Spruance S. L. *et al.* (1979) *N. Eng. J. Med.* **300**, 1180.

A phosphorylated derivative of ADENINE ARABINOSIDE with greater solubility than the parent compound. Not yet evaluated.

#### **Adeno-associated virus**

Young J.F. & Mayor H.D. (1979) *Prog. med. Virol.* **25**, 113

Hoggan M.D. (1970) *Prog. med. Virol.* **12**, 211

Henry C.J. (1973) *Prog. exp. Tumor Res.* **18**, 273

A genus of the family PARVOVIRIDAE. Replication is dependent upon the presence of a HELPER adenovirus for complete virus production, but infectious DNA and antigens demonstrable by immunofluorescence are made in the presence of a helper herpes-type virus. Replicates in cells which support adenovirus replication and reaches a higher titre than the adenovirus whose replication may be depressed. Not genetically related to adenovirus. Mature virus particles contain either POSITIVE or NEGATIVE STRANDS of DNA which are COMPLEMENTARY, and after extraction anneal to form double-stranded DNA. There are a number of sero-types. The type species is type 1. Types 1, 2, 3, and 4 are primate ADENO-ASSOCIATED VIRUSES. There are also bovine, avian, ovine, equine and canine types. Antibodies can be found in human sera, but none of these viruses is known to be pathogenic.

SYN: adeno-satellite virus.

**Adenoidal-pharyngeal-conjunctival agent** Synonym for human adenovirus.

**Adenoid degeneration agent** Synonym for human adenovirus, for which it was the original name. Causes degeneration of human tonsillar tissue grown in culture.

**Adeno-satellite virus** Synonym for adeno-associated virus.

**s-adenosyl-L-methionine** See SAM.

#### **Adenoviridae**

Philipson L. *et al.* (1975) *Virology Monographs* **14**. Springer Verlag, Vienna

## Adenovirus

A family of double-stranded DNA viruses with icosahedral symmetry. The VIRION is 70–90 nm in diameter, formed of 252 CAPSOMERES 7–9 nm in diameter. The 12 vertex capsomeres consist of a base and an outward projection of fibre with a knob at its end. Each of these 12 is called a PENTON and has 5 neighbours. The virion is non-enveloped, resistant to lipid solvents and trypsin. BUOYANT DENSITY (CsCl) 1.33–1.35 g/ml, 795S. Inside the CAPSID is the CORE, consisting of protein and a linear molecule of double-stranded DNA mol. wt.  $20\text{--}30 \times 10^6$  with no single-stranded breaks or TERMINAL REDUNDANCIES, though there are probably inverted TERMINAL REDUPLICATIONS because single-stranded DNA, formed by DENATURATION, forms rings on annealing. Viral maturation takes place in the nucleus. Virus is liberated by cell disruption. They may be divided on the basis of their host species and further on the basis of haemagglutination, antigenic structure and oncogenicity. Usually found in the respiratory tract where they are often associated with disease. There are two genera: MASTADENOVIRUS and AVIADENOVIRUS.

**Adenovirus** See Adenoviridae.

**Adenovirus-SV<sub>40</sub> hybrids** The first reported was between human adenovirus 7 and SV<sub>40</sub>.

An adenovirus 7 isolate was found to be contaminated with SV<sub>40</sub> after isolation and passage in primary rhesus monkey kidney cells. Infectious SV<sub>40</sub> virus was eliminated by passage in the presence of SV<sub>40</sub> antiserum but on injection into newborn hamsters the tumour cells produced contained adenovirus 7 and SV<sub>40</sub> T ANTIGENS. The virus could be neutralized by adenovirus antiserum and SV<sub>40</sub> GENOME sequences appeared to be in an adenovirus particle. The adenovirus SV<sub>40</sub> hybrid stock virus was named E46<sup>+</sup>. It consisted of a mixture of complete adenovirus 7 particles and hybrid particles which contained incomplete genomes of both adenovirus 7 and SV<sub>40</sub>. Adenovirus particles replicated in human embryo kidney cells but hybrid particles did not. In African green monkey kidney cells plaque formation followed two-hit kinetics. Adenovirus 7 and hybrid particles were produced. As adenovirus 7 will not replicate in monkey cells the hybrid must act as a HELPER. It has been called PARA or Particle Aiding Replication of Adenovirus. As the hybrid does not replicate in human cells it must have a DEFECTIVE adenovirus genome. As no plaques containing only hybrid virus were produced in monkey cells the hybrid must require the adenovirus as a helper. The viral DNAs in the hybrid virus are covalently linked. A number of hybrids between SV<sub>40</sub> and other adenoviruses have been described. They may be divided into those that produce free infective SV<sub>40</sub> virus and thus contain the complete SV<sub>40</sub> genome, and those that do not. Adenovirus SV<sub>40</sub> hybrid virus stocks are designated AD<sub>x</sub><sup>+</sup> and AD<sub>x</sub><sup>++</sup> (x is the adenovirus type number). The AD<sub>x</sub> refers to the adenovirus phenotype (CAPSID). (+) indicates the presence of SV<sub>40</sub> sequences in the hybrid genome and (++) indicates the hybrid contains the complete SV<sub>40</sub> genome. Thus E46<sup>+</sup> is AD<sub>7</sub><sup>+</sup>. AD<sub>2</sub><sup>++</sup> is the best studied of the hybrid viruses producing SV<sub>40</sub> virus particles and there are strains containing different amounts of the adenoviral genome. AD<sub>2</sub><sup>++</sup> HEY (high-efficiency yielders) contains only a fragment of adenoviral genome and produces SV<sub>40</sub> virus particles with great efficiency. AD<sub>2</sub><sup>++</sup> LEY (low efficiency yielders) contains almost a complete adenovirus genome and produces SV<sub>40</sub> particles with low efficiency. Some AD<sub>2</sub><sup>+</sup> hybrids contain the complete adenoviral genome and a fragment of SV<sub>40</sub> genome. They cannot yield SV<sub>40</sub> but can replicate on their own in both human and monkey cells. Thus genetically pure stocks of these hybrids can be obtained and are designated AD<sub>2</sub><sup>+</sup>ND, AD<sub>2</sub><sup>+</sup>ND<sub>2</sub>, AD<sub>2</sub><sup>+</sup>ND<sub>3</sub> etc. (ND indicates that the particles are non-defective.)

**adsorption** See attachment.

**adventitious viruses** Contaminant viruses present by chance in a virus preparation or vaccine. Animals and cell cultures are often infected with adventitious viruses, whose presence may go unrecognized for a period.

**African horse sickness virus**

Davies F.G. & Otieno S. (1977) *Vet. Rec.* **100**, 291

A species in the genus *ORBITRUS*. There are 9 serotypes identified by NEUTRALIZATION tests. There is group-specific CF antigen. Causes disease in horses, mules and donkeys. In severe cases death occurs from pulmonary oedema. In chronic cases there is cardiac involvement with oedema of the head and neck. Some infections are mild. *VIRAEMIA* often occurs. Transmitted by nocturnal biting flies of the genus *Culicoides*. Goats are slightly susceptible but ferrets and dogs are infected more readily. Mice, rats and guinea pigs can be infected i/c. A mouse brain passage virus vaccine is effective. VIRION 55–80 nm in diameter, icosahedral and similar to BLUE TONGUE VIRUS. Infectivity is ether-resistant but acid-sensitive, being inactivated below pH 6. Horse erythrocytes are agglutinated. Virus contains double-stranded RNA in 6 segments. Multiplies in eggs in yolk-sac, and in cell cultures of many species.

**African monkey cytomegalovirus** Synonym for cercopithecoid herpesvirus 2.

#### **African swine fever virus**

Coggins L. (1974) *Prog. med. Virol.* **18**, 48

A species in the family IRIDOVIRIDAE. Causes a fatal disease resembling classical swine fever in domestic pigs. There is high fever, cough and diarrhoea. Incubation period 7–9 days. Virus replication begins in the tonsils but soon becomes generalised: especially involved are lymph nodes and spleen. Surviving pigs may have *VIRAEMIA* for months. Natural hosts are probably wart hogs and bush pigs. Infection is by contact and fomites. Premises may be infective for months. However, virus has been recovered from argasid ticks and replication in the ticks demonstrated. Virus diameter 200 nm. ENVELOPE is acquired as it buds through the plasma membrane. An infectious DNA has been obtained. Survives dry at room temperature for years. Resists inactivation by some disinfectants but inactivated by 1% formaldehyde in 6 days, 2% sodium hydroxide in 24 days. Chloroform- and ether-resistant. Replicates in the yolk sac killing the embryo, and in cell culture of pig bone marrow. HAEMADSORPTION of pig erythrocytes is seen after 24 hours and CPE later. After 100 passes the virus loses virulence for pigs but does not give protection from infection with virulent virus. Antibodies do not give immunity. Originally observed in E., S. and W. Africa, reached Portugal and Spain in 1957, France in 1964, Italy in 1967 and Cuba in 1971. Outbreaks in Malta, Sardinia and Brazil in 1978. In Brazil the disease is mild and may be difficult to eradicate. Probably spread by waste food from ships and aeroplanes. In Europe the disease has become less severe, and chronically infected pigs perpetuate the infection.

SYN: wart-hog disease virus.

#### **Agouti endogenous type C retrovirus**

Sherwin S.A. *et al.* (1979) *Virology* **94**, 409

A species in the subgenus MAMMALIAN TYPE C ONCOVIRUS GROUP. Detected by appearance of REVERSE TRANSCRIPTASE activity when kidney tissue from a New World rodent, the agouti *Dasyprocta punctata*, was co-cultivated with human lung tumour cell line A549. Has been transmitted to human and cat cells. Nucleic acid HYBRIDIZATION demonstrated the presence of multiple copies of the viral GENOME in normal agouti DNA, and that there are related sequences in both New and Old World rodent cellular DNA.

**Aguate virus** An ARBOVIRUS morphologically like BUNYAVIRUS but not serologically related to members of that genus. Serologically a member of the PHLEBOTOMUS FEVER GROUP. Isolated from *Lutzomyia* sp. in central Panama and Canal Zone. Not reported to cause disease in humans.

#### **Aino virus**

Takahashi K. *et al.* (1968) *Jap. J. med. Sci. Biol.* **21**, 95

Miura Y. *et al.* (1968) *Microbiol. Immunol.* **22**, 651

A species in the genus BUNYAVIRUS, belonging to the SIMBU ANTIGENIC GROUP. Isolated from *Culex tritaeniorhynchus* in Nagasaki Prefecture, Kyushu, Japan. Not reported to cause disease in humans. Antigenically indistinguishable from SAMFORD VIRUS, and

## Akabane virus

cross-reacts with AKABANE VIRUS in CFT but not in NEUTRALIZATION or haemagglutination inhibition tests.

### Akabane virus

Kurogi H. *et al.* (1975) *Arch. Virol.* **47**, 71

Kurogi H. *et al.* (1977) *Natn. Inst. Anim. Hlth Q.* **17**, 1, 27, and 184

Goto Y. *et al.* (1978) *Vet. Microbiol.* **3**, 89

A species in the genus BUNYAVIRUS, belonging to the SIMBU ANTIGENIC GROUP. Isolated from mosquitoes but flies of *Culicoides* sp. are the most probable vectors. Found in Guma Prefecture, Honshu, Japan, and in Queensland, Australia. There is serological evidence to associate infection with EPIZOOTIC bovine congenital arthrogryposis and hydranencephaly in Japan and Australia. Experimental infection of pregnant sheep and goats causes disease in the foetus. Not reported to cause disease in humans.

### AKR mink cell focus inducing virus

Hartley J.W. *et al.* (1977) *Proc. natn Acad. Sci. U.S.A.* **74**, 789

A species in the subgenus MAMMALIAN TYPE C ONCOVIRUS GROUP. A HELPER independent virus isolated from AKR thymoma cells. Probably a recombinant between ECOTROPIC AKR MOUSE LEUKAEMIA VIRUS and a XENOTROPIC VIRUS.

**Alagoas virus** A strain of VESICULAR STOMATITIS VIRUS isolated in suckling mice from the tongue epithelium of a mule with vesicular lesions of the tongue and feet. Found in Alagoas state, Brazil. Serological surveys suggest infection in humans, horses, donkeys, monkeys and bats in various states in Brazil. A few cases of febrile disease with headache and malaise have been reported in man.

**Alastrim virus** Synonym for variola minor virus. *See* variola virus.

### Aleutian disease of mink virus

Shahrabadi M.S. *et al.* (1977) *J. Virol.* **23**, 353

Porter D.D. *et al.* (1977) *Intervirology* **8**, 129

A species in the genus PARVOVIRUS. Causes an economically important, lethal disease in ranch-raised mink. All types of mink are susceptible, but the Aleutian genotype, so named because the blue-grey coat colour is similar to that of the Aleutian blue fox, develop more severe lesions and die sooner. The virus can cross the placenta to infect the foetus, but chronically infected females produce few live kits. Animals infected *in utero* have a less severe disease than those infected after birth. Virus is excreted in the urine, faeces and saliva, and infection is readily transmitted by contact and handling. After infection there is rapid replication and high virus titres are present in spleen, liver and lymph nodes in 10 days. A proportion of non-Aleutian mink clear the virus and develop no disease. A chronic infection occurs in the majority and high antibody levels develop. VIRAEMIA persists for months. Virus/antibody complexes are formed and deposited in the tissues, producing glomerulonephritis, the usual cause of death, as well as arteritis of the coronary, hepatic, gastrointestinal and cerebral vessels. There is a systematic plasmacytosis involving bone marrow, spleen, lymph nodes, liver and kidneys. Ferrets and skunks can be infected experimentally, but not rabbits, guinea pigs, hamsters, rats or mice. Human infection is doubtful, though it would be prudent to handle the virus with caution. Replication in tissue culture is doubtful. VIRION diameter 23 nm, density 1.29–1.41 in CsCl. It is more resistant to heat than most, 60° for 30 minutes causing only partial inactivation. Resistant to lipid solvents and desoxycholate. Passes through a filter of average pore diameter 50 nm. Control of the disease can be obtained by killing all hyperglobulinaemic animals.

**Alfuy virus** A species in the genus FLAVIVIRUS. Isolated from mosquitoes in Queensland, Australia. Not reported to cause disease, but antibodies to it or to closely related virus are common in humans in N. Queensland.

**algophages** Synonym for cyanophages.

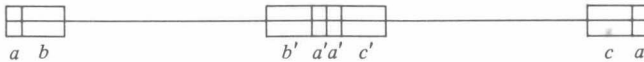
**Allerton virus** Synonym for bovid (alpha) herpesvirus 2.

**Almpiwar virus** An unclassified ARBOVIRUS. Isolated from a skink *Ablepharus boutonii virgatus* in N. Queensland, Australia. Not reported to cause disease in humans.

### Alphaherpesvirinae

Knipe D.M. *et al.* (1978) *Proc. natn. Acad. Sci. U.S.A.* **75**, 3896

A subfamily of the family HERPESVIRIDAE. Replicate rapidly, usually with CPE. Latent infection is often demonstrable in nerve ganglia. Host range is very variable. DNA mol. wt. 85–110  $\times 10^6$ . There are two unique sequences separated by other sequences which repeat in an inverted orientation. Thus:



Prime sign indicates inverted sequence.

Two genera are identified so far but they have not been named. The type species of the first is HUMAN (ALPHA) HERPESVIRUS 1 and other species are HUMAN (ALPHA) HERPESVIRUS 2 and BOVID (ALPHA) HERPESVIRUS 2. The type species of the second genus is SUID (ALPHA) HERPESVIRUS 1 and another species is EQUID (ALPHA) HERPESVIRUS 1. Other probable species in the subfamily are EQUID HERPESVIRUS 2 and 3, FELID HERPESVIRUS 1, CERCOPITHECID HERPESVIRUS 1 and CANID HERPESVIRUS 1.

SYN: herpes simplex virus group.

### Alphavirus

Chanas A.C. *et al.* (1976) *J. gen. Virol.* **32**, 295

A genus in the family TOGAVIRIDAE. All species in this genus multiply in mosquitoes as well as in vertebrates. All are serologically related to each other but not to other members of the family. The HAI test is best for demonstrating an antigenic relationship between members of the genus and the CF test or NEUTRALIZATION test for differentiating between members. Cause encephalitis on i/c injection in suckling mice. The type species is SINDBIS VIRUS. There are 20 species.

Aura (C)	Pixuna (C,A,R)
Bebaru (C)	Ross river* (C,H,B,M)
Chikungunya* (C,H,B,Ba)	Sagiyama (C)
Eastern equine encephalomyelitis* (C,A,Cu,H,R,B,M)	Semliki Forest* (C,A,B)
Everglades* (C,A,R,M)	Sindbis* (C,A,H,B)
Getah (C,A)	Una (C,A)
Mayaro* (C,H)	Venezuelan equine encephalomyelitis* (C,A,H,R,Ba,M)
Middleburg (C)	Western equine encephalomyelitis* (C,A,H,R,B)
Mucambo* (C,H,R,B,M)	Whataroa (C)
Ndumu (C)	
O'Nyong-Nyong* (A,H)	

\* Can cause disease in man.

Isolated from:

(C) Culicine mosquitoes	(A) Anopheline mosquitoes
(Cu) Culicoides	(H) Man
(R) Rodents	(B) Birds
(M) Marsupials	(Ba) Bats

**Amaas virus** Synonym for variola minor virus. See variola virus.

### $\alpha$ -amanitin

Fiume L. & Wieland Th. (1970) *FEBS Letts* **8**, 1

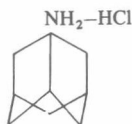
Mahy B.W.J. *et al.* (1972) *Proc. natn. Acad. Sci. U.S.A.* **69**, 1421

A cyclic polypeptide. The principal toxin found in the poisonous mushroom *Amanita phalloides*. A potent and selective inhibitor of nucleoplasmic form II DNA-DEPENDENT RNA polymerase of eukaryotic cells. It binds to the RNA polymerase and blocks RNA

## amantadine

synthesis after initiation, preventing chain elongation. Viruses which require cellular RNA POLYMERASE II for their replication e.g. ADENOVIRIDAE, INFLUENZAVIRUS and ONCOVIRINAE, are inhibited.

**amantadine** 1-adamantanamine hydrochloride. A pyrimidine NUCLEOSIDE with very limited prophylactic activity. Effective against INFLUENZA VIRUS A but not against INFLUENZA VIRUS B, nor MEASLES. Amantadine-resistant influenza virus mutants have been isolated.



The drug does not inhibit viral ATTACHMENT but acts at an early stage by blocking either PENETRATION or UNCOATING. It may cause some mental disturbance in patients with a history of psychiatric disorder. Drowsiness, slurred speech, lethargy, dizziness and insomnia are side-effects. Available in 100 mg capsules.

SYN: Symmetrel

**Amapari virus** A species in the genus ARENAVIRUS, belonging to the TACARIBE ANTIGENIC GROUP. Isolated from forest rodents in the Amapari region of northern Brazil. Produces plaques in VERO CELL cultures. Not known to cause disease in humans.

**amber** Name given to a triplet codon (UAG) specifying chain termination. Other chain terminations are ochre (UAA) and opal (UGA). None of these three trinucleotides will bind aminoacyl tRNA. Some cells contain suppressor tRNA's which will cause the insertion of an amino acid instead of terminating the protein chain at the site of a chain termination codon. The name 'amber' was obtained by translation of the German name Bernstein, one of the contributors to the original work.

**amber mutant** Virus with mutation resulting in a chain termination codon UAG. See amber.

## American haemorrhagic fever viruses

Johnson K.M. *et al.* (1967) *Prog. med. Virol.* **9**, 105

A group of species in the genus ARENAVIRUS. Sometimes used as a synonym for the TACARIBE ANTIGENIC GROUP VIRUSES, the New World arenaviruses. Two of them are associated with human haemorrhagic fever: JUNIN VIRUS in Argentina and MACHUPO VIRUS in Bolivia. PORTILLO VIRUS has been isolated from infants in Buenos Aires with a haemolytic-uraemic disease. Wild rodents are the natural hosts and transmission from man to man is rare. The viruses have also been isolated from mites and other ectoparasites, but it is doubtful if arthropods actually transmit them.

**aminoacyl-tRNA** An amino acid attached to its specific tRNA by covalent linkage between the carboxyl group on the amino acid and the 2' or 3' hydroxyl group on the ribose at the 3' end of the tRNA. In this form the amino acid is said to be 'activated'.

**aminoacyl-tRNA synthetases (amino acid-tRNA ligases)** Enzymes which bring about the covalent bonding of amino acids to their specific tRNAs. Each enzyme is capable of selecting one of the 20 amino acids and uniting it with its specific tRNA. Once charged with their amino acids, the tRNA molecules are ready to provide them to the protein-synthesizing system.

**7-amino-3-(β-D-ribofuranosyl)-pyrazolo[4,3-d]pyrimidine** See formycin.

## Amphotropic murine type C virus

Hartley J.W. & Rowe W.P. (1976) *J. Virol.* **19**, 19

A subspecies of the MOUSE TYPE C ONCOVIRUS which infects and replicates in murine and non-murine cells. It thus differs from the ECOTROPIC and XENOTROPIC sub-species. Further differentiation is possible on the basis of antigenicity and INTERFERENCE. Neither syncytia nor plaques are induced in XC cells. The virus is isolated from wild mice.



**amphotropic virus** A virus which will replicate in the cells of one or more species in addition to its natural host. Term usually applied to RETROVIRIDAE.

**Anatid herpesvirus 1** Synonym for anserid herpesvirus.

**Anhanga virus** An ARBOVIRUS morphologically like BUNYAVIRUS but not serologically related to members of that genus. Belongs to the PHLEBOTOMUS FEVER ANTIGENIC GROUP. Isolated from the sloth *Choloepus brasiliensis* in Castanhal forest, Brazil. Not reported to cause disease in humans.

**Anhembi virus** A species in the genus BUNYAVIRUS, belonging serologically to the BUNYAMWERA ANTIGENIC GROUP. Isolated from the rodent *Proechimys iheringi* and an arthropod *Phoniomyia pilicauda* in São Paulo, Brazil. Not reported to cause disease in humans.

**annealing** Synonym for hybridization.

**Anopheles A group viruses** There are three mosquito-borne viruses in this serological group, morphologically like BUNYAVIRUS but unrelated antigenically to members of that genus. Isolated only from mosquitoes, and only in S. America.

Anopheles A

Lukuni

Tacaiuma

**Anopheles A virus** An ARBOVIRUS and a member of the ANOPHELES A GROUP. Isolated from *Anopheles* sp. in Colombia, S. America. Not reported to cause disease in humans.

**Anopheles B virus** An ARBOVIRUS, morphologically like BUNYAVIRUS, but unrelated antigenically to members of that genus. Isolated only from mosquitoes in S. America. Together with BORACEA VIRUS forms the Anopheles B antigenic group.

**ansamycins** Derivatives of RIFAMYCIN.

**Anserid herpesvirus 1**

Proctor S.J. (1976) *Arch. Virol.* **50**, 83

A species in the family HERPESVIRIDAE. A natural infection in domestic ducks, and possibly of mallard, in Britain. There is nasal and ocular discharge, and diarrhoea, with up to 97% mortality. Only ducks, geese, swans and day-old chicks can be infected experimentally. The virus can be cultivated on the CAM, killing the embryo in 4 days. Can be adapted to replicate in chick fibroblast cultures, but loses virulence. Attenuated virus vaccine is effective in control of the disease.

SYN: anatid herpesvirus; duck enteritis virus; duck-plague virus.

**Ansteckende Schweinelahmung virus** Synonym for porcine enterovirus.

**Anterior poliomyelitis virus** Synonym for human poliovirus.

**anti-codon** A group of three consecutive bases in a tRNA molecule which recognizes a CODON in an mRNA molecule. The bases pair in an antiparallel manner: A with U and G with C, at least as far as the first two bases in the codon are concerned. The pairing with the third base is more complicated as one tRNA can recognise several codons provided they differ only in the last place. This is the 'wobble' hypothesis which states that a certain amount of variation or 'wobble' is tolerated in the third nucleotide of the codon.

**antigenaemia** Presence of circulating viral antigen in the bloodstream. Occurs in viral hepatitis and possibly in smallpox, myxomatosis and yellow fever.

**antigenic drift** The appearance of a virus with slightly changed antigenicity after frequent passage in the natural host. This is presumably due to selection of mutants under pressure of the immune response. Commonly occurs in influenza infections, but also observed with other viruses e.g. APHTHO VIRUS.

**antigenic shift** A sudden and major change in the antigenicity of a virus. Presumably the result of RECOMBINATION (gene reassortment). Most likely to occur in viruses with fragmented GENOMES, but only reported in INFLUENZA VIRUS A to date.

**antigenome** The complementary positive RNA strand on which is made the negative-strand GENOME of viruses such as PARAINFLUENZA VIRUS TYPE 1 MURINE.