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H1 virus. Family *Parvoviridae*, genus *Parvovirus*. Isolated from human tumour HEP1.

H3 virus. Family *Parvoviridae*, genus *Parvovirus*. Isolated from a human tumour which had been transplanted in rats.

Haden virus. See BOVINE PARVOVIRUS.

haemadsorption. The attachment of red blood cells to the surface of virus-infected cells due to virus-encoded products, usually glycoproteins, being incorporated into the infected cell membrane. Some viruses which bud from the cell surface, e.g. ORTHO- AND PARA-MYXOVIRUSES give this property to infected cells. Adsorption of erythrocytes can be used to identify infected cultures.

haemadsorption inhibition. A serological test in which haemadsorption is inhibited by the interaction of the antibodies with the surface of the haemadsorbing virus.

haemagglutinating encephalomyelitis virus of pigs. Synonym: PORCINE HAEMAGGLUTINATING ENCEPHALITIS VIRUS. Family *Coronaviridae*, genus *Coronavirus*. Causes encephalomyelitis in pigs with high mortality in young animals. Virus grows in primary pig kidney cell cultures giving multi-nucleate giant cells.

haemagglutination. The clumping of red blood cells. A large number of membrane-bound animal viruses haemagglutinate a wide variety of red blood cells, each virus favouring certain cells from certain animals. Used as a quick, quantitative assay for certain viruses, e.g. INFLUENZA VIRUS

haemagglutination inhibition test (HI test). Used for the detection of antibodies to haemagglutinating viruses. The antibodies react with the viral haemagglutinin thus preventing haemagglutination.

haemagglutinin. A glycoprotein which is present as spikes on certain membrane-bound viruses (e.g. MYXO- and PARAMYXO-VIRUSES) and binds to neuraminic acid-containing receptors on cells. In INFLUENZA VIRUS it is serotype-specific; its three-dimensional structure has been determined. When binding to red blood cells causes HAEM-AGGLUTINATION.

Wilson, I.A. *et al.* (1981) *Nature*, **289**, 366.

haemorrhagic encephalopathy of rats virus. Family *Parvoviridae*, genus *Parvovirus*. Isolated by injection of new-born rats with brain and spinal cord extracts from Lewis rats treated with cyclophosphamide. Causes haemorrhages and necrosis in the spinal cord. Injection i.c. into new-born hamsters causes fatal infection.

haemorrhagic enteritis of turkey virus. Family *Adenoviridae*, genus *Aviadenovirus*. Causes depression with bloody droppings. Intestine is filled with blood. Often fatal disease.

haemorrhagic septicaemia of trout virus. Synonym: EGTVED VIRUS. Family *Rhabdoviridae*, not assigned to genus. Causes haemorrhagic septicaemia in many species of trout. Can be grown in trout ovarian cells and fat head minnow cells.

hairless black syndrome virus. A disease of the honeybee, *Apis mellifera*, serologically-indistinguishable from BEE CHRONIC PARALYSIS VIRUS, but apparently causing distinct histopathology and inducing hairlessness and a black appearance in adult bees.

Rinderer, T.E. and Green, T.J. (1976) *J. Invertebr. Pathol.* **27**, 403.

hare fibroma virus. Family *Poxviridae*, subfamily *Chordopoxvirinae*, genus *Lepripoxvirus*. Causes fibromas in hares in Northern Italy and Southern France. Transmissible to rabbits. Related serologically to myxoma virus.

Hart Park virus. Family *Rhabdoviridae*, not assigned to genus. Isolated from mosquitoes in California. Multiplies in new-born mice inoculated i.c.

hart's-tongue fern virus. The first virus to be identified in ferns. It has been found in *Phyllitis scolopendrium* (hart's-tongue fern) and in various other ferns in England. It did not infect the angiosperms tested. The particles are rod-shaped, of two lengths, 320 nm. and 135 nm., and are 22 nm. wide. The virus is mechanically transmitted with difficulty and is transmitted in the soil, possibly by nematodes. The properties so far determined suggest that it might belong to the *TOBRAVIRUS* group.
Hull, R. (1968) *Virology* **35**, 333.

HAT medium. A cell culture medium containing hypoxanthine, aminopterin and thymidine. As aminopterin inhibits *de novo* synthesis of purines and pyrimidines HAT medium is used to select cells which have THYMIDINE KINASE and hypoxanthine-guanine phosphoribosyl transferase activities. Used in monoclonal antibody production to select hybridomas from unfused myeloma cells.

Hazara virus. Family *Bunyaviridae*, genus *Nairovirus*. Isolated from a tick in Pakistan.

head. The structural component of TAILED PHAGES which contains the DNA genome. The head may be isometric (e.g. λ phage) or elongated, apparently by the addition of extra rows of capsomeres (e.g. T4 PHAGE).

headful packaging. Mechanism for DNA packaging which occurs during replication in T4 and other phages whose DNA is in the circularly permuted form. Empty phage head structures are filled with DNA from a concatemeric precursor. After completion of one 'headful', the remaining DNA is cut and the filling of a second head begins. The amount of DNA packaged in each head includes a complete set of viral genes. This commonly produces a collection of genomes which are circularly permuted and terminally redundant.

Ritchie, D.A. (1983) In Topley and Wilson's Principles of Bacteriology, Virology and Immunity. Vol. 1. p. 177. ed. G. Wilson, A. Miles and M.T. Parker. Edward Arnold: London.

HeLa cells. Epithelial cells derived from a cervical adenocarcinoma from HENrietta LAX, but the

pseudonyms Helen LANE and Helen LARSON were used to protect her identity when she was alive. Susceptible to many viruses, e.g. POLIOVIRUS 1 and ADENOVIRUS TYPE 3.
Gey, G.O. *et al.* (1952) *Cancer Res.* **12**, 264.

Helenium virus S. A *Carlavirus*.
Koenig, R. and Lesemann, D-E. (1983) CMI/AAB Descriptions of Plant Viruses No. 265.
Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 173. CRC Press: Boca Raton, Florida.

Helenium virus Y. A possible *Potyvirus*.
Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 183. CRC Press: Boca Raton, Florida.

helical symmetry. A form of capsid structure found in many RNA viruses in which the protein subunits which interact with the nucleic acid form a helix; the adjacent subunits along the helix and between turns of the helix interact to give greater stability. For given helix characteristics (pitch etc.) the length of the particle is determined by the size of nucleic acid encapsidated. All rod-shaped plant viruses, e.g. TOBACCO MOSAIC VIRUS, POTATO VIRUS Y, have coat protein subunits arranged in helical symmetry; the nucleocapsid proteins of ORTHO- AND PARA-MYXOVIRUSES and of RHABDOVIRUSES are arranged helically around the genomic RNA. See CUBIC SYMMETRY, ICOSAHEDRAL SYMMETRY.

Heliothis zea nuclear polyhedrosis virus. Baculovirus (Subgroup A) isolated from the cotton bollworm, *H. zea*, in the USA. The virus is of the SNPV type and is highly infectious for *H. virescens*, *H. punctigera* and *H. armigera* as well as the homologous host. The virus has been extensively evaluated as a selective biological control agent for *Heliothis* spp. on cotton, tobacco, sorghum and vegetable crops. The virus was first registered for use in the USA in 1975 and was marketed as ELCAR by Sandoz Inc. until 1982, when the product was discontinued. A range of closely-related genotypic variants of the virus has been isolated from *H. zea* and *H. armigera*. Although less easy to propagate in cell culture than the prototype *BACULOVIRUS*, *Autographa californica* NPV, successful infection *in vitro* has been achieved in several cell lines derived from *H. zea*.
Ignoffo, C.M. and Couch, T. (1981) In Microbial Control of Pests and Plant Diseases 1970-1980. p. 330. ed. H.D. Burges. Academic Press: London.

Helminthosporium maydis virus. Type member of the *Helminthosporium maydis virus group*. Buck, K.W. (1986) In *Fungal Virology*, p. 1. ed. K.W. Buck. CRC Press: Boca Raton, Florida.

Helminthosporium maydis virus group. (Named after the type member). A possible genus of a fungal virus with isometric particles, 48 nm. in diameter, which sediment at 283S. The capsid consists of a single coat protein species (mw. 121×10^3) and each contains a single molecule of dsRNA (mw. 5.7×10^6).

Helminthosporium victoriae 145S virus. A possible member of the *Penicillium chrysogenum virus group*.

Ghabrial, S.A. (1986) In *Fungal Virology*, p. 163. ed. K.W. Buck. CRC Press: Boca Raton, Florida.

Helminthosporium victoriae 190S virus. A possible member of the *Totivirus group*.

Ghabrial, S.A. (1986) In *Fungal Virology*, p. 163. ed. K.W. Buck. CRC Press: Boca Raton, Florida.

Helminthosporium victoriae virus A (HvV-A). Synonym: HELMINTHOSPORIUM VICTORIAE 190S VIRUS.

Helminthosporium victoriae virus B (HvV-B). Synonym: HELMINTHOSPORIUM VICTORIAE 145S VIRUS.

helper virus. A virus which provides the factor(s) needed by a defective virus for replication. For certain plant virus complexes the term refers to the virus which confers insect transmissibility to the complex.

henbane mosaic virus. A *Potyvirus*. Govier, D.A. and Plumb, R.T. (1972) CMI/AAB Descriptions of Plant Viruses No. 95. Francki, R.I.B. *et al.* (1985) In *Atlas of Plant Viruses*. Vol. 2. p. 183. CRC Press: Boca Raton, Florida.

Hepadnaviridae. A proposed family consisting of DNA viruses which infect man, woodchucks, ground squirrels and Pekin ducks. The virus infecting man is composed of a double shell particle (the Dane particle), 42 nm. in diameter, but small spherical particles, 22nm. in diameter (the surface antigen), are also present in the plasma of

carriers. The virus particle consists of a 27 nm. icosahedral nucleocapsid (the core particle) containing one major polypeptide species surrounded by a detergent-sensitive envelope. The envelope protein is similar to, if not identical with, the 22 nm. particle which occurs naturally in the sera of infected patients. The surface particles contain at least seven polypeptides. The viral genome is circular, has a mw. of 1.6×10^6 and is partially ds and partially ss. It can integrate into chromosome DNA. The virus causes acute and chronic hepatitis, hepatocellular carcinoma, immune complex disease, polyarteritis and aplastic anaemia.

Gust, I.A. *et al.* (1986) *Intervirology* 25, 14.

hepatitis A virus. Synonym: EPIDEMIC JAUNDICE VIRUS, INFECTIOUS HEPATITIS VIRUS. Family *Picornaviridae*, genus *Enterovirus*. Causes 'short incubation' hepatitis. Usually caused by water or food-borne infection. Chimpanzees and marmosets are susceptible to experimental infection. Can be grown in cell culture.

Gust, I.D. *et al.* (1983) *Intervirology* 20, 1.

hepatitis B virus. Synonym: SERUM HEPATITIS VIRUS. Family *Hepadnaviridae*. Causes 'long incubation' hepatitis. Infection usually results from inoculation of serum but virus can be transmitted by sexual contact. Chronic carriers are common. Non-human primates can be infected. First virus disease for which a genetically engineered vaccine became available.

Gust, I.D. *et al.* (1986) *Intervirology* 25, 14.

hepatitis non A non B virus. Many cases of hepatitis in man are not associated with either hepatitis A or hepatitis B viruses. Recent work has shown that a calicivirus is implicated in the water-transmitted disease and a togavirus in the post-transfusion disease.

Bradley, D. *et al.* (1986) *J. gen. Virol.* 69, 731.

hepatopancreatic parvo-like virus. Possible member of *Parvoviridae* observed in shrimps (*Penaeus* spp.; Crustacea).

Lightner, D.V. and Redman, R.M. (1985) *J. Invertebr. Pathol.* 45, 47.

HEPES. N-2-hydroxyethylpiperazine-N'-2-ethanesulphonic acid. (mw. 238.3). A biological buffer, pK_a 7.55, with a pH range of 6.6-8.6.

Good, N. *et al.* (1966) *Biochem.* 5, 467.

Heracleum latent virus. A possible member of



100nm

92 Herpes B virus

the *Closterovirus* subgroup 2.

Bem, F. and Murant, A.F. (1980) CMI/AAB Descriptions of Plant Viruses No. 228.

Francki, R.I.B. *et al.* (1985) *In Atlas of Plant Viruses*. Vol. 2. p. 219. CRC Press: Boca Raton, Florida.

Herpes B virus. See CERCOPITHECID HERPESVIRUS 1.

Herpes simiae virus. See CERCOPITHECID HERPESVIRUS 1.

Herpes simplex virus. Synonym: HUMAN (ALPHA) HERPESVIRUS 1. Family *Herpesviridae*, subfamily *Alphaherpesvirinae*, genus *Human Herpes Virus group*. Causes 'cold sores', particularly in young children. The virus can also pass along nerves and become latent in ganglia from which it is reactivated by stimuli such as colds and sunlight. Can be treated successfully with Acyclovir. See INDUCTION.

Herpesviridae. (Greek 'herpes, herpes' = creeping, crawling creature, from nature of lesions.) A family of enveloped DNA viruses comprising three subfamilies, ALPHA, BETA and GAMMA HERPESVIRINAE and five genera, HUMAN HERPESVIRUS, SUID HERPESVIRUS, HUMAN CYTOMEGALOVIRUS group, LYMPHOPROLIFERATION VIRUS group and one unnamed genus. The particles are roughly spherical, 120-200 nm. in diameter and with a buoyant density of 1.20-1.29 g/cc in CsCl. There are more than 20 structural



100nm

proteins with mw. $12-220 \times 10^3$. Each particle contains one molecule of linear dsDNA, mw. $80-150 \times 10^6$. Replication of the DNA is nuclear but the mRNA from the transcripts is translated in the cytoplasm. Each virus has its own host range. Herpes viruses occur in both man and cold-blooded vertebrates and in invertebrates. Some viruses induce neoplasia. Transmission is usually by contact but it can occur by other routes.

Mathews, R.E.F. (1982) *Intervirolgy* 17, 47.

Herpesvirus 3. See CHICKENPOX VIRUS.

Hershey circles. Circles of λ phage DNA pro-

duced by the annealing of the complementary, 12-nucleotide single-stranded ends of the DNA (after A.D. Hershey).

heteroduplex analysis. The study of the structures produced by the hybridisation of two ssDNA molecules derived from different sources. If they have complementary or near complementary sequences double-stranded molecules will be formed. If there are regions of non-complementarity single-stranded regions will remain. The study is usually by electron microscopy using the KLEINSCHMIDT PROCEDURE.

heterokaryon. A hybrid cell formed by the fusion of two cells from different species. See HOMOKARYON.

hexamer. A group of six protein subunits on the triangular faces of capsids with ICOSAHEDRAL SYMMETRY.

hexon. The arrangement of protein subunits on the triangular faces of ADENOVIRUS particles.

Hibiscus chlorotic ringspot virus. A member of the *Carmovirus* group.

Waterworth, H.E. (1980) CMI/AAB Descriptions of Plant Viruses No. 227.

Morris, T.J. and Carrington, J.C. (1988) *In The Plant Viruses*. Vol. 3. p. 73. ed. R. Koenig. Plenum Press: New York.

Hibiscus latent ringspot virus. A *Nepovirus*. Brunt, A.A. *et al.* (1981) CMI/AAB Descriptions of Plant Viruses No. 233.

Francki, R.I.B. *et al.* (1985) *In Atlas of Plant Viruses*. Vol. 2. p. 23. CRC Press: Boca Raton, Florida.

Hibiscus yellow mosaic virus. A *Tobamovirus*. Occurs in Japan.

Doi, Y. *Personal communication*.

high pressure (performance) liquid chromatography (HPLC). A method for separating peptides, oligonucleotides, etc., with high resolution.

high voltage electrophoresis. Electrophoresis at potential differences of more than 1,000 volts. Used in nucleic acid sequencing and in paper electrophoresis of nucleotides.

Hinze virus. See LEPORID HERPESVIRUS.

Hippeastrum latent virus. Synonym: NERINE LATENT VIRUS.

Hippeastrum mosaic virus. A *Potyvirus*. Brunt, A.A. (1973) CMI/AAB Descriptions of Plant Viruses No. 117.

Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 183. CRC Press: Boca Raton, Florida.

Hirt supernatant. A method for separating viral DNA from cellular DNA by lysing cells with sodium dodecyl sulphate in the presence of 1M NaCl. The cellular DNA precipitates leaving viral DNA in the supernatant.

Hirt, B. (1967) J. mol. Biol. **26**, 365.

histones. Basic proteins found in cell nuclei in close association with DNA forming CHROMATIN. They contain tyrosine but little or no tryptophan. There are five main classes differing in their relative content of lysine and arginine. Cells infected with CARDIOVIRUSES have altered histone composition. DNA viruses which use the eukaryotic host transcription system, e.g. cauliflower mosaic virus, are thought to interact with host histones.

histopathology. The branch of pathology dealing with tissue changes associated with disease.

HIV. See HUMAN IMMUNODEFICIENCY VIRUS.

HOB-mutant. Mutant of the 1A clone of *AUTOGRAPHA CALIFORNICA* NUCLEAR POLYHEDROSIS VIRUS which kills the insect host, *Trichoplusia ni*, more rapidly than the wild-type strain.

Wood, H.A. *et al.* (1981) J. invertebr. Pathol. **38**, 236.

hog cholera virus. Synonym: SWINE FEVER. Family *Togaviridae*, genus *Pestivirus*. A highly contagious disease of pigs causing fever, vomiting, diarrhoea, haemorrhages and frequently death. Occurs in most parts of the world. Calves, goats and deer can be infected experimentally. Can be grown in pig cells. Serologically related to bovine viral diarrhoea virus.

Holcus lanatus yellowing virus. A possible plant *Rhabdovirus*.

Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 1. p. 73. CRC Press: Boca Raton, Florida.

Holcus streak virus. A possible *Potyvirus*. Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 183. CRC Press: Boca Raton, Florida.

Holcus transitory mottle virus. Synonym: COCKSFOOT MILD MOSAIC VIRUS.

homokaryon. Hybrid cell formed by the fusion of two cells of the same species. See HETEROKARYON.

homologous antiserum. A serum containing antibodies raised against a specific antigen and which will react with that antigen.

homology. The degree of relatedness between the nucleotide sequences of two nucleic acid molecules or the amino acid sequences of two protein molecules. Hybridisation experiments can produce useful information but, for critical analyses, sequence data are needed.

honeysuckle latent virus. A *Carlavirus*.

Brunt, A.A. and van der Meer, F.A. (1984) CMI/AAB Descriptions of Plant Viruses No. 289.

Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 173. CRC Press: Boca Raton, Florida.

honeysuckle yellow vein mosaic virus. A *Geminivirus*, transmitted by whitefly.

Harrison, B.D. (1985) Ann. Rev. Phytopath. **23**, 55.

hop American latent virus. A *Carlavirus*. Barbara, D.J. and Adams, A.N. (1983) CMI/AAB Descriptions of Plant Viruses No. 262.

Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 173. CRC Press: Boca Raton, Florida.

hop latent virus. A *Carlavirus*.

Barbara, D.J. and Adams, A.N. (1983) CMI/AAB Descriptions of Plant Viruses No. 261.

Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 173. CRC Press: Boca Raton, Florida.

hop mosaic virus. A *Carlavirus*.

Barbara, D.J. and Adams, A.N. (1981) CMI/AAB Descriptions of Plant Viruses No. 241.

Francki, R.I.B. *et al.* (1985) In Atlas of Plant Viruses. Vol. 2. p. 173. CRC Press: Boca Raton, Florida.

hop stunt viroid. A VIROID, 297 nucleotides. Shikata, E. (1987) *In* The Viroids. p. 279. ed. T.O. Diener. Plenum Press: New York.

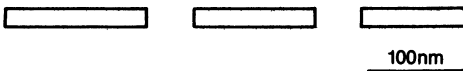
hop trefoil cryptic virus 1. A member of the *Cryptovirus* group, subgroup A. Boccardo, G. *et al.* (1987) *Adv. Virus Res.* **32**, 171.

hop trefoil cryptic virus 2. A member of the *Cryptovirus* group, subgroup B. Boccardo, G. *et al.* (1987) *Adv. Virus Res.* **32**, 171.

hop virus A. A strain of *Apple Mosaic Virus*. Francki, R.I.B. (1985) *In* The Plant Viruses. Vol. 1. p. 1. ed. R.I.B. Francki. Plenum Press: New York.

hop virus B. A strain of *Prunus Necrotic Ring-spot Virus*. Francki, R.I.B. (1985) *In* The Plant Viruses. Vol. 1. p. 1. ed. R.I.B. Francki. Plenum Press: New York.

Hordeivirus group. (Latin 'hordeum' = barley). (Type member BARLEY STRIPE MOSAIC VIRUS). Genus of MULTICOMPONENT plant viruses with rigid rod-shaped particles, 100-150 nm. long and 20 nm. in diameter, which sediment at 175-200S.



The coat protein subunits (mw. 21×10^3) are arranged in the particles in helical symmetry with pitch $c.2.5$ nm. There are two to four nucleoprotein components each containing a unique species of RNA. The infective genome comprises three species of linear (+)-sense ssRNA, RNA-1 (mw. $1.43-1.5 \times 10^6$), RNA-2 (mw. $1.24-1.35 \times 10^6$) RNA-3 (mw. $1.10-1.24 \times 10^6$); in some strains the sizes of RNA-2 and -3 are very similar which led to the belief that the type virus was bipartite. SUBGENOMIC RNAs may also be encapsidated. The 5' termini of the RNAs have a CAP; the 3' termini have tRNA activity accepting tyrosine and there is a short internal poly(A) sequence near the 3' terminus. RNA-1 is a MONOCISTRONIC messenger for a protein mw. 120×10^3 , RNA-2 encodes the coat protein at its 5' end and probably another protein, RNA-3 is bicistronic, the 5' protein having mw. 75×10^3 , the 3' protein (mw. 19×10^3) being translated from a SUBGENOMIC RNA

(RNA-4, mw. 0.28×10^6). Host ranges of members are narrow and mainly restricted to Graminae. Particles are found in most cell types. Hordeiviruses are mechanically transmissible and are transmitted through seed.

Matthews, R.E.F. (1982) *Intervirology* **17**, 178. Francki, R.I.B. *et al.* (1985) *In* Atlas of Plant Viruses. Vol. 2. p. 133. CRC Press: Boca Raton, Florida.

Carroll, T.W. (1986) *In* The Plant Viruses. Vol. 2. p. 373. ed. M.H.V. van Regenmortel and H. Fraenkel-Conrat. Plenum Press: New York.

Atabekov, J.G. and Dolja, V.V. (1986) *In* The Plant Viruses. Vol. 2. p. 397. ed. M.H.V. van Regenmortel and H. Fraenkel-Conrat. Plenum Press: New York.

horizontal transmission. Transmission of a virus, or other pathogen, between animals at any age after birth. *See* TRANSMISSION, VERTICAL TRANSMISSION.

horse pox virus. Synonym: CONTAGIOUS PUSTULAR DERMATITIS OF HORSES VIRUS. Family *Poxviridae*, subfamily *Chordopoxvirinae*, genus *Orthopoxvirus*. Causes lesions on lips, buccal mucosa and nose with fever and drooling of saliva. Reported to cause lesions on fingers of people working with horses.

horsegram yellow mosaic virus. A *Gemini-virus*, transmitted by whitefly. Muniyapa, V. *et al.* (1987) *J. Phytopath.* **119**, 81.

horseradish peroxidase. An enzyme derived from the plant, horseradish, *A Armoracia rusticana*. Used in ELISA tests to give the colour reaction with its substrate, e.g. brown with 3',3'-diaminidene.

host. An organism or cell culture in which a given virus can replicate.

host range. A listing of species of hosts which are susceptible to a given virus (or other pathogen). A critical host range listing should include species which are resistant to the virus. Can be used in identifying and characterising viruses.

hot spot. A region usually within a gene where mutations occur at an unusually high frequency.

housefly virus. Unclassified REOVIRUS-like agent, containing 10 segments of double-stranded RNA (total mw. $17-18 \times 10^6$) isolated

from the housefly, *Musca domestica*, in Australia. The electrophoretic profile of genome segments and serological properties of the virus suggest that it is distinct from other members of the REOVIRIDAE.

Moussa, A.Y. *et al.* (1982) *Aust. J. biol. Sci* **35**, 669.

HPB-SL-26 cells. Insect cell line from the cotton leafworm, *Spodoptera littoralis*, susceptible to infection by *S. LITTORALIS* NUCLEAR POLYHEDROSIS VIRUS.

HPS-1 virus. An unclassified RNA virus isolated from cultured cells of *Drosophila melanogaster*. Virions are unenveloped, isometric (36 nm. in diameter), contain two proteins (mw. of major protein 120×10^3) and a single segment of dsRNA (c.6 kbp).

Scott, M.P. *et al.* (1980) *Cell* **22**, 929.

HTLV III. See HIV, HUMAN T-CELL LYMPHOTROPIC VIRUS TYPE III.

Huacho virus. Family *Reoviridae*, genus *Orbivirus*. Isolated from ticks in Peru.

Hughes group viruses. Family *Bunyaviridae*, genus *Nairovirus*. Isolated from ticks and sea birds.

human alphaherpesvirus 2. Synonyms: HERPES FEBRILIS, HERPES SIMPLEX TYPE 2. Family *Herpesviridae*, subfamily *Alphaherpesvirinae*, genus *Herpesvirus Group*. Similar to herpesvirus 1 except that it is usually transmitted sexually. The virus causes genital lesions and it may cause carcinoma of the cervix. It is very closely related antigenically to herpesvirus 1.

Human cytomegalovirus group. A genus in the subfamily *Betaherpesvirinae*. Contains viruses which infect the mouse, rat, pig and guinea pig.

human embryo lung cells. Non-transformed diploid cells having a finite life span. Used for vaccine production for e.g. RABIES VIRUS. Hayflick, L. and Moorhead, P.S. (1961) *Exp. Cell Res.* **25**, 585.

Human herpesvirus 1 group. A genus in the subfamily *Alphaherpesvirinae*. Contains the viruses causing human herpes, types 1 and 2 and bovine mammillitis.

human herpesvirus 3. See VARICELLA ZOSTER VIRUS.

human herpesvirus 4. See EPSTEIN-BARR VIRUS.

human immunodeficiency virus (HIV). Synonyms: HTLV III, LAV. Family *Retroviridae*, subfamily *Lentivirinae*. Causative agent of AIDS. The name was proposed and accepted by ICTV in 1986 to minimise the confusion caused by the two names HTLV III and LAV. It can be grown in lymphocyte cultures without causing cpe.

human rhinovirus. See COMMON COLD FEVER VIRUS.

human T-cell lymphotropic virus type I. Family *Retroviridae*, subfamily *Lentivirinae*. Causes adult T-cell leukaemia which is common in Japan.

human T-cell lymphotropic virus type III. See HIV. The name given by workers at the National Cancer Institute, USA, to isolates of the virus causing AIDS.

Gallo, R.C. *et al.* (1984) *Science* **224**, 500.

humoral immunity. Immunity conferred by antibodies in extracellular fluids including the serum and lymph.

hundskrankheit virus. See SANDFLY FEVER VIRUS.

hyacinth mosaic virus. A possible *Potyvirus*. Francki, R.I.B. *et al.* (1985) *In Atlas of Plant Viruses*. Vol. 2. p. 183. CRC Press: Boca Raton, Florida.

hybrid arrested translation. A method for identifying the proteins encoded by a cloned DNA sequence. The mRNA preparation is hybridised with the cloned DNA and only mRNA species homologous to the DNA will anneal to it. Comparison of *in vitro* translation products of annealed with unannealed mRNAs will identify the proteins, the production of which is inhibited by hybrid formation. See HYBRID RELEASED TRANSLATION.

Paterson, B.M. (1977) *Proc. Natl. Acad. Sci. USA.* **74**, 4370.

hybrid released (selected) translation. A method used to identify proteins encoded by a

cloned DNA. A preparation of mRNA is hybridized to the cloned DNA immobilised on a solid matrix such as nitrocellulose. The mRNA homologous to the DNA is retained on the filter and can then be removed by melting the RNA:DNA duplex. The purified RNA is then translated *in vitro* and the protein product(s) identified, often by gel electrophoresis. Goldberg, M.L. *et al.* (1979) *Meths. Enzymol.* **68**, 206.

hybridisation. 1. In molecular biology it refers to the formation of stable duplexes between complementary sequences by way of Watson-Crick base-pairing. *See* ANNEALING. 2. In genetics and breeding it means the formation of a novel diploid organism by normal sexual processes or by protoplast fusion.

hybridoma. A hybrid cell line produced from the fusion of a normal lymphocyte with a myeloma cell. After selection and cloning a hybridoma cell line will produce a MONOCLONAL ANTIBODY.

Hydra viridis/Chlorella virus. A virus from a *Chlorella*-like green alga which has a symbiotic relationship with the digestive cells of *Hydra viridis*. The virus particles are isometric, 185 nm. in diameter, contain dsDNA (mw. 136×10^6) and up to 19 proteins (mw. $10.3-82 \times 10^3$). The algal cells lyse immediately they are isolated from the *Hydra* and it is thought that the virus may be important in the symbiotic relationship. van Etten, J.L. *et al.* (1981) *Virology* **113**, 704.

Hydrangea mosaic virus. An *Illarvirus*. Francki, R.I.B. (1985) *In* The Plant Viruses. Vol. 1. p. 1. ed. R.I.B. Francki. Plenum Press: New York.

Hydrangea ringspot virus. A *Potexvirus*. Koenig, R. (1973) CMI/AAB Descriptions of Plant Viruses No. 114. Francki, R.I.B. *et al.* (1985) *In* Atlas of Plant Viruses. Vol. 2. p. 159. CRC Press: Boca Raton, Florida.

hydration. The incorporation of water into a complex molecule. Proteins, nucleic acids and virus particles are hydrated to varying extents and this affects their hydrodynamic properties. The amount of hydration is affected by the composition of the solvent in which the molecules are suspended. The water structure surrounding virus particles is disrupted by chaotropic ions such as

Cl^- ; this can lead to disruption of the virus particles.

hydrogen bonding. A non-covalent bond formed between the hydrogen atom in an -O-H or -N-H group and an oxygen or nitrogen atom (*see* figure under BASE PAIR). These bonds are relatively weak but are crucial in maintaining the secondary structure of nucleic acids and proteins. Hydrogen bonds maintain the double-helical structure of DNA.

hydrophobia virus. *See* RABIES VIRUS.

hydroxyapatite. A form of calcium phosphate often used to bind nucleic acids. The binding depends upon the nature of the nucleic acid and on its secondary structure. Thus, under certain conditions it will bind supercoiled DNA but not relaxed DNA and under other conditions it will bind ds and not ss DNA. Bernardi, G. (1971) *Meths. Enzymol.* **21**, 95.

hyperchromicity. The increase in the absorbance of light of 260 nm. wavelength by nucleic acid at its melting temperature. It is an indication of the amount of base-pairing in the nucleic acid.

hyperimmune serum. Serum from an animal which has received two or more injections of a foreign antigen for the purpose of producing a reagent for use in serology.

hypersensitive. The state of being abnormally sensitive. In virology it refers to an extreme reaction to a virus, e.g. the formation of local lesions or the necrotic response of a leaf to a plant virus.

hypertrophy. Increase in cell size causing an increase in the size of an organ or tissue, e.g. mumps virus infection of the lymph nodes.

Hypochoeris mosaic virus. A possible member of the *Furovirus* group. Brunt, A.A. and Stace-Smith, R. (1983) CMI/AAB Descriptions of Plant Viruses No. 273. Brunt, A.A. and Shikata, E. (1986) *In* The Plant Viruses. Vol. 2. p. 305. ed. M.H.V. van Regenmortel and H. Fraenkel-Conrat. Plenum Press: New York.

hypochromicity. Reduction in absorbance of light at 260 nm. wavelength by complementary

strands of nucleic acid which are hybridising or nucleic acid which is increasing its secondary structure.

Hyposoter exiguae virus. Formerly classified as the type species of proposed subgroup D 1, BACULOVIRUS genus. Now included as a member of subgroup A, POLYDNAVIRUS genus. Virions contain a polydisperse supercoiled dsDNA genome. The virus was isolated from the parasitoid *Hyposoter exiguae* (Hymenoptera; Ichneumonidae) (see POLYDNAVIRUS).

Krell, P.J. and Stoltz, D.B. (1980) *Virology* **101**, 408.

HYPR virus. Family *Flaviviridae*, genus *Flavivirus*. Isolated from a boy with encephalitis in Czechoslovakia. Causes frequent infections in Hungary, Poland, Yugoslavia, Austria, Bulgaria, Sweden and Finland.

Hz-1 'Baculovirus'. Unclassified virus, closely resembling the NON-OCCLUDED BACULOVIRUS

group in morphological and biochemical properties. First discovered in a persistently infected *Heliothis zea* cell culture (IMC-Hz-1) where it replicates in the nucleus. Virions are loosely-enveloped, rod-shaped nucleocapsids with two predominant size classes of nucleocapsid (367-400 x 40 nm. and 775-815 x 40 nm.). Particles contain at least 28 structural proteins (mw. 14-153 x 10³) and a large circular dsDNA genome (mw. 154 x 10⁶; 235 kbp), the largest reported for any baculovirus. The virus elicits both productive (lytic) and persistent infections in several lepidopteran cell cultures but has no known natural host organism. Defective particles (containing genome deletions of up to 91 kbp) are involved in the establishment of persistent infections. Unlike many baculoviruses, virions are released from cells by lysis of nuclear and cytoplasmic membranes rather than by budding. Some limited DNA homology has been reported with *AUTOGRAPHA CALIFORNICA* NUCLEAR POLYHEDROSIS VIRUS. Burand, J.P. and Wood, H.A. (1986) *J. gen. Virol.* **67**, 167.