

PLAGUES IN MAN

OTHER AGENTS OF DISEASE - SUBVIRAL PARTICLES

I. VIROIDS

A. STRUCTURE & SEQUENCE

1. NUCLEOTIDE SEQUENCE -- 246N (CCCvd) TO 375N (CEvd)
 - b. ROD SHAPE (20:1 AXIAL RATIO)
 - c. 27 DISTINCT VIROIDS (7 others unclassified)
 - (1) >100 NUCLEOTIDE SEQUENCES DETERMINED
 - (2) ISOLATE VARIATION
2. SECONDARY STRUCTURE
 - a. CIRCULAR <=====> LINEAR
 - b. BASE-PAIRED REGIONS AND LOOPS

B. CLASSIFICATION -- BASED ON SEQUENCE AND SELF-CLEAVAGE

1. FAMILY: POSPIVIROIDAE
 - a. FIVE GENERA: Pospiviroid, Cocadviroid, etc.
 - b. 24 species: PSTVd, CCCvd, CSVd, CEvd, HLvd
2. FAMILY: AVSUNVIROIDAE (Avsunviroid, Pelamoviroid)
TWO GENERA & 3 species: ASBVd; PLMVD, CChMVD

C. REPLICATION

1. NO CODING SEQUENCES -- NO REPLICASE
2. HOW DOES IT PROPAGATE?

D. PATHOGENESIS

1. LIKE VIRUS INFECTIONS
 - a. WILTS, STUNTING, LEAF DISTORTIONS, NECROSIS
 - b. MANY ARE SYMPTOMLESS -- LATENT VIROIDS
2. PROTEIN CHANGES (LITTLE NA CHANGES)
3. SEED, POLLEN & AGRICULTURAL TRANSMISSION

II. PRIONS - KURU, AN UNUSUAL HUMAN DISEASE

A. EPIDEMIC IN PAPUA, NEW GUINEA 1920-1970

B. FORE' WOMEN AND CHILDREN AFFECTED

C. LOSS OF MOTOR SKILLS AND DEMENTIA

D. DEATH USUALLY WITHIN ONE YEAR

E. DISEASE STUDIED BY CARLETON GAJDUSEK

1. TRANSMITTED BY RITUALISTIC CANNIBALISM - MOURNING
2. PROPERTIES LIKE OTHER RARE HUMAN DISEASES
 - a. CREUTZFELDT-JAKOB DISEASE - CJD
 - b. FATAL FAMILIAL INSOMNIA
 - c. GERSTMANN-STRAUSSLER-SCHEINKER SYNDROME
3. MAMMALIAN DISEASES
 - a. SCRAPIE IN SHEEP
 - b. CHRONIC WASTING DISEASE OF DEER AND ELK
 - c. TRANSMISSIBLE MINK ENCEPHALOPATHY
RECENTLY IN ENGLAND MAD COW DISEASE

F. RECENT WORK ON SCRAPIE, CJD AND KURU--PRIONS

[WORK OF STANLEY PRUISNER]

1. RAPID ASSAY WITH HAMSTERS
2. THE "PARTICLE" IS A PROTEIN: NO NUCLEIC ACID
3. A DNA PROBE WAS MADE: AA SEQUENCE ---> NUC SEQUENCE
4. THE HAMSTER GENE WAS ISOLATED USING THE PROBE
5. THE PRION GENE WAS SEQUENCED
6. THE "INFECTIOUS PARTICLE" IS A HOST PROTEIN
7. HETERODIMER CAUSES NORMAL PROTEIN TRANSFORMATION

G. IS THERE A CURE FOR THIS RARE DISEASE ?

H. BEEF, GREAT BRITAIN, AND BSE - MAD COW DISEASE

1. CONTAMINATED OFFAL
2. TRANSMISSIBLE TO HUMANS - vCJD

OTHER AGENTS OF DISEASE – EUKAROYTC PATHOGENS

- I. FUNGI (YEASTS)
 - A. PROPERTIES
 1. USUALLY MYCELIAL GROWTH (YEASTS - SINGLE CELLS)
 2. HAPLOID AND DIPLOID FORMS
 - a. DIPLOID FORM: SHORT-LIVED ZYGOTE
 - b. MEIOSIS
 - C. HAPLOID STAGE (MYCELIUM)
 - d. FUSION AND DIKARYOTIC STAGE
 - e. NUCLEAR FUSION - ZYGOTE → SPORES
 3. CLASSIFIED BY TYPE OF ZYGOTE
 - a. ZYGOMYCOTA -- Rhizopus (bread mold)
 - b. ASCOMYCOTA -- many saprophytes, Morchella, truffles
 - c. BASIDIOMYCOTA - Most mushrooms, puffballs, rusts
 - d. DEUTEROMYCOTA - Aspergillus, many others
(No sexual form seen)
 - B. PATHOGENS
 1. SKIN DISEASES
 - a. MOSTLY CAUSED BY DEUTEROMYCOTA
 - b. ATHELETE'S FOOT, RINGWORM, ETC.
MANY SPECIES - TRICHOPHYTON, EPIDERMOPHYTON,
MICROSPORUM
 - c. TREATMENT c TOPICAL OINTMENT - MICONAZOLE, ETC.
 2. SUBCUTANEOUS INFECTIONS
 - a. MADURA FOOT (A MYCETOMA) AND SPOROTRICHOSIS
 - b. INTRODUCTION OF FUNGUS BY WOUNDS (LEGS AND FEET)
 3. SYSTEMIC MYCOSES
 - a. COCCIDIOIDOMYCOSIS, CRYPTOCOCCUS, HISTOPLASMOSIS,
BLASTOMYCOSIS
 - b. USUALLY CAUSE BY INHALING SPORES
 - c. DISSEMINATED AND SERIOUS
 4. OPPORTUNISTIC MYCOSES
 - a. CANDIDIASIS
 - b. PNEUMOCYSTIS PNEUMONIA
 - c. ASPERGILLOSIS
- II. PROTOZOAN DISEASES
 - A. AMEBIASIS (AMEBIC DYSENTERY), CRYPTOSPORIDIOSIS (DIARRHEAL DISEASE FROM WATER), GIARDIASIS (EPIDEMIC WATER-BORNE DIARRHEA) AND TRICHOMONIASIS (*T. vaginalis*, A COMMON STD)
 - B. MALARIA
 1. AGENTS ARE SPOROZOANS (PHYLUM: APICOMPLEXA), PLASMODIUM SPP.-- *P. falciparum*, *P. malariae*, *P. vivax* and *P. ovale*. CELLS ARE NON-MOTILE WITH APICAL COMPLEX. THEY FORM SPORES AND SPOROZOITES. ALL ARE PARASITES
 2. COMPLEX LIFE CYCLE IN *Anopheles* MOSQUITO AND IN HUMAN CELLS (LIVER AND RED BLOOD CELLS)
 3. TRANSMISSION CYCLE: FEMALE ANOPHELES <-> HUMANS
 4. INCIDENCE: IN TROPICS (WAS ENDEMIC IN USA BEFORE 1920) CURRENTLY 300 MILLION INFECTED, 2-4 MILLION DEATHS ANNUALLY
 4. SYMPTOMS: INTERMITTANT FEVER AND CHILLS (HEADACHE AND VOMITING) MORE SEVERE LIVER, KINDEY AND SPLEEN INVOLVEMENT
 5. TREATMENT AND PREVENTION: QUININE (19TH C) PLUS SEVERAL QUININE DERIVITIVES (CHLOROQUINE) VACCINES ARE BEING TESTED.