Coronaviruses and their Diseases (NATO Asi Series. Series B, Physics)

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Interest in the coronaviruses has never been greater. Their economic impact is considerable as they infect humans, livestock, poultry and companion animals. Murine hepatitis virus (MHV) infection of the mouse and rat central nervous systems are the subject of intense study; these investigations are providing insights into the potential role of viruses in human neurological diseases and, more generally, into mechanisms causing neurological damage. The single-stranded, positive-sense RNA genomes of two species of these enveloped viruses (IBV and MHV) have been cloned completely and one of them (lBV) sequenced in its entirety, revealing a genome size of some 27000 nucleotides. This has made possible more incisive investigations into the nature of those polypeptides, encoded by more than half of the genome, which are likely to contribute, in the main, to RNA polymerase/replicase activity. Intriguingly, ribosomal frameshifting is exhibited within the mRNA coding for these polypeptides. The cloning/sequencing phase of coronavirology for which the 1980's will be partly remembered, has provided a sound framework for furthex: studies of the virus structural proteins and also some provocative insights relevant to these

studies. The large spike glycoprotein(s), responsible for membrane fusion and bearing important antigenic sites, varies amazingly in length and composition both within as well as between coronavirus species. Receptors on host cells have been identified. The integral membrane glycoprotein (M) has been shown to use internal hydrophobic sequences to direct translocation within membranes.