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Foamy Viruses

With 40 Figures and 7 Tables

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Foamy virus cytopathic effect in a VeroA cell culture infected with a simian foamy virus

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Preface

In the year 2002 the nomenclature of the *Retroviridae* was changed by the International Committee on Taxonomy of Viruses (ICTV). The previous arrangement of seven genera in one family subsequently became six genera within the subfamily of the *Orthoretrovirinae* and one genus (foamy viruses) in the subfamily *Spumaretrovirinae* (see Table 1).

There were a variety of reasons why the subcommittee in question suggested to the ICTV that the family of *Retroviridae* should be separated into two subfamilies. The main reason, however, was the aberrant replication pathway of foamy viruses, which distinguishes them from all other retroviruses.

Although we cannot present a complete picture, so many details have been accumulated over the past ten or so years, that it seems worthwhile to summarize them here. The first five chapters of this book deal with one or the other aspect of this peculiar replication strategy. Basic research will probably uncover further fascinating findings on the molecular biology of foamy viruses. However, due to recent advancements, the application of foamy virus-derived vectors may dominate the interest in the future. Therefore, a comprehensive chapter on this aspect by Mergia and Heinkelein is also included.

The use of cell cultures and subgenomic plasmids dominated the research on foamy viruses in the past. However, a complete understanding of the foamy virus replication pathway requires animal experiments. The current knowledge on the replication of foamy viruses *in vivo* is reviewed by Falcone et al. in chapter seven.

Foamy viruses are naturally found in those species that harbour lentiviruses, with the exception of humans (see below). Recently a molecular characterization of viral isolates from bovines, felines, and equines has been undertaken. These results are summarized in chapter nine by Ali Sa.

However, still most of the findings on foamy viruses were obtained by research on a single virus isolate previously called “human foamy virus”, which appeared to be the first to be investigated on a molecular level. However, to my knowledge genuine human foamy viruses do not exist. What does exist are several trans-species transmissions of different simian foamy viruses from monkeys and apes to human hosts. In chapter eight by

Heneine et al. these zoonoses are dealt with. Thus, the term "human foamy virus" is very much misleading. Therefore and for the sake of conformity in this book, the authors agreed to use the more neutral term "PFV" for prototypic foamy virus.

From the first plan until realisation this book had a very long incubation period. The reason for this is simply due to the fact that worldwide only a handful research labs continuously pursue work on foamy viruses. This obviously limits the number of potential authors. In particular, if one wants to be as up to date as we wanted to be with these reviews. However, if at least one reader becomes motivated to enter the field, the aim of this book will have been achieved.

Dresden 2003 Axel Rethwilm

Table 1: The ICTV nomenclature of the Retroviridae

Subfamily	Genus	Example	Virion Morphology	Genome
Orthoretrovirinae	**Alpharetroviruses**	Avian Leukosis Virus (ALV)	central, spherical core "C-type particles"	simple
	Betaretroviruses	Mouse Mammary Tumor Virus (MMTV), Mason-Pfizer Monkey Virus (MPMV)	eccentric, spherical core "B-type particles" (MMTV) or cylindrical core "D-type particles" (MPMV)	simple
	Gammaretroviruses	Murine Leukemia Virus (MuLV)	central, spherical core "C-type particles"	simple
	Deltaretroviruses	Bovine Leukemia Virus (BLV), Human T-cell Leukemia Virus (HTLV)	central, spherical core "C-type particles"	complex
	Epsilonretroviruses	Walleye Dermal Sarcoma Virus (WDSV)	central, spherical core "C-type particles"	complex
	Lentiviruses	Human Immunodeficiency Virus (HIV)	cone-shaped core	complex
Spumaretrovirinae	**Foamyviruses**	Prototype Foamy Virus (PFV)	central, spherical core	complex

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