

**HIV/AIDS at 30: Back to the Future**  
*BHIVA / Wellcome Trust Multidisciplinary Event to mark World AIDS Day 2011*

British HIV Association **BHIVA** Supported by **wellcome**trust

**HIV/AIDS at 30:  
Back to the Future**  
*Multidisciplinary Event  
to mark World AIDS Day*

1500–2045  
**Thursday 1 December 2011**  
Wellcome Collection Conference Centre  
London

In support of World AIDS Day

In partnership with    

British HIV Association (BHIVA) 2011

**HIV/AIDS at 30: Back to the Future**  
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**Professor Andrew Lever**  
University of Cambridge

*Thursday 1 December 2011, Wellcome Collection Conference Centre, London*

## What has HIV done for everybody else?

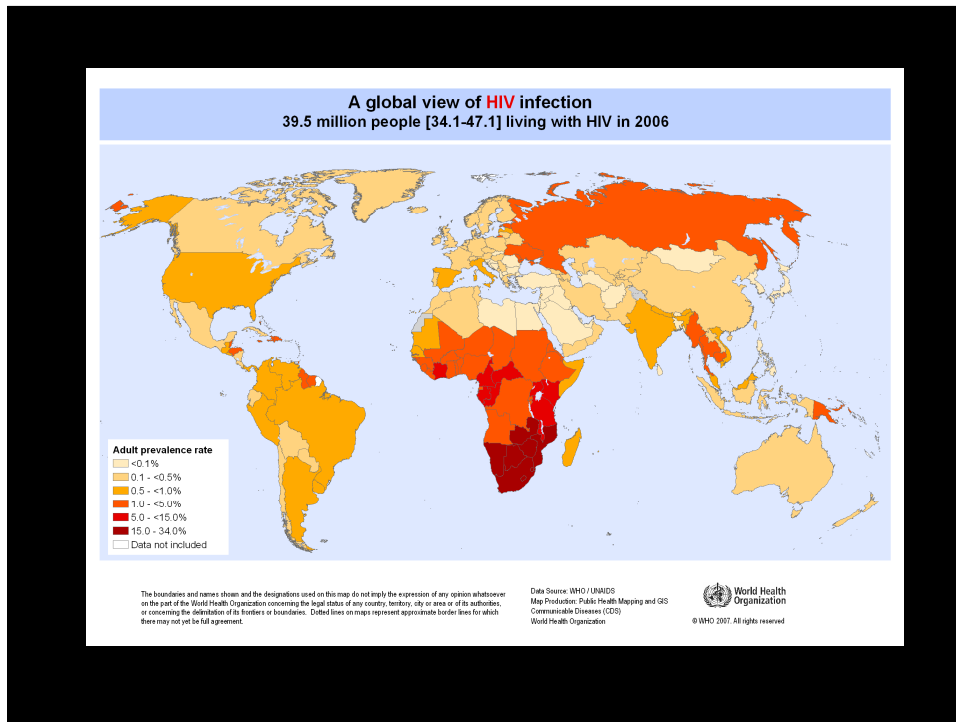
Andrew Lever

University of Cambridge



All right... all right... but apart from better sanitation *and* medicine *and* education *and* irrigation *and* public health *and* roads *and* a freshwater system *and* baths *and* public order... *what* have the Romans done for *us*?

(John Cleese – Life of Brian)



## Over 6000 new HIV infections a day

- More than 97% are in low- and middle-income countries
- About 1000 are in children under 15 years of age

Penicillium marneffii



Kaposi's sarcoma



AIDS associated conditions

What have we learned from HIV which we wouldn't have otherwise?

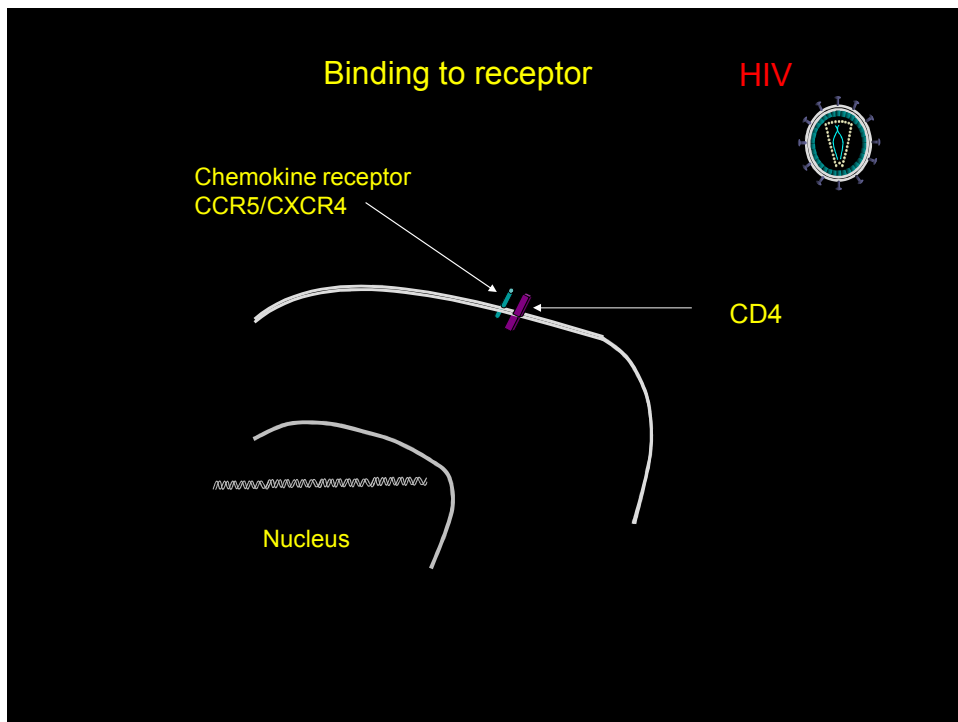
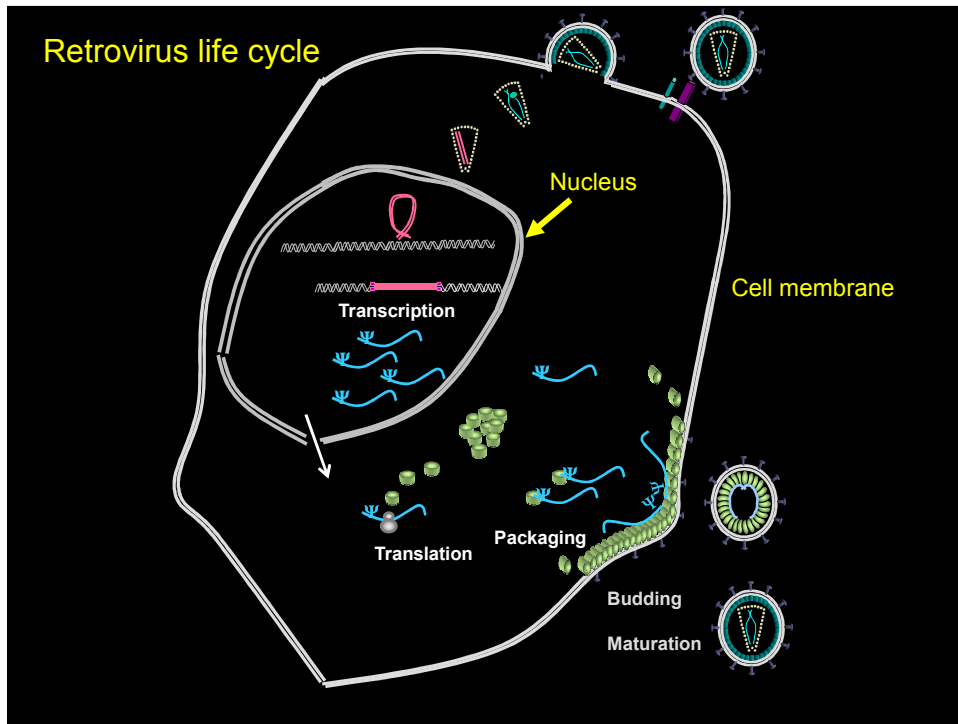
- Scientific knowledge and discoveries
- Cultural changes

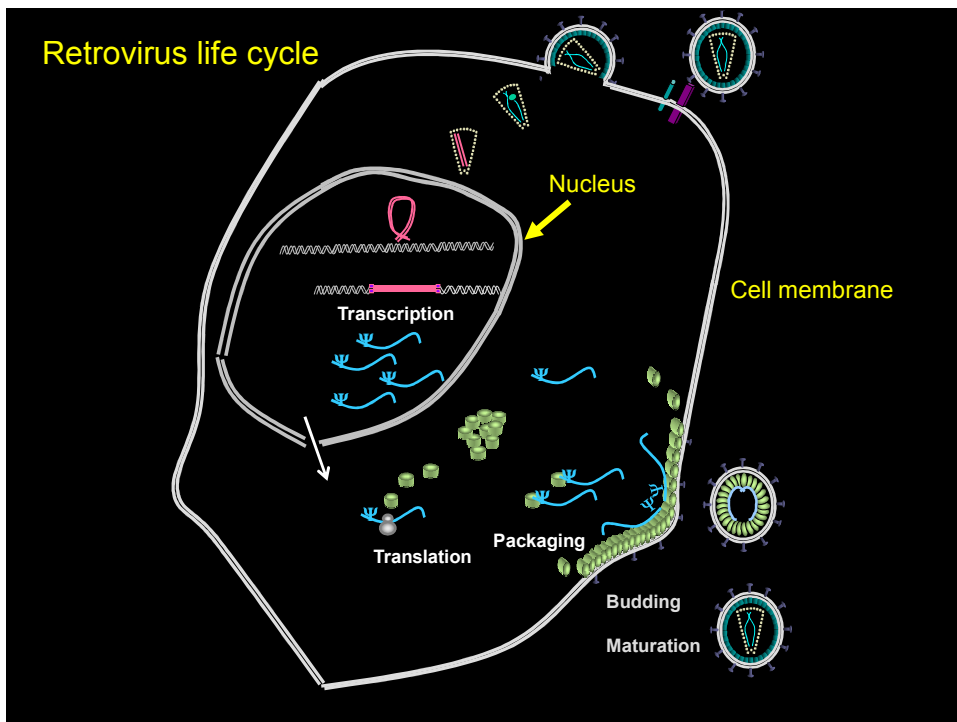
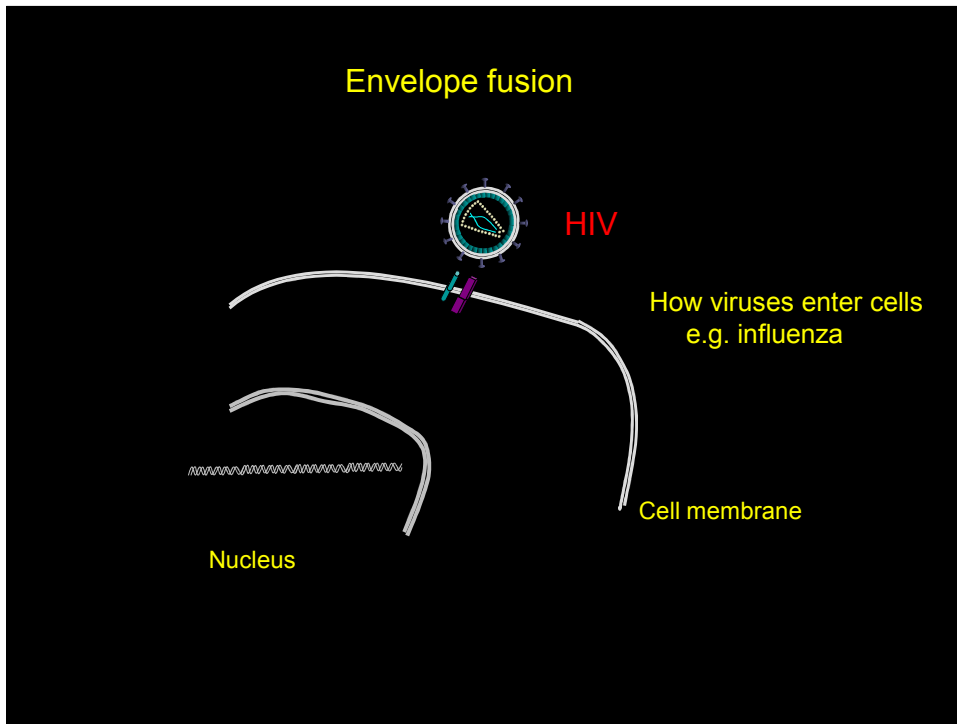
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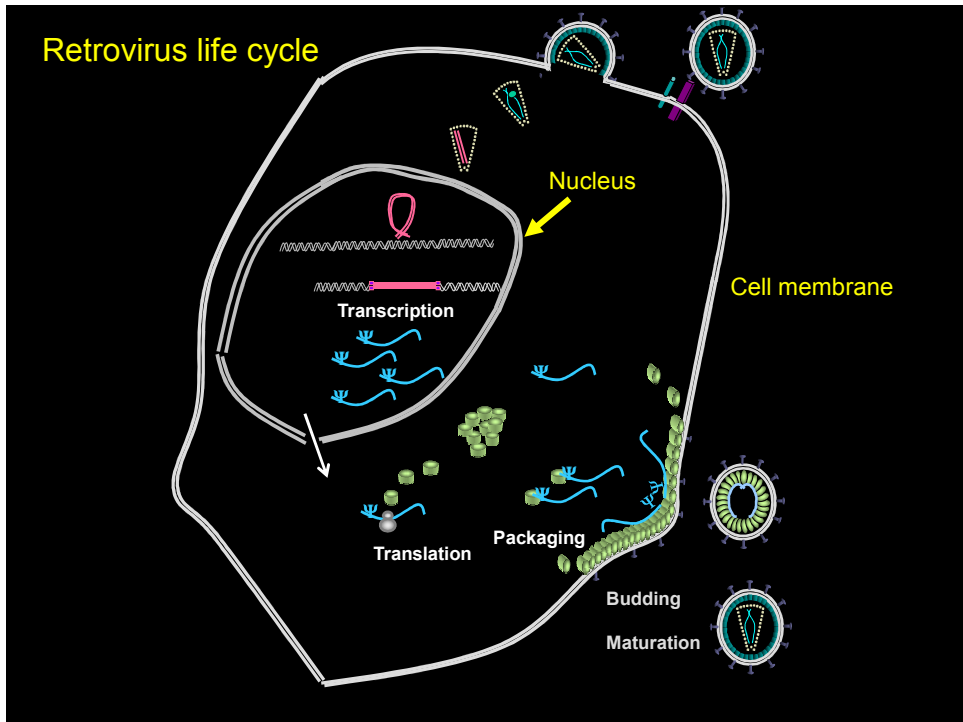
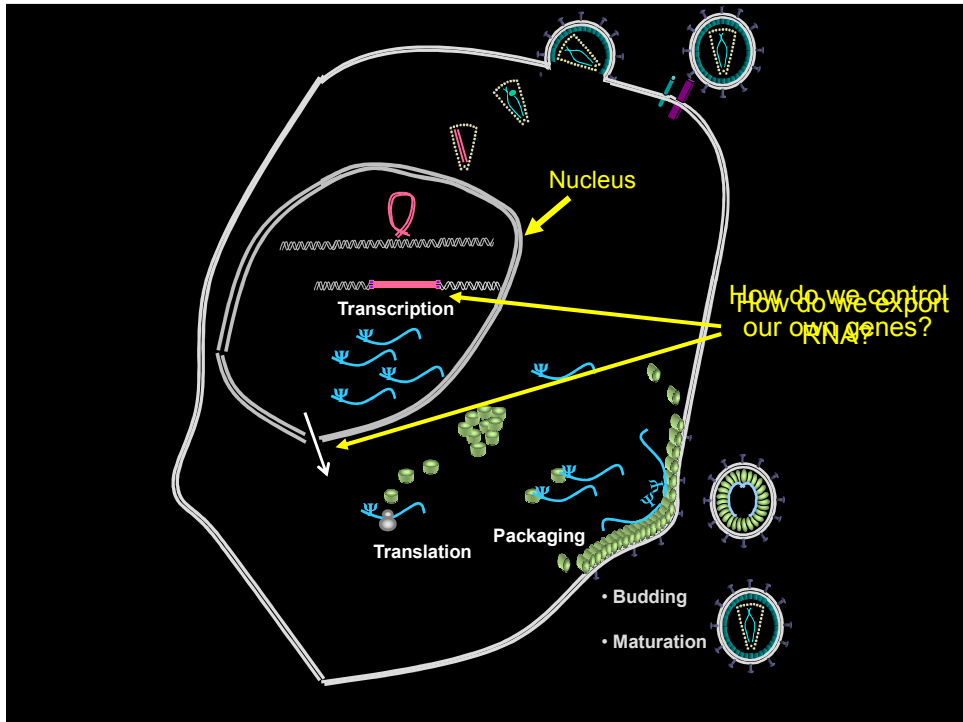
- Scientific knowledge and discoveries
  - How viruses replicate
  - Genes and genomes
  - Our immune system
  - Gene therapy vectors
  - Pharmaceuticals

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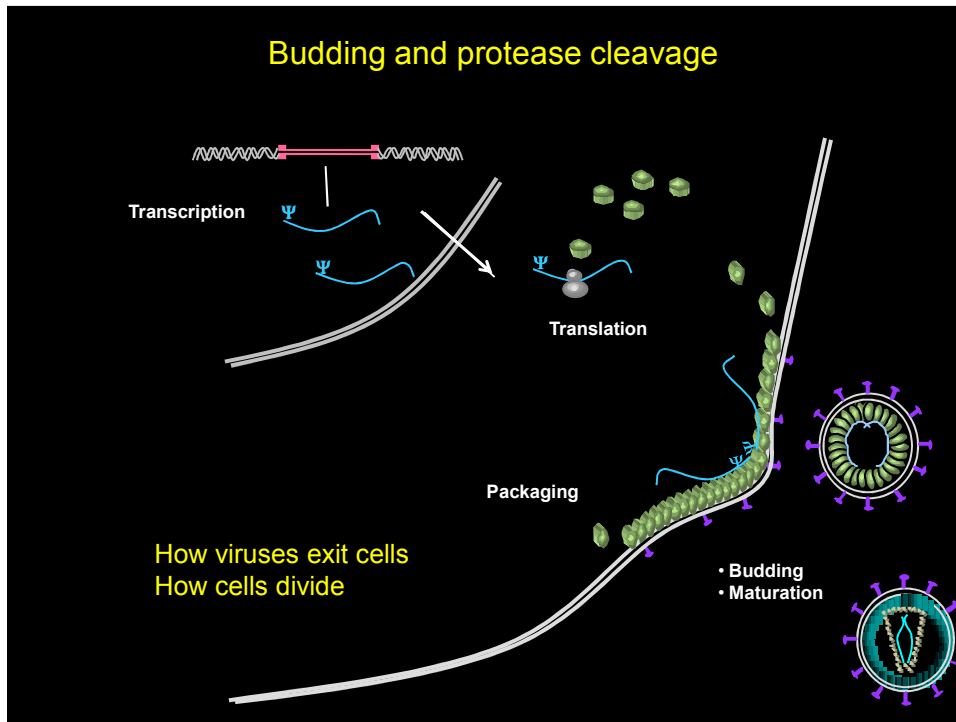
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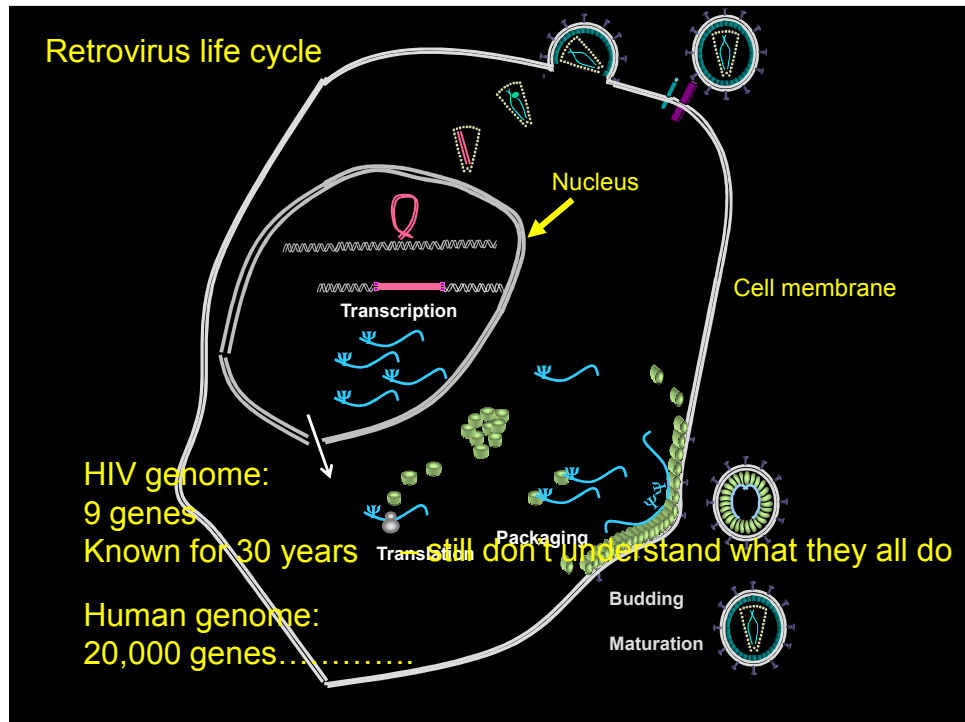






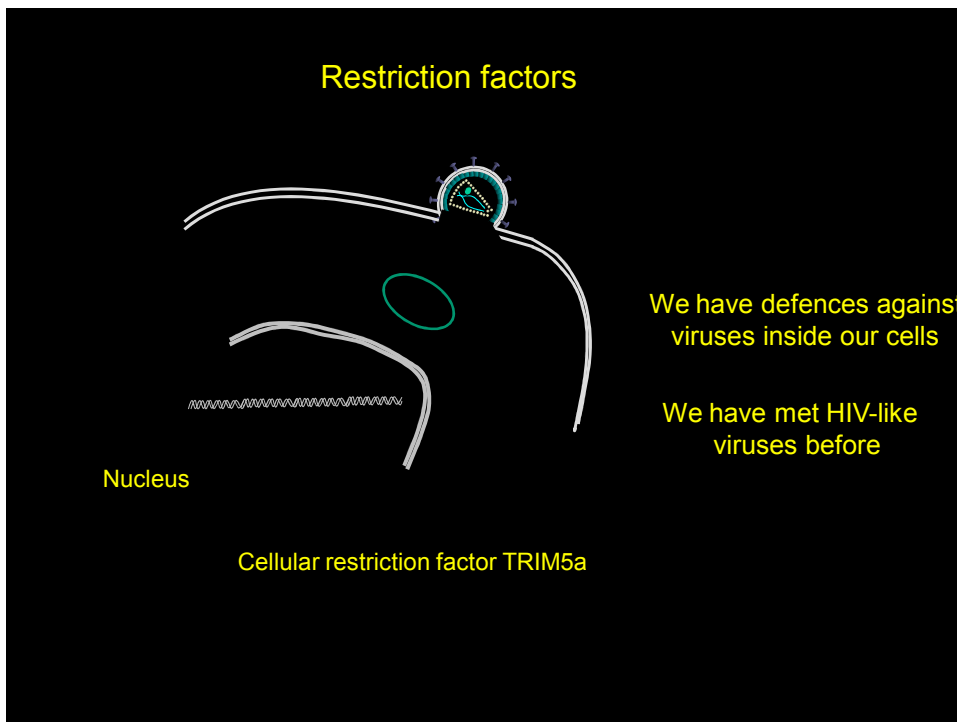
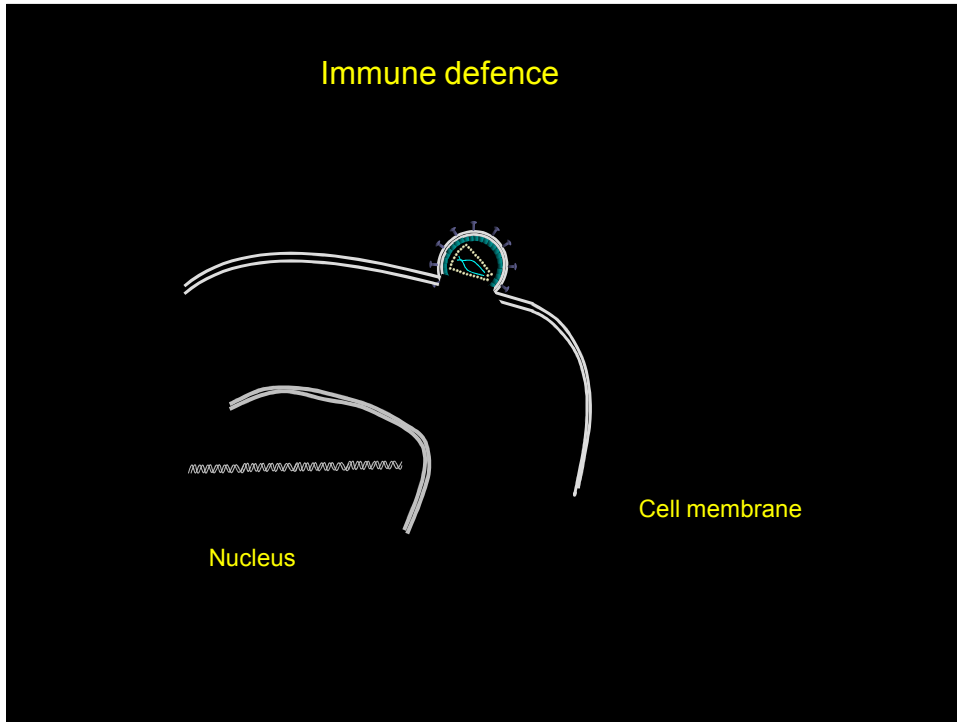
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- **Scientific knowledge and discoveries**
  - How viruses replicate
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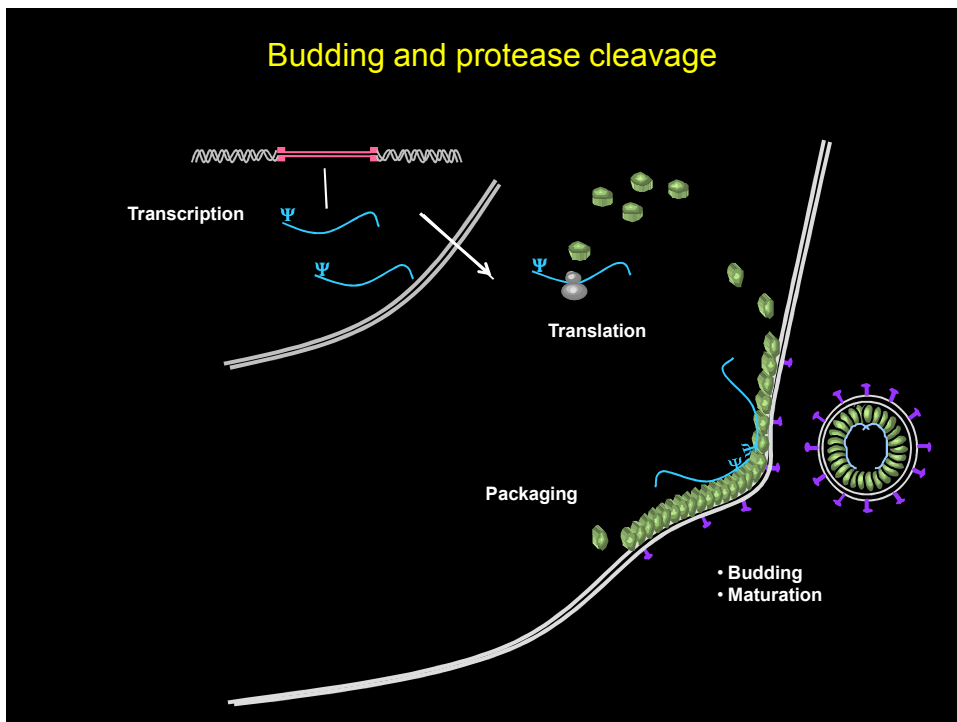
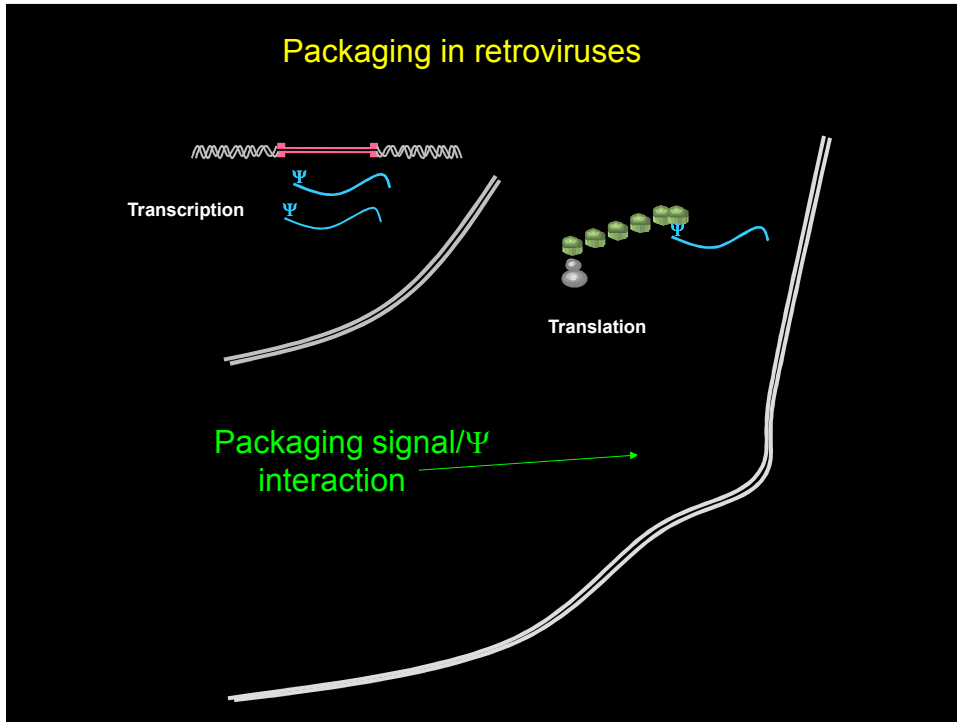
## Our immune system

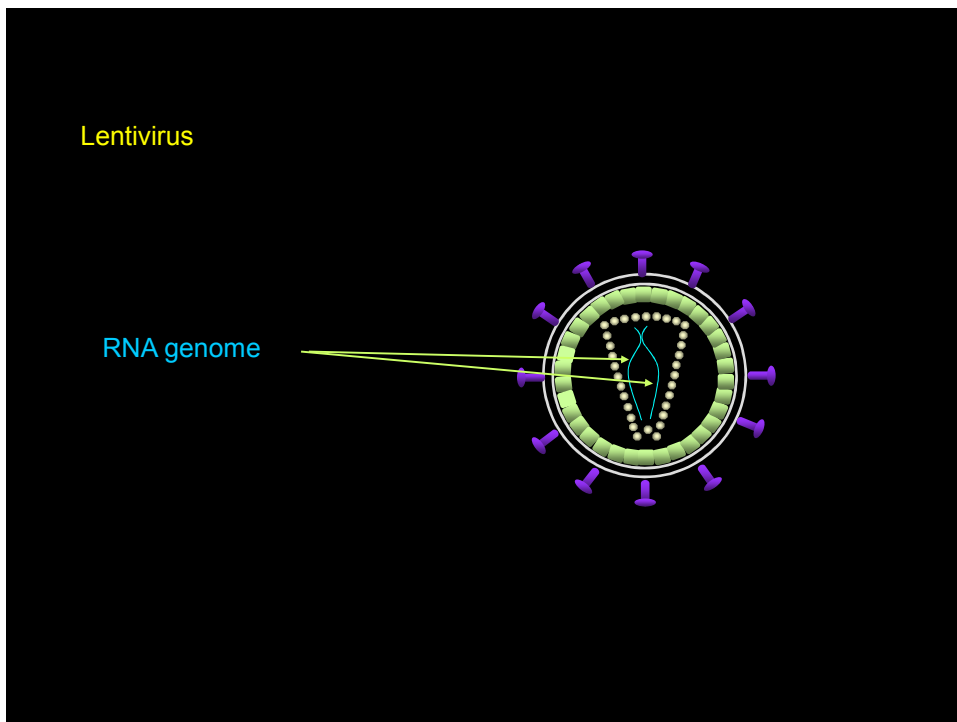
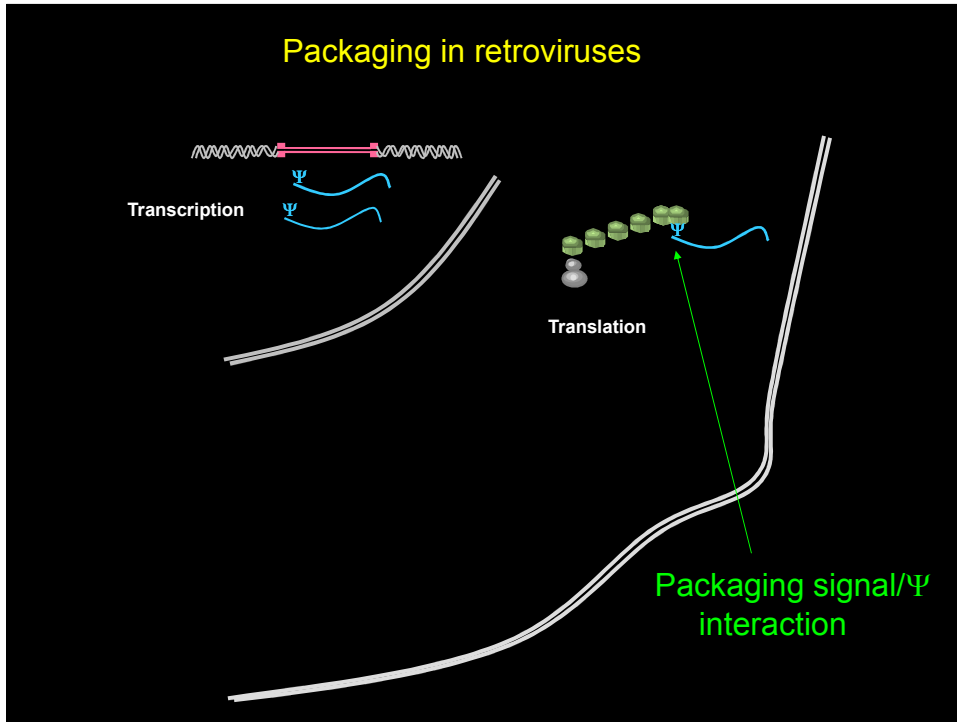
- 60 million infections
- 20 million deaths
- Noone has cleared the infection
- Noone has shown resistance to a second infection

Vaccine ??

## What have we learned from HIV which we wouldn't have otherwise?

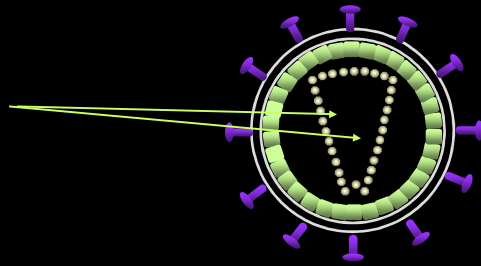
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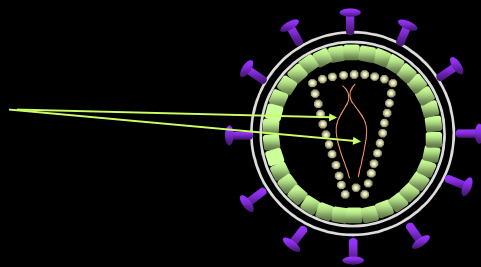
Lentivirus particle – no genetic material

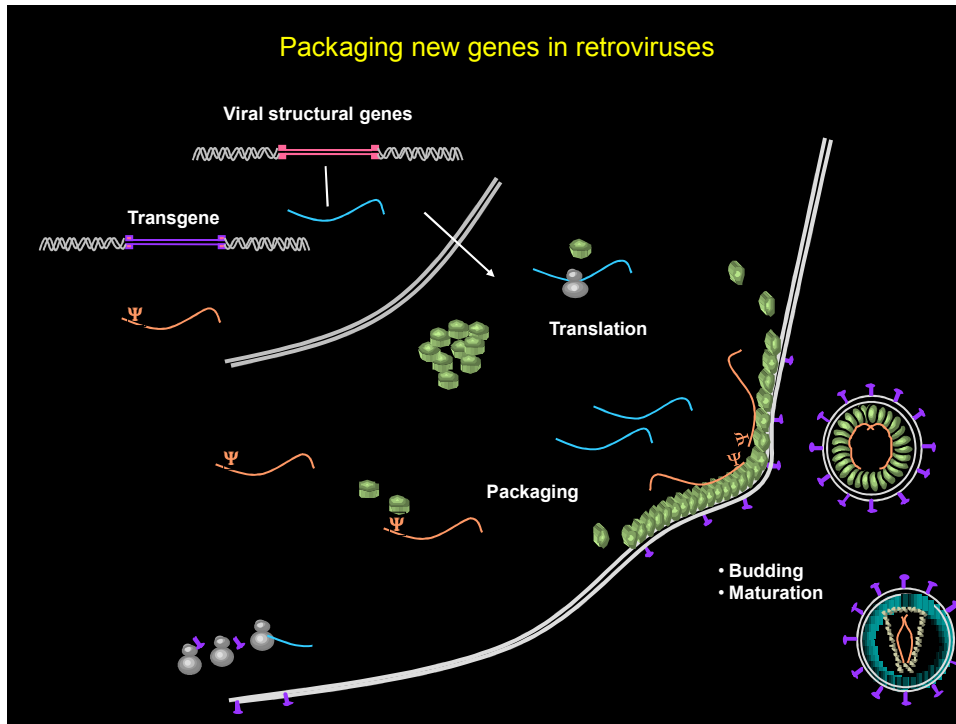
No genome



Lentivirus-based vector containing useful genes

New genes



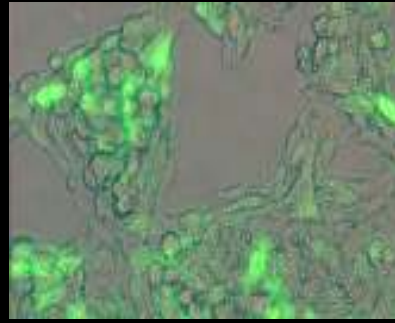
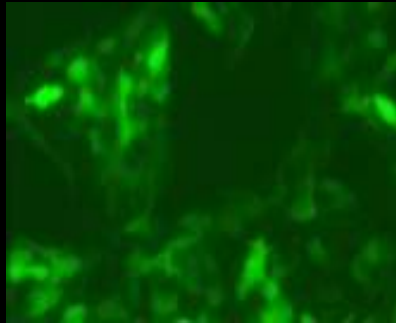


### Lentiviruses as delivery units (vectors)

Lentiviruses can enter and integrate genes into cells that are not dividing such as cells of the brain, liver and muscle



### Liver cells transduced by HIV-1 vector



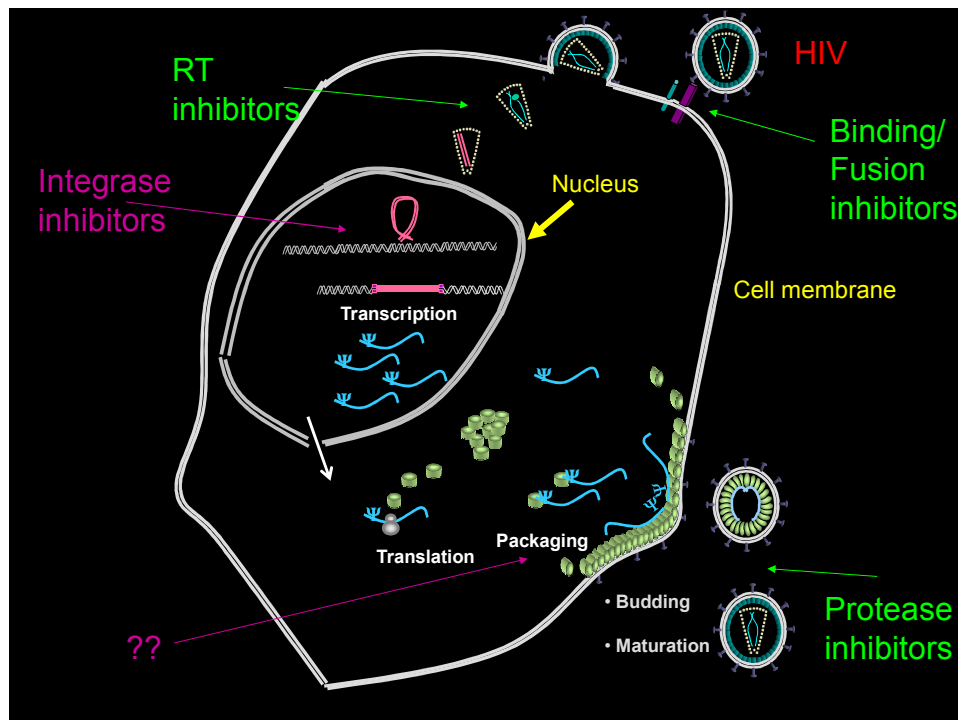
### Lentivirus-mediated Gene Transfer of Viral Interleukin 10 Prolongs Survival of Cardiac Allografts



Donor	Recipient	Treatment of cardiac grafts	Graft survival (days)
LEW	DA	Saline	$8.0 \pm 0.41$
LEW	DA	HIV-PGK- $\emptyset$	$6.67 \pm 0.29$
LEW	DA	HIV-PGK-vIL-10	$14.5 \pm 1.04^*$

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## Introduction of antiretroviral drugs

1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
AZT				ddl	ddC		d4T	3TC	IDV	DLV	EFV	AMP	LOP/	TDF		ATV	FOS	TPV	DRV	RAL
							SQV		RIT	NEV	ABC		RIT		FTC	T-20		MVC	ETR	

Nucleoside RT inhibitors  
 Non nucleoside RT inhibitors  
 Protease inhibitors  
 Entry inhibitors  
 Integrase inhibitors

## Treatment for Hepatitis B

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- Cultural changes

## How has HIV made us *think* differently about things

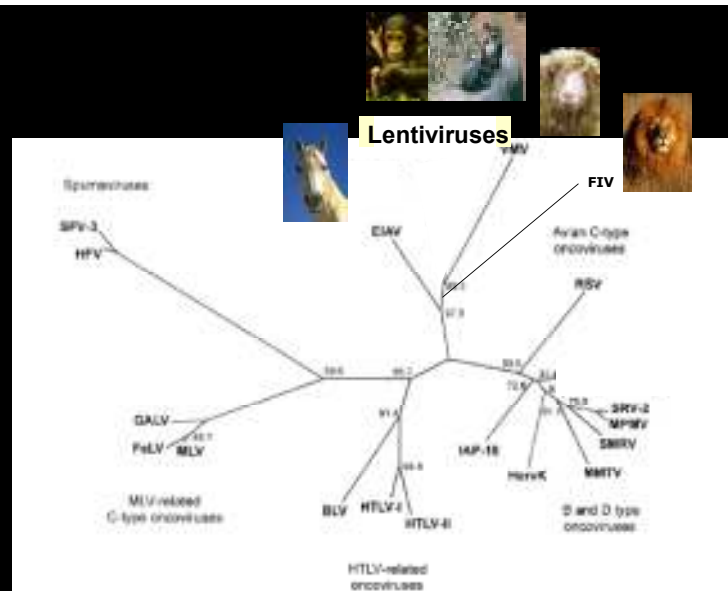
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## What have we learned from HIV which we wouldn't have otherwise?

- Cultural changes
  - Us and other animals
  - Internationalism of infection
  - Sexual promiscuity/health
  - Attitudes to specific groups
  - Health as a human right

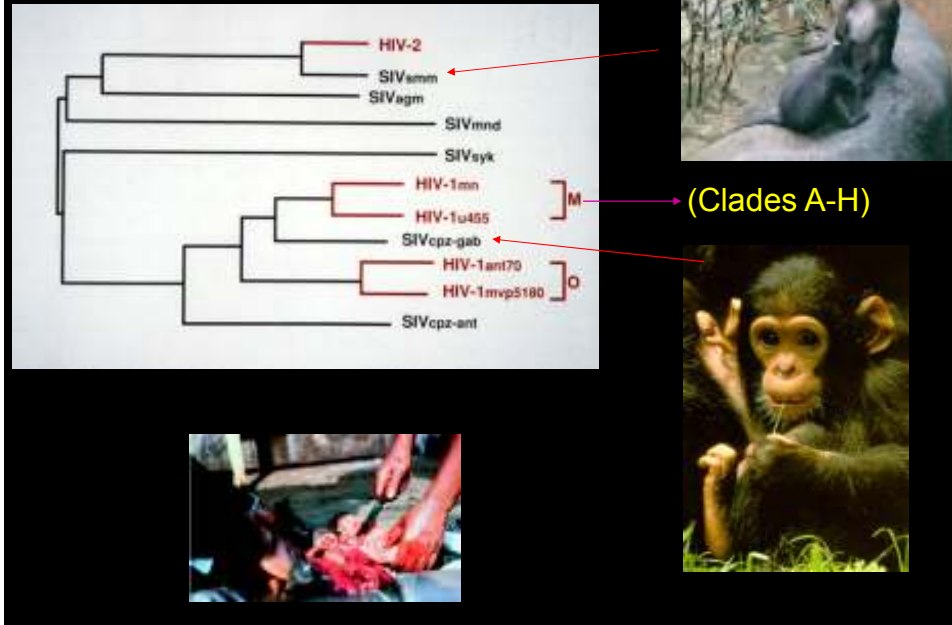
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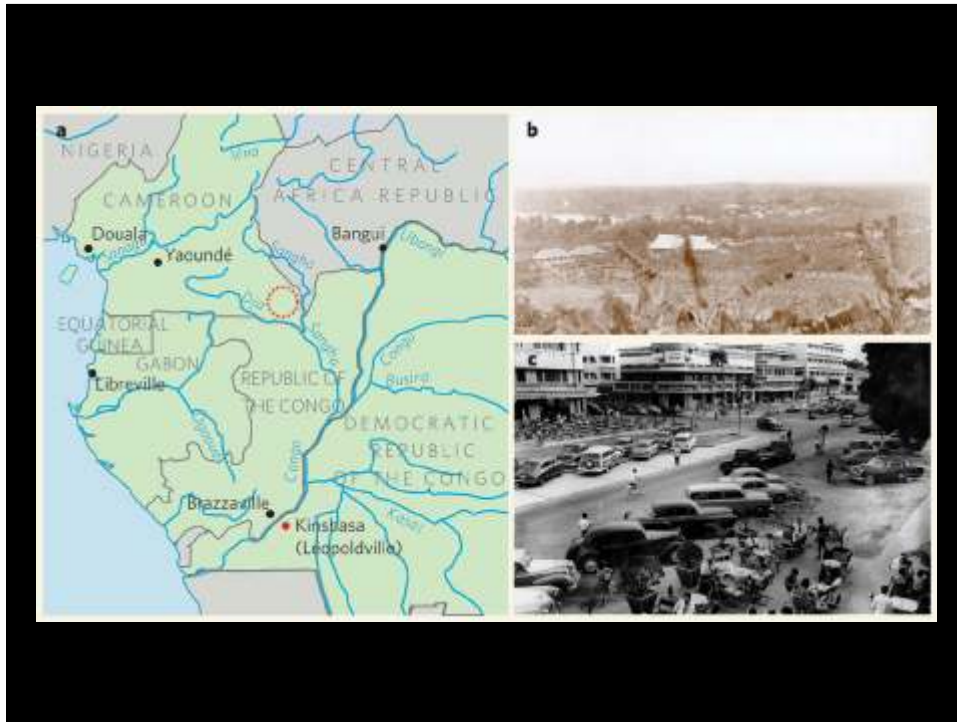
The Retrovirus family

## Origin of HIV

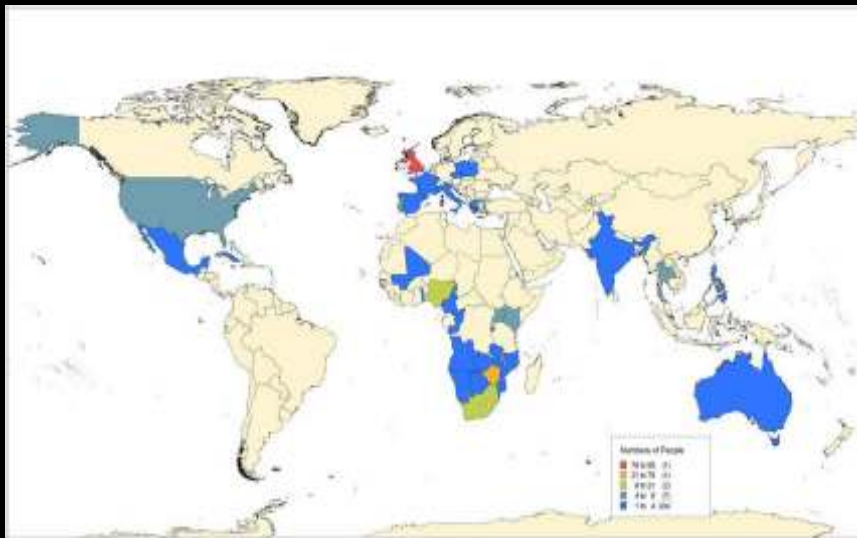


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Country of origin of HIV positive patients - Addenbrooke's



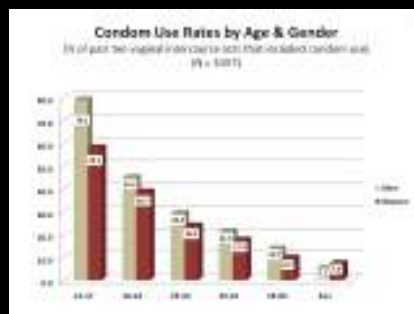
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## Sexual behaviour

Changes in both directions

Improvements in general correlate with education





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## Attitudes to specific groups

Changes in both directions

Improvements correlate with education

The four 'H's

Heroin users, Homosexuals, Haitians, Haemophiliacs



The fifth 'H'



Ryan White

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## 'Rights' and 'Human rights'

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control

Universal Declaration of Human Rights 1948

## Charter of WHO

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition

Modern transportation has made it impossible for a nation to protect itself against the introduction of disease by quarantine. This makes it necessary to develop strong health services in every country, which must be coordinated through international action

Harry Truman 1945

What have we learned from HIV which we  
wouldn't have otherwise?

HIV arrived into a population which already had a  
'rights' agenda

Global treatment of HIV is seen as an essential 'human  
right'

(The Human Right to Health – Jonathan Wolff)

What have we learned from HIV which we  
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Health is a human right

## Deaths from HIV/AIDS globally



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