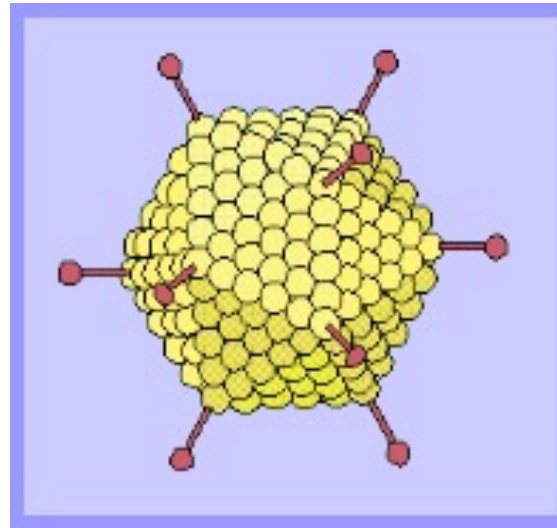
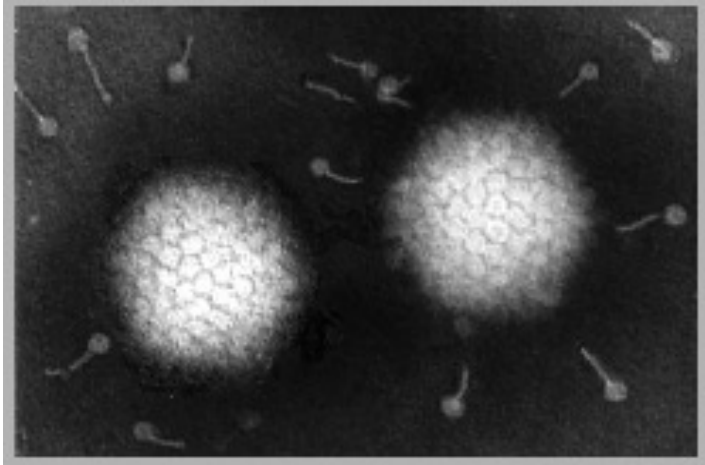
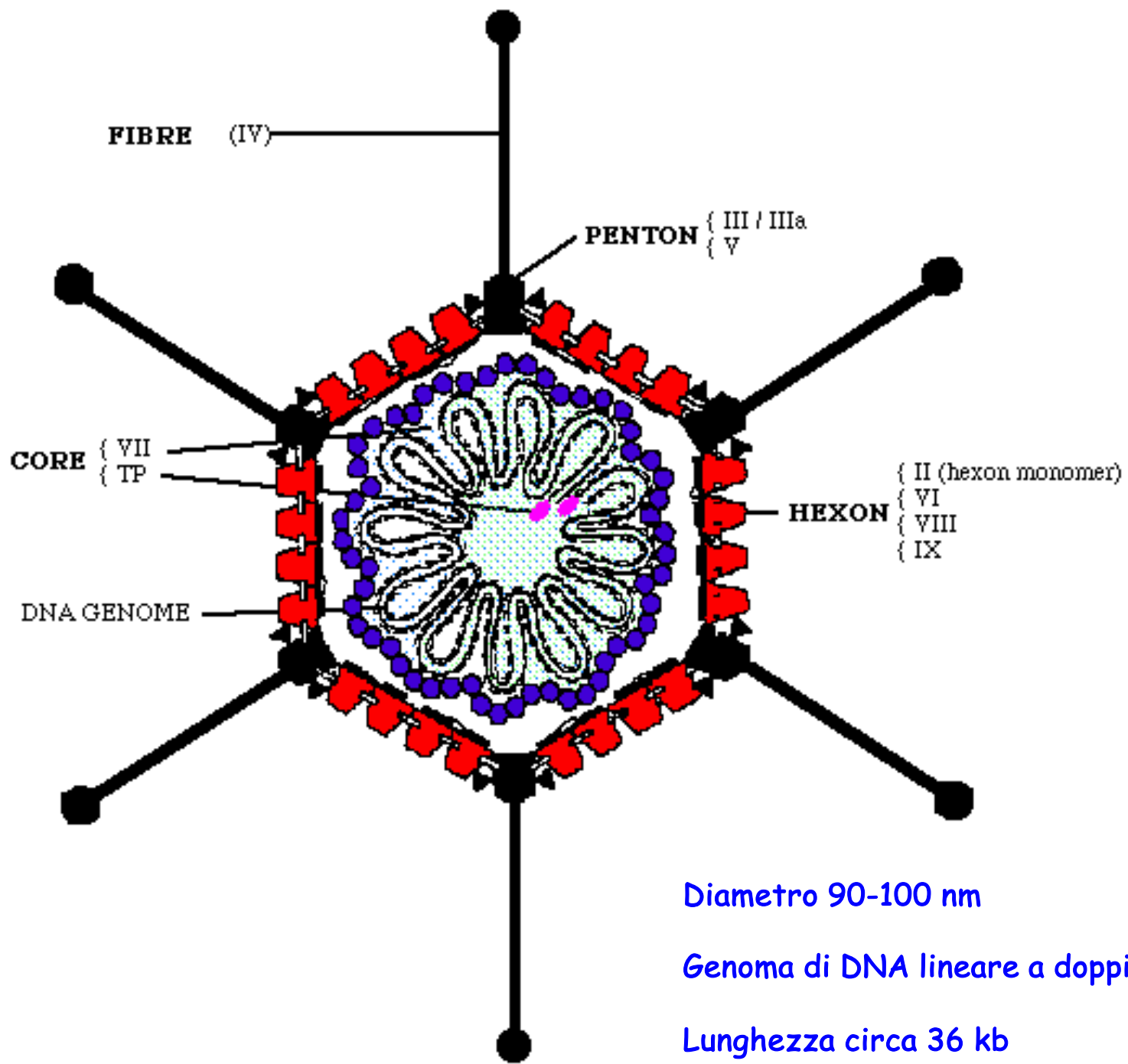
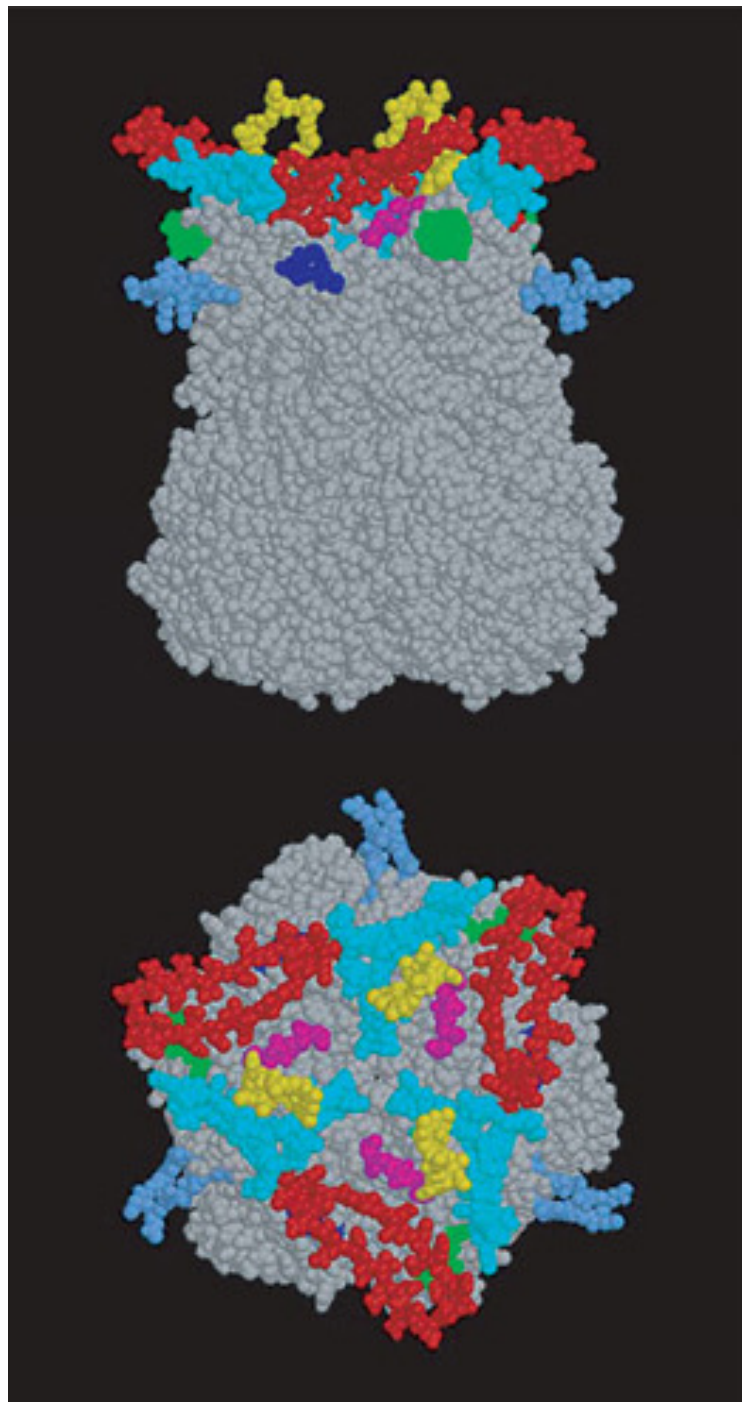


# **Adenovirus**

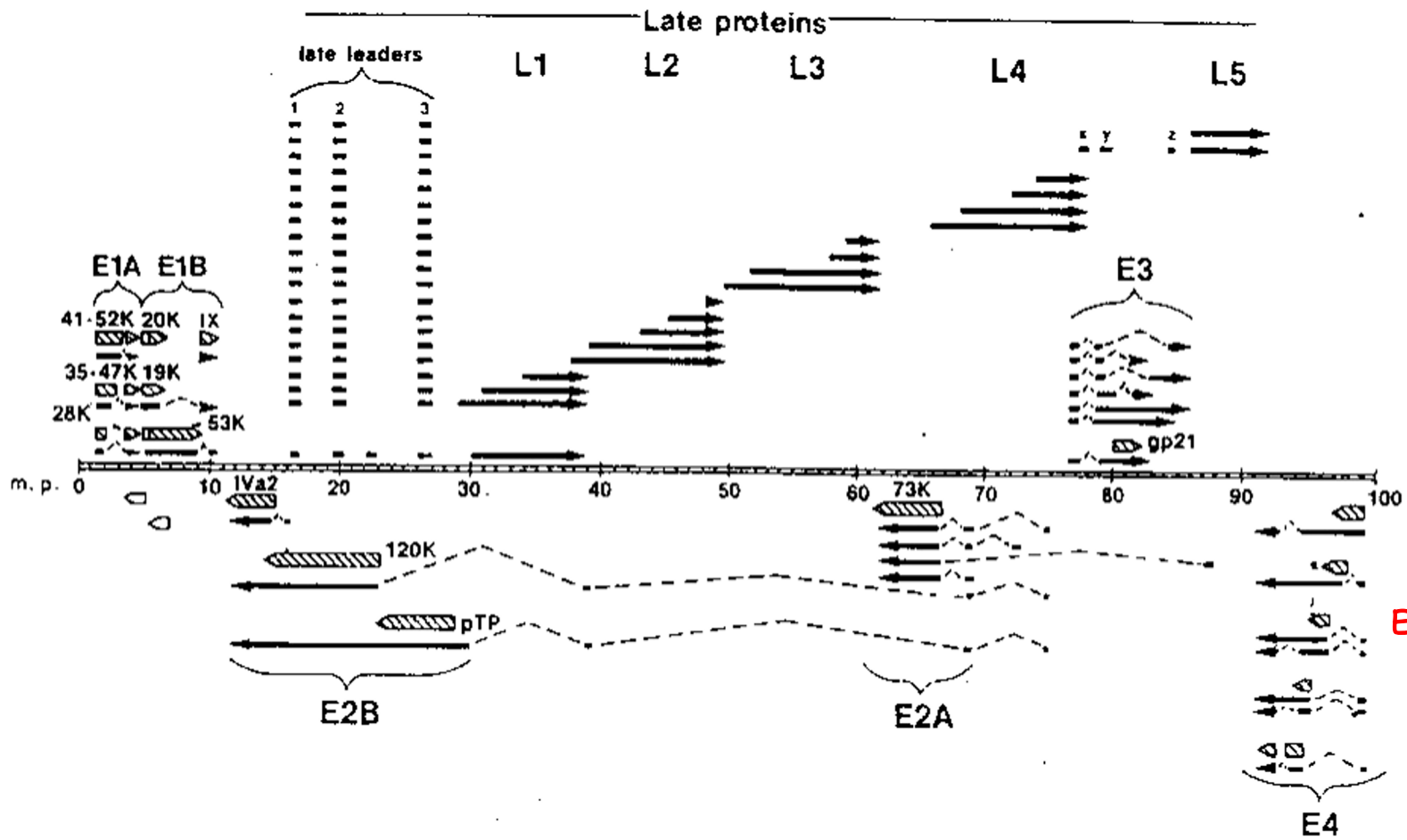




Le sette regioni  
ipervariabili  
dell'esone

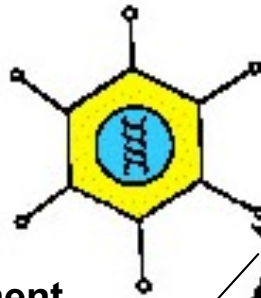
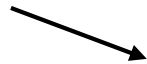
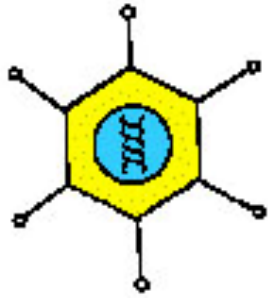


Modificata da Roberts et al.,  
Nature 441:239-243, 2006

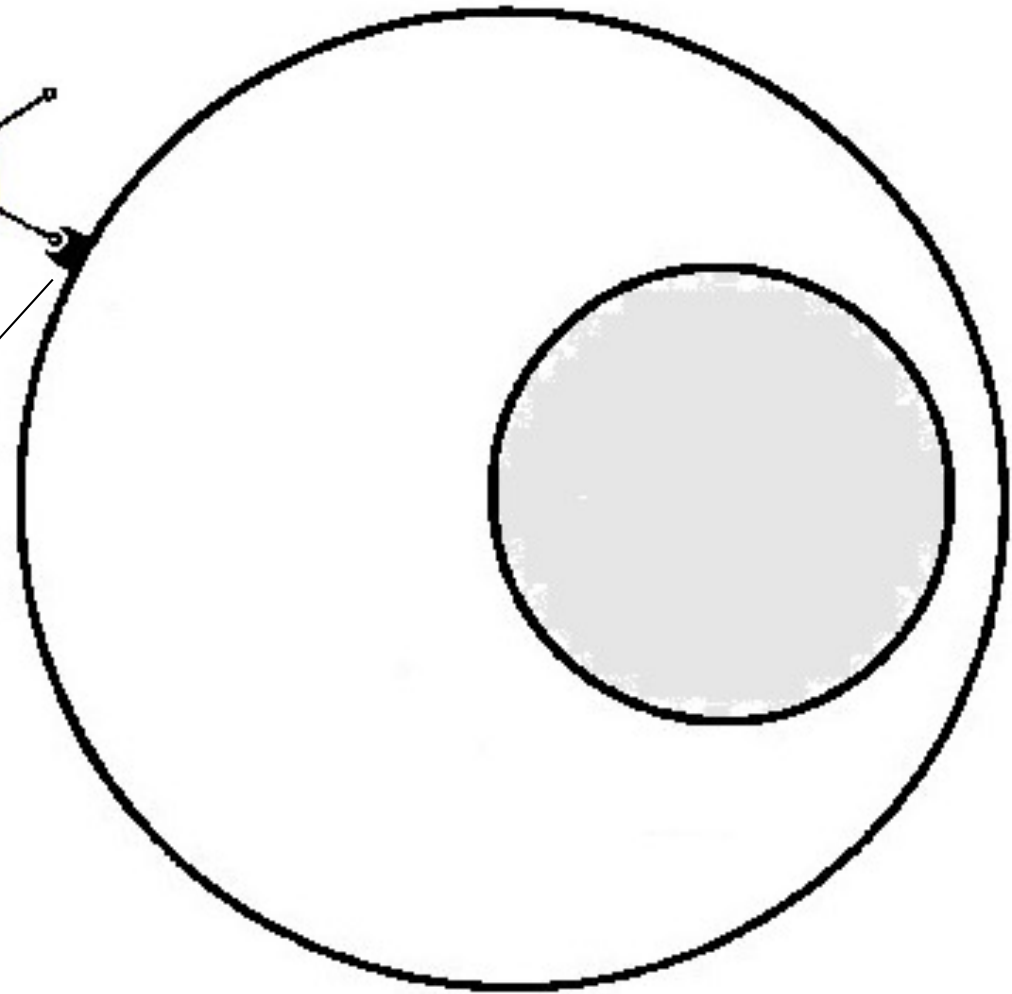


E4 ORF3

**Mature virion**

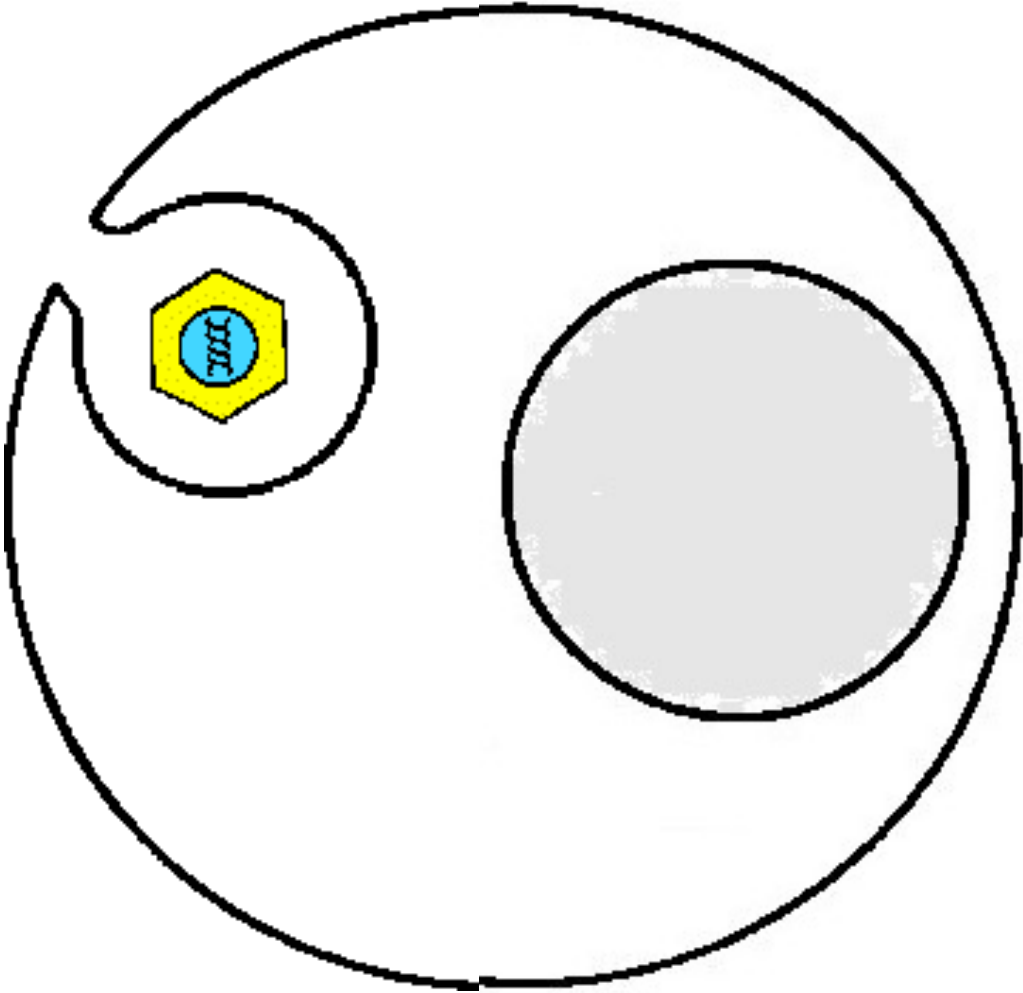


**Attachment**

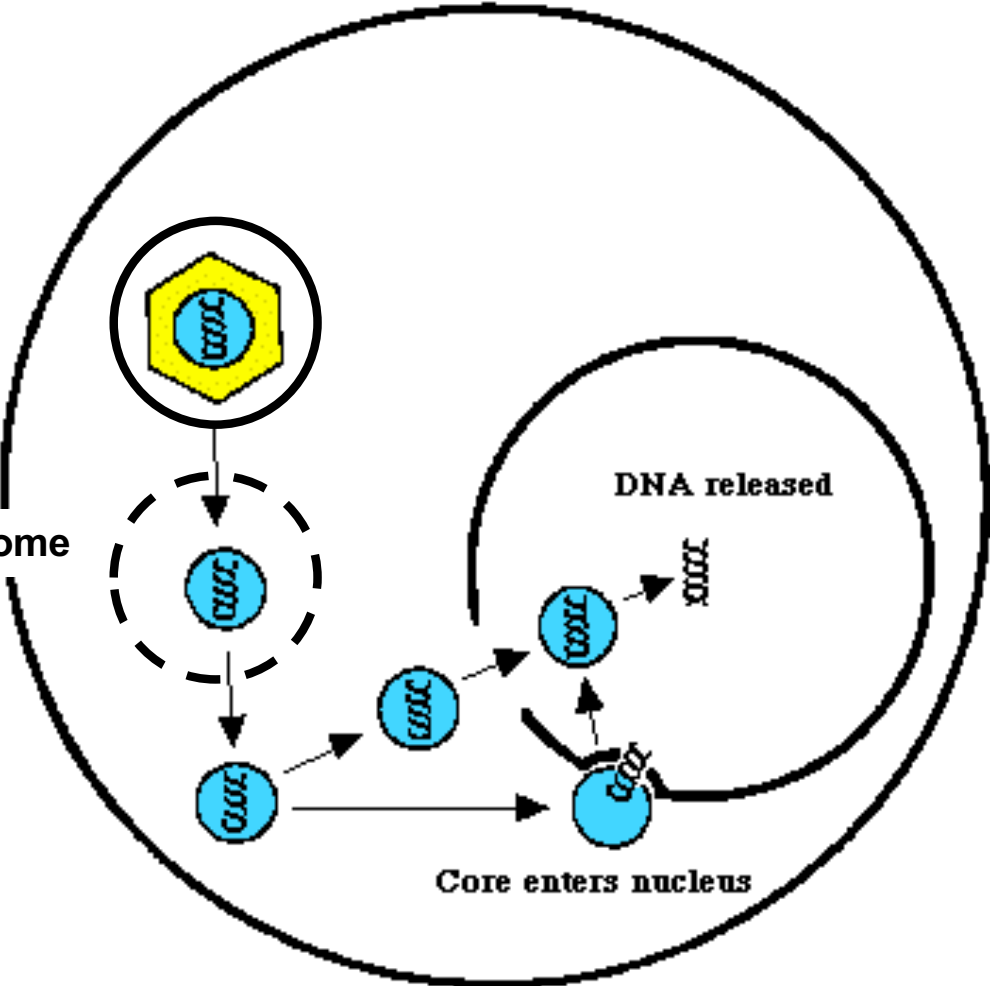


**CAR**  
**(Coxsackie Adenovirus Receptor)**

Phagocytosis



Release from phagosome

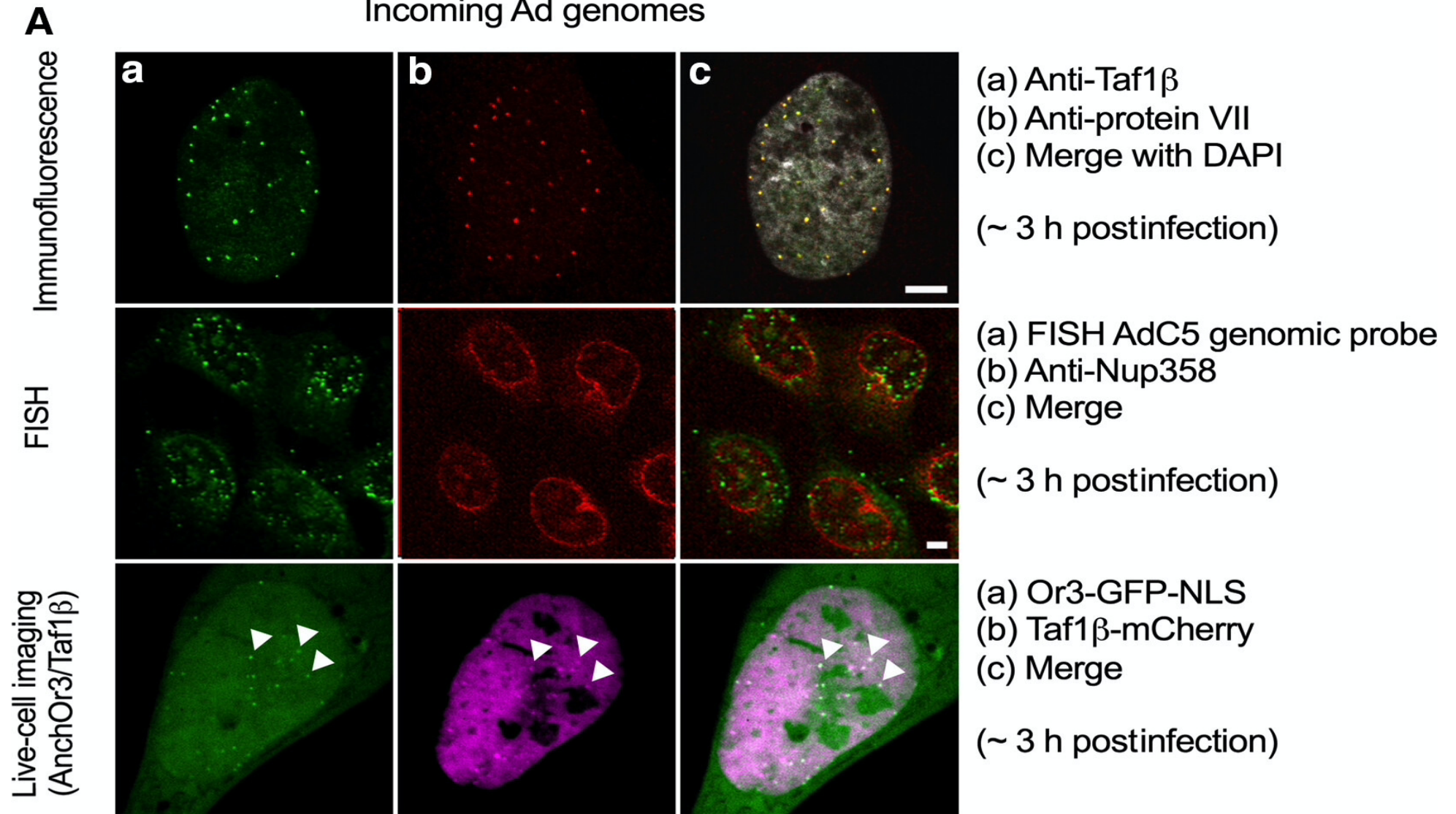


Core enters nucleus

DNA released

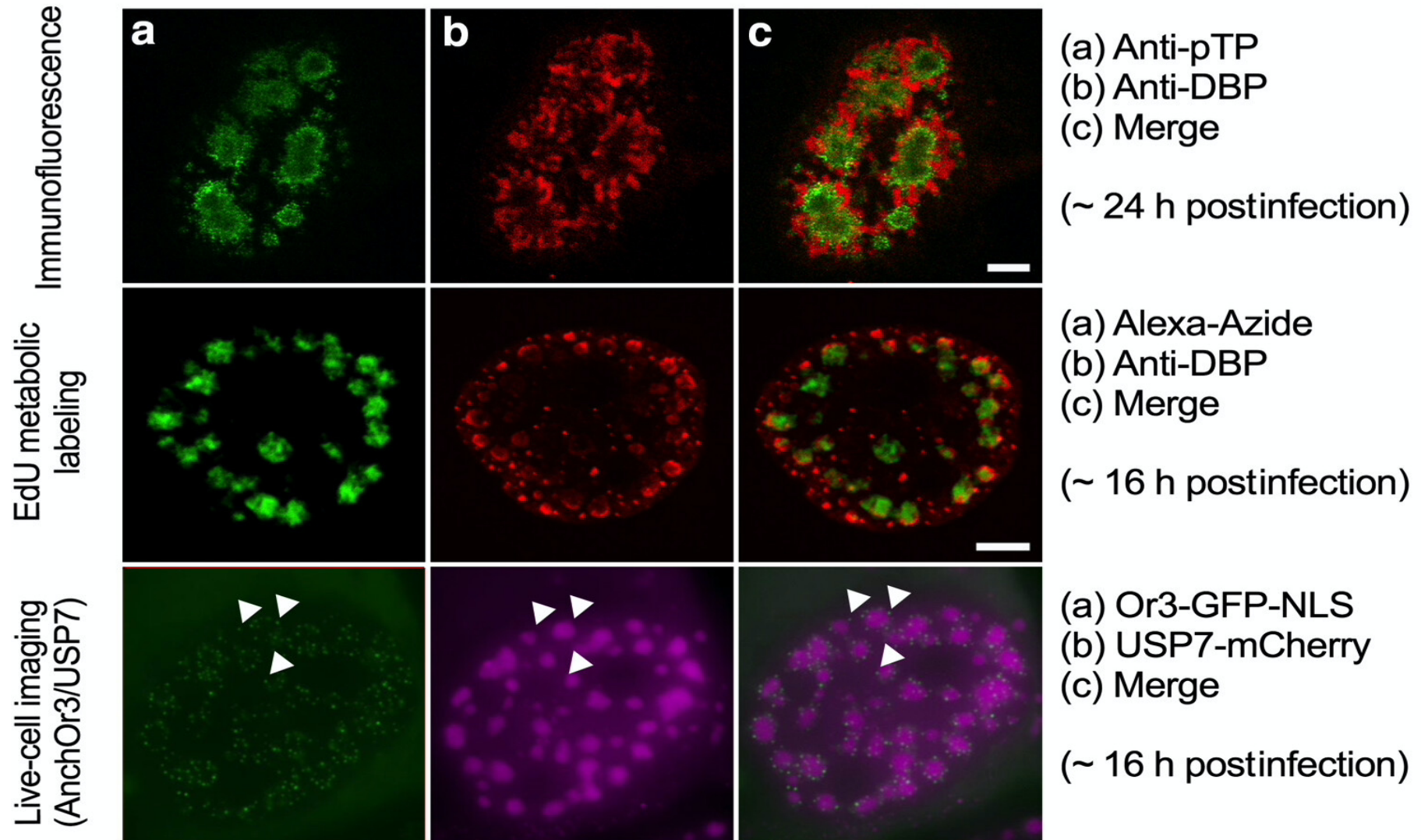


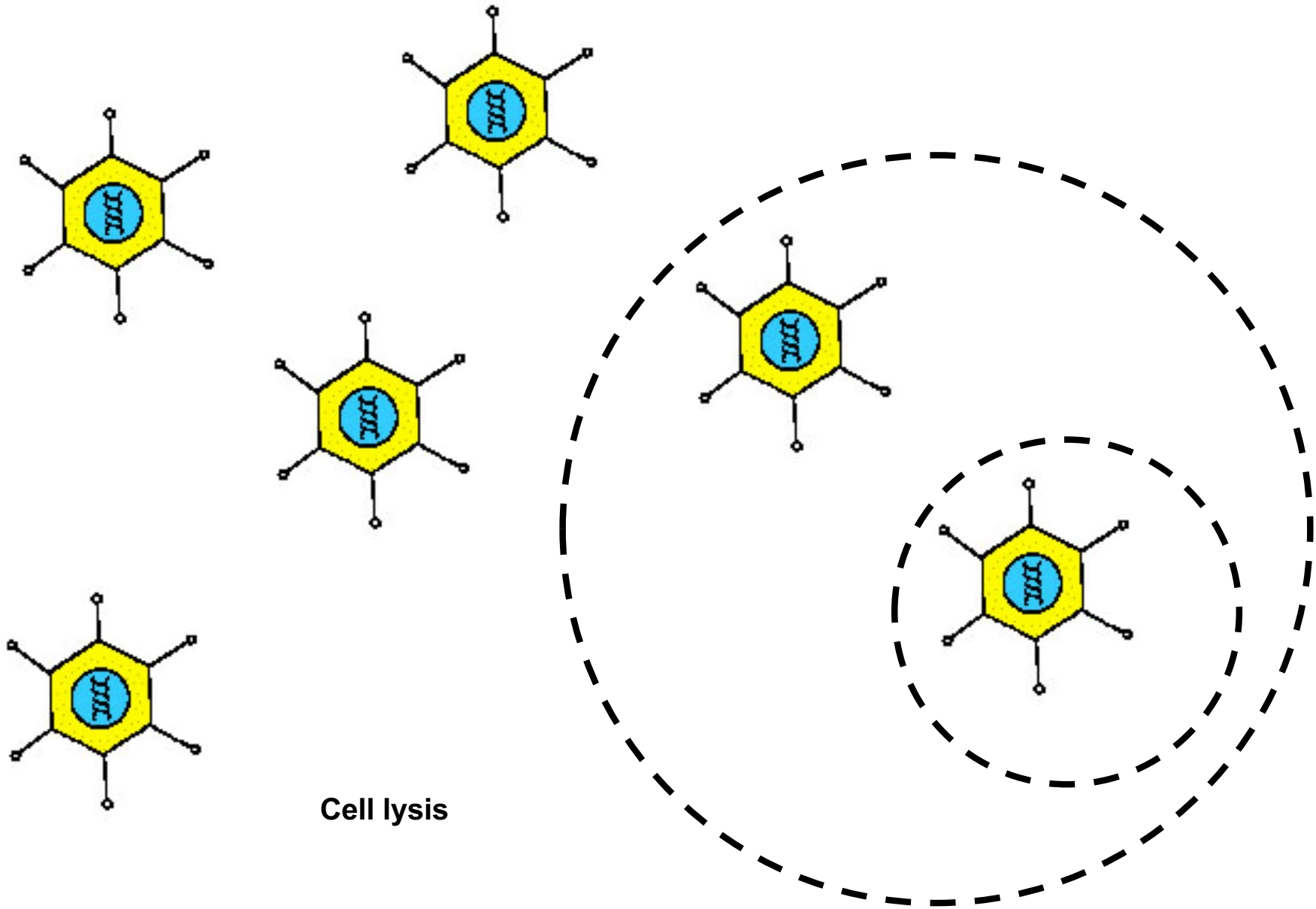
## Incoming Ad genomes



**B**

## Replicating Ad genomes





Cell lysis

# **Splicing dell'RNA**

*Proc. Natl. Acad. Sci. USA*  
Vol. 74, No. 8, pp. 3171-3175, August 1977  
Biochemistry

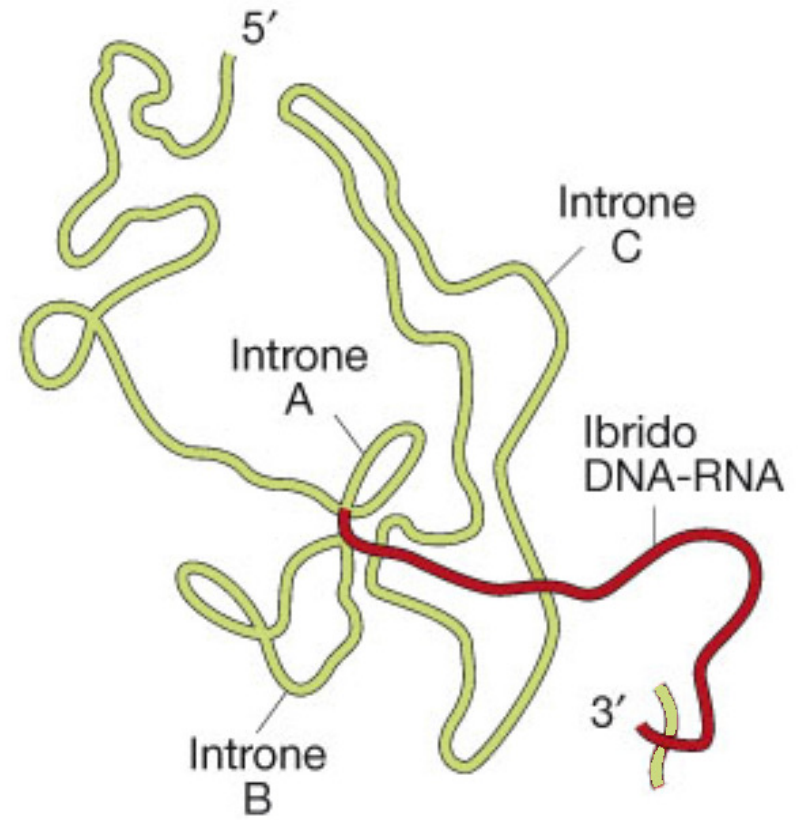
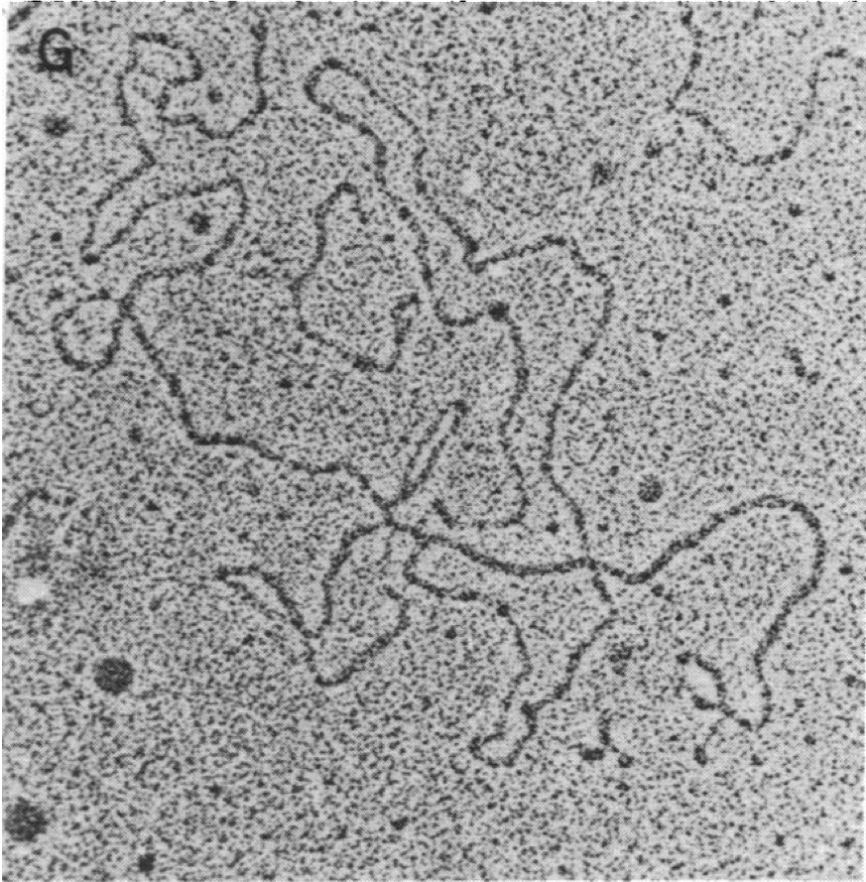
## **Spliced segments at the 5' terminus of adenovirus 2 late mRNA\***

(adenovirus 2 mRNA processing/5' tails on mRNAs/electron microscopy of mRNA·DNA hybrids)

SUSAN M. BERGET, CLAIRE MOORE, AND PHILLIP A. SHARP

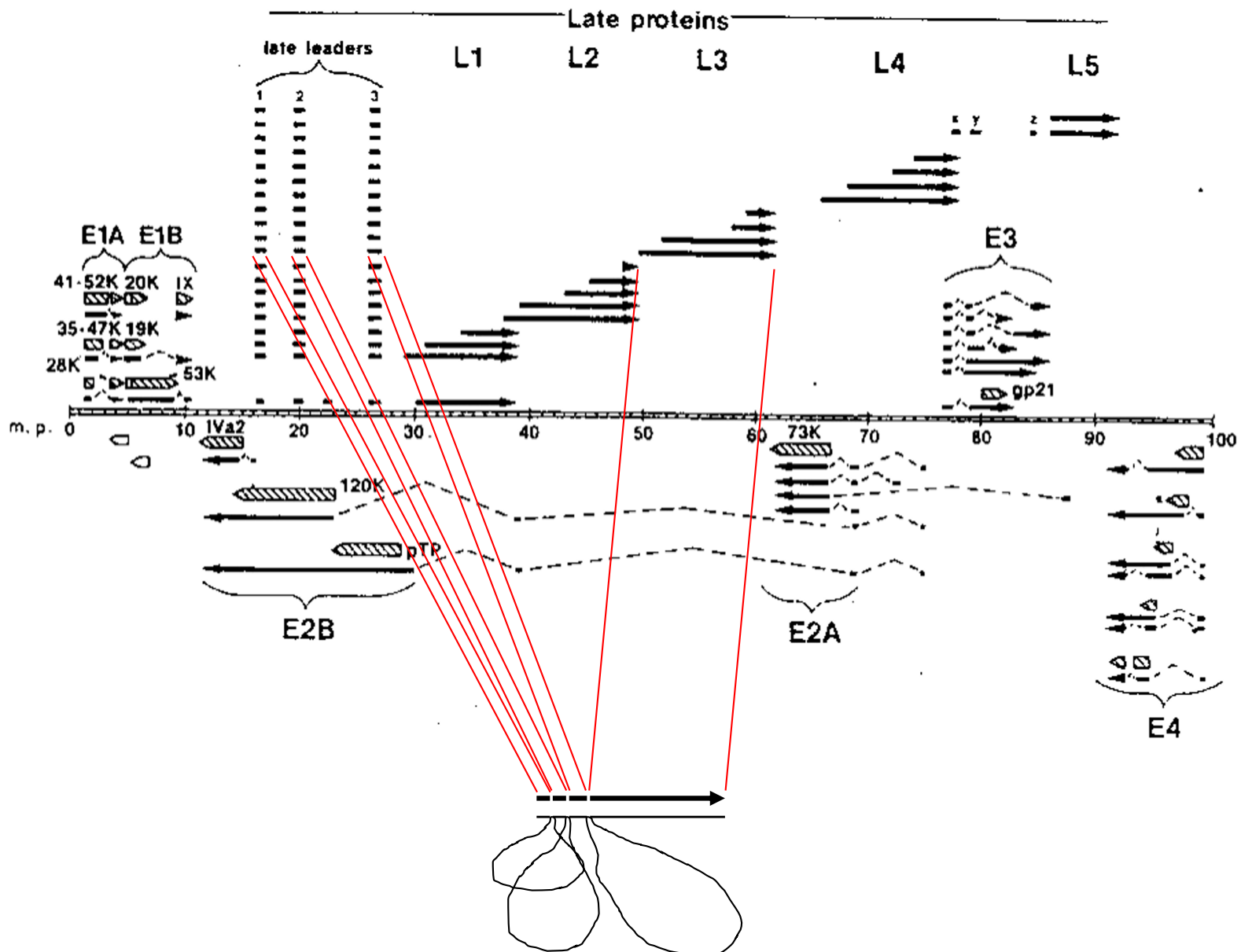
Center for Cancer Research and Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

*Communicated by David Baltimore, May 9, 1977*



Tripartite leader

L3 = hexon

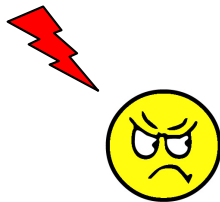


# Oncogenesi

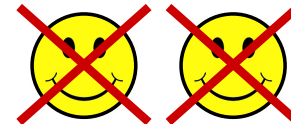


# Tumorigenesi

**Attivazione di  
oncogeni**



**Inattivazione di  
oncosoppressori**



## Esempi di oncosoppressori



p53

Arresto del ciclo cellulare  
Apoptosi



Rb

Controllo del ciclo cellulare  
Differenziamento

# Association between an oncogene and an anti-oncogene: the adenovirus E1A proteins bind to the retinoblastoma gene product

Peter Whyte<sup>\*†</sup>, Karen J. Buchkovich<sup>\*</sup>, Jonathan M. Horowitz<sup>‡</sup>, Stephen H. Friend<sup>‡§</sup>, Margaret Raybuck<sup>\*\*†</sup>, Robert A. Weinberg<sup>‡</sup> & Ed Harlow<sup>\*\*||</sup>

\* Cold Spring Harbor Laboratory, Cold Spring Harbor, New York 11724, USA

‡ Whitehead Institute for Biomedical Research, Cambridge, Massachusetts 02142, USA and Department of Biology, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA

§ Division of Hematology-Oncology, The Children's Hospital, Dana-Farber Cancer Institute, Department of Pediatrics, Harvard Medical School, Boston, Massachusetts 02115, USA

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*One of the cellular targets implicated in the process of transformation by the adenovirus E1A proteins is a 105K cellular protein. Previously, this protein had been shown to form stable protein/protein complexes with the E1A polypeptides but its identity was unknown. Here, we demonstrate that it is the product of the retinoblastoma gene. The interaction between E1A and the retinoblastoma gene product is the first demonstration of a physical link between an oncogene and an anti-oncogene.*

---

REGULATION of cellular proliferation is a complex process that involves both positively and negatively acting signals. Tumourigenesis results from alterations in genes whose protein products are involved in these signalling pathways. The DNA tumour viruses encode a set of proteins that are capable of overriding and reprogramming normal regulation of cellular

growth; consequently, they have been widely used as model systems for studying cellular transformation. The oncogenes—tumour-inducing genes—from polyomavirus, simian virus 40 (SV40) and adenovirus are able to induce a number of distinct changes in cell phenotype, including immortalization, secretion of growth factors, loss of contact inhibition, anchorage-independent growth and morphological transformation. Unlike the transforming retroviruses, these DNA viruses contain oncogenes that do not appear to have cellular homologues. Although functional similarities have been shown between cellular oncogenes

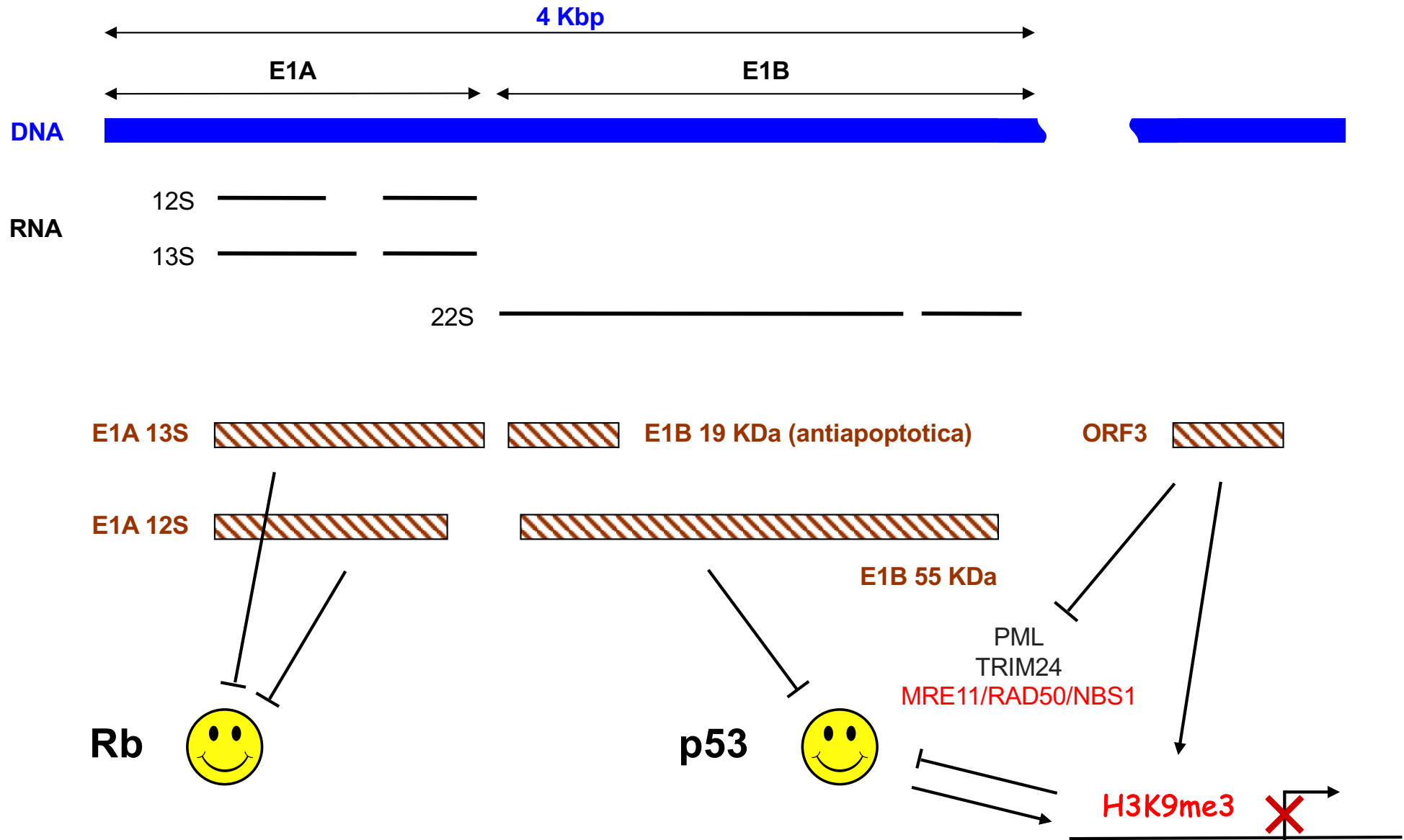
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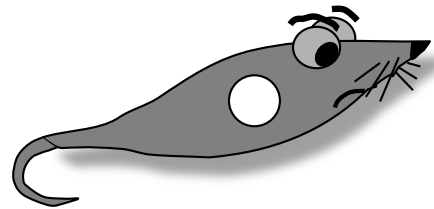
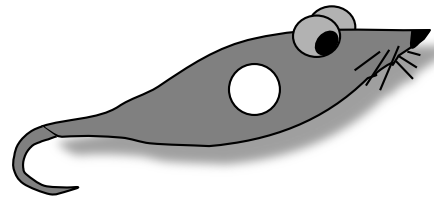
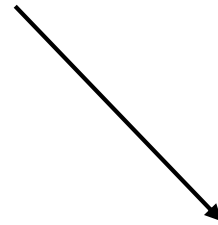
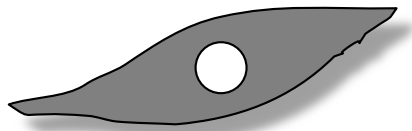
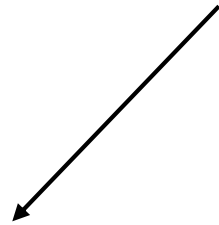
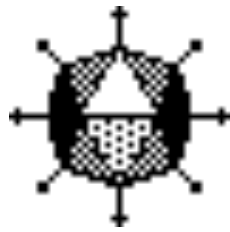
† Present addresses: Fred Hutchinson Cancer Center, 1124 Columbia Street, Seattle, Washington 98104, USA (P.W.) and Amersham International plc., Forest Farm Industrial Estate, Whitchurch, Cardiff, UK (M.R.).

|| To whom correspondence should be addressed.

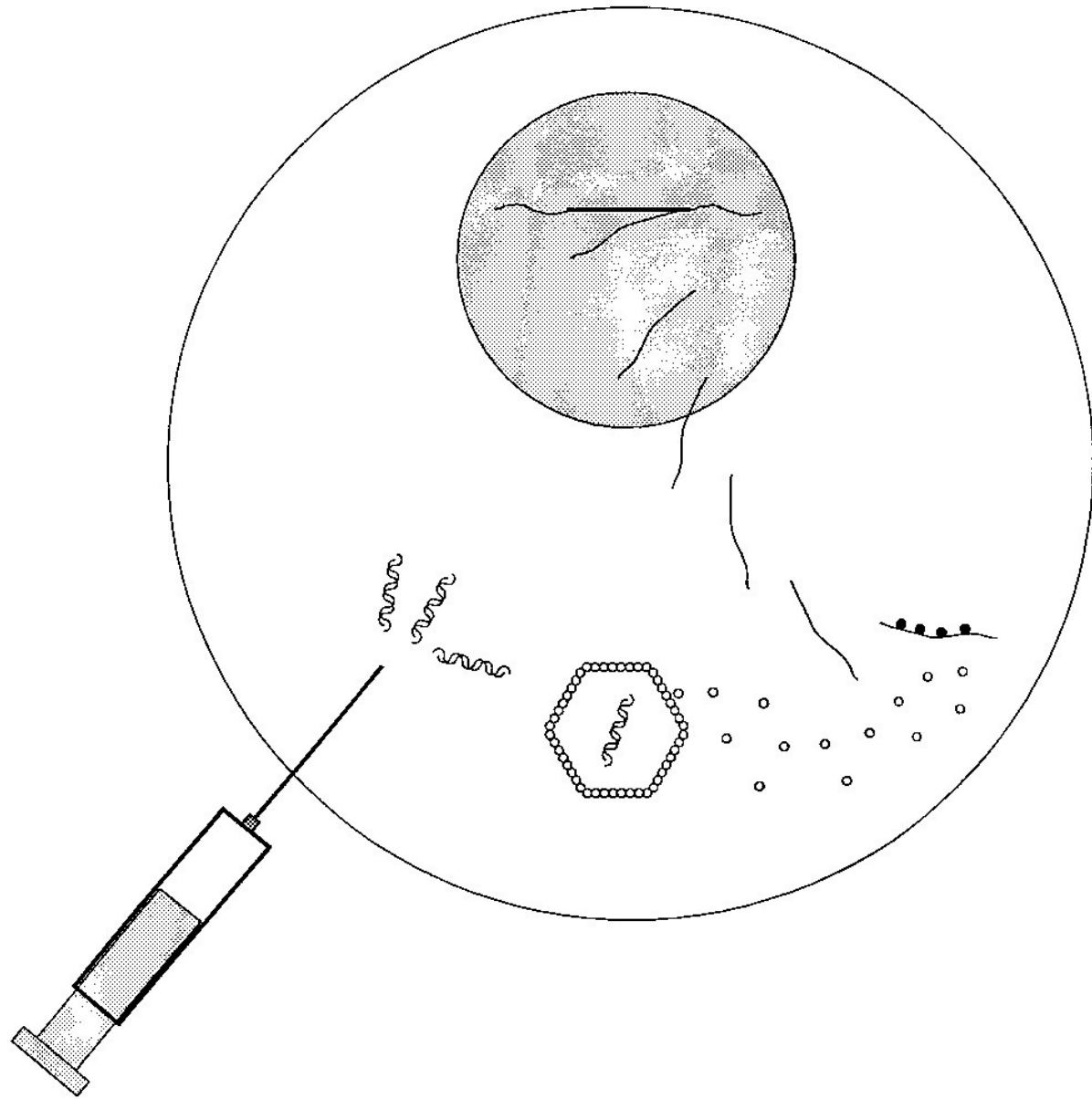
# Regione E1

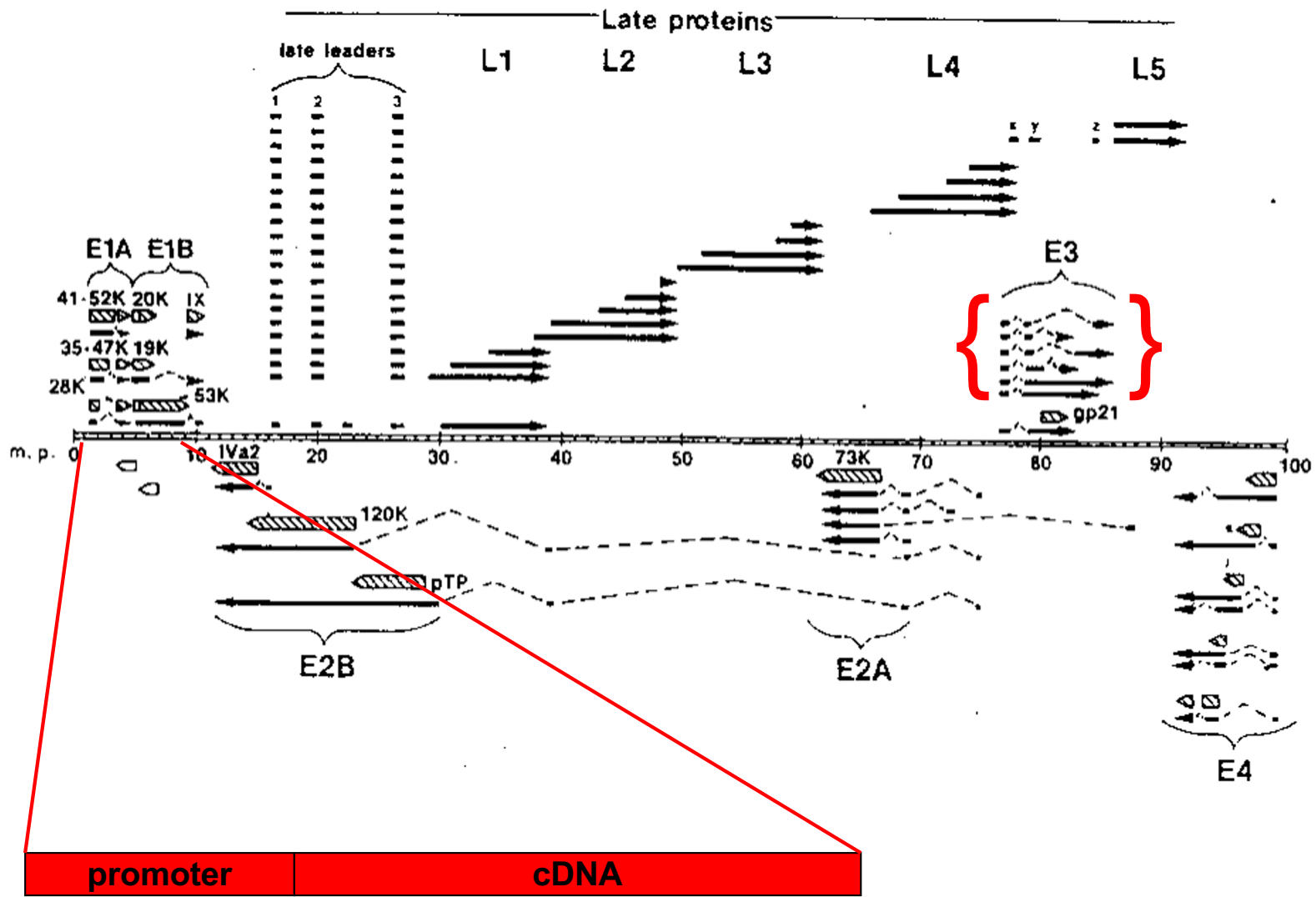
# Regione E4





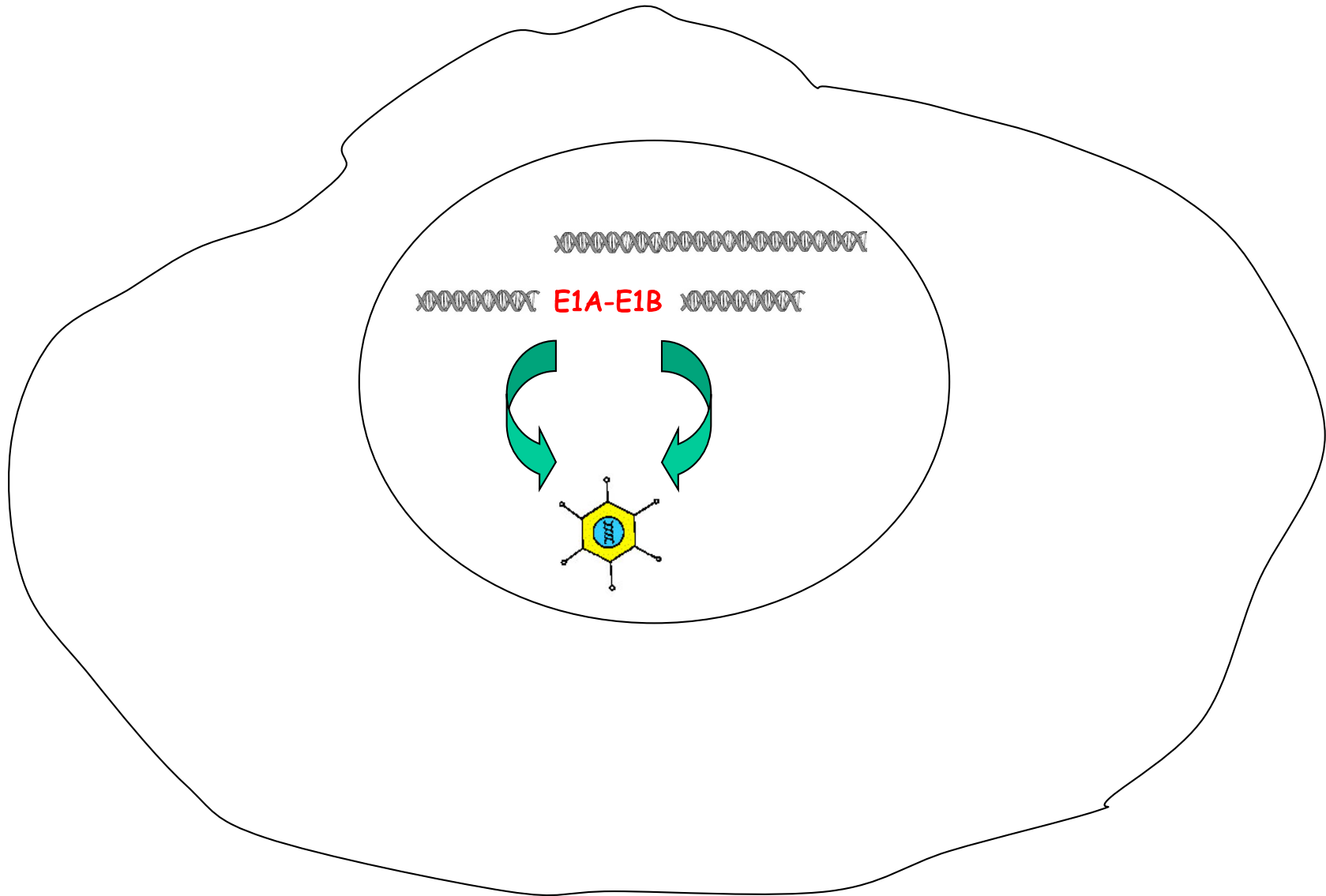
# **Adenovirus ricombinanti**







# HEK-293



# "Gutted" adenoviruses

