

3104NSC

CYCLE 3: DRUG DESIGN

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Drug Design - Course Hub

WHAT CAN DRUG DESIGN ACHIEVE?

- Fame?
- Fortune?
- Altruism?

FAME: CARL DJERASSI - "FATHER OF THE PILL"



Chemist involved in development of oral contraceptive pill

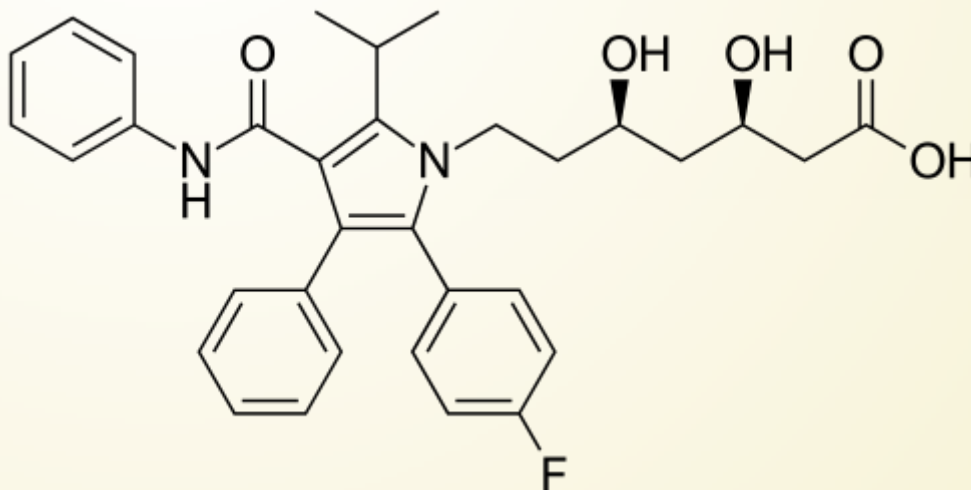
CARL DJERASSI

- published >1,200 academic papers!
- worked in academia & industry
- wrote "Science-in-Fiction" novels, poetry, 4 autobiographies
- 9 "Science-in-Theatre" plays

FORTUNE: LIPITOR - TOP SELLING DRUG

Lipitor (atorvastatin) is the highest selling drug of all time

- >\$148,744,000 lifetime sales!

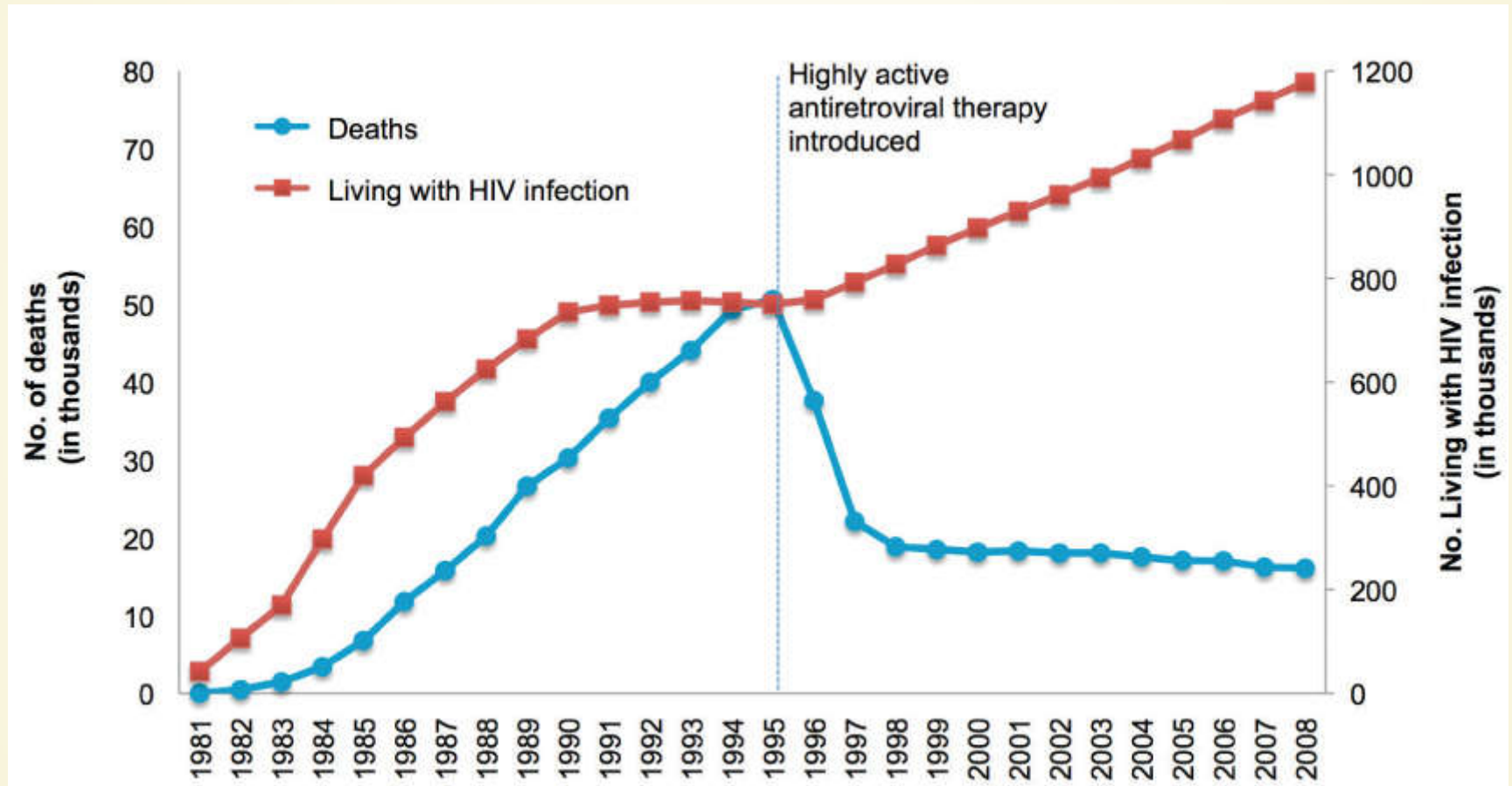


LIPITOR

A "statin" - used in prevention of cardiovascular disease

- lipid-lowering agent
- inhibits HMG-CoA reductase

ALTRUISM: HIV/AIDS - USA

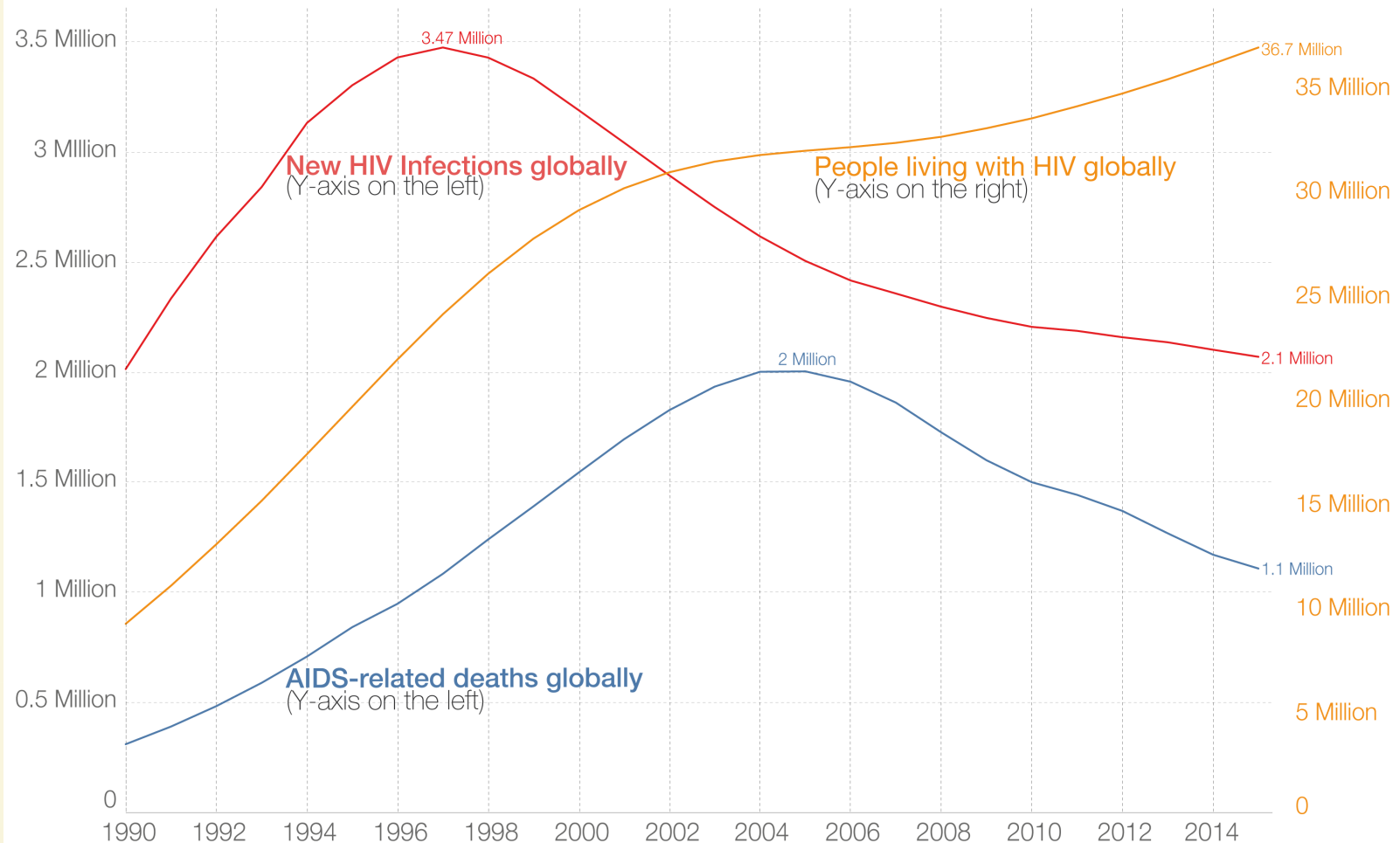


Source: Centers for Disease Control and Prevention

ALTRUISM: HIV/AIDS - GLOBAL

Global number of AIDS-related deaths, new HIV Infections, and People living with HIV (1990-2015)

Our World
in Data



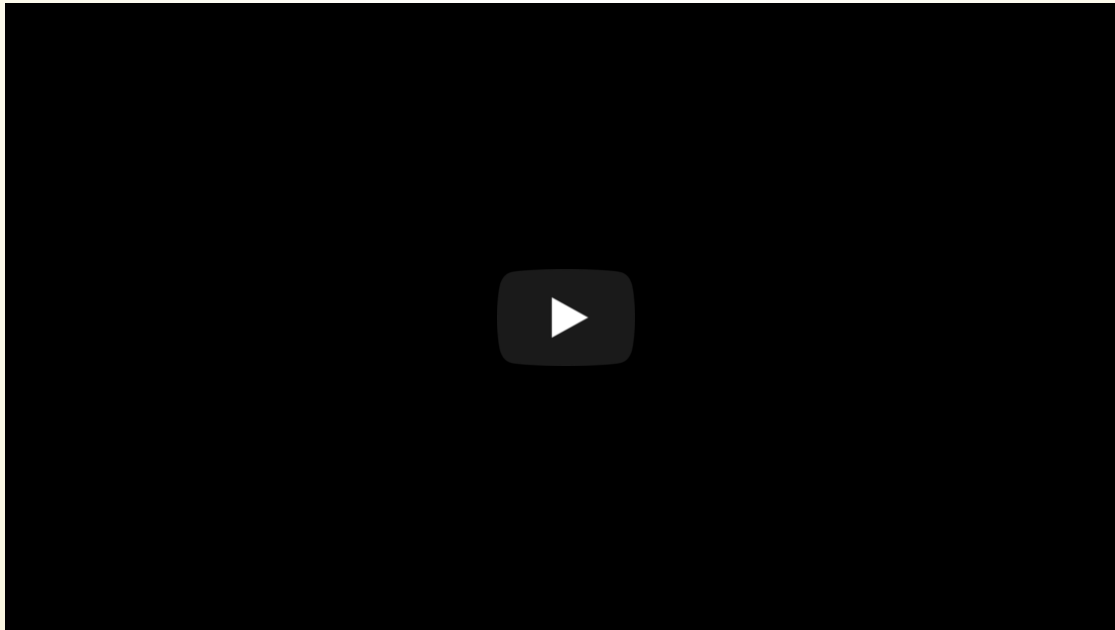
Data source: UN AIDS (via www.aidsinfoonline.org)

The data visualization is available at OurWorldinData.org. There you find more visualizations and research on HIV/AIDS.

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HIV/AIDS: 1987 AUSTRALIAN AD CAMPAIGN

In 1987, HIV/AIDS posed an enormous public health concern. In Australia, this prompted one of the most controversial (and scary, to those of us alive during the 1980's!) public awareness advertising campaigns of the era:



ALTRUISM: TESTICULAR CANCER

Before 1960s, metastatic testicular cancer was one of the biggest killers of young men:

- **<10%** alive after *1 year*

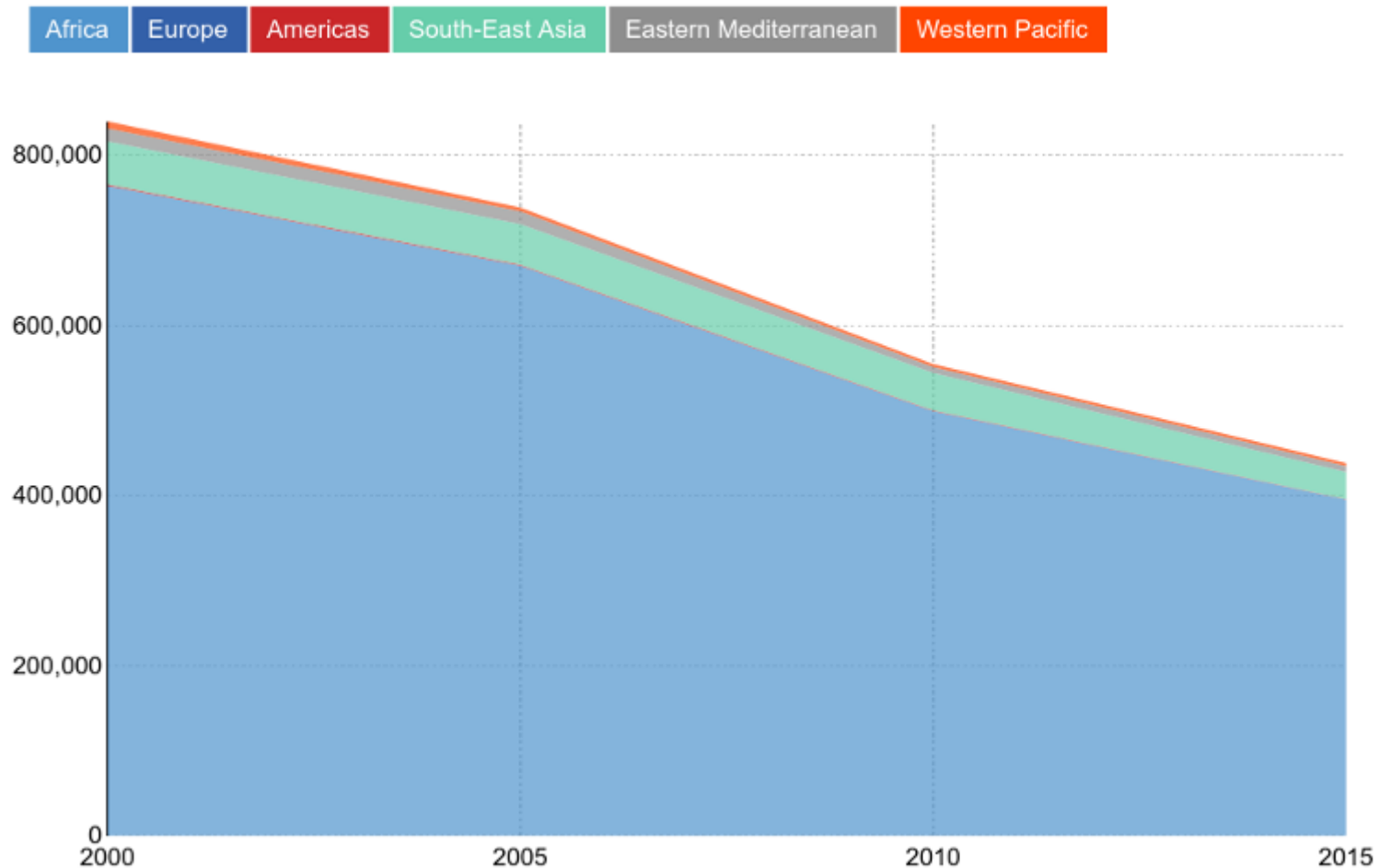
Today, advances in surgery, radiation and especially chemotherapy:

- **>95%** *cure* of all patients

ALTRUISM: MALARIA NEXT?

Global malaria deaths by world region

Our World
in Data



Source: Deaths by World Region (WHO)

OurWorldInData.org/malaria/ • CC BY-SA

MALARIA: MEDICINES FOR MALARIA VENTURE (MMV)

Griffith University has strong ties to the **MMV**:



The image is a screenshot of the Medicines for Malaria Venture (MMV) website banner. At the top left is the MMV logo, consisting of the letters 'MMV' followed by four colored circles (purple, red, pink, and a small purple dot) and the text 'Medicines for Malaria Venture' below it. At the top right are a magnifying glass icon and a hamburger menu icon. A purple banner across the middle contains the text 'Developing antimalarials to save lives' in white. Below this is a photograph of a smiling man and woman with two young children in a rural setting with thatched huts. A semi-transparent white circle on the right side of the photo contains the text: 'Annual Report now online! Read up-to-date articles highlighting our activities for 2016.' At the bottom are navigation arrows: a left arrow, three circles (the middle one is filled), and a right arrow.

MMV Medicines for Malaria Venture

Developing antimalarials to save lives

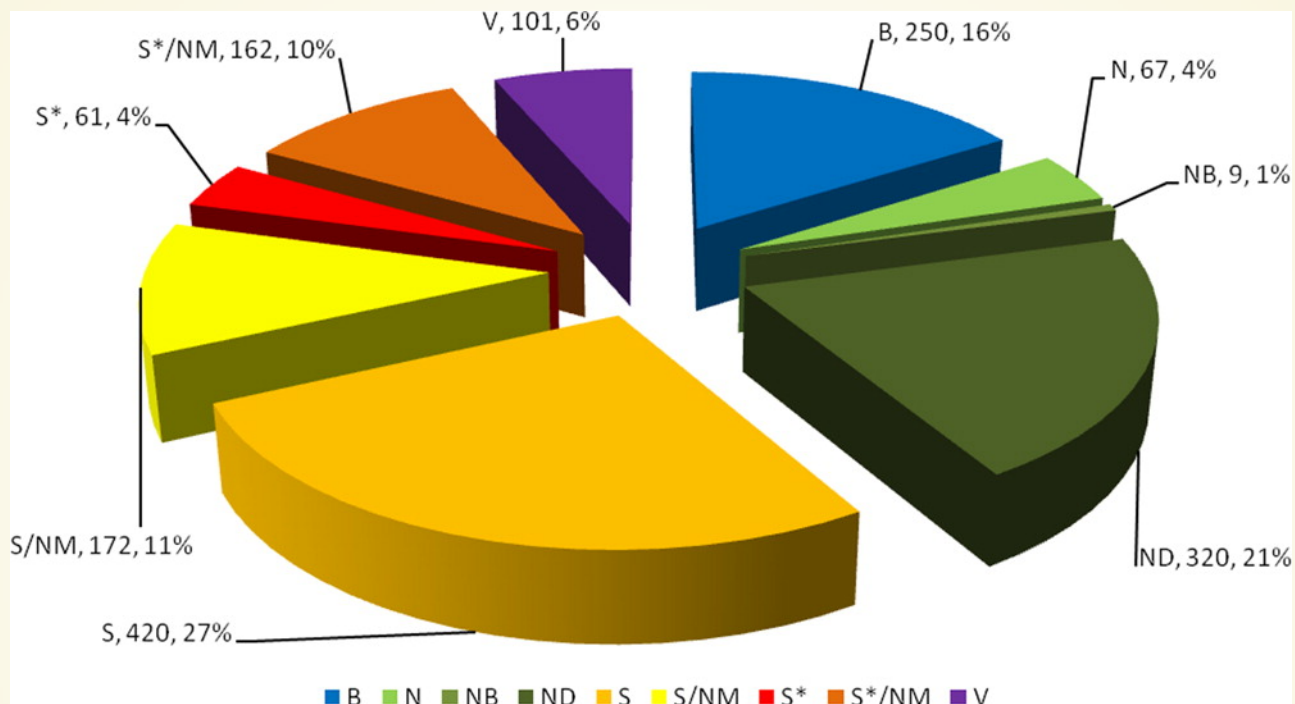
Annual Report now online!
Read up-to-date articles
highlighting our activities for 2016.

SYNTHESIS IN DRUG DISCOVERY

- Organic synthesis plays a vital role in modern drug discovery
- Despite advances in 'biologics', most drugs are still small, organic molecules ($M_w < 900$)
- If you can't make anything, you can't do anything:

No-one has ever been cured by a virtual medicine!

DRUG ORIGINS 1981-2014



code	brief definition/year
B	Biological macromolecule, 1997
N	Unaltered natural product, 1997
NB	Botanical drug (defined mixture), 2012
ND	Natural product derivative, 1997
S	Synthetic drug, 1997
S*	Synthetic drug (NP pharmacophore), 1997
V	Vaccine, 2003
/NM	Mimic of natural product, 2003

SUMMARY:

Whether your interest is fame, fortune or altruism,
drug discovery allows you to make major global impact

WITHOUT SYNTHESIS, THERE IS

NO FAME

NO FORTUNE

NO HUMANITARIAN IMPACT!