

Conflict of Interest Disclosure

Sanjiv Chopra, M.D., MACP

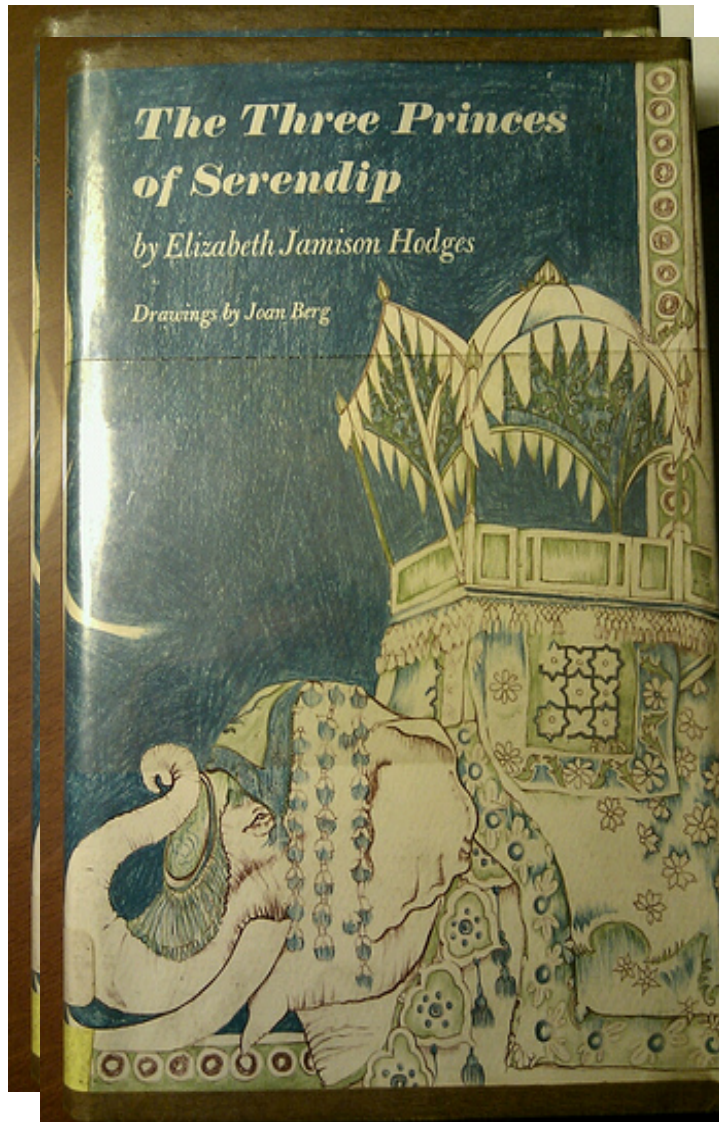
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The Top Stories In Medicine In the Last One Hundred Years

**Sanjiv Chopra, M.D., MACP
Professor of Medicine, Harvard Medical School**

**Marshall Wolf Master Clinician Educator
Brigham and Women's Hospital**

The Three Princes of Serendip



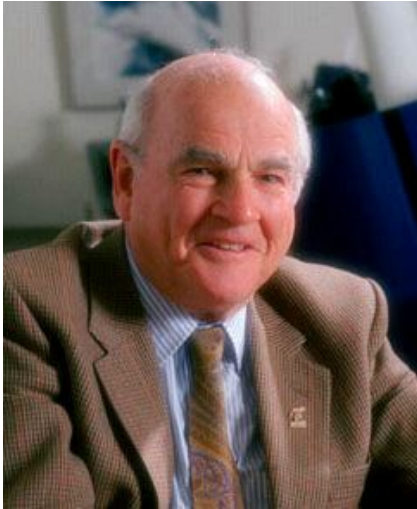
Whose heroes were always making discoveries by accidents and sagacity, of things they were not in quest of.

In the field of observation, chance favors only the prepared mind.



Louis Pasteur

A Tale of Serendipity



**Baruch Blumberg, M.D. and
the Discovery of Australia
Antigen**

Polymorphism

Occurrence in the natural habitat of two or more discontinuous and presumably inherited forms of a species in such proportions that the rarest of them cannot be maintained merely by recurrent mutation.

E.B. Ford

A "New" Antigen in Leukemia Sera

Baruch S. Blumberg, MD and Harvey J. Alter, MD

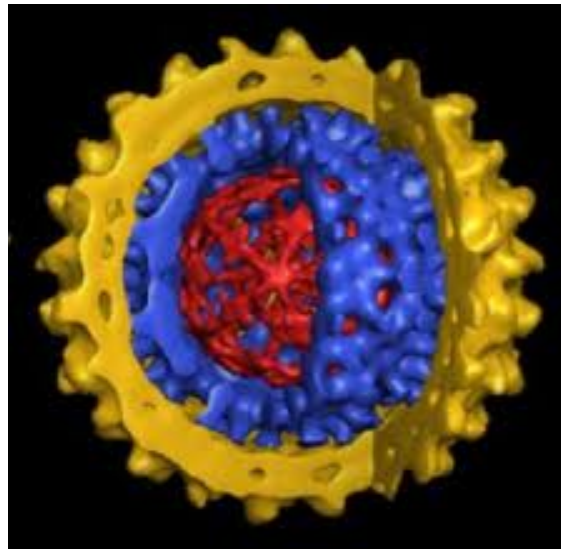
JAMA. 1965;191(7):541-546.



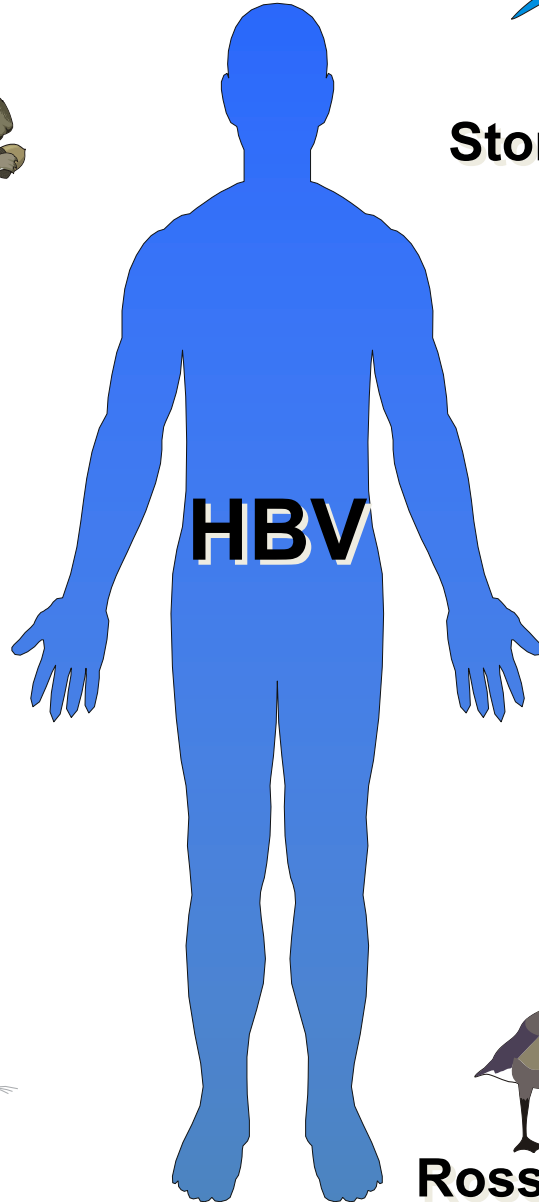
Biology of Hepatitis B

- Nobel lecture December 13, 1976 by Blumberg
- Fascinating read in the July 1977 issue of Science

The Hepatitis B Virion



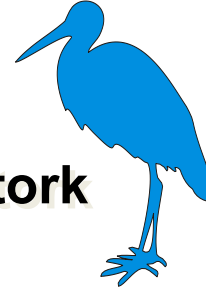
Hepadnaviruses



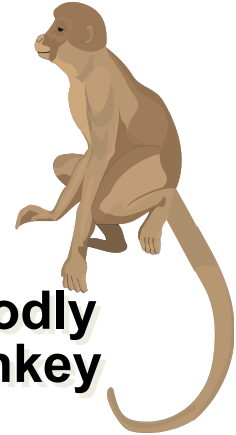
Tree squirrel



Stork



Woodly monkey



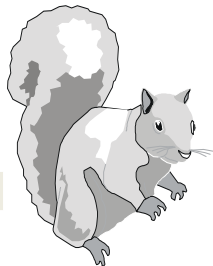
Ground squirrel



Woodchuck



Arctic ground squirrel



Heron



Duck



Ross Goose



HBV Transmission



Unusual Mode of HBV Transmission

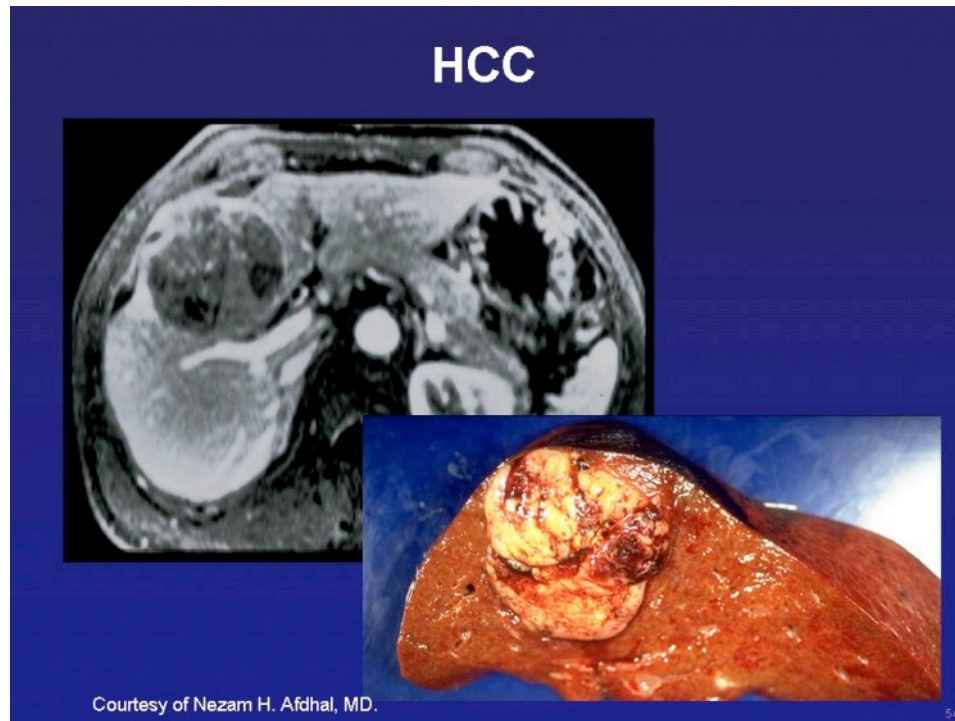


Orienteering

World Wide Burden of HBV

**350 - 400 million people worldwide
afflicted with chronic HBV.**

PHCC in Chronic HBV



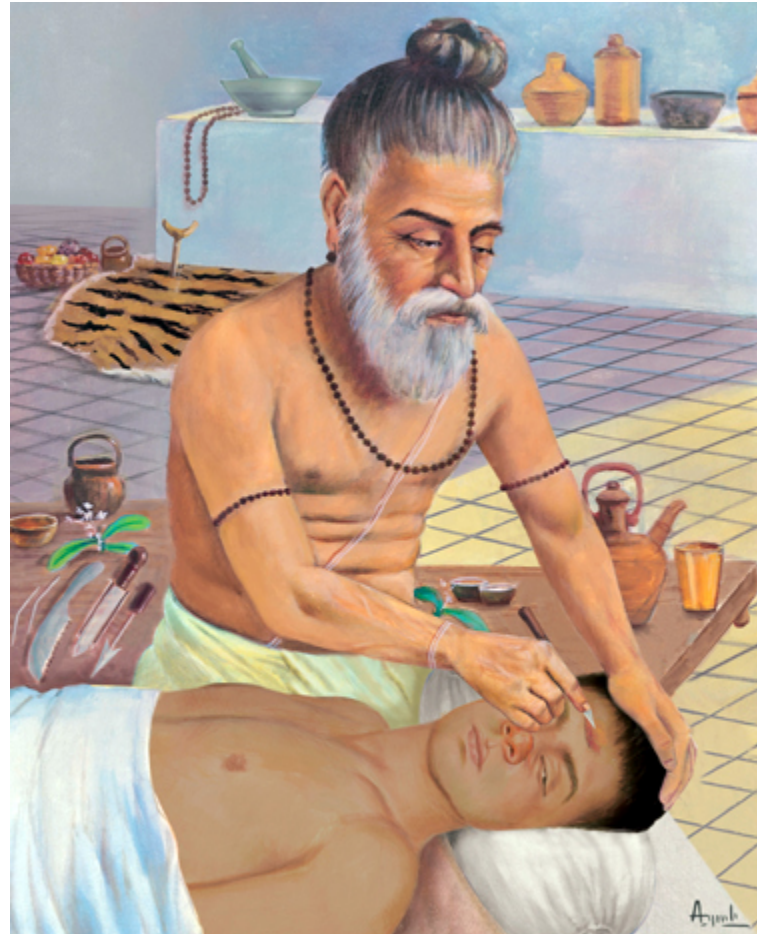
The Hepatitis B Vaccine is Truly the First Anti-Cancer Vaccine !

Prevalence of HBsAg carrier rate in Taiwan decreased
from 15% to 1.5% !

Childhood HCC mortality decreased by 75% !

Chen HL et al. JAMA 1996;276:906

Chang MH et al. N Engl J Med 1997;336:2855



Sushruta: 600-512 B.C. Indian Physician who advocated the Caesarian section, removal of kidney stones and cataracts, and catalogued 101 types of surgical instruments. He also wrote an excellent descriptions of a disease resembling **cholera** in the Sushruta Samshita in Sanskrit.

May God be with me! May Heaven bless this New Year. May it be a year of fruitfulness, of peace and prosperity; may it be a year of peace and unity for all mankind; **may the world be freed of cholera.**



Giacomo Meyerbeer 1791-1864

Cholera: A disease that begins, where other diseases end...with death.



Two Seminal Observations in the Early 1960's

- Discovery of the sodium-glucose co-transport as the mechanism for intestinal glucose absorption (Robert K. Crane).
- Intestinal mucosa intact in cholera and capable of absorbing water.



As a young physician working in Bangladesh, Dr. Richard Cash was instrumental in completing the first successful clinical trial of oral rehydration therapy on patients with severe diarrhea. He captured this image of a cholera patient who required nearly 150 liters of fluid resuscitation.

Haiti Earthquake, 2010

Burden of Cholera

- More than 6% of Haitians afflicted
- 717,000 cases of **Cholera**
- 8,200 deaths



Yemen Cholera Outbreak 2017

- A country ravished by war, economic collapse and near famine suffers from devastating cholera outbreak.
- 700,000 suspected cases in total with 7,000 new cases a day (October, 2017).

Peter Bent Brigham Hospital, Boston 1954



Bond of Brothers



Richard and Roland Herrick

Richard, a difficult patient

“Since admission patient has been extremely uncooperative. Has knocked over infusions, has been restrained, has been moved to side room because of loud outbursts. Restless, cursing all members of the House Staff.”

“Rather a difficult p.m. . . . Is extremely uncooperative. Behavior erratic and unpredictable. Bit nurse on hand while bed linen being changed. . . .”

October 27th, 1954

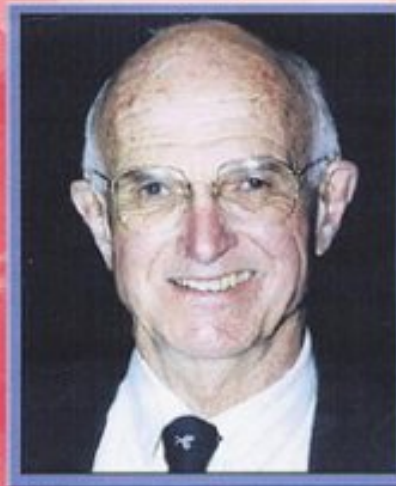
SCIENCE

UNLOCKING THE SECRETS OF

Profiling the Achievers in Science, Medicine & Technology

*Joseph E. Murray
and the Story of the
First Human Kidney
Transplant*

Joanne Mattern



Important Milestones

First Successful ...

1954 **Kidney** Transplant

1967 **Liver** Transplant

1968 **Heart** Transplant

1968 **Pancreas** Transplant

1981 **Heart-Lung** Transplant

1989 **Living Related Liver** Transplant

2011 **Full Face** Transplant

2012 **Kidney** Transplant Chain



Artie was challenged by his
cardiologist to run the
Boston Marathon.



Artie Michaels' Inspiring Story

- Primary Sclerosing Cholangitis dx 1989.
- Liver transplant 1990. Surgery lasted 19 hrs.
- 1992 routine check-up, cardiologist challenges him to a race in the Boston Marathon.
- He ran it ... each mile was a major accomplishment. The strain was great but he completed the 26 mile run and finished the race ahead of the cardiologist who was 20 years his junior!

Kidney Transplant Chains

Historic record set involving 60 individuals, 30 donors and 30 recipients.

Carried out over 4 months, in 17 hospitals, in 7 states.

The New York Times

60 Lives, 30 Kidneys, All Linked



**What is the Most Common
Chronic Infection in Man ?**

H.Pylori



Serendipity ...

After numerous attempts to culture the bacteria, Barry Marshall and Robin Warren finally visualized bacterial colonies in 1982.

They had unintentionally left their petri dishes incubating for 5 days over the Easter weekend.



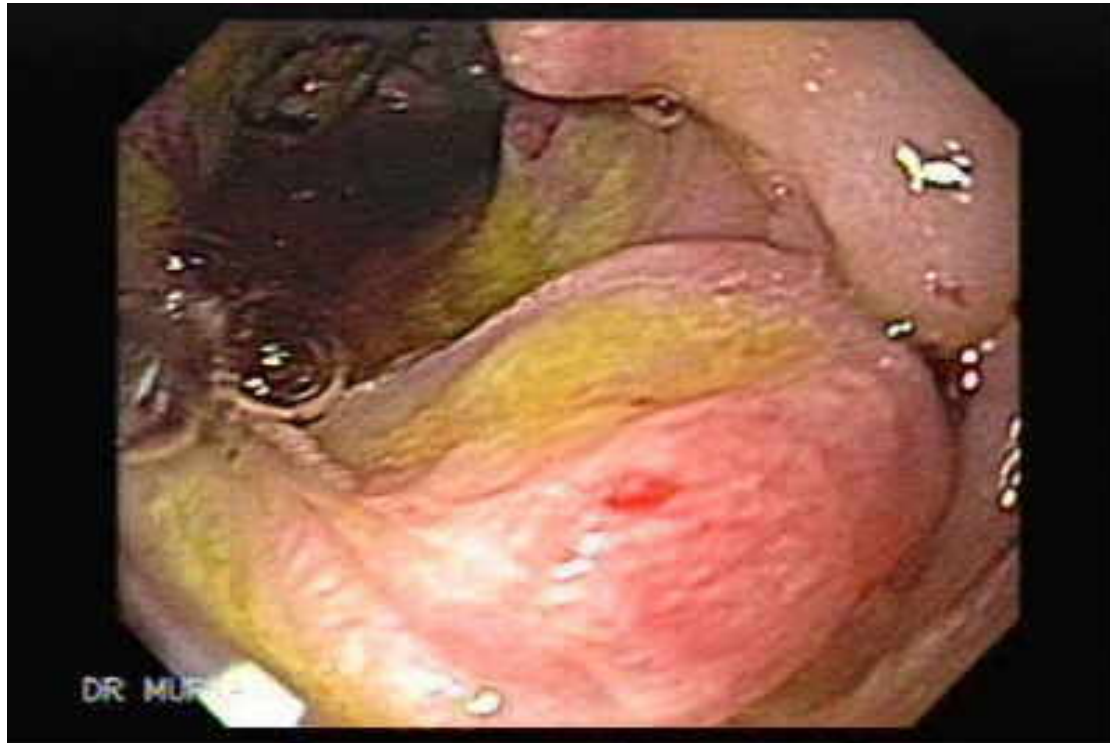
Marshall and Warren

Marshall BJ, Warren JR: Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration.

Lancet 1984;1:1311-5

- # More Than Half of the World Population Infected with H.Pylori !
- **100%** of infected patients have **gastritis**.
 - Less than **10%** develop **peptic ulcer disease**.
 - Less than **2%** develop **Gastric Cancer, Gastric Lymphoma or Gastric Maltoma**.

Gastric Maltoma



Karl Schwarz's Dictum 1910

No Acid, No Ulcer

2012 Dictum

No H.Pylori, No Ulcer

So Is It

pH or Hp ?

Enough said about the topic
(NSAID)

Essentially **3** Causes of Duodenal Ulcer

Acid Hypersecretion

H.Pylori

NSAIDS

Medical Imaging

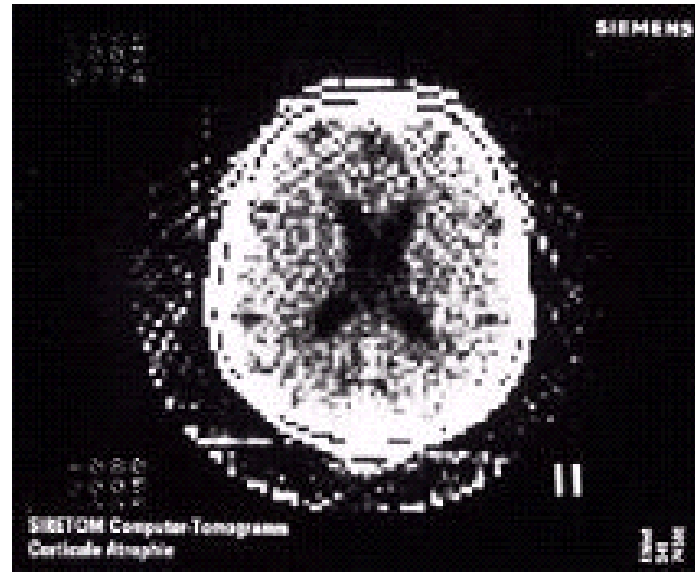
From the very first x-ray to molecular imaging



Wilhelm Röntgen



First CT scan image



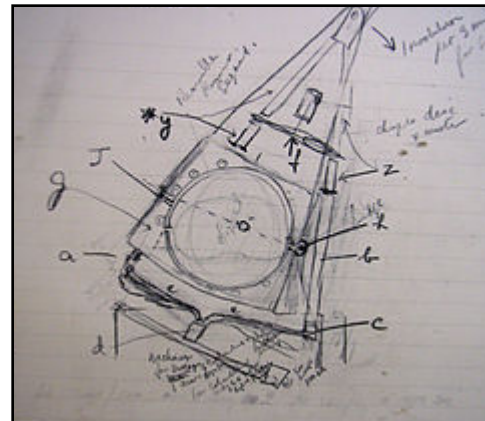
CT was invented in 1972 by British engineer Godfrey Hounsfield of EMI Laboratories, England and by South Africa-born physicist Allan Cormack of Tufts University, Massachusetts. Hounsfield and Cormack were later awarded the Nobel Peace Prize for their contributions to medicine and science. The first CT scanner developed by Hounsfield in his lab at EMI took several hours to acquire the raw data for a single scan or "slice" and took days to reconstruct a single image from this raw data.

Nobel Prize 1979

Godfrey N. Hounsfield



Allan M. Cormack



EMI - Electric and Musical Industries Ltd

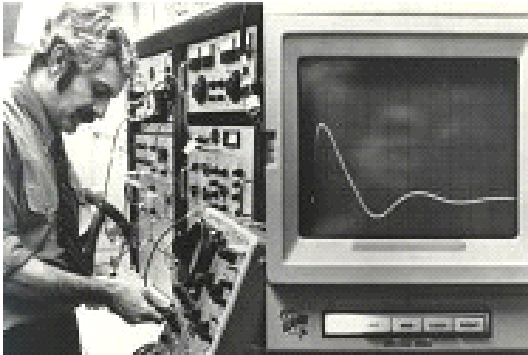
Investor in:

Airborne RADAR, CT Scanners, and...

EMI - Electric and Musical Industries Ltd

Investor in Airborne RADAR, CT Scanner, and **the BEATLES**

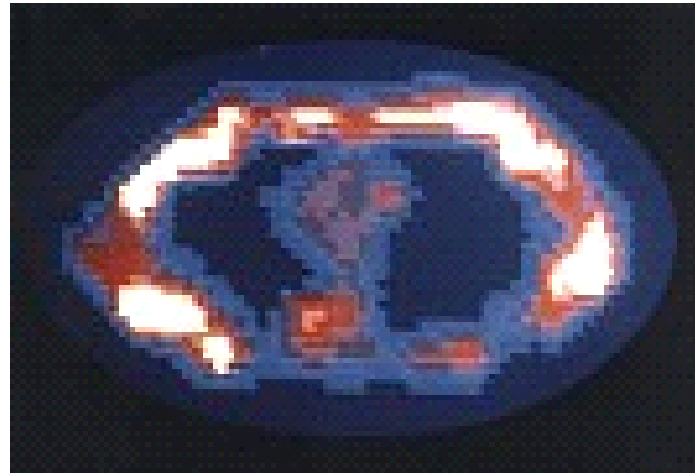




Dr Raymond Damadian developed first MR scanning machine



Post doc fellows



First human MR image – chest of his fellow, Dr Minkoff

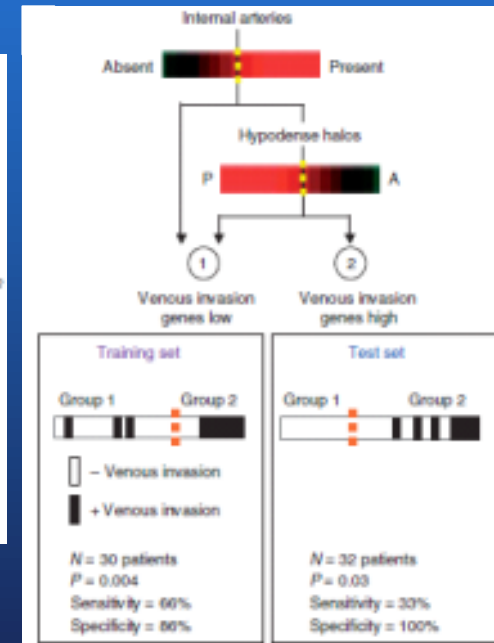
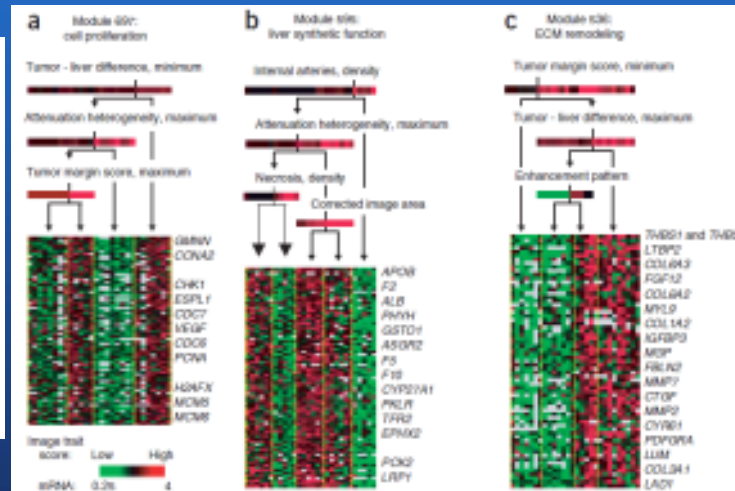
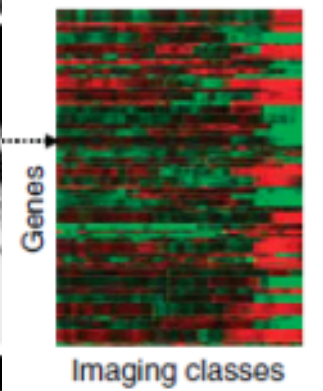
Linking gene expression and imaging traits

Imaging traits in HCC

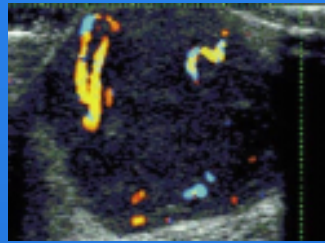
Constructing an association map

Molecular portraits of HCC derived from imaging traits

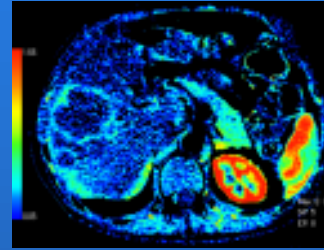
Imaging traits that predict venous invasion



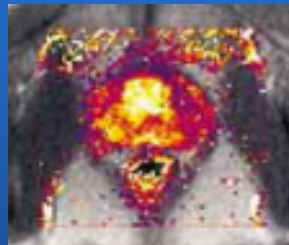
Contrast
Ultrasound



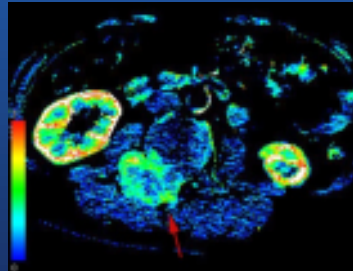
CT Perfusion
mapping



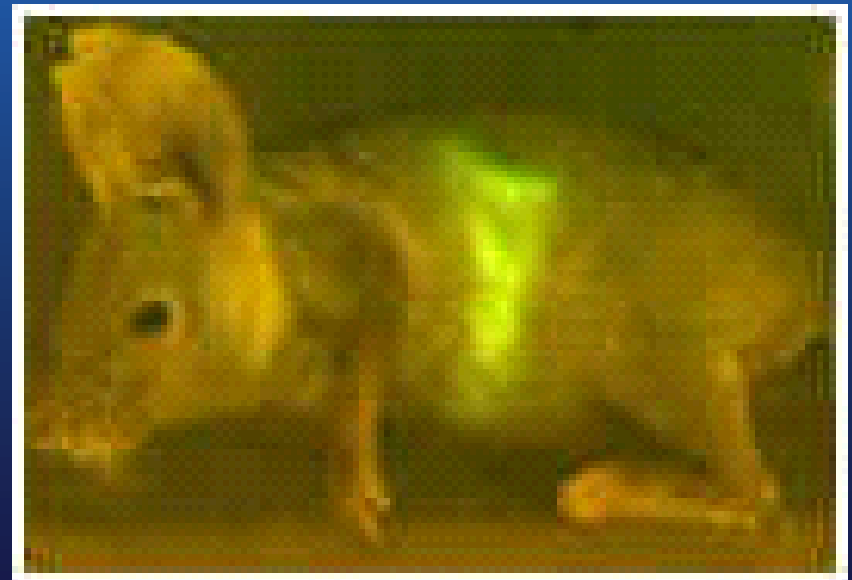
Functional MRI



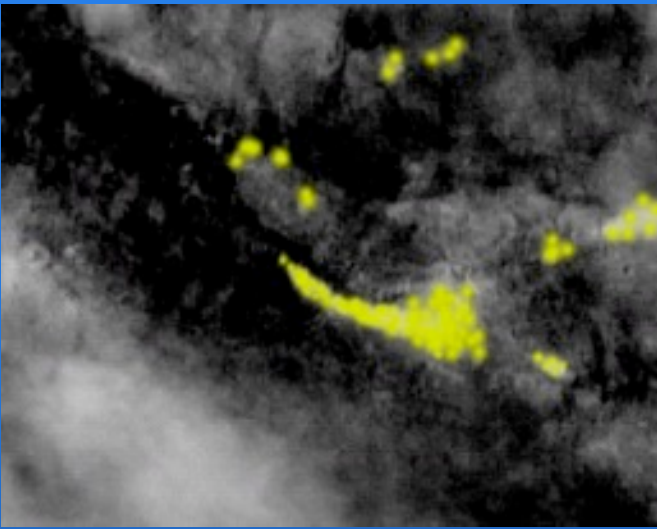
PET



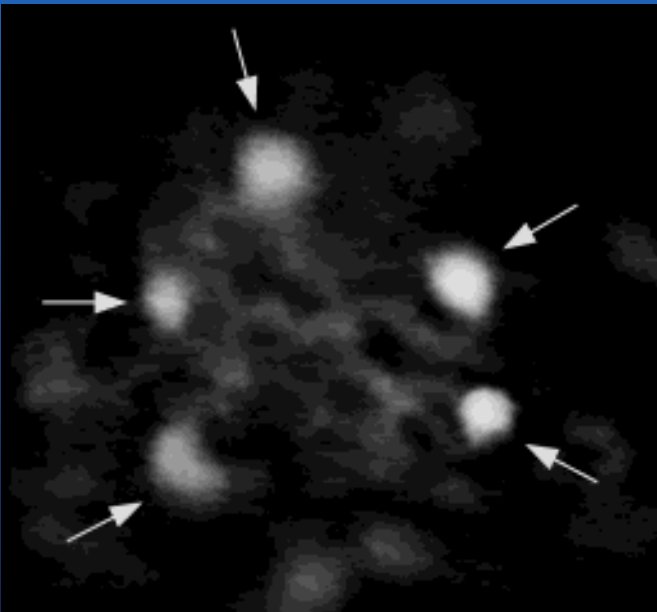
Optical
Imaging



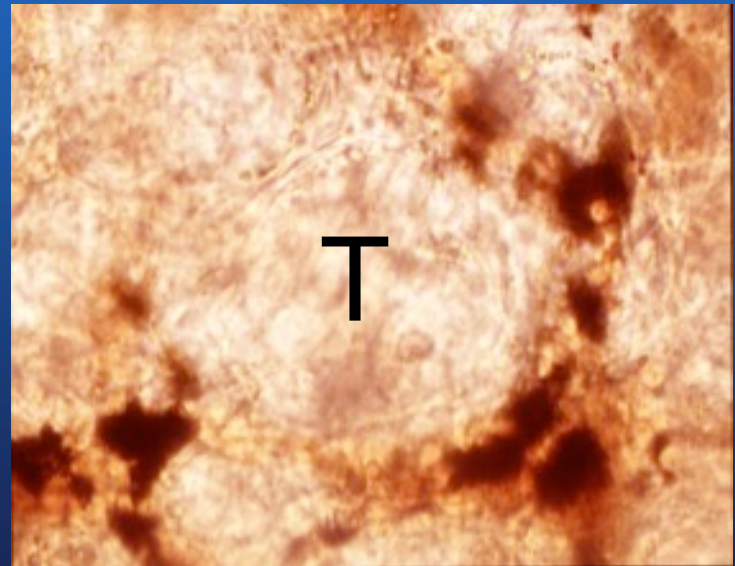
Molecular imaging of Liver Tumor growth



Macrophage recruitment from sinusoids



into developing tumors



to support tumor growth

From Salvarsan to **Penicillin**



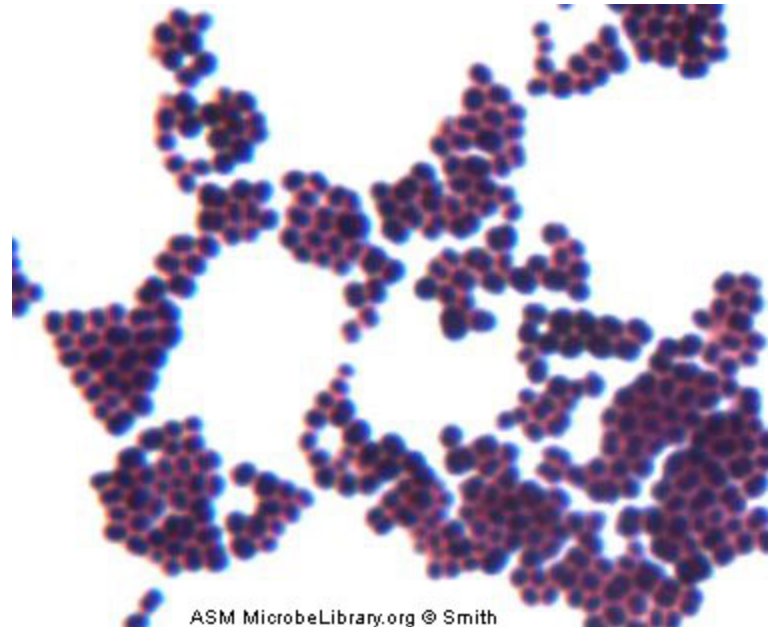
The Mold in Dr. Florey's Coat

The Story
of the
Penicillin
Miracle

ERIC LAX

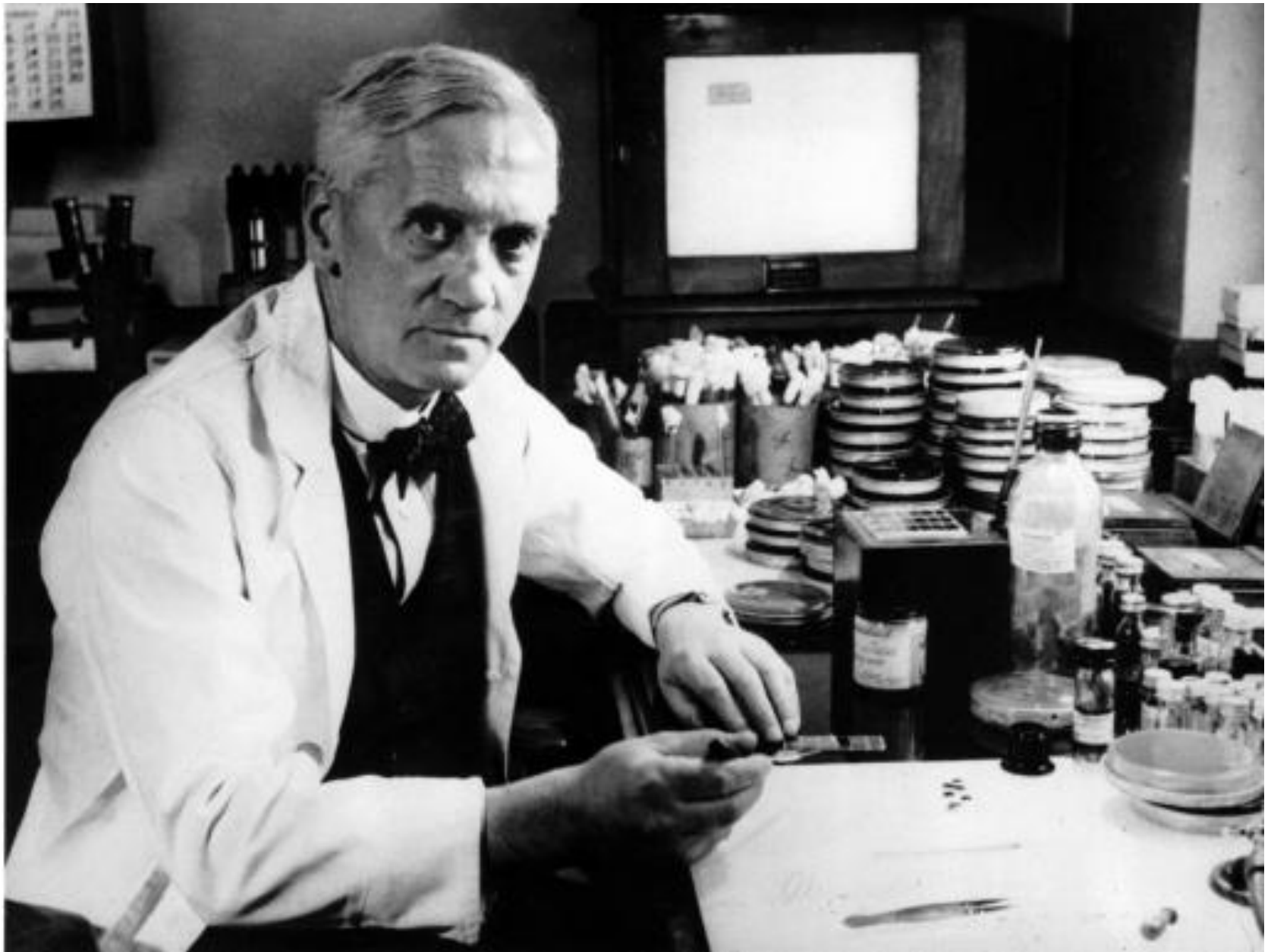


"Admirable, superbly researched . . . perhaps the most exciting tale of science since the apple dropped on Newton's head."
—Simon Winchester,
The New York Times



ASM MicrobeLibrary.org © Smith

FI

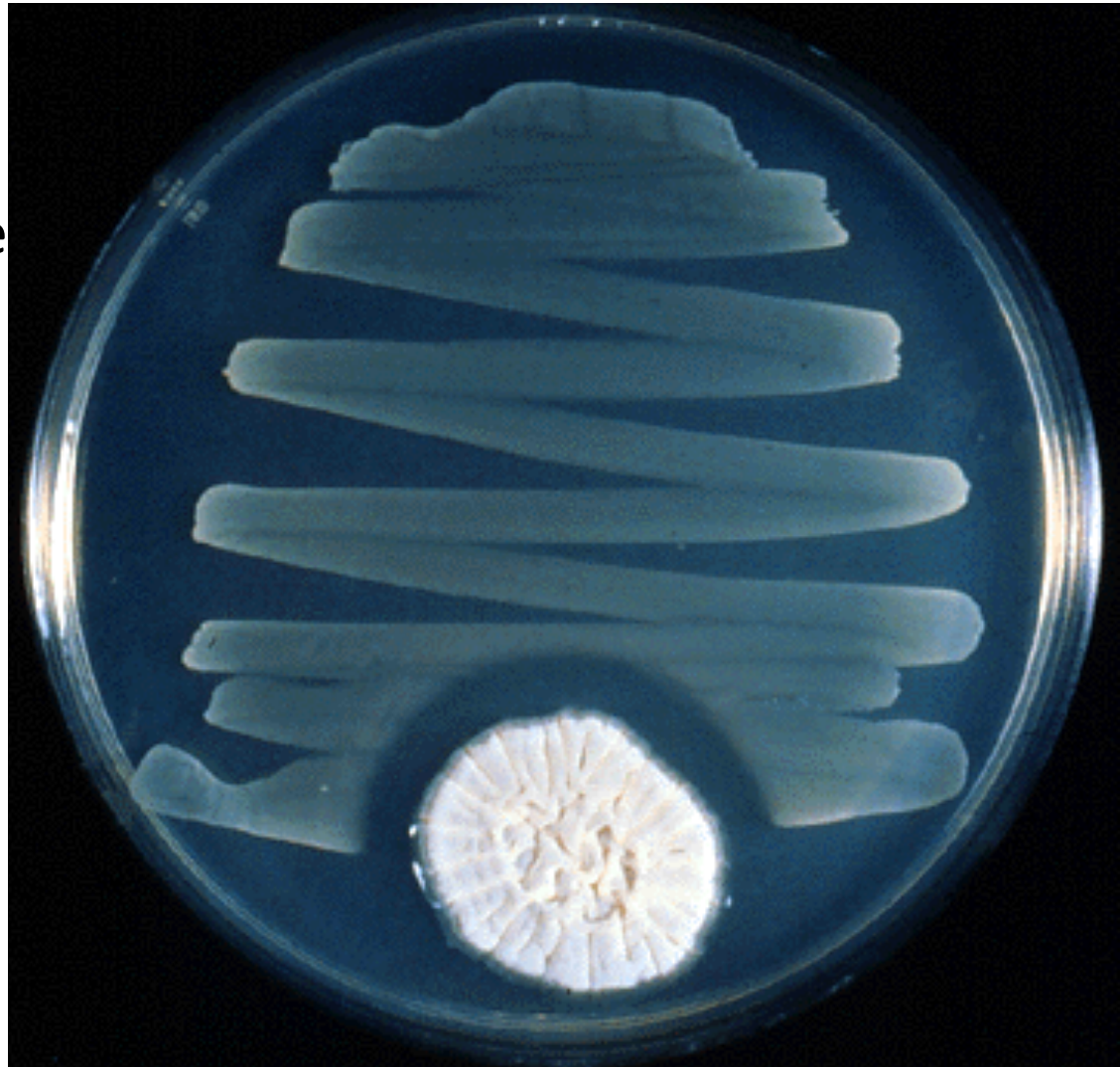


It was a Warm Summer Night in 1928

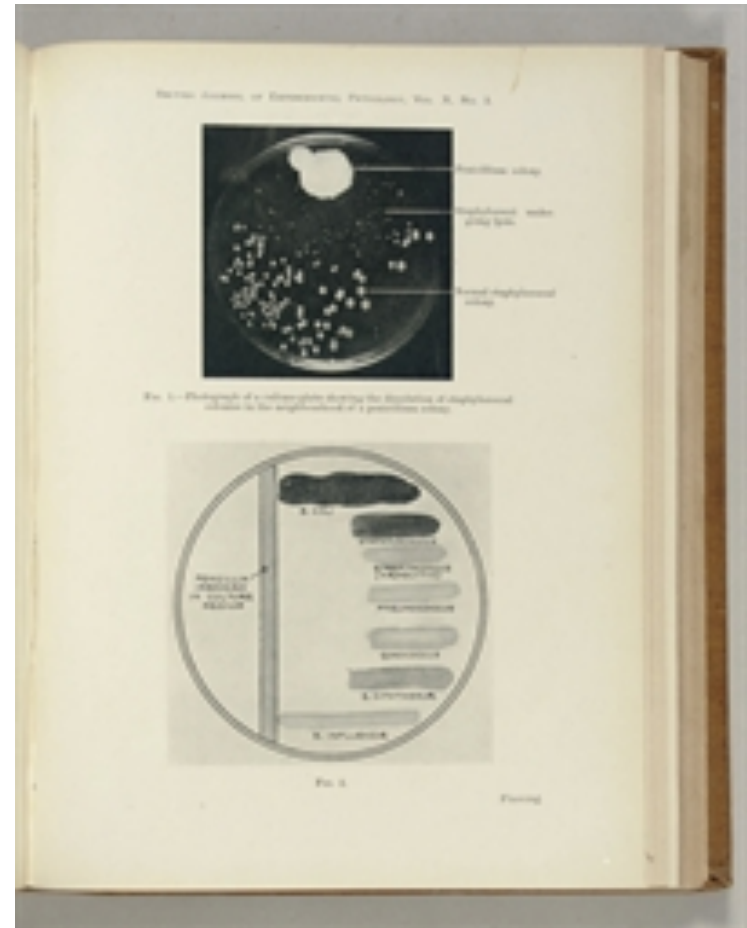


When he returned from vacation he
observed...

An agar plate of
staphylococci and the effect
of the mold *Penicillium*
notatum



FLEMING, Alexander *On the Antibacterial Action of Cultures of a Penicillium, with special reference to their use in the isolation of B. Influenzae.* In: *The British Journal of Experimental Pathology*, volume 10, pp.226-236. **1929.**



Attempts to develop a drug

- Lysozyme research;
- In 1935 he largely abandoned this work

