

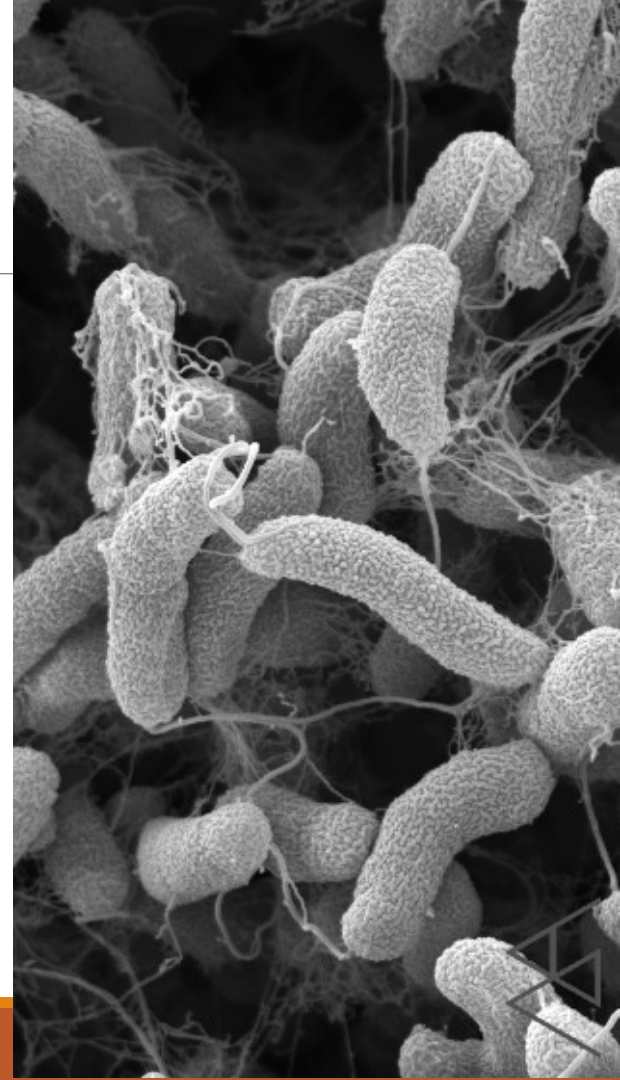
Biological weapons and biotechnology

JAKUB DRMOLA

Types

- bacteria
 - anthrax, cholera, salmonella, tetanus, tularemia, yersinia pestis, rickettsia, typhus, Q fever, glanders
- viruses
 - encephalitis, smallpox, marburg virus, ebola
- fungus
- toxins
 - botulotoxin, ricin, enterotoxin

- in some cases, animals can also be considered as biological weapons (dogs, dolphins, snakes, bees, ...)



Vectors of infection

- inhalation or consumption
- through blood or skin

- aerosol dispersal (trucks, planes, drones, missiles)
- detonation (problematic)
- infiltration (water, food, ventilation)
- other organisms (humans, rats, flees, mosquitos, ...)



Targets

- people
 - to kill
 - to incapacitate
- animals
 - as food
 - as transport
- plants
 - as food
 - against drugs



Strategic and tactical aspects



- operational support
- demoralize enemy
- attack population
- annihilation

- highly dependent on weather and environmental conditions
- quite unpredictable
- friendly fire
- latent and hard to detect

History

- ancient history (poisoned arrows, wells, during sieges, use of snakes and wasps, and even plague?)
- native americans decimated by smallpox
- vaccination discovered 1796
- deployed during WW1
 - mostly against animals
- deployed during WW2
 - esp. by Japan in China (2-500 000 dead)
 - plans to attack USA: “Cherry Blossoms at Night”
 - other powers quite behind, eager to “learn”
- very active development during Cold War on both sides



GRUINARD ISLAND

THIS ISLAND IS
GOVERNMENT PROPERTY
UNDER EXPERIMENT
THE GROUND IS CONTAMINATED
WITH ANTHRAX AND DANGEROUS.
LANDING IS PROHIBITED
BY ORDER 1950



Spanish Flu

- 1918-1920
- global population around 1,75 bil.
- WW1 casualties:
 - 15-20 mil.
- WW2 casualties:
 - 40-100 mil.
- Spanish Flu:
 - 50-100 mil.

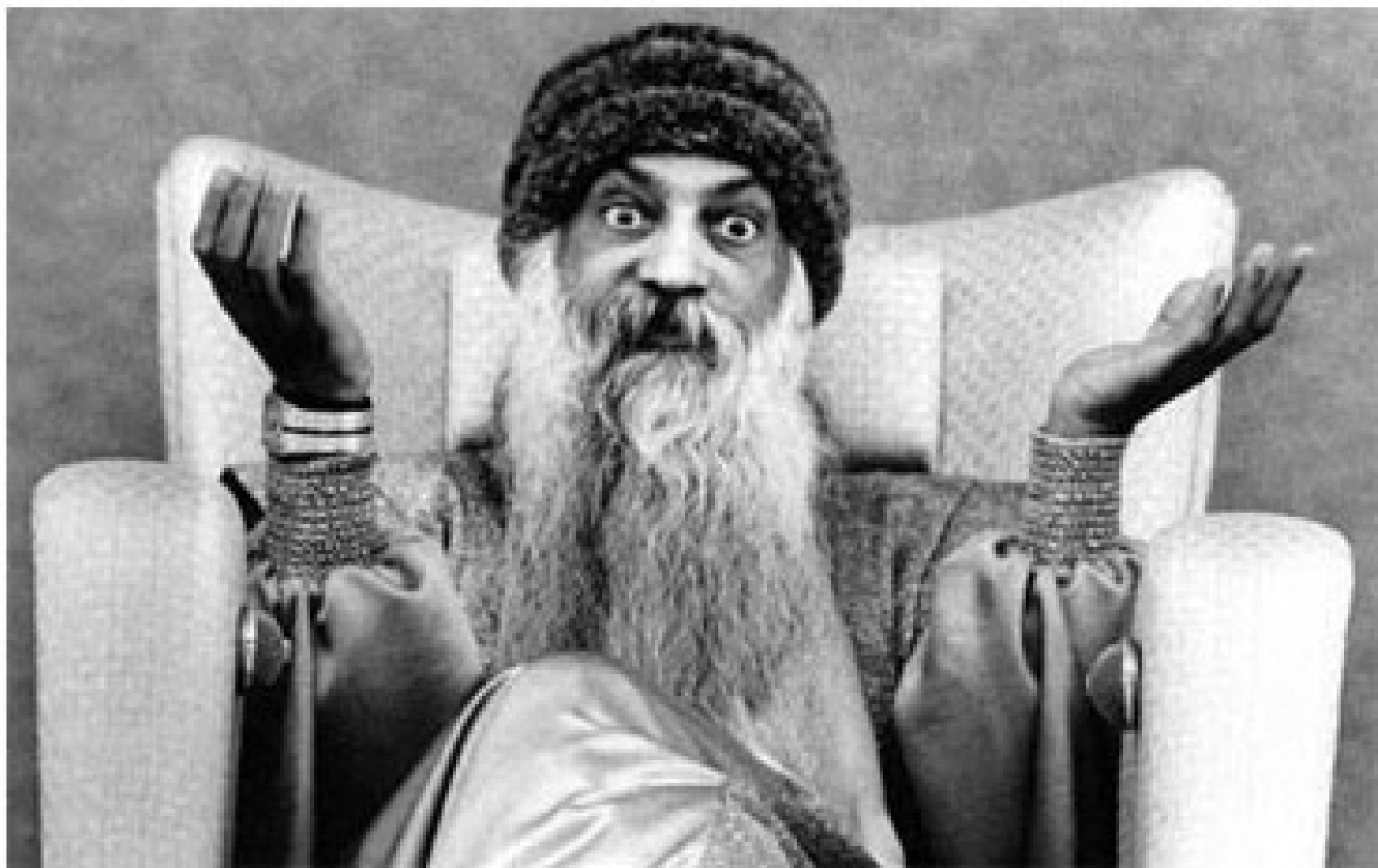
- Black Death:
 - 75-200 mil.



Terrorism and assassinations and others

- 1978, Bulgarian dissident, Georgi Markov killed by ricin pellet
- 1984, Dalles, Rajneesh and salmonella
 - 751 infected, 45 hospitalized
 - today known as Osho, still popular
- 1990-5, Aum Shinrikyo
 - unsuccessful attempts to deploy anthrax, botulin and ebola
- 2001, Bruce Ivins, anthrax letters
 - 22 infected, 5 dead
 - ended with suicide, still unclear motivation
- many unfulfilled threats and plans from a number of organizations







4TH GRADE
GREENDALE SCHOOL
FRANKLIN AVE NJ 08824

SENATOR DASCHLE
509 HART SENATE OFFICE
BUILDING
WASHINGTON DC 20540-0000

09-11-01

YOU CAN NOT STOP US.
WE HAVE THIS ANTHRAX.
YOU DIE NOW.
ARE YOU AFRAID?
DEATH TO AMERICA.
DEATH TO ISRAEL.
ALLAN IS GREAT.

TOM BROKAW
NBC TV
30 ROCKEFELLER PLAZA
NEW YORK NY 10112

09-11-01

THIS IS NEXT
TAKE PENACILIN NOW
DEATH TO AMERICA
DEATH TO ISRAEL
ALLAN IS GREAT

EMILIA
New York Post
1211 Ave. of the Americas
New York NY 10036

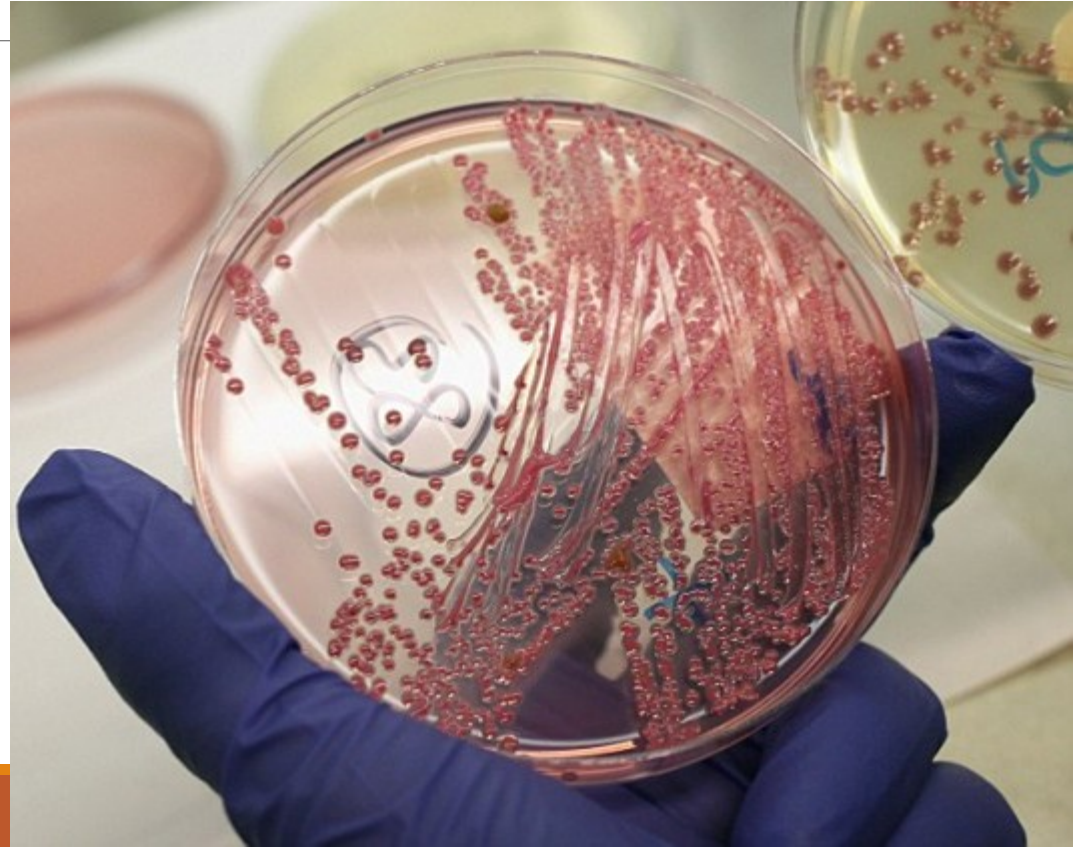
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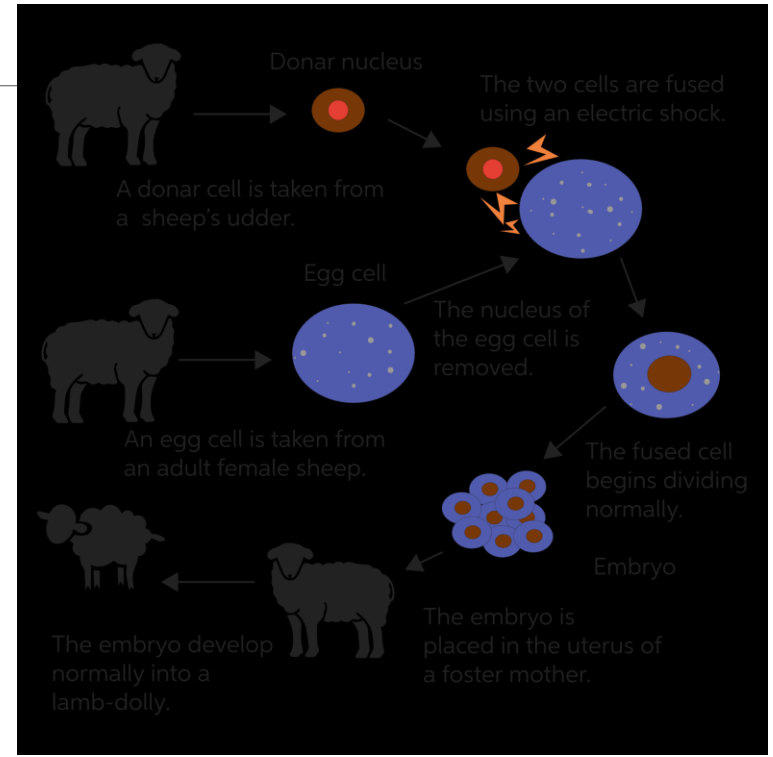
THIS IS NEXT
TAKE PENACILIN NOW
DEATH TO AMERICA
DEATH TO ISRAEL
ALLAN IS GREAT



Current situation

- development relatively cheap, but difficult
- deployment very difficult
- growing bacterial resistance
 - <https://www.youtube.com/watch?v=pIVk4NVIUh8>
- can be directly genetically modified now
 - chimeras, deimmunization, genetic targeting
- can accidentally leak or be acquired by terrorists
- engineered anti-material bioweapons possible









A man with dark hair, wearing a light blue and white vertically striped button-down shirt, is speaking at a podium. He has a red lanyard around his neck with a badge. His hands are clasped in front of him. A black laptop is open on the podium. A microphone is positioned in front of him. The background is a plain, light-colored wall.

SECOND INTERNATIONAL SUMMIT ON
HUMAN GENOMICS

The Economist

Carbyn and the Left's strange alliance
No-go for NGOs in China
Islamic State's taste for slavery
Commodities: the bings, the hangovers
India's post-politicians

Editing humanity

The prospect of genetic enhancement



MIT Technology Review

Features of
HP Tries to Reinvent
the Computer
Reinvention of
Persuasion
Features of
The Problem with
Fake Meat

WE CAN
NOW
ENGINEER
THE
HUMAN
RACE

p26



The war on Boris Johnson / Can I still afford to drive? / Money

100p

www.the-spectator.com

THE SPECTATOR

Eugenics is back

Fraser Nelson on the race
for designer babies

RETIRED
AGE
AUS RAISE
SIX ORCHIDS AND
MAD PLETHORPE
TONGA MAT
THE RABBIT WHO
MAD ME A TORY
MAY NEW PLEAS



Aggressive marketing
Marketing
Marketing



Heu...
Stop
Get I...

G. REED
M. ONEY
O. PPRESS

The Miracles of
BEEs DIE
OFF WE S...
E OFF

gmo's
are not
healthy
for
children
and
other

**SAY NO
TO
FRANKEN
FOODS**

muck

Crop Modification Techniques

Cross Breeding

Combining two sexually compatible species to create a variety with the desired traits of the parents



The Honeycrisp Apple gets its famous texture and flavor by blending the traits of its parents.

Mutagenesis

Use of mutagens such as radioactivity to induce random mutations, creating the desired trait



Radiation was used to produce a deeper color in the red grapefruit.

Ployploidy

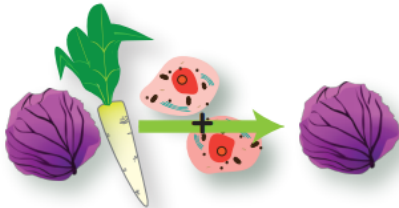
Multiplication of the number of chromosomes in a crop to impact its fertility



Seedless watermelons are created by crossing a plant with 2 sets of chromosomes with another that has 4 sets. The seedless fruit has 3 sets.

Protoplast Fusion

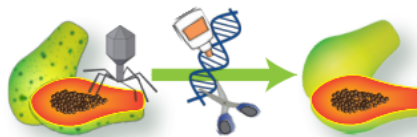
Fusion of cells or cell components to transfer traits between species



Male sterility is transferred from radishes to red cabbage by fusing their cells. Male sterility helps plant breeders make hybrid crops.

Transgenesis

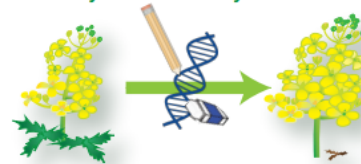
Addition of genes from any species to create a new variety with desired traits



The Rainbow Papaya is modified with a gene that gives it resistance to the Papaya Ringspot Virus.

Genome Editing

Use of an enzyme system to modify DNA directly within the cell



Genome editing was used to develop herbicide resistant canola to help farmers control weeds.

www.biofortified.org

Follow us on Twitter (@frankfoode) or join our Facebook Page

By Layla Katirae (@BiochicaGMO) in collaboration with Karl Haro von Mogel (@kjhvm)

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Other controversies

- designer babies
- artificial organs
- synthetic organisms
- gene editing
- gene drives

