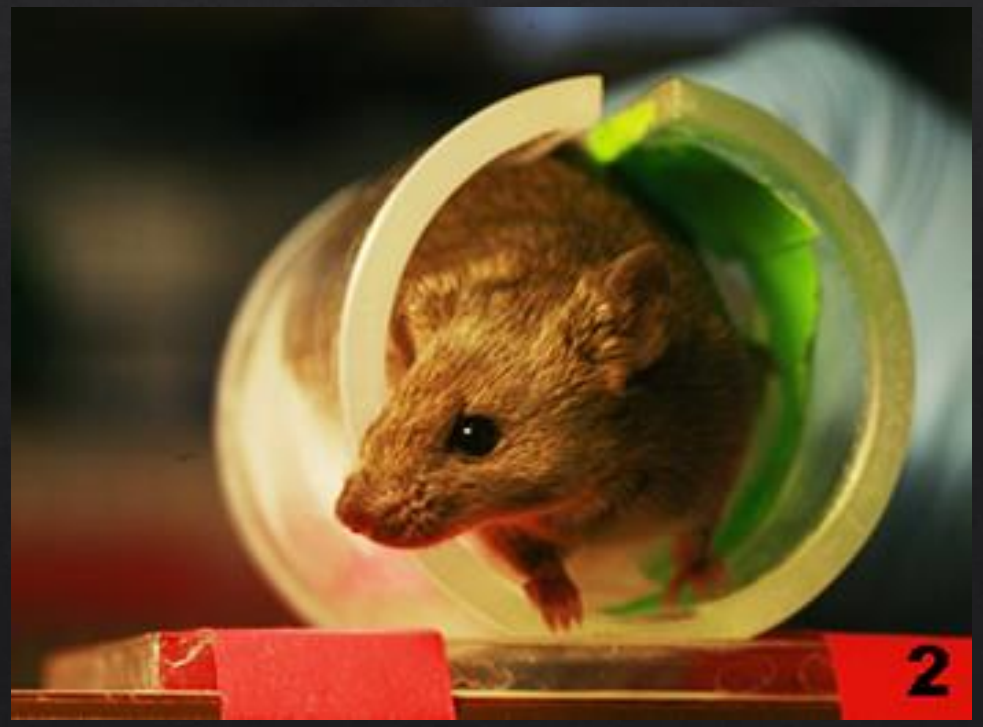
Uso de Animais na Pesquisa



Ciência de Animais de Laboratório
VPT2203

Claudia Madalena Cabrera Mori
E-mail: claudiam@usp.br

Uso de animais na pesquisa

https://www.ccac.ca/en/facts-and-legislation/animals-in-canadian-science/

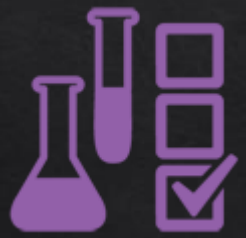
Pesquisa básica

- Estudar os padrões de migração ou habitats de animais selvagens
- Investigar como hormônios produzidos no intestino e no cérebro regulam a energia, o equilíbrio, o crescimento e a reprodução em peixes

Estudos Médicos e Clínicos

Estudos para fins médicos relacionados a doenças e distúrbios humanos ou animais

- Estudar roedores para entender melhor os genes envolvidos no câncer
- Estudar cães para melhor compreender e desenvolver tratamentos para epilepsia canina



Testes Regulatórios

Testar a eficácia e segurança de produtos e medicamentos, conforme exigido legalmente, antes que os testes em humanos possam começar.

- Segurança de vacinas em roedores e primatas não humanos
- Eficácia de um novo medicamento para a doença de Parkinson

Desenvolvimento de Produtos e Dispositivos Médicos

Estudos para o desenvolvimento de produtos ou dispositivos para medicina humana ou veterinária

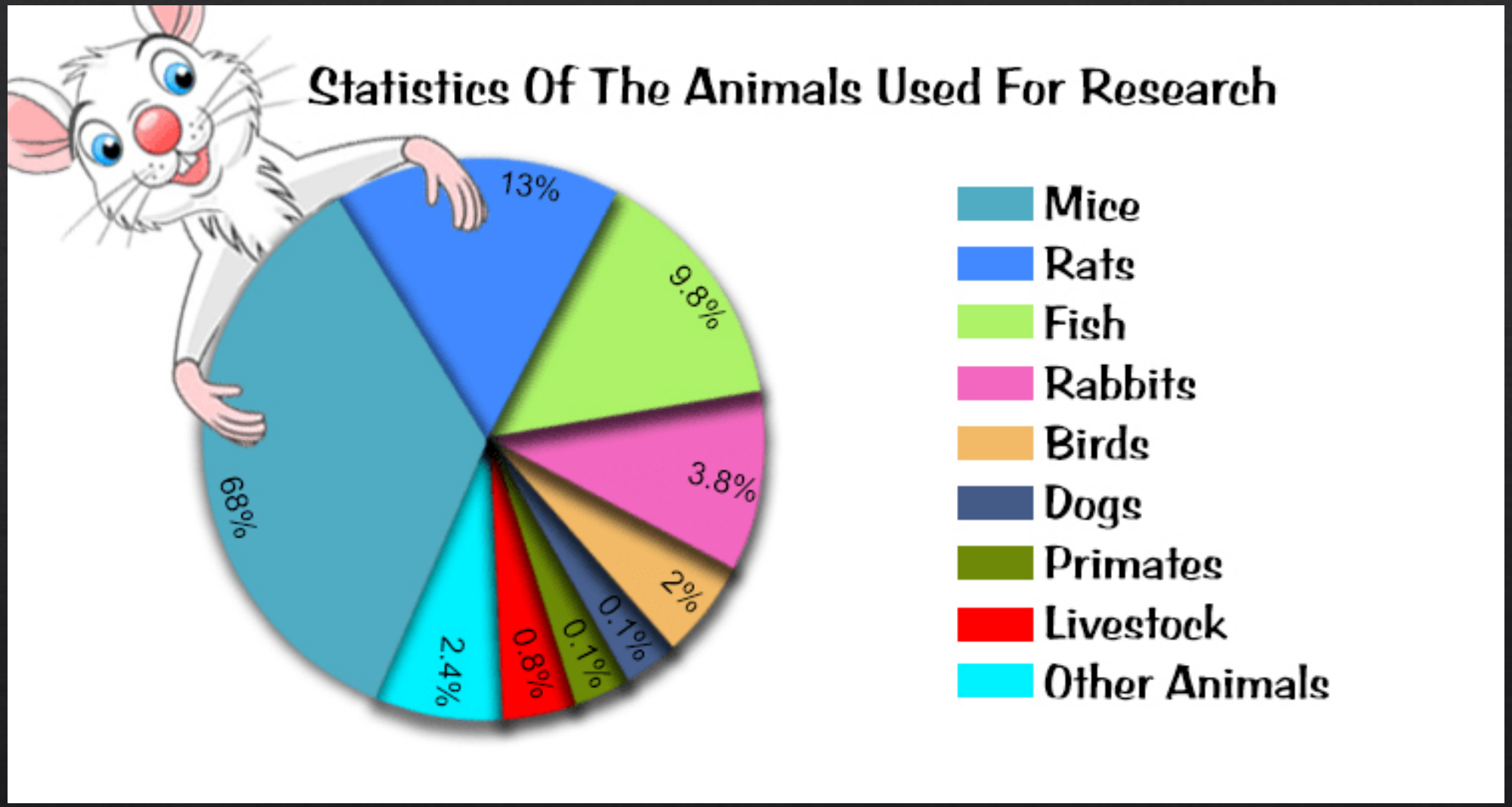
- Desenvolvimento de novas formulações nutricionais para animais de produção e pets
- Estudos realizados em porcos para desenvolver órgãos artificiais para humanos

Ensino e Treinamento

Ensino e treinamento para desenvolver habilidades práticas e conhecimentos em técnicas específicas

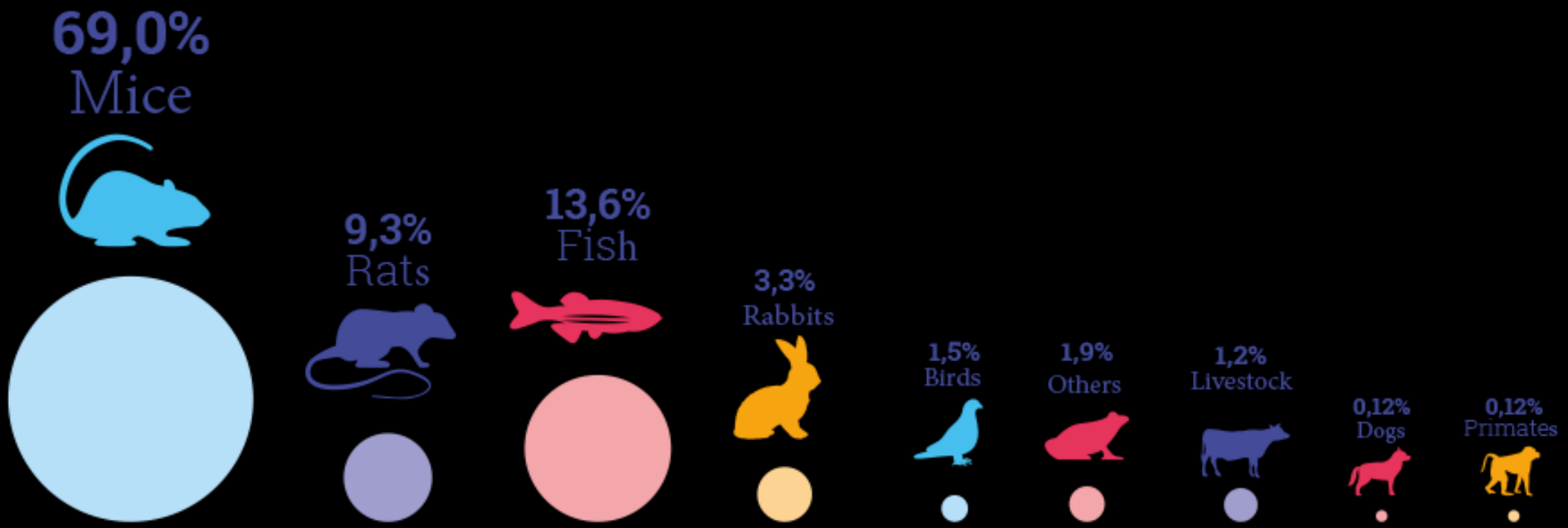
- Treinamento de estudantes de veterinária na prevenção, diagnóstico e tratamento de doenças
- Treinamento de técnicos de saúde animal em vacinação, raios-X e outros procedimentos
- Treinamento de médicos em cirurgias

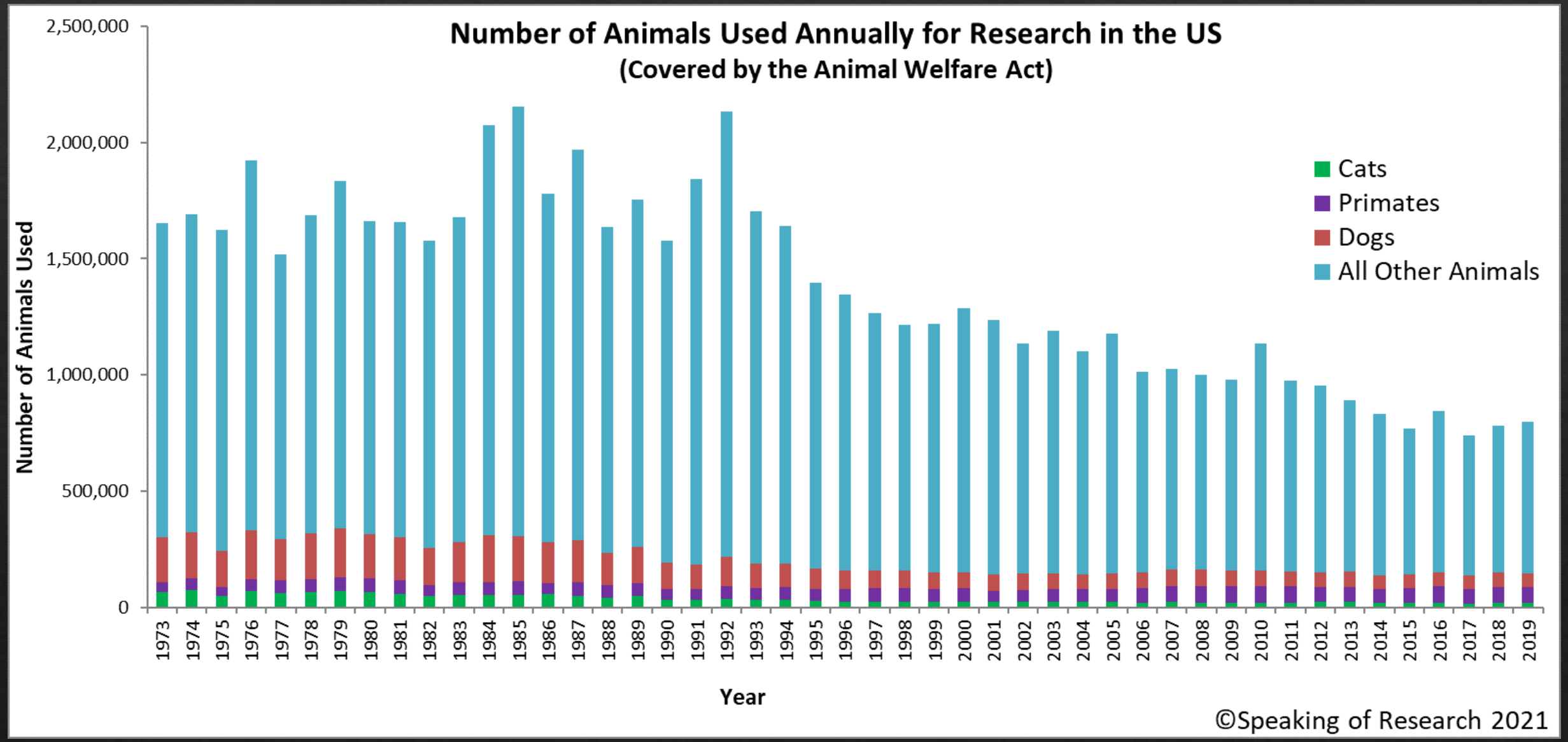
ANIMAIS DE EXPERIMENTAÇÃO... QUEM SÃO?



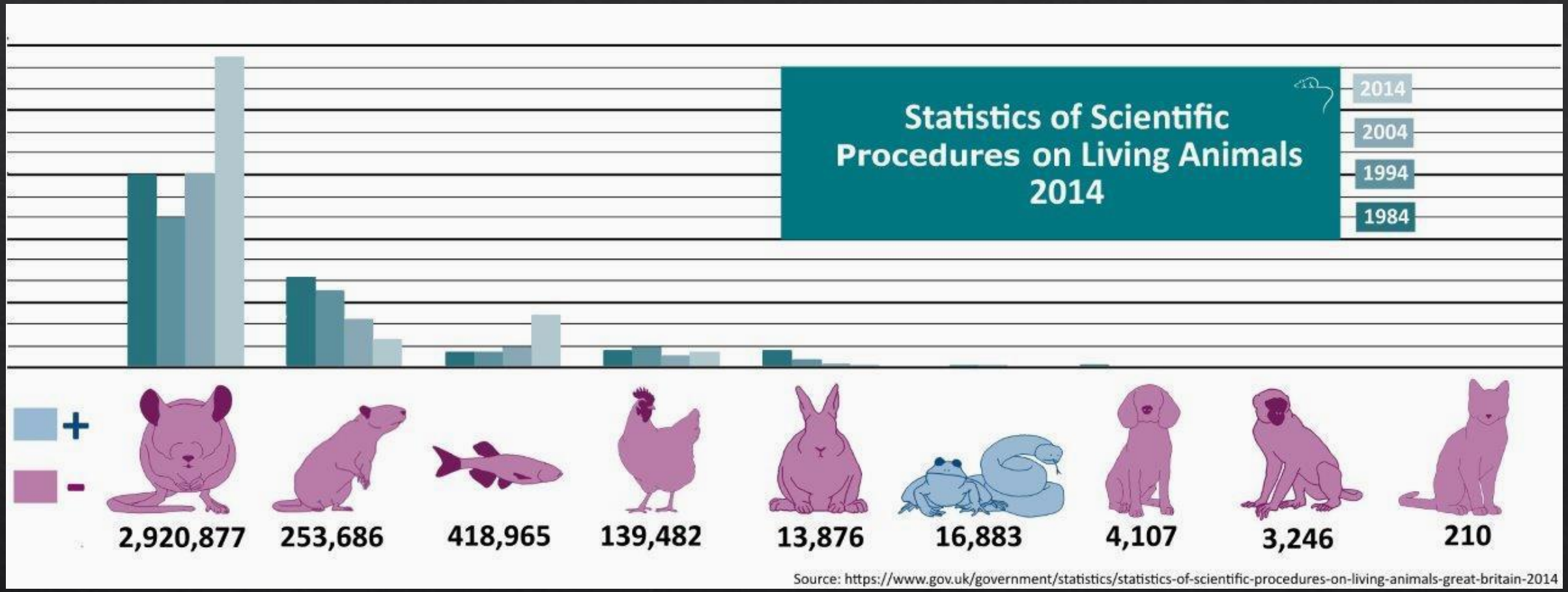
https://www.myfirstsaving.com/network/uploads/17/1853/70qcfufioxvgummp.png

What proportion do the different animal groups have in the experimental animals?



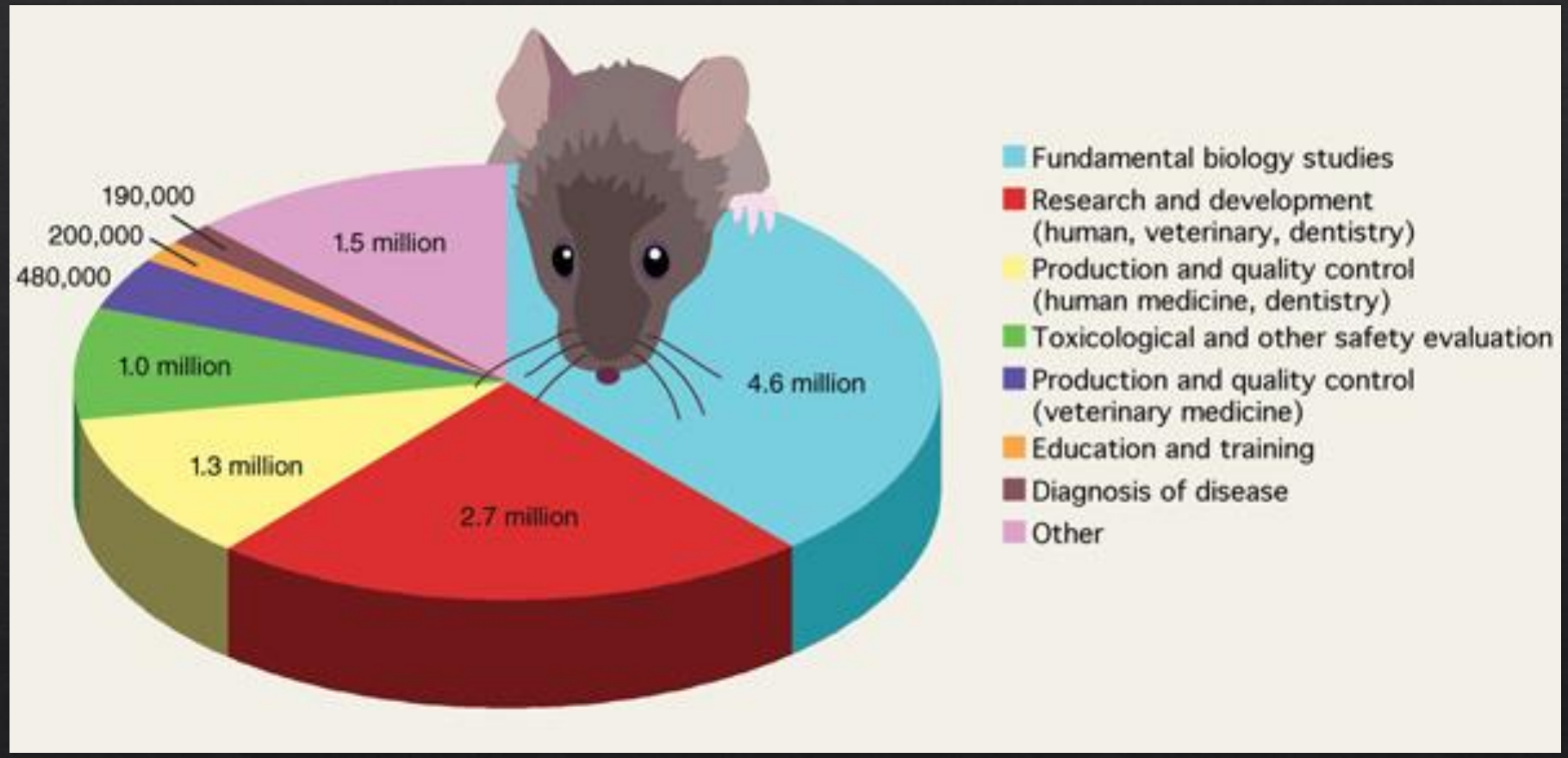


https://speakingofresearch.files.wordpress.com/2021/08/animal-use-statistics-in-us-1973-2019.png

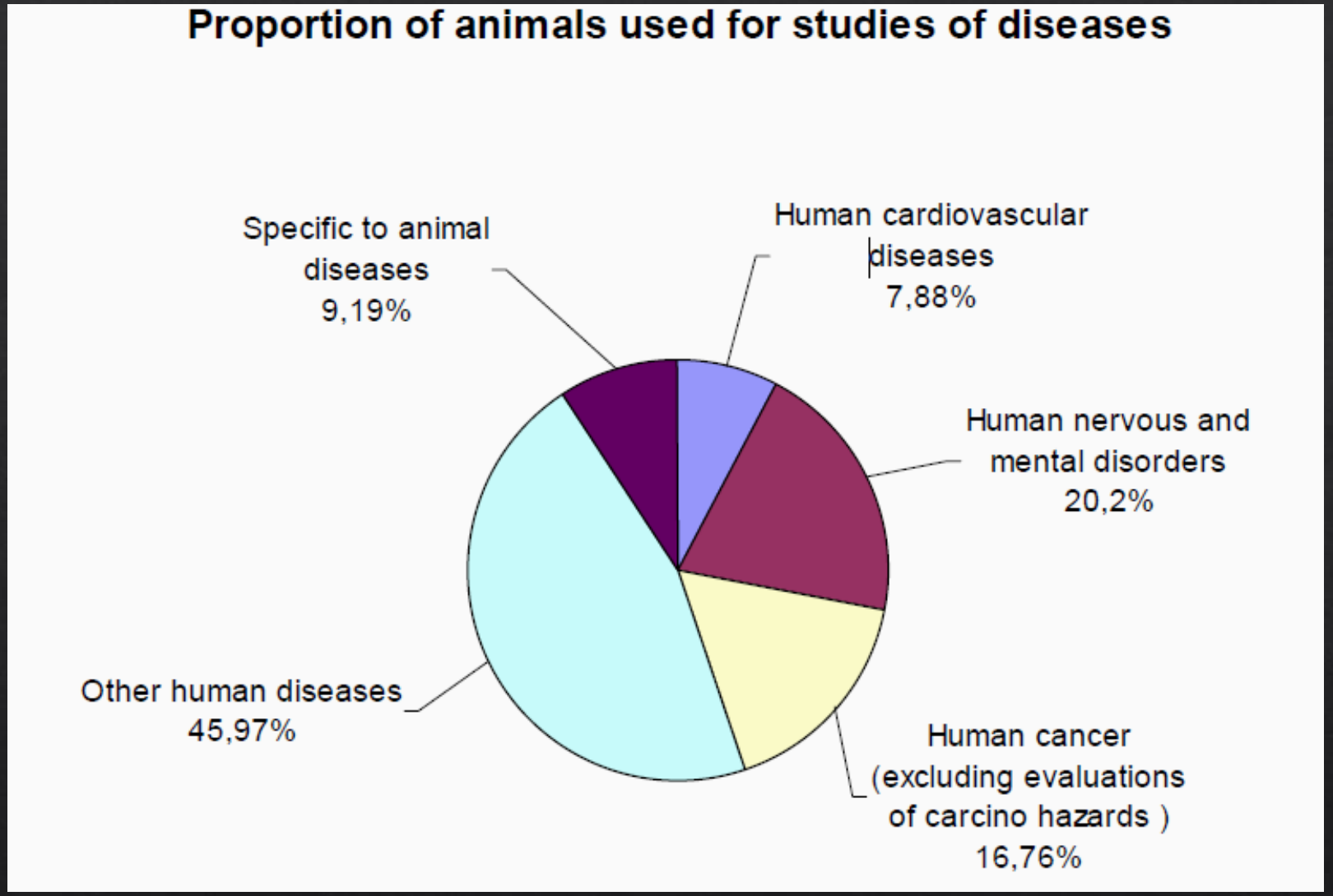


http://www.understandinganimalresearch.org.uk/files/2314/4551/0659/stats_graph-2014_2.jpg

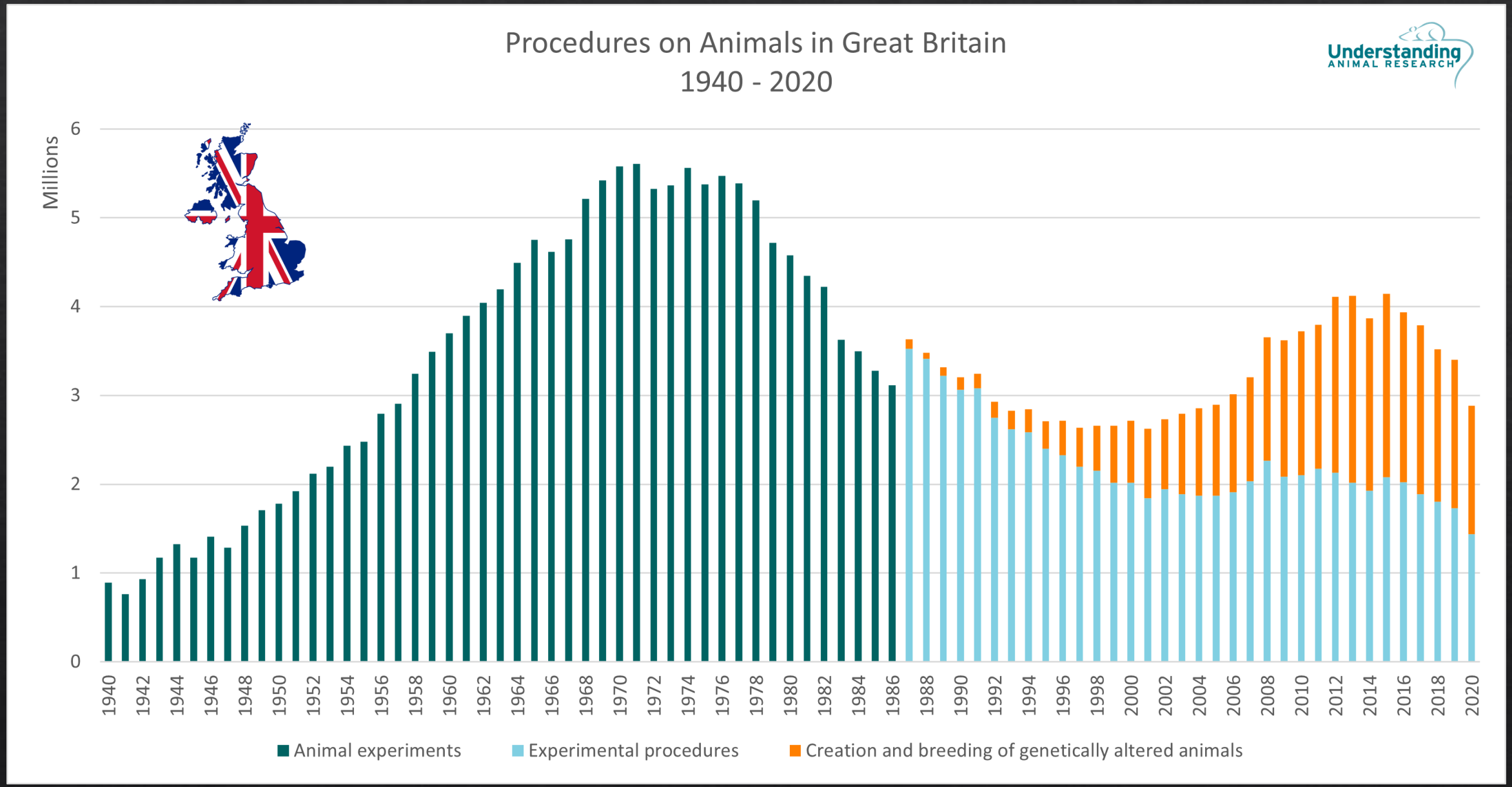
Uso mundial de animais em pesquisa:
75 a 100 milhões de vertebrados por ano.



NATURE MEDICINE, vol. 16, n. 11, nov. 2010

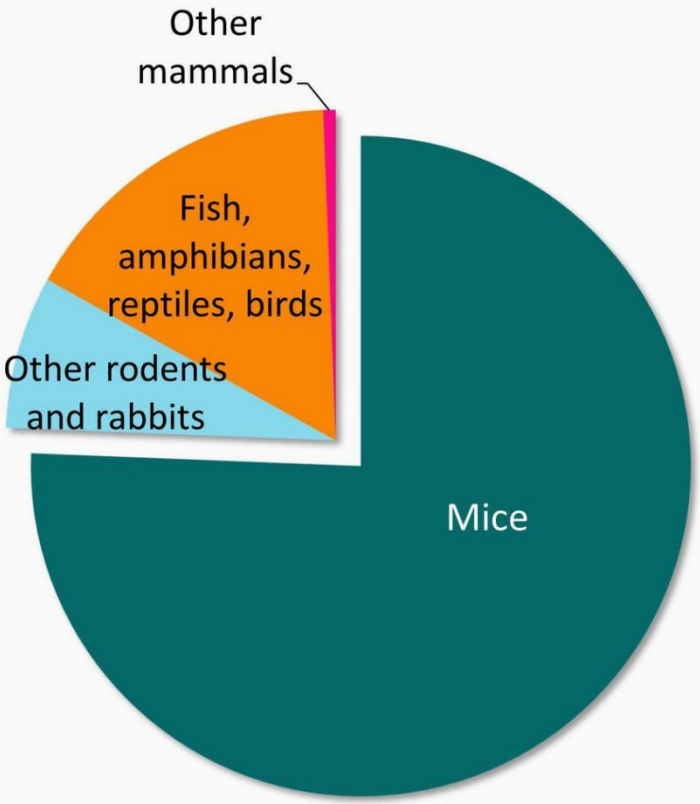


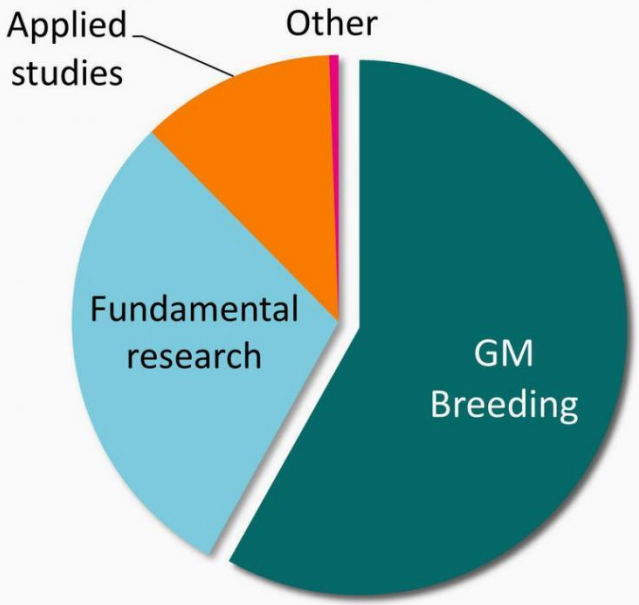
http://www.understandinganimalresearch.org.uk/files/3914/1172/3313/2013-eu-stats-pie-chart-propor.png



https://www.understandinganimalresearch.org.uk/files/4016/2824/6863/Procedures_on_Animals_in_Great_Britain_1940-2020_graph.png

Over 75% of animals used in research are mice...





...and most of those are used for breeding in genetic modification studies

Annual Statistics of Scientific Procedures on Living Animals, Great Britain 2018

3.52 million

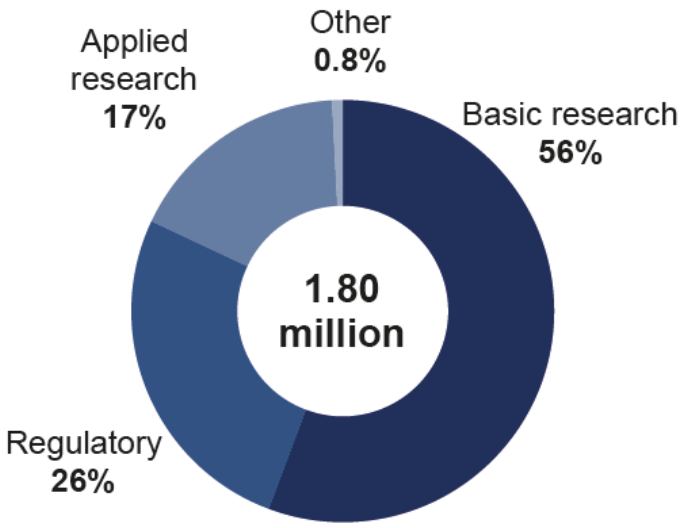
procedures were carried out in Great Britain involving living animals in 2018

Experimental procedures	Creation and breeding of GA animals
1.80 million procedures carried out for experimental purposes.	**1.72 million** procedures for the creation and breeding of GA animals.
These procedures involve using animals in scientific studies for purposes such as: basic research and the development of treatments, safety testing of pharmaceuticals and other substances, specific surgical training and education, environmental research and species protection.	This refers to the breeding of animals whose genes have mutated or have been modified. These animals are used to produce GA offspring for use in experimental procedures but are not themselves used in experimental procedures.

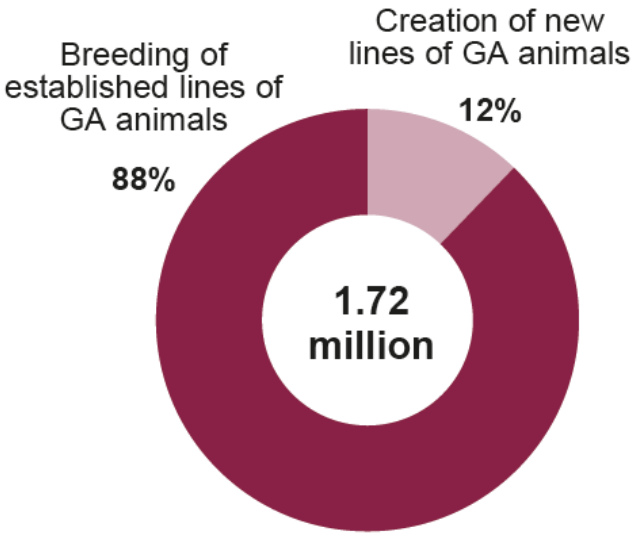
Species

60% of procedures used **mice**	**87%** were for creation/breeding of **mice**
17% of procedures used **fish**	**13%** were for creation/breeding of **fish**
9% of procedures used **rats**	**0.4%** were for creation/breeding of **rats**

Purpose of procedures



Over half of experimental procedures were for basic research. The top three areas targeted in this research were the immune system, the nervous system and oncology (cancer).



Most procedures in this category were for maintenance of already established GA lines, with 12% of procedures for the creation of new lines.

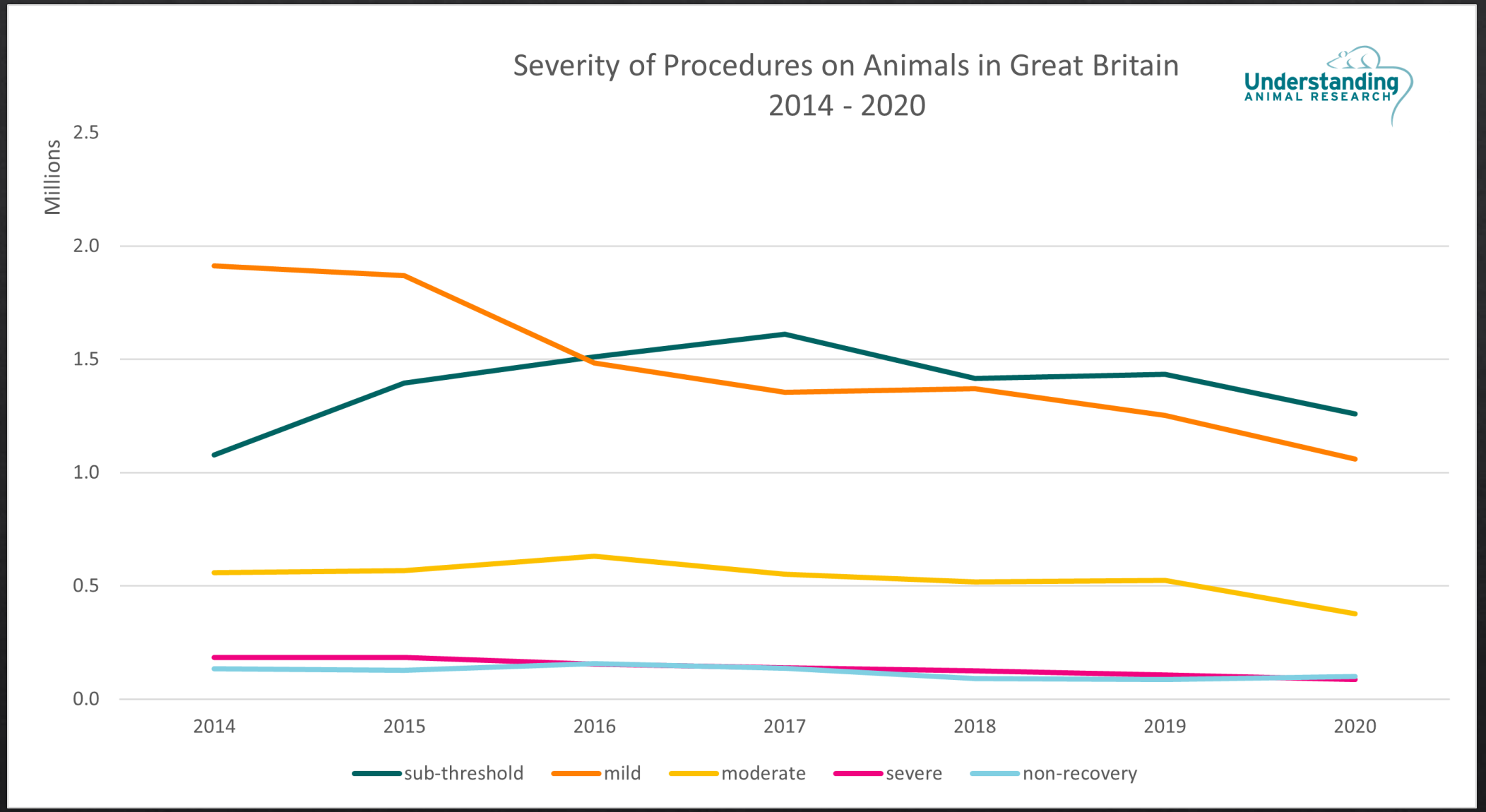
Severity

90% of all experimental procedures were assessed as **sub-threshold, mild or moderate** in severity.

5% were assessed as severe and 5% were non-recovery.

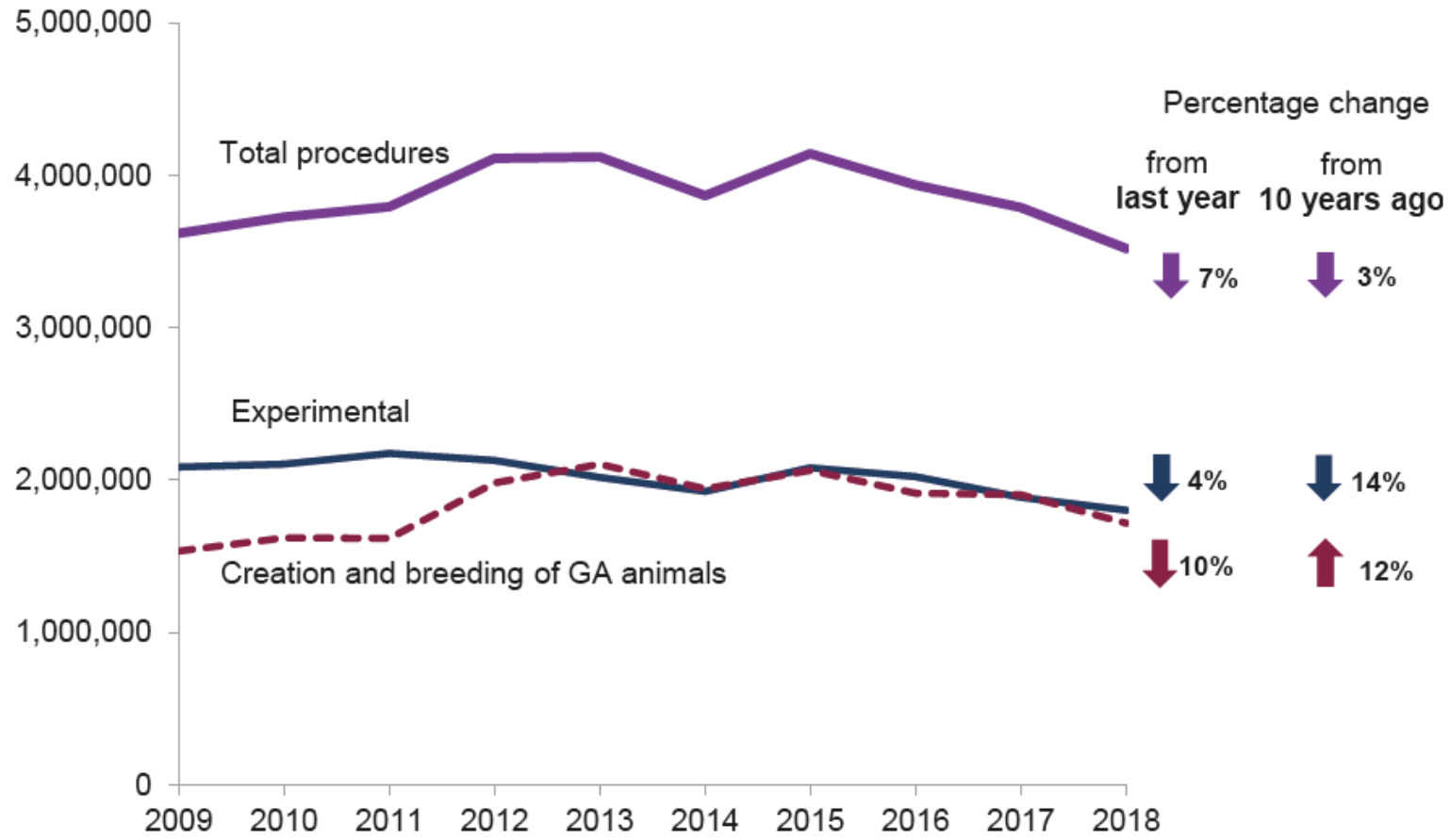
98% of all procedures for creation and breeding were assessed as **sub-threshold, mild or moderate** in severity.

2% were assessed as severe and 0.03% were non-recovery.



https://www.understandinganimalresearch.org.uk/files/2016/2824/6991/Severity_of_Procedures_on_Animals_in_Great_Britain_2014-2020.png

Figure 2. Total scientific procedures by type, 2009 to 2018



Source: Home Office, Annual Statistics of Scientific Procedures on Living Animals, Great Britain 2018: data tables, Table 1.2 and Annual Statistics of Scientific Procedures on Living Animals, Great Britain 2017: time series tables, Table 1

THE MOUSE CV

AN EXPERIENCED LIFE SAVER

PROFILE

- I have been Involved in roughly 75% of research
- My life span is short and I reproduce fast which means I am suitable for studying disease across a whole life cycle
- 98% of my genes have comparable genes in humans
- Humans and I have similar reproductive and nervous systems and suffer from many of the same diseases
- I can be genetically modified to include human genes to enhance biological relevance
- I can act as an avatar for human cancer to allow drug therapies to be trialed safely

RESEARCH AREAS

- AIDS and HIV
- Alzheimer's disease
- Anesthetics
- Anticoagulants
- Antidepressants
- Asthma
- Blindness
- Brain injury
- Breast cancer
- Cardiac arrest
- Cystic fibrosis
- Deafness
- Down's syndrome
- Hepatitis B, C & E
- Huntington's disease
- Influenza
- Leukemia
- Malaria
- Motor Neuron Disease
- Multiple sclerosis
- Muscular dystrophy
- Parkinson's Disease
- Prostate cancer
- Schistomiasis
- Spinal cord injury
- Stroke
- Testicular cancer
- Tuberculosis

NOBEL PRIZES

- 1905- Transmission and treatment of TB
- 1906- Structure of nervous system
- 1907- Role of protozoa in disease
- 1908- Immunity to infectious diseases
- 1928- Investigations on typhus
- 1929- Importance of dietary vitamins
- 1939- Discovery of prontosil
- 1945- Discovery of penicillin
- 1951- Yellow fever vaccine
- 1952- Discovery of streptomycin
- 1954- culture of the polio vaccine
- 1960- Understanding of immunity
- 1970- Understanding of neurotransmitters
- 1974- Structural & functional organisation of cells
- 1975- Tumour viruses and genetics of cells
- 1977- Hypothalamic hormones
- 1999- Discovery of signal peptides
- 2000- Signal transduction in nervous system
- 2004- Odour receptors & olfactory systems
- 2008- Role of HIV and HPV in causing disease
- 2010- Development of in vitro fertalisation
- 2011- Innate and adaptive immunity discoveries
- 2012- Reprogramming mature cells
- 2013- Machinery regulating vesicle traffic discoveries
- 2014- The inner GPS of the brain
- 2015- Novel therapies to treat parasitic infections
- 2016- Cellular autophagy
- 2017- The circadian rhythm
- 2018- Cancer therapy- negative immune regulation
- 2019 - Discovery of how cells sense and adapt to oxygen availability

animalresearch.info

THE GLOBAL RESOURCE FOR ANIMAL USE IN SCIENCE

https://www.animalresearch.info/en/medical-advances/nobel-prizes/

https://www.animalresearch.info/en/medical-advances/medical-discovery-timeline/

https://www.animalresearch.info/en/medical-advances/veterinary-medicine/

Animals **2013**, *3*, 238-273; doi:10.3390/ani3010238

OPEN ACCESS

animals

ISSN 2076-2615

www.mdpi.com/journal/animals

Review

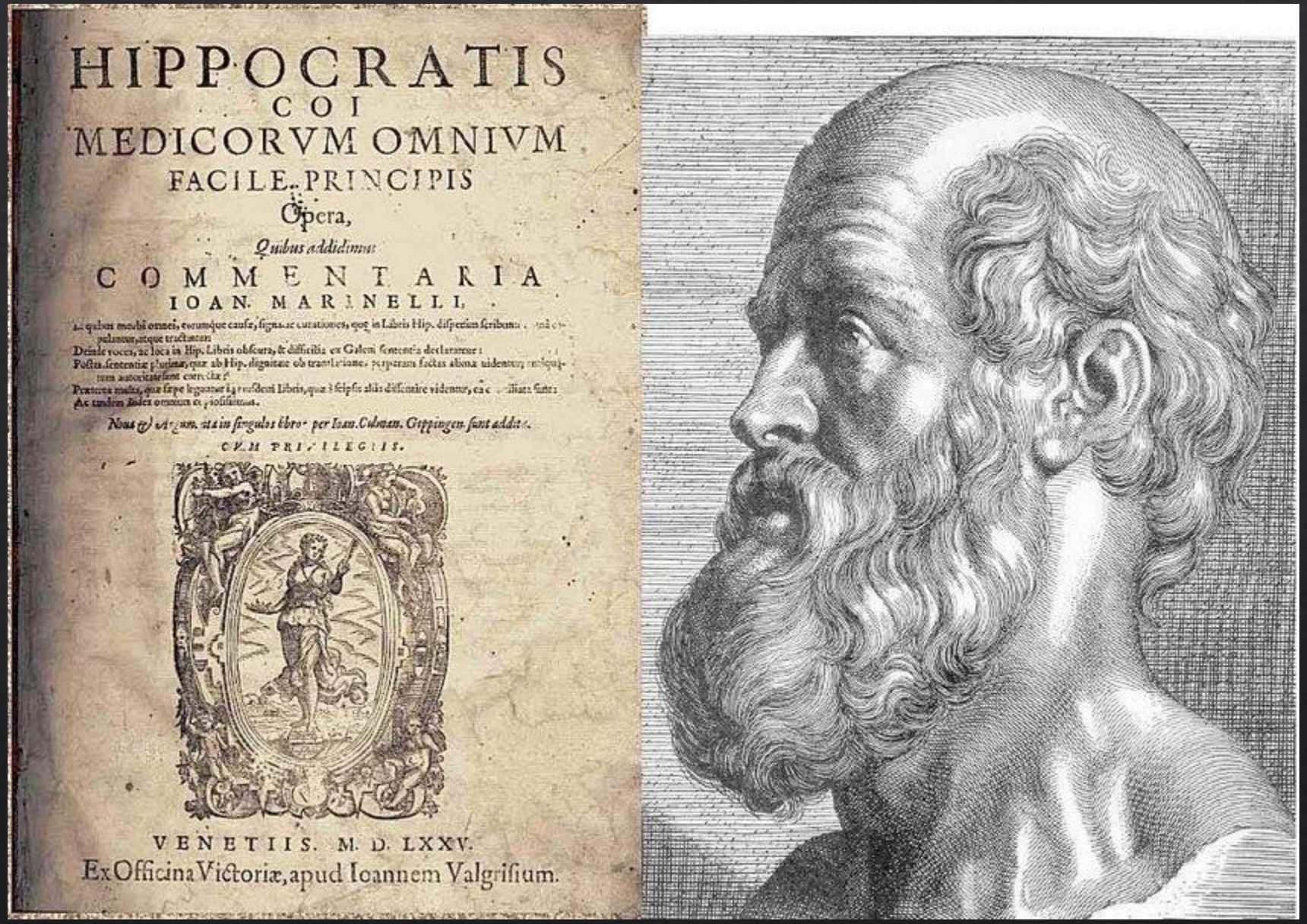
Animal Experiments in Biomedical Research: A Historical Perspective

Nuno Henrique Franco

HIPÓCRATES
460-377 a.C.

Corpus Hippocraticum

1st Medical Handbook

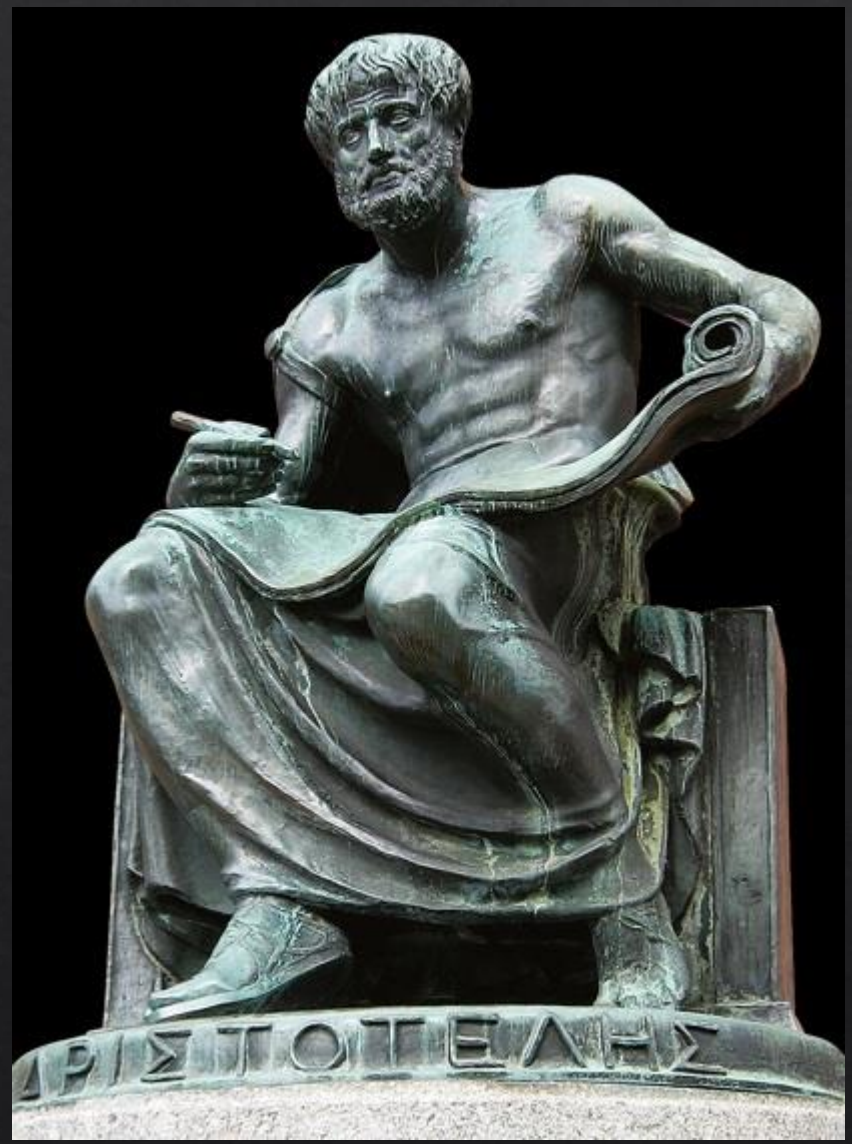


https://www.researchgate.net/profile/Ricardo-Losardo/publication/331515803/figure/fig1/AS:736465042550788@1552598357968/Corpus-hippocraticum-e-Hipocrates-c460-aC-c370-aC.jpg

ARISTÓTELES (384-322 a.C.)

Historia animalium

https://www.universiteitleiden.nl/binaries/content/gallery/ul2/main-images/humanities/aristotle_animals.jpg/aristotle_animals.jpg/d700xvar



https://londonhuawiki.wpi.edu/images/c/c2/Aristotle.jpeg

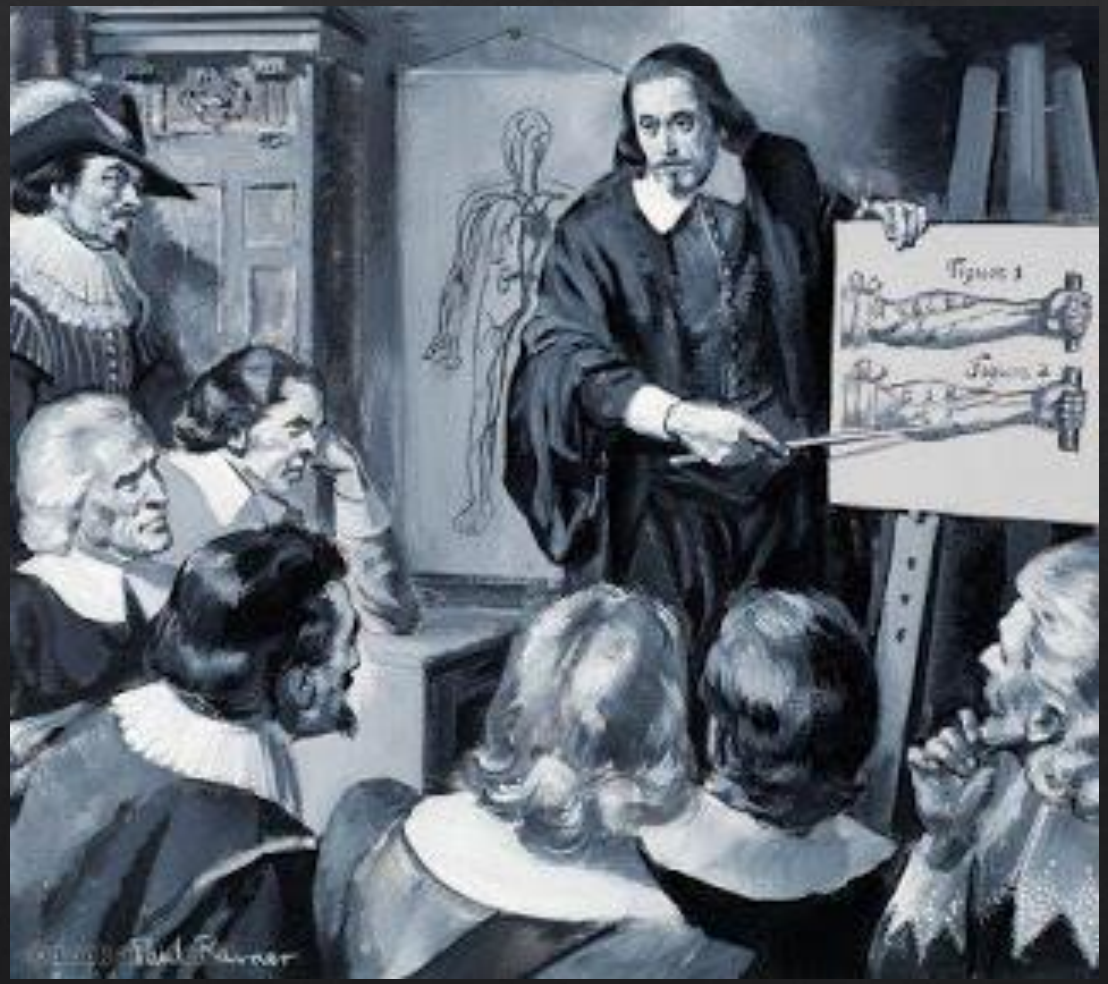
https://ae01.alicdn.com/kf/HLB1I4IbOhjaK1RjSZKzxh4VwXXaI/Aelius-Galenus-Ou-Cl-udio-Galenus-Ad129-Para-C-199217-Aka-Galen-De-P-rgamo.jpeg_Q90.jpeg_.webp

GALENUS
130-201 a.C.

Experimentos com animais vivos e conscientes (porcos, cães e macacos)

https://www.sciencesource.com/Doc/TR1_WATERMARKED/7/e/c/8/SS21575446.jpg?d63674182424

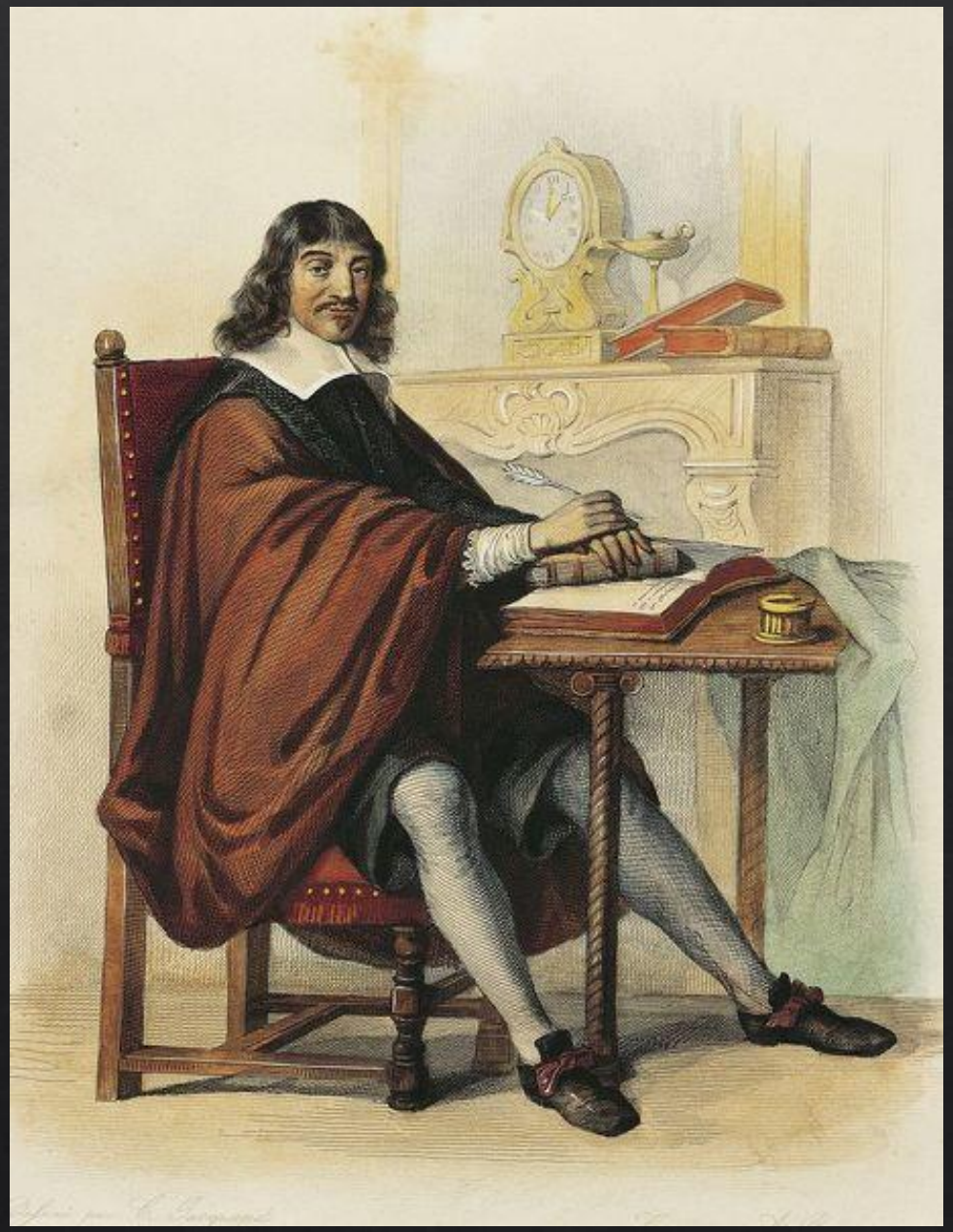
William Harvey
1578-1657



https://i.pinimg.com/236x/09/97/22/0997224842649c3c5cc2aa0b75cf7429--william-harvey-medical-pictures.jpg

De Motu Cordis
(Sobre o Movimento do Coração e do Sangue),
publicado em 1628.

https://www.sciencesource.com/Doc/TR1_WATERMARKED/d/c/f/b/SS2723461.jpg?d63644231833



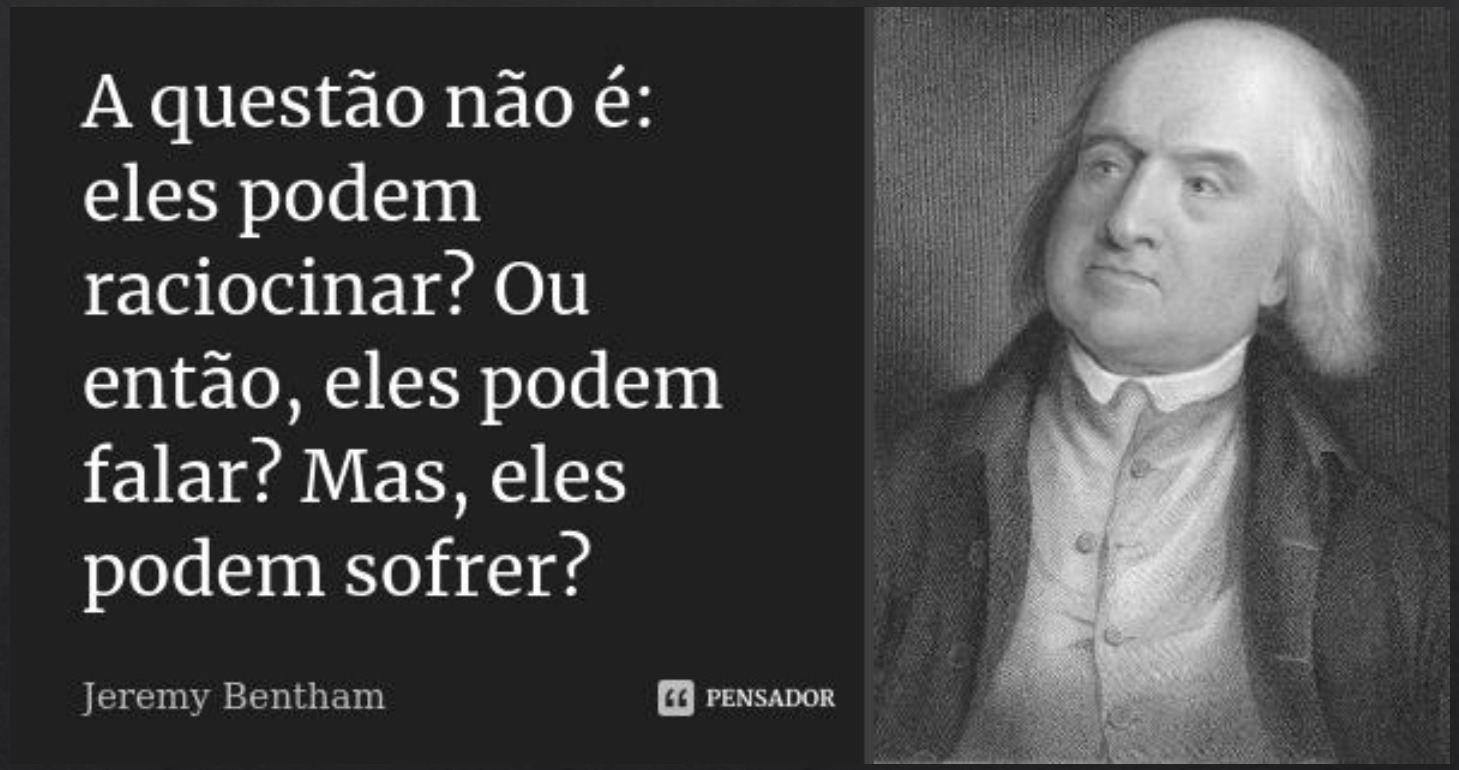
https://www.mediastorehouse.com.au/p/617/france-paris-portrait-rene-descartes-9500039.jpg

RENÉ DESCARTES
1596-1650

Dualismo mente/corpo: animais não têm a glândula pineal (epífise), isto é, não têm alma então: não têm consciência e nem têm dor (máquina insensível).

Jeremy Bentham (1748-1832)

https://upload.wikimedia.org/wikipedia/commons/c/c8/Jeremy_Bentham_by_Henry_William_Pickersgill_detail.jpg



https://cdn.pensador.com/img/frase/je/re/jeremy_bentham_a_questao_nao_e_eles_podem_raciocinar_ou_lqdn5lg.jpg

Bentham (1789) – An Introduction to the Principles of Morals and Legislation.

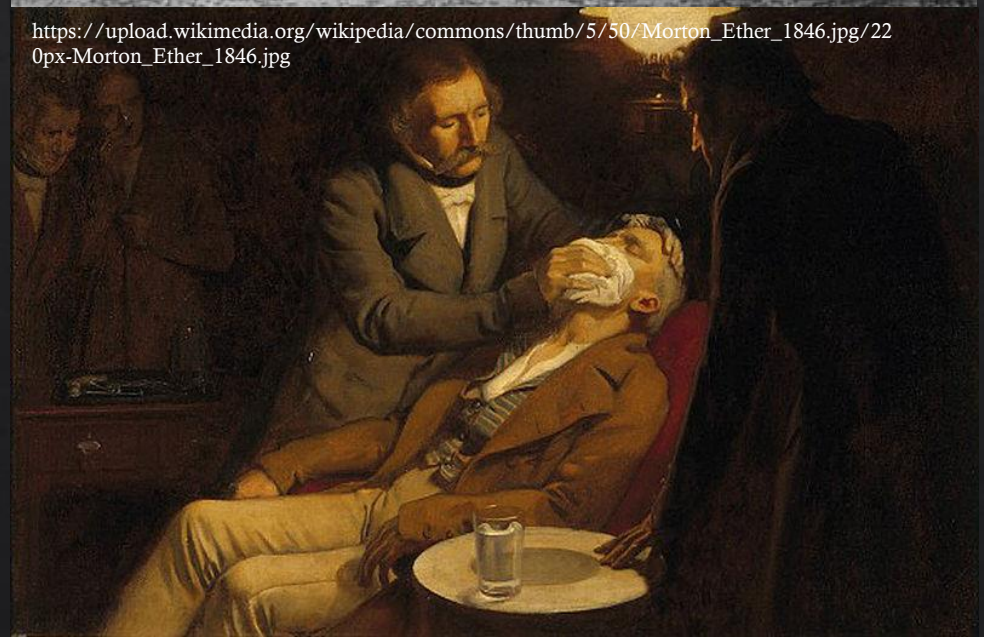
WILLIAM GREEN
1819-1868

Primeira anestesia com etér - Harvard University (1846).

https://i.ytimg.com/vi/zaOwiS5Wxgk/maxresdefault.jpg

https://i.pinimg.com/originals/a7/77/69/a777698c6cf30a4800d7628c64f421a4.jpg

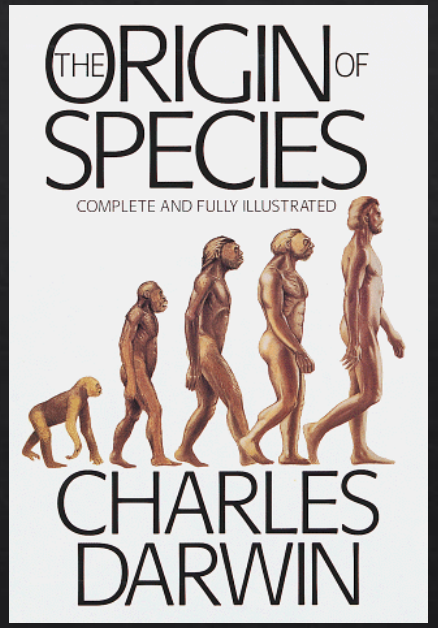
https://upload.wikimedia.org/wikipedia/commons/thumb/5/50/Morton_Ether_1846.jpg/220px-Morton_Ether_1846.jpg

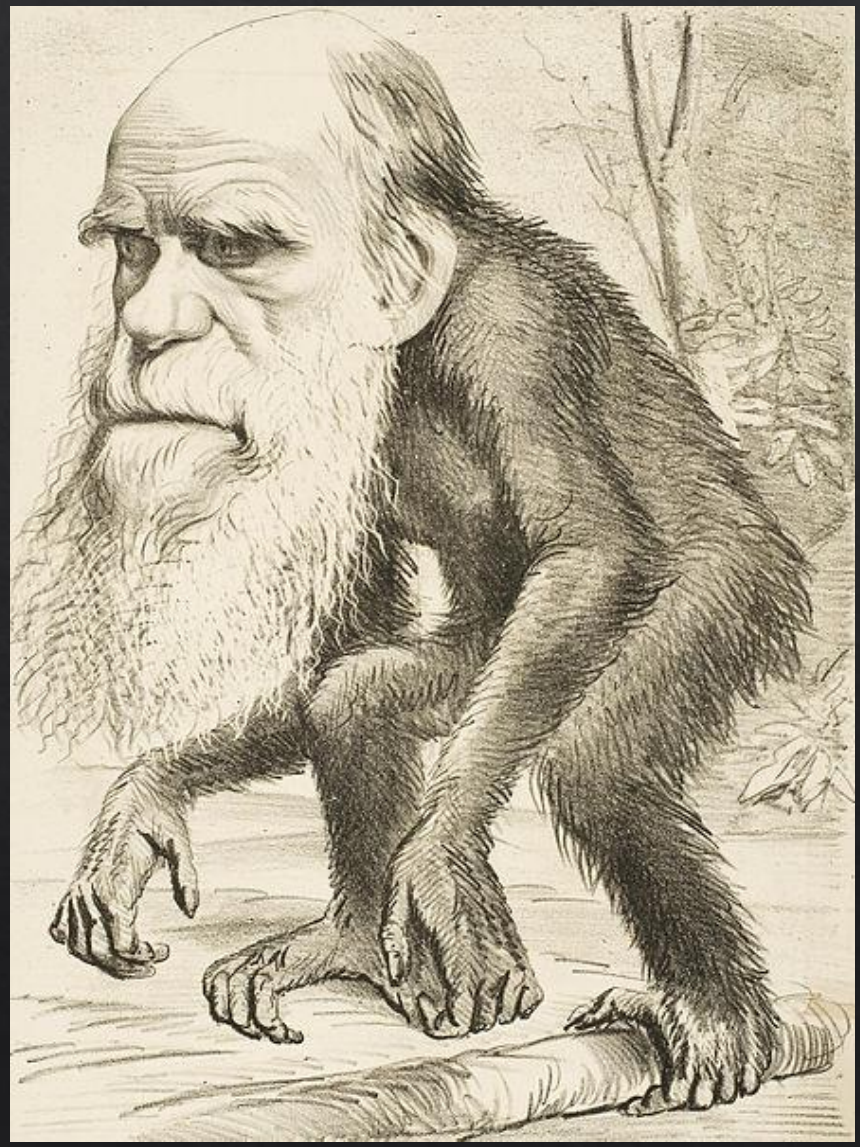


CHARLES DARWING
1809-1882

A Origen das Espécies (1859):

similaridades entre homem - animal

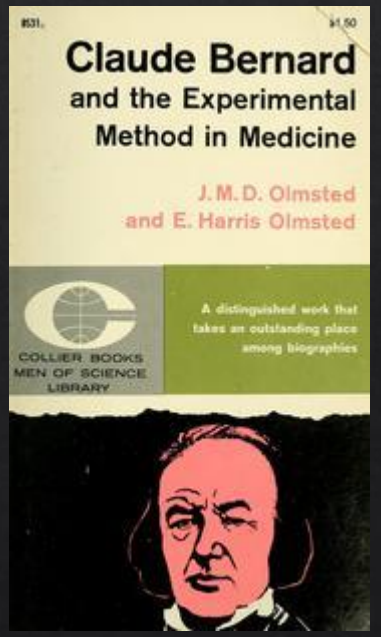




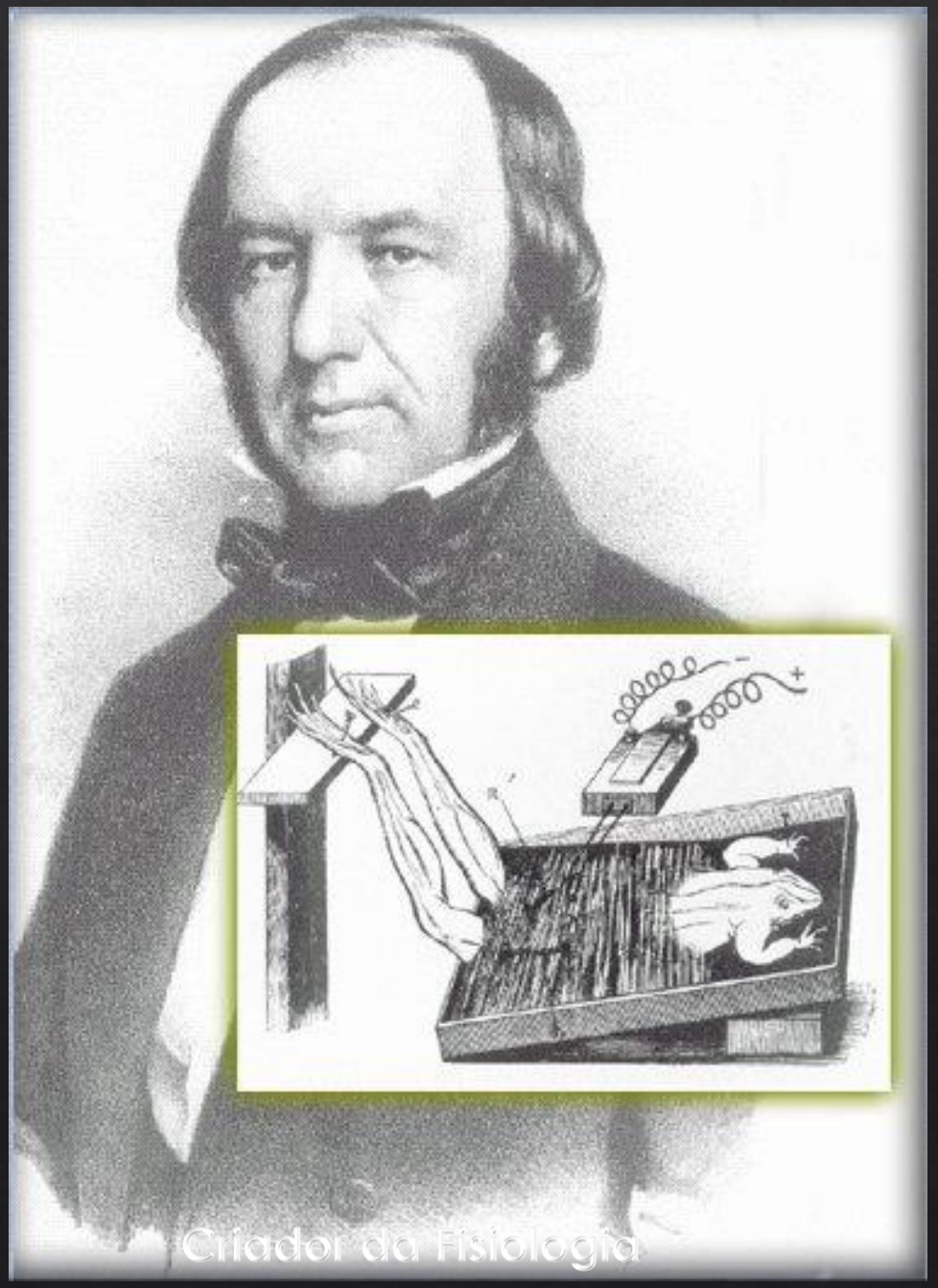
https://upload.wikimedia.org/wikipedia/commons/6/6f/Editorial_cartoon_depicting_Charles_Darwin_as_an_ape_%281871%29.jpg

CLAUDE BERNARD
1813-1878

Introdução à l'étude de la médecine expérimentale (1865).



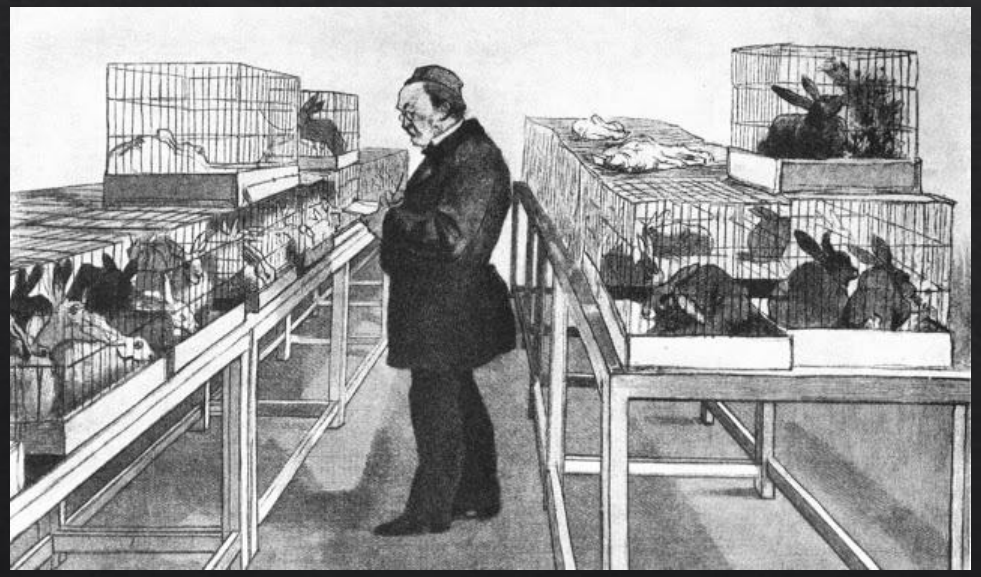
http://www.andalan.es/wp-content/uploads/4.-El-Metodo-Experimental.jpg



https://www.vidaalterna.com/zarlene/gif/claude_bernard2.jpg

LOUIS PASTEUR
1822-1895

Vacina contra a raiva em humanos (1885).



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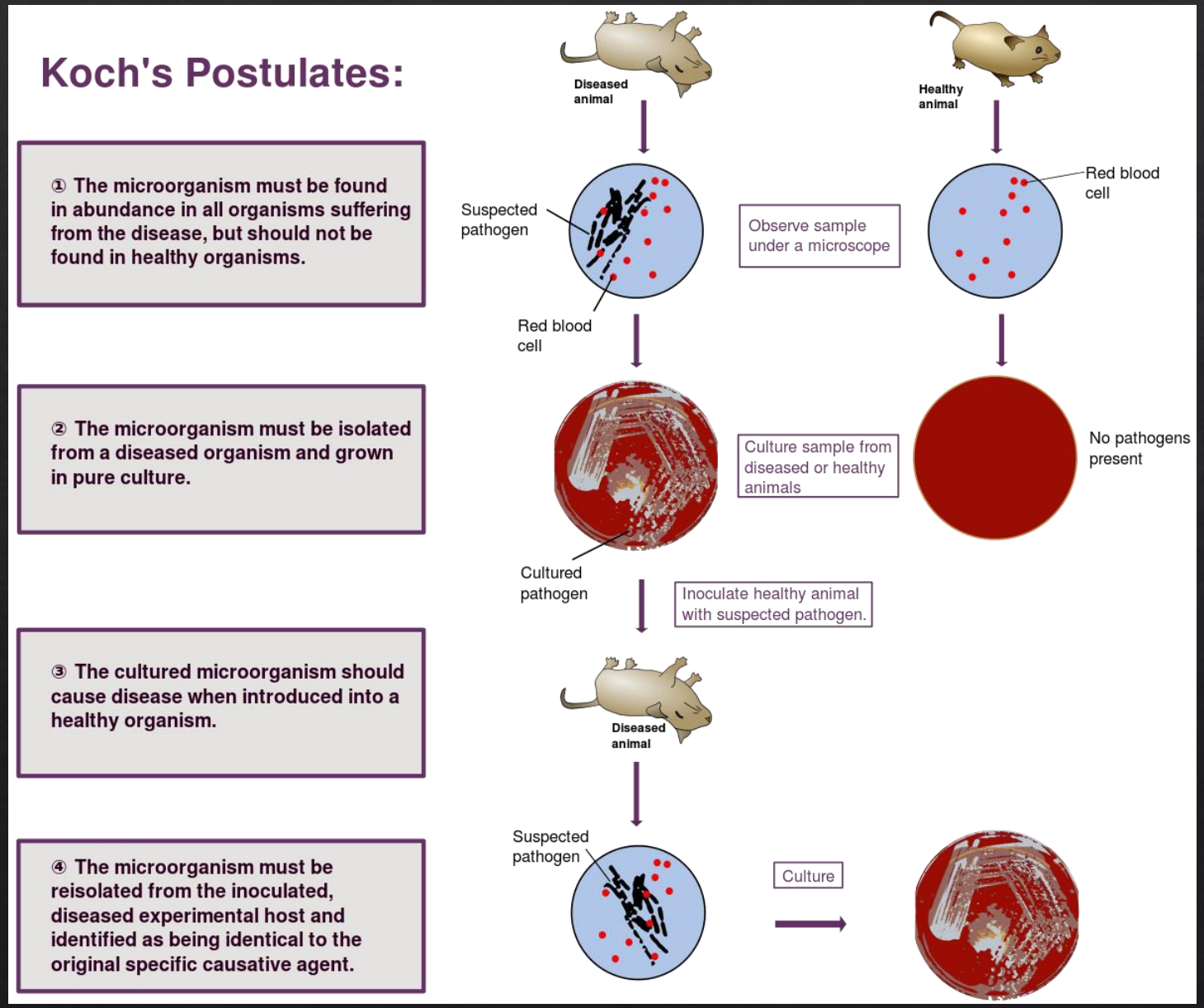
https://media.sciencephoto.com/h4/16/01/70/h4160170-800px-wm.jpg

Microbiologia: *Postulados de Koch* (1884)

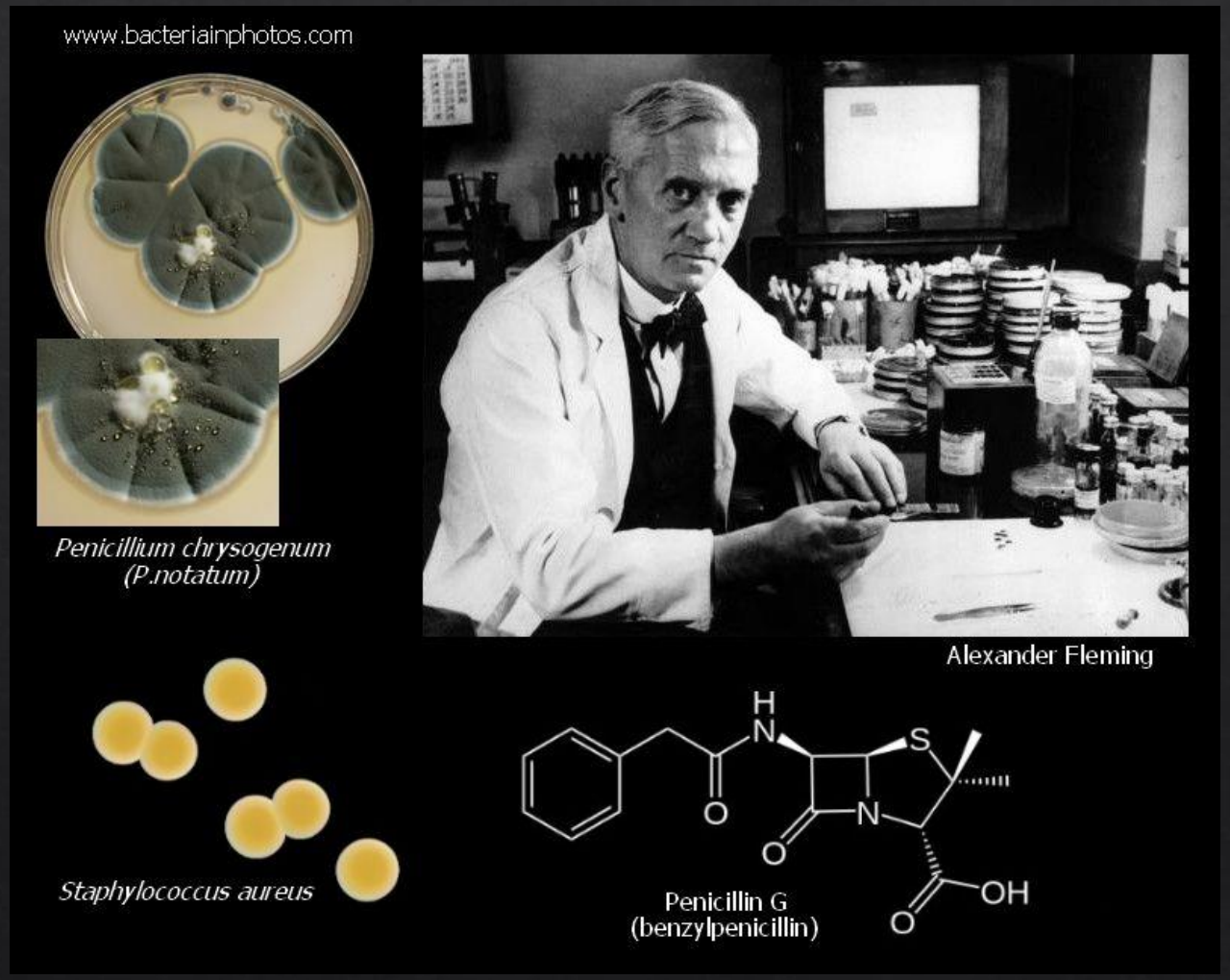


Robert Koch
(1843-1910)

https://upload.wikimedia.org/wikipedia/commons/thumb/1/11/Koch%27s_Postulates.svg/1200px-Koch%27s_Postulates.svg.png

Frederich Banting e Charles Best
Insulina (1921)

Alexander Fleming
Penicilina (1928)



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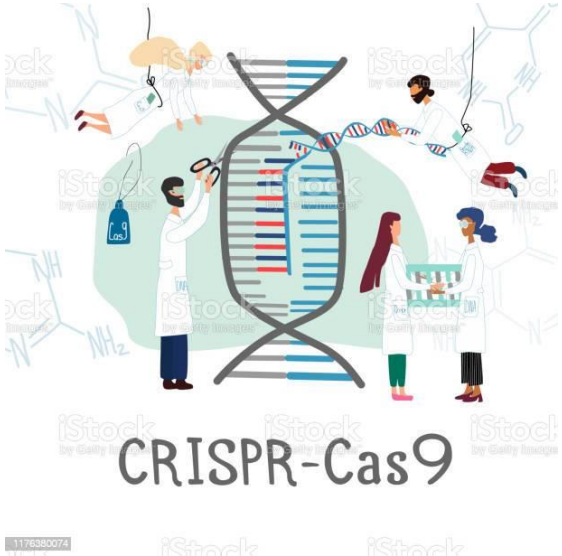
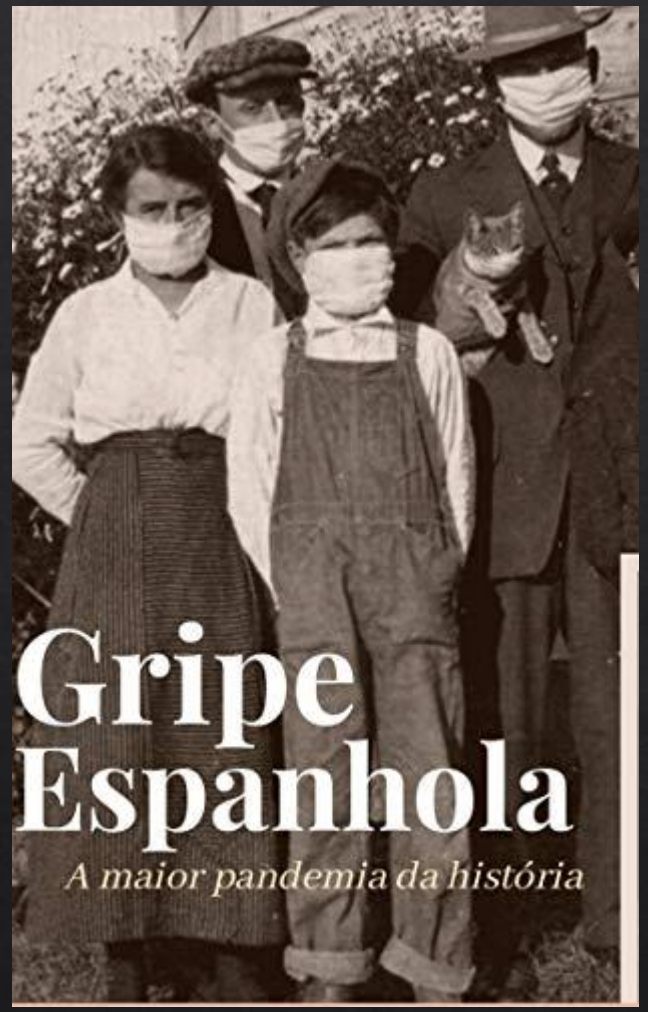
https://i.pinimg.com/originals/47/df/d8/47dfd8316b919d10ef251396c6021be0.jpg

2020: Descoberta da técnica de edição do genoma CRISPR/Cas9. Possibilita alterar o DNA de animais, plantas e microorganismos com altíssima precisão. Essa tecnologia teve um impacto revolucionário na pesquisa biomédica contribuindo para novas terapias contra o câncer e pode tornar realidade o sonho de curar doenças genéticas.



1918-1920



https://m.media-amazon.com/images/I/51UKeQGTKHL.jpg

GAZETA DE NOTICIAS

A GRANDE EPIDEMIA

As providencias do governo de muito pouco valeram até agora

Continuamos entregues á Divina Providencia

: E os casos fataes augmentam :

A gravidade da situação e as providencias do governo

A Caixa Economica

Providencias do governo

Stereotypada e impressa nas machinas rotativas do Marinoni, na typographia da Sociedade Anonyma GAZETA DE NOTICIAS.

NUMERO AVULSO 100 RS.

O RIO É UM VASTO HOSPITAL!

A invasão da influenza hespanhola

A desidia criminosa do governo

O povo soffre os horrores da exploração

Não ha medicos, não ha remedios

Soccorro!

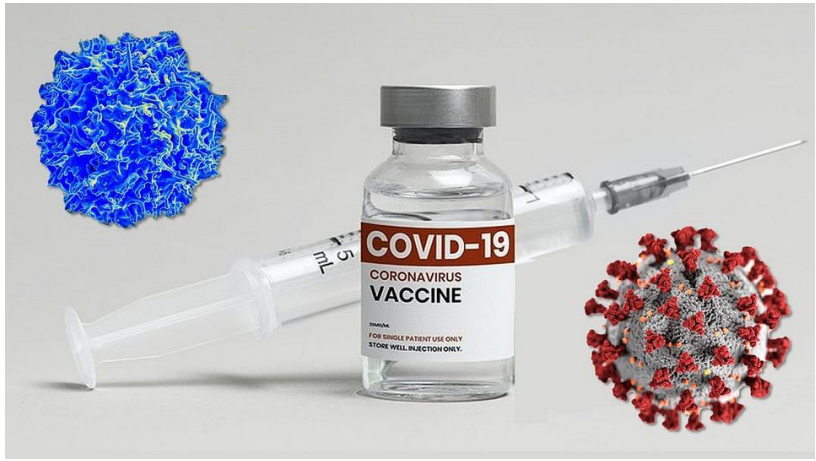
Na Detenção

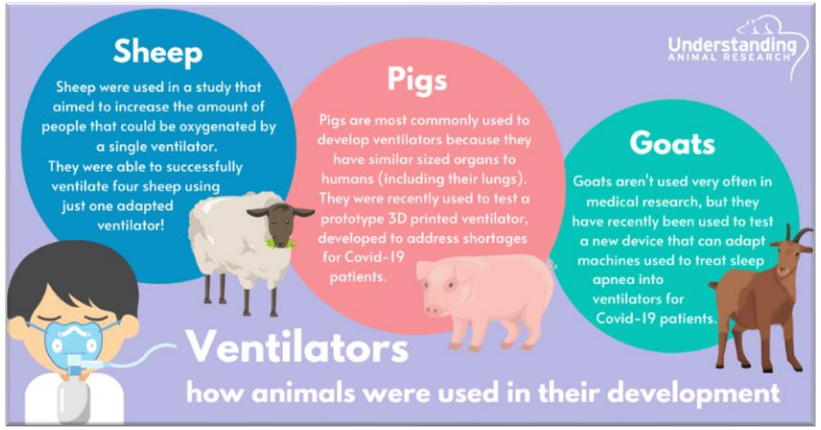
Na Brigada Policial

Na Bibliotheca Nacional

E' preciso demittil-o!

Milhares de pessoas procuram as pharmacias


COVID-19
CORONAVIRUS
VACCINE
5 mL
FOR SINGLE PATIENT USE ONLY
STORE WELL INJECTION ONLY.


Understanding
ANIMAL RESEARCH
Sheep
Sheep were used in a study that aimed to increase the amount of people that could be oxygenated by a single ventilator.
They were able to successfully ventilate four sheep using just one adapted ventilator!
Pigs
Pigs are most commonly used to develop ventilators because they have similar sized organs to humans (including their lungs).
They were recently used to test a prototype 3D printed ventilator, developed to address shortages for Covid-19 patients.
Goats
Goats aren't used very often in medical research, but they have recently been used to test a new device that can adapt machines used to treat sleep apnea into ventilators for Covid-19 patients.
Ventilators
how animals were used in their development