



Drug testing

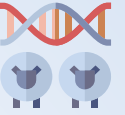
Organism used in Scientific research

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Objectives



1

Define **model organisms**

4

The **ethical and regulatory imperatives** of use animals in SR

3

Describe **examples** of use animals in SR.

2

List of **organisms** use in SR

5

List the **advantages and disadvantages** of use animals in SR



Introduction

Model organism is a species used by researchers to study specific biological processes they have similar genetic characteristics to humans and are commonly used in research areas such as genetics, developmental biology are typically chosen for their easy maintenance and reproduction in a laboratory Mice, rats, fish, amphibians, and reptiles combined account for more than 85% of research animals Most are euthanized after being used in an experiment .

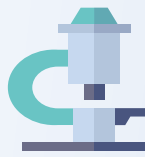


1

**Define
model
organisms**

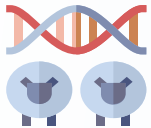


Infliction of pain



A model organism is a species that has been widely studied, usually because it is easy to maintain and breed in a laboratory setting and has particular experimental advantages.

- ▶ These are non-human species that are used to help scientists understand biological processes.
- ▶ They may have particularly robust embryos that are easily studied and manipulated in the lab, this is useful for scientists studying development.
- ▶ Or they may occupy a pivotal position in the evolutionary tree, this is useful for scientists studying evolution



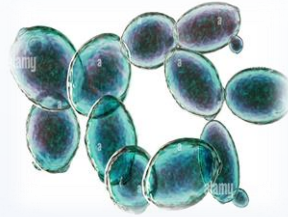


2

List of **organisms** used in scientific research

Infliction of pain

➤ **Yaset (*Saccharomyces cerevisiae*).**



➤ ***Drosophila melanogaster* (fruit fly)**



➤ ***Mus musculus* (mouse)**

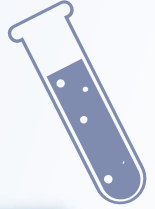


➤ ***Homo sapiens* (human)**

➤ ***Pisum sativum* (a garden pea)**



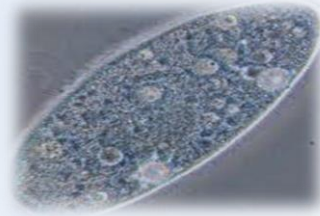
➤ Escherichia coli (E. coli)



➤ Danio rerio (zebrafish)



➤ Paramecium (a protozoan)



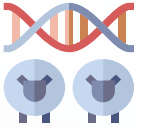
➤ Neurospora crassa (orange bread *Zea mays*)



3

Describe
examples of
using animals in
SR.





➤ **The house mouse (*Mus musculus*)**

they are often used to study human diseases For example, many scientists use mice to study diseases such as cancer since mice better recapitulate the complex interactions between cancer cells, therapeutic drugs, and the rest of the body

➤ **The fruit fly (*Drosophila melanogaster*)**

was brought to the forefront by Thomas Hunt Morgan, who is known as the “father” of *Drosophila* research. Morgan discovered that genes were found within chromosomes using the fruit fly far before we even knew that DNA was genetic material



➤ **Yeast (*Saccharomyces cerevisiae*)**

Yeast are also the first eukaryotic genome to be entirely sequenced and is very amenable to genetic manipulation.

➤ **Zebrafish (*Danio rerio*)**

the zebrafish has gradually become an important model organism. They share about 70% of their genes with humans and 85% of human genes associated with a disease have a homolog in zebrafish and Scientists can simply inject one-celled embryos with DNA or RNA to edit their genomes or to create transgenic animals





4

The ethical and regulatory imperatives of use animals in SR

- Taking into account scientific planning and caution for any experiments conducted on animals based on a scientific information research methodology approved by the University's Scientific Research Ethics Committee and the Use of Experimental Animals.
- Reviewing specialists in the health of experimental animals to know their condition before, during and at the end of the experiments to preserve the public health of those working on them and to ensure that infection does not spread among animals or those dealing with them.



- Using alternative options if possible in conducting experiments, such as using cell and tissue cultures or electronic simulation experiments as an alternative to animals.
- Not conducting experiments on endangered animals, except for the purpose of increasing their reproductive rates, and after obtaining legal approval (from the competent authorities), and in accordance with the regulations in force to preserve environmental life. It is also not permissible to conduct any vaccination between animals that do not belong to the same species.



- Taking care of the animal's housing in terms of breeding places, feeding, ventilation, periodic health care, and safe waste disposal in order to avoid infection and ensure the health of the animal.
- Using euthanasia for animals after the end of the experiments or the loss of some vital organs to put an end to the animal's suffering due to the severe pain of those experiments





4

List the advantages and disadvantages of using animals in SR



➤ Advantages

Model Organisms:

Certain organisms (like mice, fruit flies, and zebrafish) have well-mapped genetics and are easy to manipulate, making them ideal for studying biological processes.

Short Life Cycles:

Many organisms have short life spans, allowing researchers to observe multiple generations and study evolutionary processes and developmental biology.





➤ Advantages

-Some simpler organisms (like bacteria or yeast) do not raise the same ethical concerns as higher animals, enabling experimentation with fewer moral dilemmas.

Controlled Environments:

-Laboratory settings allow for controlled experiments, minimizing variables and enhancing the reliability of results.

Medical Research:

-Animal models are crucial for studying diseases, drug effects, and treatment efficacy before human trials.





➤ **Disadvantages:**

- Ethical Concerns: Issues regarding animal welfare.
- Species Differences: Results may not apply to humans.
- Complexity of Systems: Simplifying may overlook natural complexities.
- Cost and Resources: Maintaining organisms can be expensive.
- Regulatory Restrictions: May limit experimental design.
- Public Perception: Negative sentiments can affect funding



Summary



- A model organisms are a species used to study specific biological processes There are several types and they vary in complexity and use. They are usually easy to maintain and breed in a laboratory setting, and has genetic characteristics similar to humans.
- Like zebrafish and yeast zebrafish has gradually become an important model organism.
- They share about 70%of their genes with humans, And Yeast is ,also the first eukaryotic genome to be entirely sequenced.
- Despite the ethical challenges associated with the use of animals in scientific experiments the scientific and medical benefits gained remain invaluable, such as the development of medical treatments and a better understanding of disease mechanisms



Reference



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Thank you for listening to our presentation



● Laboratory experiments on animal