GSA MODEL ORGANISMS DECK

New Game!

Genetics Society of America

Home

An exciting new set of game rules to explore process of science ideas. In this case, a closer look at the use of *model organisms* – – in genetic research.

GSA deck

Swap Projects!

CHANCE CARD

You have the opportunity to exchange ideas and expertise with another scientist.

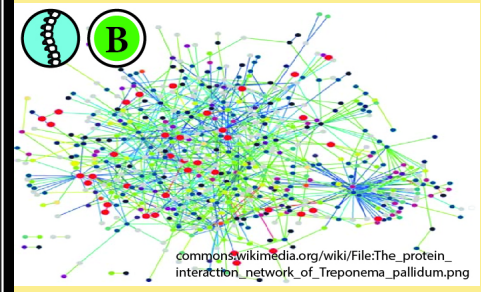
Play: Choose a player and take one of their projects and associated resources. Give them one of your projects and associated resources.

May not be used on collaborative or mandatory projects.

GSA deck

Software Development 2

PROJECT CARD



Task: Design a computer program for analyzing genetic data.

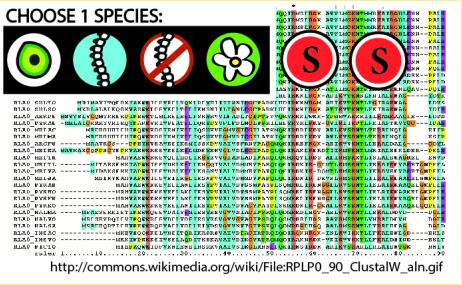
Collect: 1 **VERTEBRATE** card, 1 **BIOINFORMATICS** card

GSA deck

Graphic by *Wikipedia*

Genome Sequencing 3

PROJECT CARD



Task : Sequence the entire genome of an organism of your choosing.

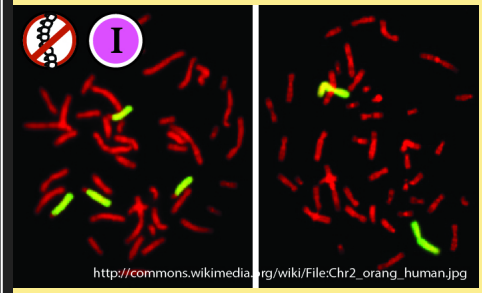
Collect: 2 **SEQUENCING** cards, 1 **SPECIES** card

GSA deck

Graphic by *Wikipedia*

Cytogenetic Analysis 2

PROJECT CARD



Task: Investigate chromosome arrangements, forms, and behaviors in an invertebrate model organism.

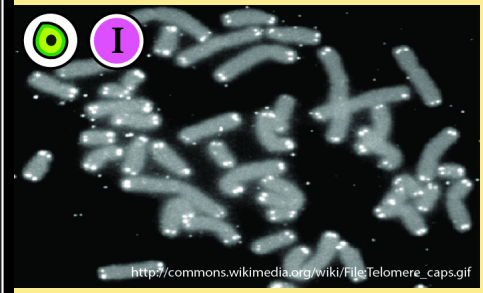
Collect: 1 **INVERTEBRATE** card, 1 **IMAGING** card

GSA deck

Graphic by *Wikipedia*

Telomere Study 2

PROJECT CARD



Task: Study the maintenance, structure, and localization of telomeres (a genetic component involved in aging) in a single celled model organism.

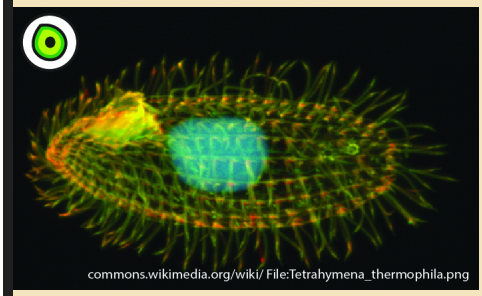
Collect: 1 **SINGLE-CELLED ORGANISM** card, 1 **IMAGING** card

GSA deck

Graphic by *Wikipedia*

Ciliates

Tetrahymena (genus)



commons.wikimedia.org/wiki/ File:Tetrahymena_thermophila.png

Chromalveolata, Ciliophora

SINGLE-CELLED ORGANISM: These unicellular protists use hair-like cilia for locomotion and feeding. They are important to biomedical research and have contributed to our understanding of many cellular and biochemical processes.

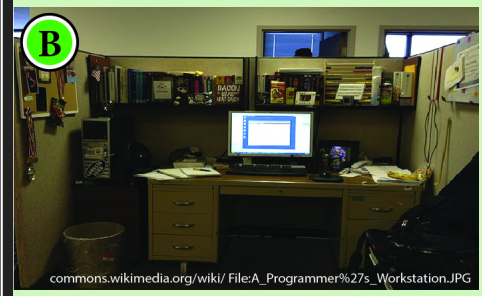
GSA deck

Graphic by *Wikipedia*

Cool, Warm

Bioinformatics

Research Technique



commons.wikimedia.org/wiki/ File:A_Programmer%27s_Workstation.JPG

The use of computers to store, organize, and analyze biological data. The exponential growth of data produced with next-gen sequencing has made bioinformatics essential to genetics research.

EXAMPLES: ***genome assembly, genetic variant detection,*** *and* ***sequence alignment.***

Graphic by *Wikipedia*

GSA deck

Genetic Analysis

Research Technique

Generation/propagation of organisms of the same genetic strain allowing researchers to produce populations of organisms with defined mutations, to study traits, & to understand biological systems.

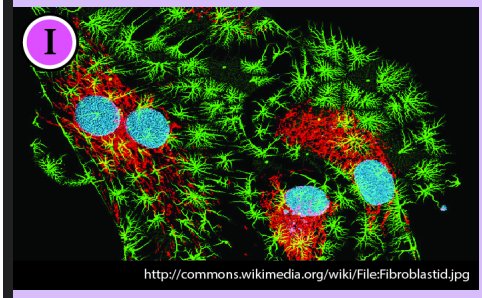
EXAMPLES: **inbreeding, genetic crosses, cell culture, and mutagenesis.**

Graphic by *Bill Branson, NCI*

GSA deck

Imaging

Research Technique



http://commons.wikimedia.org/wiki/File:Fibroblastid.jpg

The visual representation of an organism's exterior and interior at different magnifications.

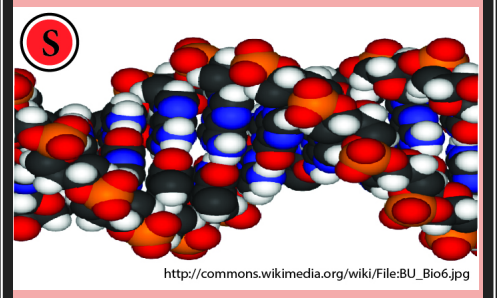
EXAMPLES: ***microscopy, radiography, fluorescent probes*** *and* ***biomarkers.***

GSA deck

Graphic by *Wikipedia*

Sequencing

Research Technique



http://commons.wikimedia.org/wiki/File:BU_Bio6.jpg

Determining the order of nucleotides of an DNA or RNA fragment. Sequencing may be applied to small and large amounts of nucleic acids, from a single gene to a whole genome.

EXAMPLES: ***Sanger Sequencing*** *and* ***Sequencing by Synthesis.***

Graphic by *Wikipedia*

GSA deck

Molecular Genetics

Research Technique

http://commons.wikimedia.org/wiki/File:Pipetten.JPG

Lab methods that manipulate tissue, DNA, and protein to study the structure, function and interaction of genes.

EXAMPLES: ***extraction, cloning*** *and* ***amplification*** *of RNA and DNA,* ***gene knockdown*** *and* ***mutagenesis.***

Graphic by *Wikipedia*

GSA deck

Grant Approved

WILDCARD

You just got funded!

Play: You may use this card in place of a **SPECIES** card for one project. You do not have to specify which species it is being used for until the project is complete.

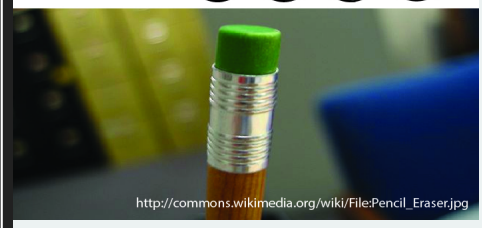
Graphic by *Wikipedia*

GSA deck

Human Error!

CHANCE CARD

CAN BE PLAYED ON:



Something isn't working! Perhaps your samples are contaminated, you lost your data, or forgot to feed your organism again.

Play: Place face up on another players species card. The covered species card is immediately placed in the burn pile along with this card.

Graphic by *Wikipedia*

GSA deck

Grant Approved

WILDCARD

You just got funded!

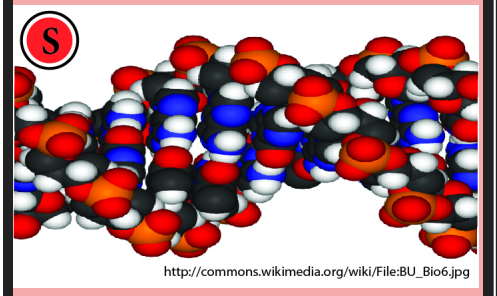
Play: You may use this card in place of a **RESEARCH TECHNIQUE** card for one project. You do not have to specify which technique it is being used for until the project is complete.

Graphic by *Wikipedia*

GSA deck

Sequencing

Research Technique



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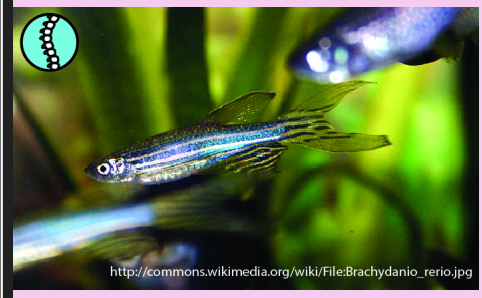
GSA deck

Zebrafish

Danio rerio



Animalia, Chordata, Actinopterygii

VERTEBRATE: An ideal model organism for research in development, genetics, and stem cell research due to its large transparent embryos and regenerative abilities. Its shiny stripes and simple needs also makes it a popular aquarium pet.

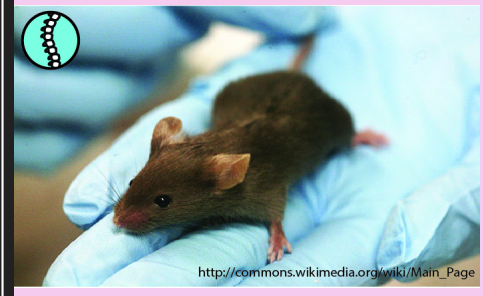
GSA deck

Graphic by *Wikipedia*

Warm

Mouse

Mus (genus)



Animalia, Chordata, Mammalia

VERTEBRATE: The mouse is the most widely used mammalian model system. Its physiological and genetic similarity to humans makes it ideal for medical research.

GSA deck

Graphic by *Wikipedia*

Cool, Warm

Increase Sample Size

MANDATORY PROJECT

Your reviewers are not convinced by your results and want to increase your sample size! Collect 2 SPECIES cards in the same category.

Play: Give this card to another player. No points for completing. **-2** points for NOT completing. Cannot be collaborated with.

GSA deck

Graphic by *Wikipedia*

Lab Preparations

MANDATORY PROJECT

Before starting a molecular genetics project, you must prepare your reagents and optimize your protocol!

Play: Give to another player. No points for completing. **-2** points if NOT completed. Cannot be collaborated with.

Graphic by *Wikipedia*

GSA deck

Resource Donation

CHANCE CARD

A neighbouring lab has a resource you want, and generously offers it to you!

Play: Take a resouce from another player's project and place it in your hand. Place this card in the burn pile after use.

Graphic by *Wikipedia*

GSA deck

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GSA deck

Lose Funding!

CHANCE CARD

CAN BE PLAYED ON: M S G I B

Budget cuts create project setbacks. Noooo!

Play: Place on top of another player's **RESEARCH TECHNIQUE** card. The card affected is immediately removed and placed in the burn pile along with this card.

Graphic by *Wikipedia*

GSA deck

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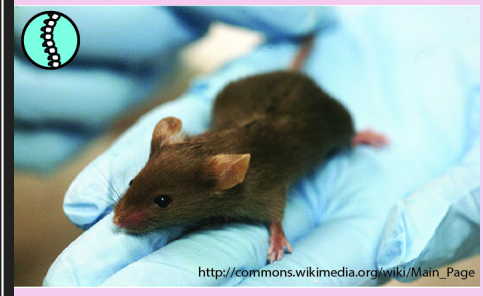
Mus (genus)



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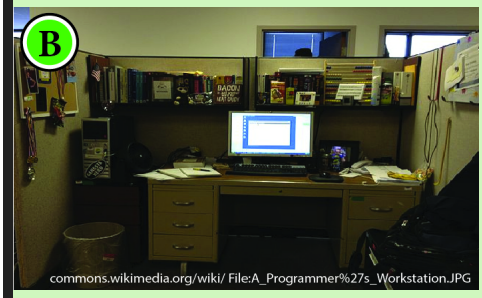
Cool, Warm

Bioinformatics

Research Technique



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Graphic by *Bill Branson, NCI*

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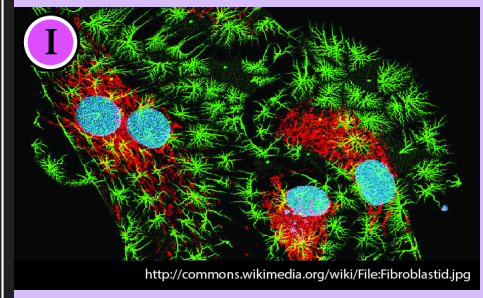
Research Technique



The visual representation of an organism's exterior and interior at different magnifications.

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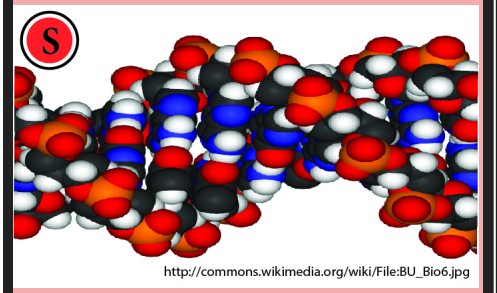
GSA deck

Graphic by *Wikipedia*

Sequencing

Research Technique



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Graphic by *Wikipedia*

GSA deck

Fruit Fly

Drosophila melanogaster

`Animalia, Arthropoda, Insecta`

INVERTEBRATE: This tiny fly has been a favourite model organism among geneticists for over 100 years due to it's short life cycle, prolific reproduction, the ease at which it can be mutated, and the ease at which its inherited physical traits can be identified.

GSA deck

Graphic by *Wikipedia*

Cool, Warm

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GSA deck

Graphic by *Wikipedia*

Transposon Study 3

PROJECT CARD

S B

Task : Identify the structure and location of transposable elements in the genome, as well as their possible role in epigenetic control.

Collect: 1 **SINGLE CELLED ORGANISM** card, 1 **SEQUENCING** card, 1 **BIOINFORMATICS** card

GSA deck

Graphic by *Wikipedia*

Gene Knockout 4

PROJECT CARD

S I G

Task : Study the biological effects of disrupting specific genes in a multicellular model organism.

Collect: 1 **INVERTEBRATE ORGANISM** card, 1 **SEQUENCING** card, 1 **IMAGING** card, 1 **GENETIC ANALYSIS** card

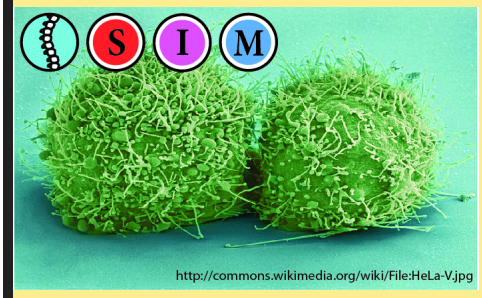
GSA deck

Graphic by *Wikipedia*

Cancer Research 4

PROJECT CARD

S I M



Task: Study the genetics of human tumor development using a vertebrate model organisim.

Collect: 1 **VERTEBRATE** card, 1 **MOLECULAR GENETICS** card, 1 **SEQUENCING** card, 1 **IMAGING** card

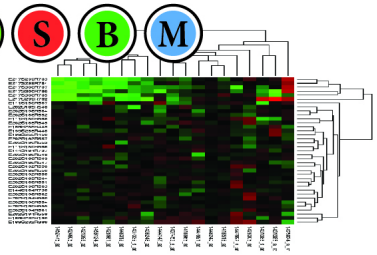
GSA deck

Graphic by *Wikipedia*

Transcriptomics 4

PROJECT CARD

S B M



Task: Study changes in gene expression that occur when plants defend themselves from pests and pathogens.

Collect: 1 **PLANT** card, 1 **MOLECULAR GENETICS** card, 1 **SEQUENCING** card, 1 **BIOINFORMATICS** card

GSA deck

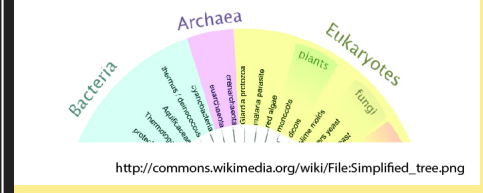
Graphic by *Wikipedia*

Phylogenetic Analysis 4

PROJECT CARD

CHOOSE 2 SPECIES:

S B



Task: Infer the evolutionary relationships of different species by comparing their genetic sequences.

Collect: 1 **SEQUENCING** card + 1 **BIOINFORMATICS** card + 2 different species cards.

GSA deck

Graphic by *Wikipedia*

Common Garden Experiment 3

PROJECT CARD

Task : Differentiate between genetic and environmental effects on plant traits such as growth and flowering time.

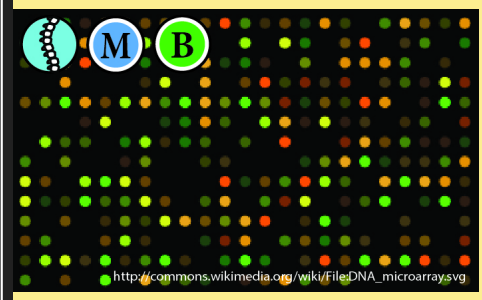
Collect: 1 **PLANT** card, 1 **SEQUENCING** card, 1 **GENETIC ANALYSIS** card

Graphic by *Wikipedia*

GSA deck

SNP analysis 3

PROJECT CARD



Task: Identify genetic variation associated with psychiatric disorders using a single-nucleotide polymorphism (SNP) array.

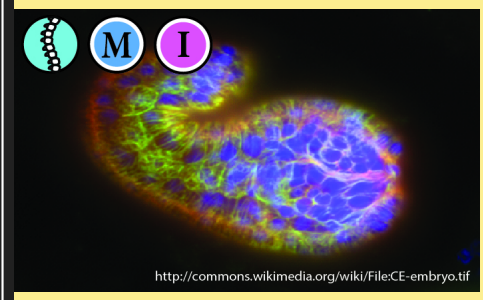
Collect: 1 **VERTEBRATE** card, 1 **MOLECULAR GENETICS** card, 1 **BIOINFORMATICS** card

Graphic by *Wikipedia*

GSA deck

Embryonic Development Study 3

PROJECT CARD



Task : Determine the role of chromatin structure in embryonic development and its contribution to stem cell properties.

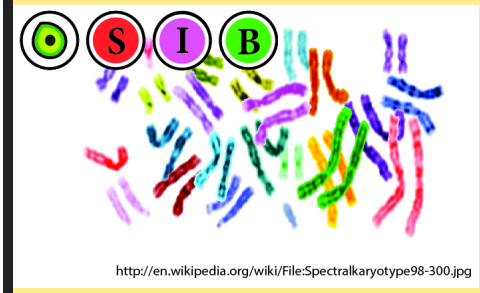
Collect: 1 **VERTEBRATE** card, 1 **MOLECULAR GENETICS** card, 1 **IMAGING** card

Graphic by *Wikipedia*

GSA deck

Genome Stability Study 4

PROJECT CARD



Task: Study the genes responsible for the maintenance of chromosome structure and genome stability.

Collect: 1 **SINGLE-CELLED ORGANISM** card, 1 **SEQUENCING** card, 1 **IMAGING** card, 1 **BIOINFORMATICS** card

Graphic by *Wikipedia*

GSA deck

Hybrid study 3

PROJECT CARD

Task: Study the genetics of reproductive isolation by mating two different genetic lines to produce hybrid organisms.

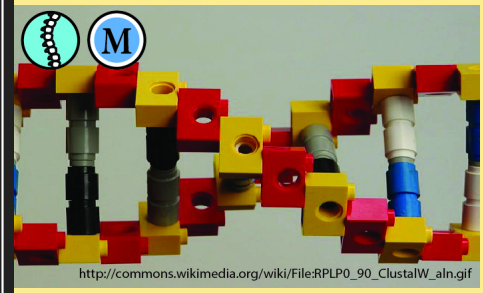
Collect: 1 **INVERTEBRATE** card, 1 **GENETIC ANALYSIS** card, 1 **SEQUENCING**

Graphic by *Wikipedia*

GSA deck

CRISPR/Cas Genome Editing 2

PROJECT CARD



Task : Use modified bacterial DNA segments (CRISPRs) to silence, enhance, or otherwise alter the genes of another organism.

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GSA deck

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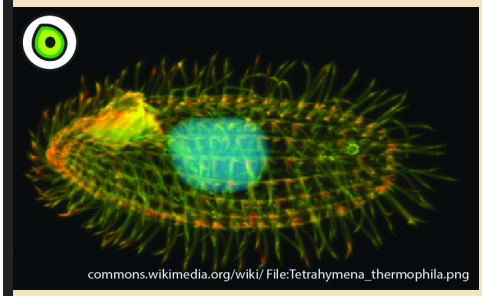

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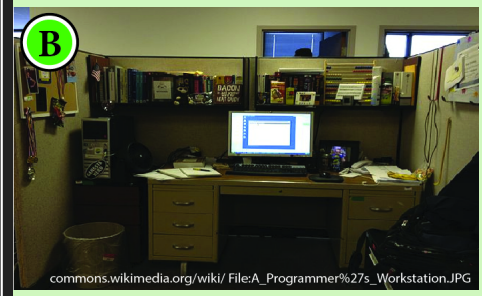
Cool, Warm

Bioinformatics

Research Technique



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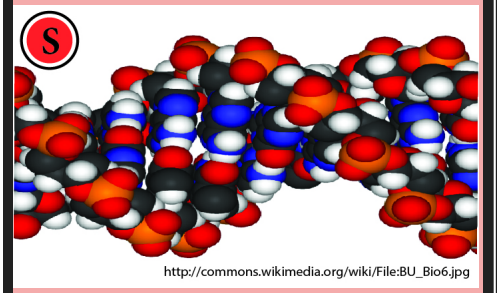

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GSA deck

Yeast

(Multiple species)

Fungi

SINGLE-CELLED ORGANISM: The simple reproduction and genome of this unicellular eukaryote makes it ideal for genetic studies. The practical applications of yeast extend well beyond research, contributing to fermentation in products like bread, wine, and beer!

GSA deck

Graphic by *Wikipedia*

Cool, Warm, Hot

Frog

Xenopus laevis, X. tropicalis

Animalia, Chordata, Amphibia

VERTEBRATE: Commonly known as the "clawed frog", this amphibian's large embryos and eggs are easy to obtain and manipulate for medical and developmetal research.

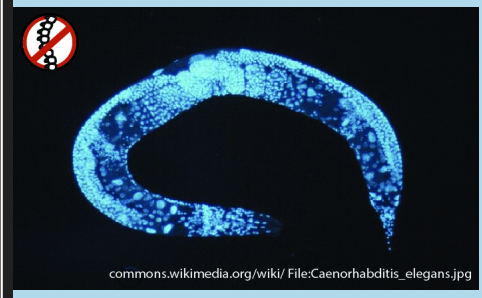
GSA deck

Graphic by *Wikipedia*

Warm, Hot

C. elegans

Caenorhabditis elegans



Animalia, Nematoda, Chromadorea

INVERTEBRATE: This transparent nematode (roundworm) is no more than 1 mm in length, making it easy to examine for inherited traits during genetic studies. It has the distinction of being the first multicellular organism its entire genome sequenced.

GSA deck

Graphic by *Wikipedia*

Cool, Warm

Arabidopsis

Arabidopsis thaliana

Plantae, Angiosperms, Eudicots

PLANT: This small flowering plant from the mustard family is an ideal model organism because of its short generation time, large yield, and small genome. It was the first plant to have it's entire genome sequenced.

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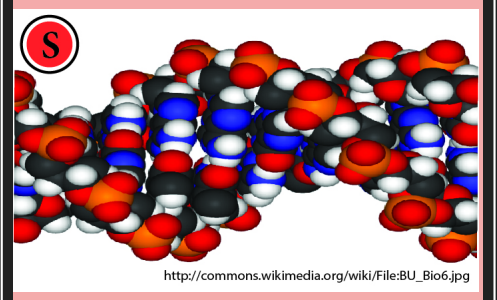

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GSA deck

Graphic by *Wikipedia*

Cool, Warm, Hot

Frog

Xenopus laevis, X. tropicalis

Animalia, Chordata, Amphibia

VERTEBRATE: Commonly known as the "clawed frog", this amphibian's large embryos and eggs are easy to obtain and manipulate for medical and developmetal research.

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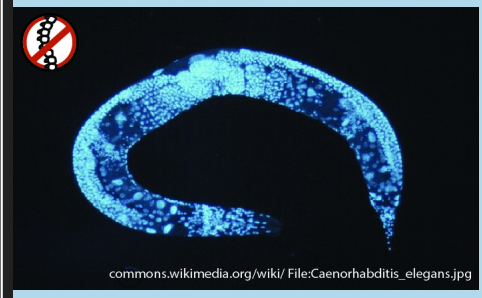
Warm, Hot

C. elegans

Caenorhabditis elegans



Animalia, Nematoda, Chromadorea

INVERTEBRATE: This transparent nematode (roundworm) is no more than 1 mm in length, making it easy to examine for inherited traits during genetic studies. It has the distinction of being the first multicellular organism its entire genome sequenced.

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Cool, Warm

Arabidopsis

Arabidopsis thaliana

Plantae, Angiosperms, Eudicots

PLANT: This small flowering plant from the mustard family is an ideal model organism because of its short generation time, large yield, and small genome. It was the first plant to have it's entire genome sequenced.

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Cool, Warm

Genetic Analysis

Research Technique

Generation/propagation of organisms of the same genetic strain allowing researchers to produce populations of organisms with defined mutations, to study traits, & to understand biological systems.

EXAMPLES: **inbreeding, genetic crosses, cell culture, and mutagenesis.**

Graphic by *Bill Branson, NCI*

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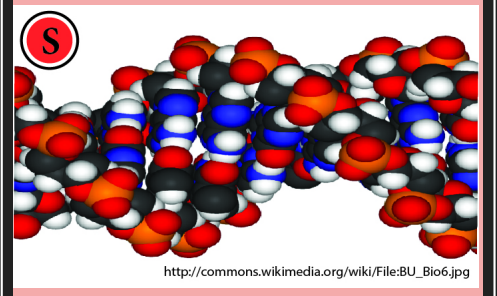
Sequencing

Research Technique



Determining the order of nucleotides of an DNA or RNA fragment. Sequencing may be applied to small and large amounts of nucleic acids, from a single gene to a whole genome.

EXAMPLES: ***Sanger Sequencing*** *and* ***Sequencing by Synthesis.***

Graphic by *Wikipedia*

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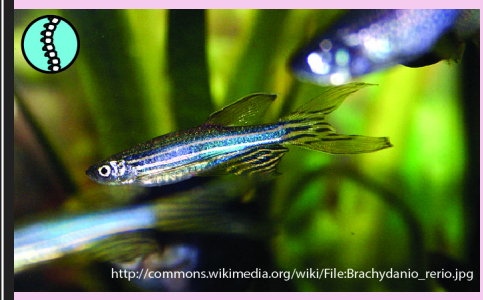
Zebrafish

Danio rerio



Animalia, Chordata, Actinopterygii

VERTEBRATE: An ideal model organism for research in development, genetics, and stem cell research due to its large transparent embryos and regenerative abilities. Its shiny stripes and simple needs also makes it a popular aquarium pet.

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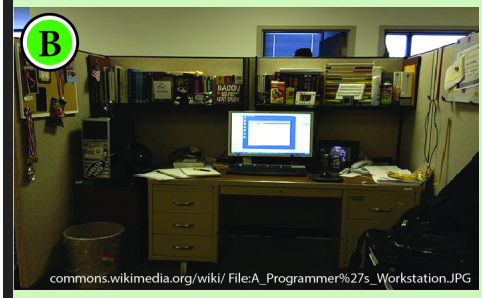
Graphic by *Wikipedia*

Warm

Bioinformatics

Research Technique



The use of computers to store, organize, and analyze biological data. The exponential growth of data produced with next-gen sequencing has made bioinformatics essential to genetics research.

EXAMPLES: ***genome assembly, genetic variant detection,*** *and* ***sequence alignment.***

Graphic by *Wikipedia*

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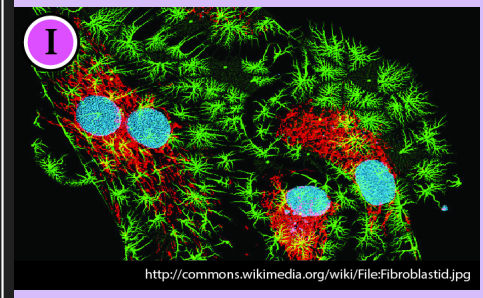
GSA deck

Imaging

Research Technique



The visual representation of an organism's exterior and interior at different magnifications.

EXAMPLES: ***microscopy, radiography, fluorescent probes*** *and* ***biomarkers.***

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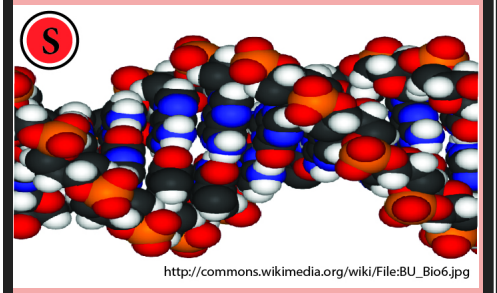
Graphic by *Wikipedia*

Sequencing

Research Technique



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EXAMPLES: ***Sanger Sequencing*** *and* ***Sequencing by Synthesis.***

Graphic by *Wikipedia*

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Molecular Genetics

Research Technique

Lab methods that manipulate tissue, DNA, and protein to study the structure, function and interaction of genes.

EXAMPLES: ***extraction, cloning*** *and* ***amplification*** *of RNA and DNA,* ***gene knockdown*** *and* ***mutagenesis.***

Graphic by *Wikipedia*

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Fruit Fly

Drosophila melanogaster

`Animalia, Arthropoda, Insecta`

INVERTEBRATE: This tiny fly has been a favourite model organism among geneticists for over 100 years due to it's short life cycle, prolific reproduction, the ease at which it can be mutated, and the ease at which its inherited physical traits can be identified.

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Cool, Warm