

Bio393: Genetic Analysis

Dr. Erik Andersen
Dan Cook (TA)

Lectures MWF 2-2:50 PM
Discussion F 3-3:50 PM
Tech M128

**Genetics is the most rapidly moving
and exciting part of biology today!**



Please take the pre-course survey on the course website

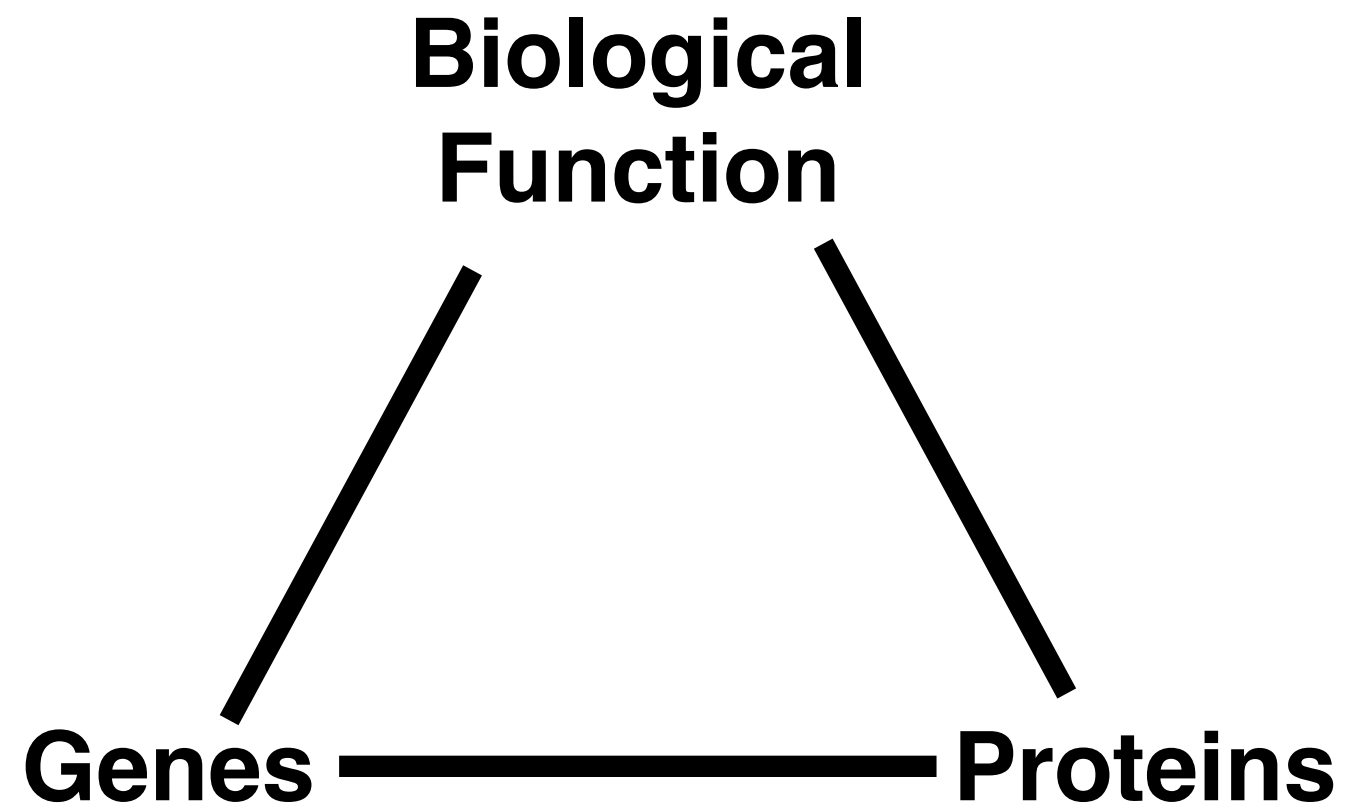
www.andersenlab.org/bio393

Date	Topic
March 30	Mendelian Inheritance
April 1	Chromosome theory, meiosis, mitosis
April 3	Quiz #1
April 6	Recombination and mapping
April 8	Screens, selections, mutations, dosage
April 10	Problem set #1
April 13	Complementation
April 15	Genetic interactions: epistasis
April 17	Quiz #2
April 20	Genetic interactions: Enh. and Sup.
April 22	Principles and methods of genetic analysis I
April 24	Problem set #2
April 27	Principles and methods of genetic analysis II
April 29	Principles and methods of genetic analysis III
May 1	Midterm

Date	Topic
May 4	Developmental genetics I
May 6	Developmental genetics II
May 8	Quiz #3
May 11	Behavioral genetics
May 13	Model organisms in genetics
May 15	Problem set #3
May 18	Human variation and allele freq. spectrum
May 20	Pedigrees and linkage mapping
May 22	Quiz #4
May 25	Memorial Day - no class
May 27	Linkage disequilibrium and pop. structure
May 29	Problem set #4
June 1	Complex traits and GWAS
June 3	Epigenetics and transgenerational effects
June 5	Genome seq, exome seq, and data!

Point Distribution

Problem sets	15%	60 points (15 points each)
Quizzes	20%	80 points (20 points each)
Participation	5%	20 points
Midterm	30%	120 points
Final	30%	120 points





Study organisms
with components
removed

Genetics

**Biological
Function**

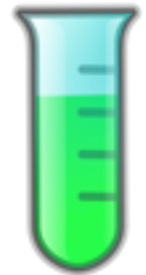
Genes

Proteins

Biological Function

Genetics

Biochemistry

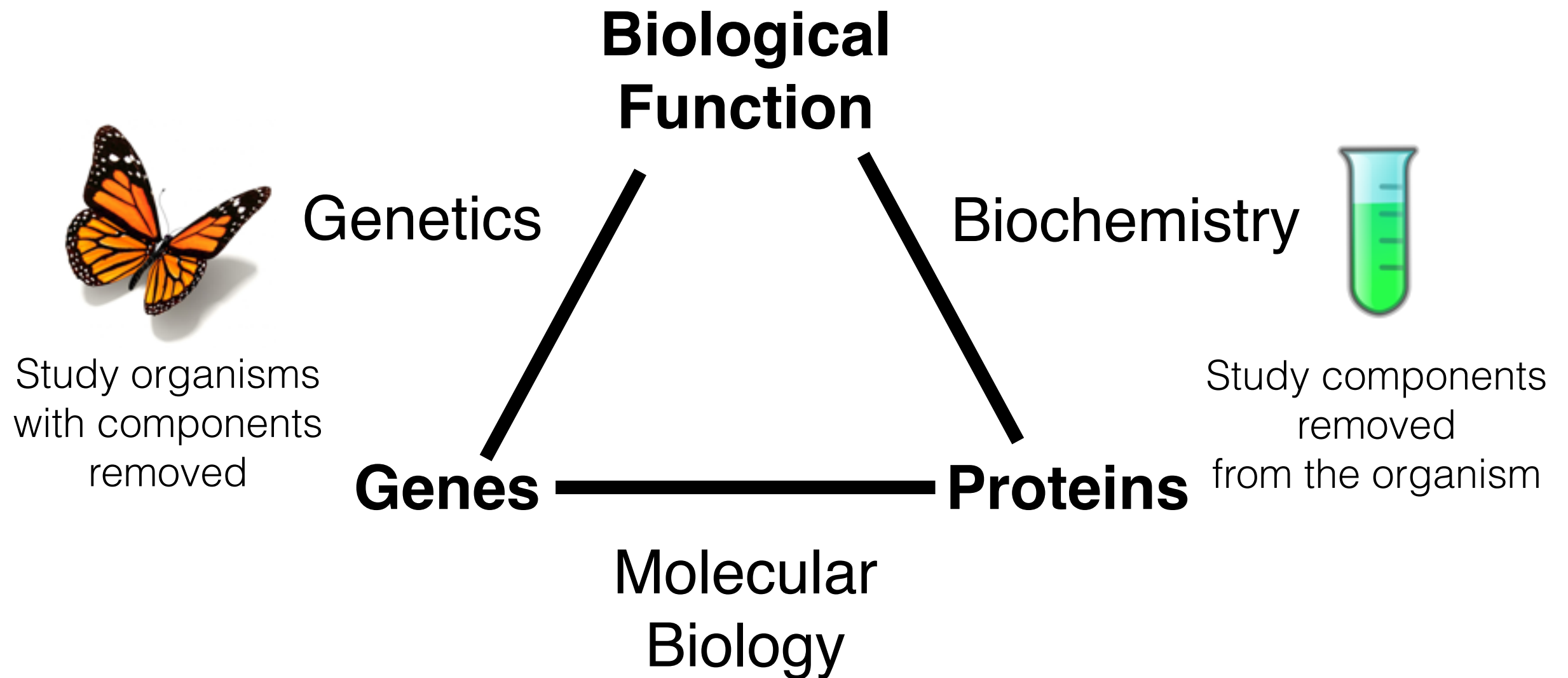


Study organisms
with components
removed

Study components
removed
from the organism

Genes

Proteins



The father of genetics: Gregor Mendel



The father of genetics: Gregor Mendel



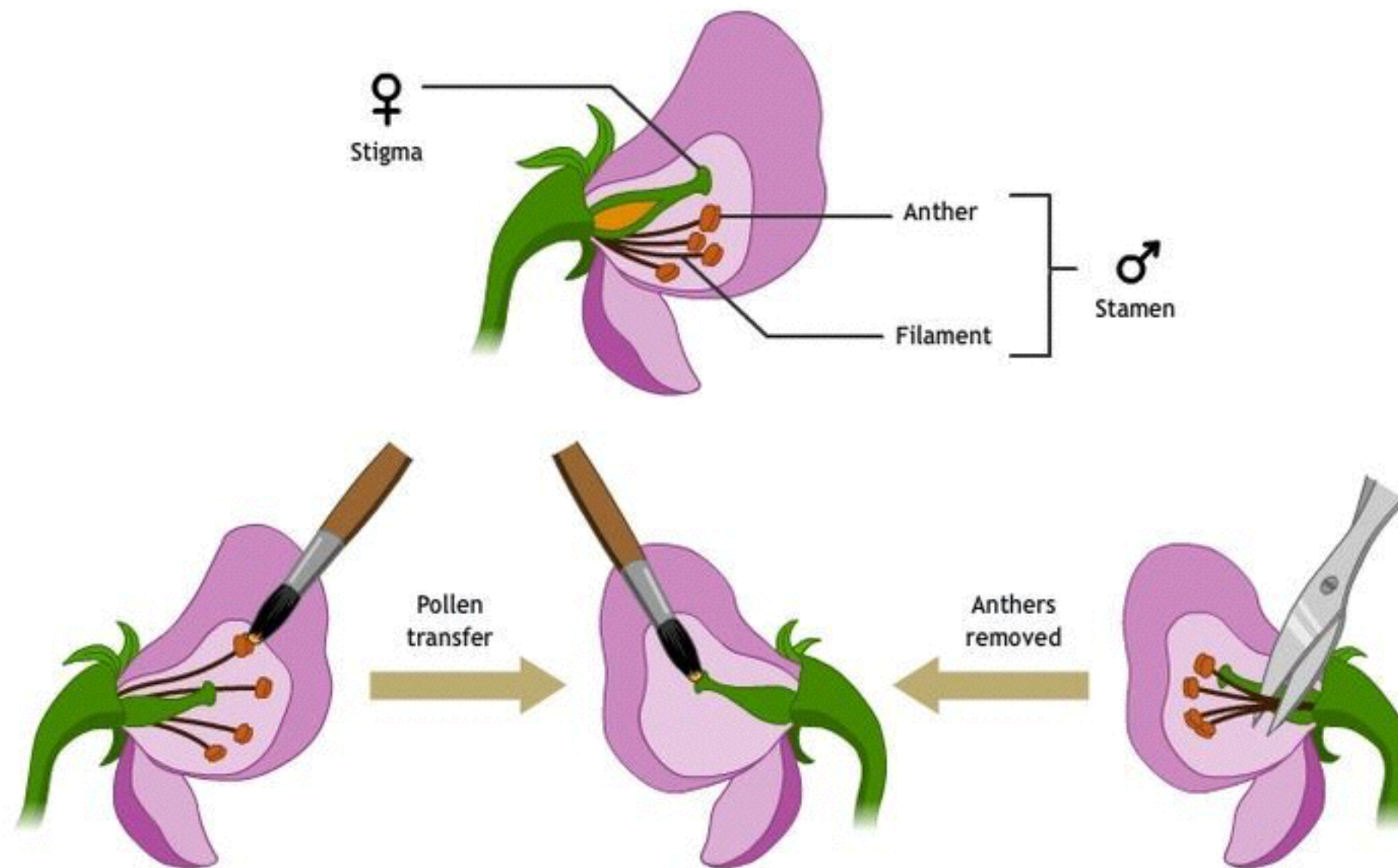
Experimental question drives the choice of study organism

The father of genetics: Gregor Mendel

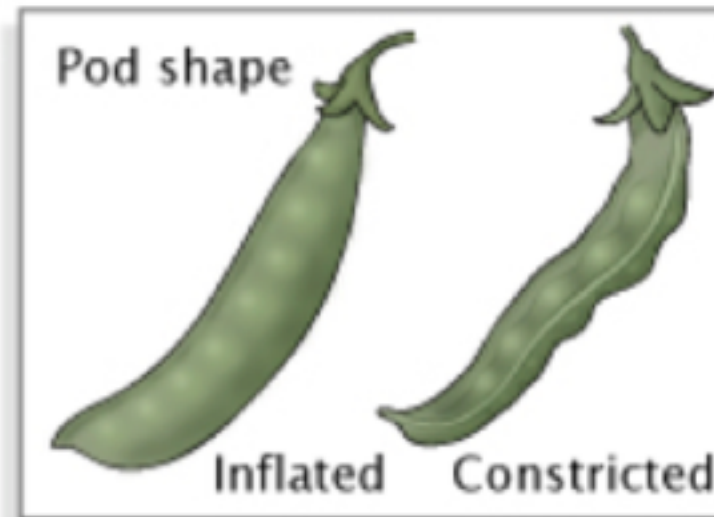
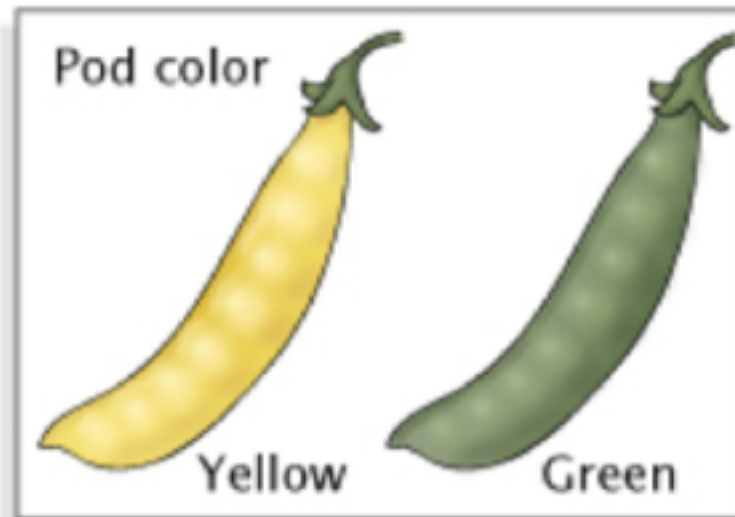
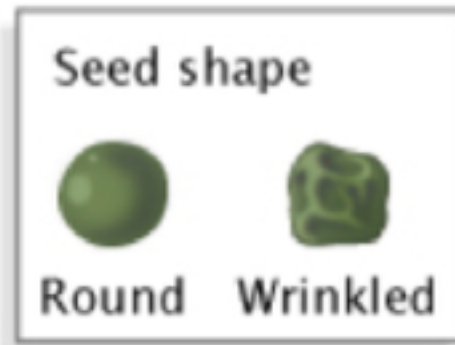


Experimental question drives the choice of study organism





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“Opportunity is missed by most people because it is dressed in overalls and looks like work.”

Thomas A. Edison

Law of dominance

Alleles that confer the recessive phenotype
will be masked by alleles that confer the dominant phenotype















OR

What you see in the F1 is the dominant phenotype

Law of segregation

Every individual contains a pair of alleles.

Gametes (egg or sperm) carry only one allele of each gene.

Character	Dominant Trait	×	Recessive Trait	F ₂ Generation Dominant:Recessive	Ratio
Flower color	Purple 	×	White 	705:224	3.15:1
Flower position	Axial 	×	Terminal 	651:207	3.14:1
Seed color	Yellow 	×	Green 	6022:2001	3.01:1
Seed shape	Round 	×	Wrinkled 	5474:1850	2.96:1
Pod shape	Inflated 	×	Constricted 	882:299	2.95:1
Pod color	Green 	×	Yellow 	428:152	2.82:1
Stem length	Tall 	×	Dwarf 	787:277	2.84:1

Law of independent assortment

Every individual contains a pair of alleles.

Gametes (egg or sperm) carry only one allele of each gene.

Genetics is a powerful discovery and analytical tool

