Mnemonics

Biology

Anterior Pituitary Hormones

"FLAGTOP"

F: Follicle Stimulating Hormone
L: Luteinizing Hormone
A: ACTH
G: Growth Hormone
T: Thyroid Stimulating Hormone
O: MSH - melan**O**cyte stimulating hormone
P: Prolactin

FSH in males

directly stimulates spermatogenesis - sperm look like "FiSH." In females, FSH obviously stimulates ovarian follicles (which secrete estrogens, which stimulate endometrial proliferation).

LH in males

stimulates androgen secretion so males become "Like Hairy Apes" (LH $\rightarrow$ A). Androgens also stimulate spermatogenesis, so LH also indirectly stimulates spermatogenesis. In females, LH stimulates the corpus luteum (which secretes estrogens and progesterone, which stimulate the endometrium).

Autonomic Nervous System

Sympathetic: fight or flight
Parasympathetic: rest and digest

Causes of Deviations from Hardy-Weinberg Equilibrium

"Maggie May Does Not Smoke"

Mutations, Migration, genetic Drift, Non-random mating, Selection.

Cell Cycle

"Go Sally Go! Make Children!"

G_1, S, G_2, M, C

Growth phase 1, DNA Synthesis (replication), Growth phase 2, Mitosis, Cytokinesis.

Mitosis

"People Meet And Talk", or
"PMAT"

Prophase, Metaphase, Anaphase, Telophase.

Meiosis

"PMAT x2"

Prophase I, Metaphase I, Anaphase I, Telophase I,
Prophase II, Metaphase II, Anaphase II, Telophase II,
(Note: 4 haploid daughter cells instead of 2 diploid daughter cells)

Chordate Features

"Do Not Pinch People"
Dorsal, hollow nerve cord
Notochord
Pharyngeal slits
Postanal tail

Developmental Stages

"Must Be Good"
Morula, Blastula, Gastrula

Fat-soluble Vitamins

"ADEK"
Vitamins A,D,E, and K

Gastrointestinal Hormones
(i.e. ones that originate from the GI tract)

"Garlic Cloves Smell Exquisite"

Hormone	Source	Target	Triggers	Effects
Gastrin	Gastric mucosa	Stomach	Food in stomach, psychic factors	Increased HCl secretion & gastric emptying
Cholecystokinin (CCK)	Duodenal mucosa	Gallbladder & pancreas	Amino acids, peptides, fatty acids in duodenum	Contraction of gallbladder & secretion of pancreatic juice
Secretin	Gastric mucosa	Pancreas	Acid in duodenum	Increased bicarbonate secretion
Enterogastrone (gastric inhibitory peptide)	Duodenal mucosa	Stomach	Fat digestion products in duodenum	Decreases gastric emptying

Hormones that Increase Blood Glucose

"STENGG"
Somatotropin (growth hormone)
Thyroid hormones (thyroxine and triiodothyronine)

Epinephrine
Norepinephrine
Glucagon
Glucocorticosteroids

Immunoglobulins

"MADGE"
IgM, IgA, IgD, IgG, IgE

Kingdoms

"My Poor Friend Picks Apples"
Monera, Protista, Fungi, Plants, Animals

Male Reproductive Tract (path of sperm)

"SEVEN UP"
Seminiferous tubules
Epididymis
Vas deferens
Ejaculatory duct
(Nothing)
Urethra
Penis

Menstrual Cycle

"FOL(d) M(a)PS"
Ovarian cycle: Follicular phase, Ovulatory phase, Luteal phase
Menstrual cycle: Menstrual flow, Proliferative phase, Secretory phase
The ovarian cycle controls the menstrual cycle. The cycles begin (day 0) when menstrual flow starts. At day 14, the luteal and secretory phases begin and last until day 28, after which the cycles begin again.

Molecular Genetics

"EXons EXpressed, INtrons IN the trash"
DNA expression into mature mRNA

"CUT the PY"

Cytosine, **U**racil, and **T**hiamine are **PY**rimidines (one-ring structures)

"GAPur"

Guanine and **A**denine are **PUR**ines (two-ring structures)

"All Tigers Can Growl"

Adenine bonds to **T**hymine; **C**ytosine bonds to **G**uanine

Or, "Pure Silver Taxi"

Purines, **A** and **G**, bond to pyrimidines, **T** and **C**, respectively

Oxyhemoglobin Dissociation Curve

Think of an exercising muscle for a rightward shift:
Exercising muscle is:
hot,
acidic (lactic acid),
hypercarbic,
and has increased 2,3-DPG.
Exercising muscle benefits from increased oxygen unloading from red blood cells.

Proteases in the Duodenum

"Eat Tender Chicken Chunks Elegantly"
Enterokinase
Trypsin
Chymotrypsin
Carboxypeptidase
Elastase
Note: The first enzyme is produced by intestinal mucosal cells, while the others are produced in inactive precursor forms by the pancreas.
Enterokinase converts trypsinogen into trypsin
Trypsin converts other trypsinogen molecules into trypsin
Trypsin converts chymotrypsinogen into chymotrypsin
Trypsin converts procarboxypeptidase into carboxypeptidase
Trypsin converts proelastase into elastase

Scientific Method

Inductive Reasoning
"IS GOHH"
Induction: Specific → General. Or, Observation → Hypothesis → Hypothesis-testing.
The inductive process proceeds from specific observations to a general hypothesis.
Deductive Reasoning
"D(o)GS"
Deduction: General → Specific
The deductive process proceeds from a general hypothesis to predictions about specific observations.

Sedimentation

Rate of **S**e**D**imentation is proportional to **S**ize and **D**ensity
More precisely,
terminal velocity of particle $\propto$ radius^2 x (density - density of medium)

Sizes

"Bowel Movement" or "BM"

A **B**acterium is about 1 **M**icron (1 μm)

A eukaryotic cell is about 10 times larger (10 μm)

A virus is about 100 times smaller (0.01 μm)

Note: these are very, very rough guides. The ranges of sizes are wide.

Striated Muscle

"ZIAH"

Z-line, I-band, A-band, H-zone

Taxonomy

"King Phillip Came Over From Great Spain"

Kingdom Phylum Class Order Family Genus Species

Vertebrate Features

"CEVASACK"

Cephalization
Endoskeleton
Vertebrae
Axial skeleton
Skull
Appendicular skeleton
Closed circulatory system
Kidneys

White Blood Cells

(In order of decreasing numbers.)
"Nobody Likes My Educational Background"

N Neutrophils
L Lymphocytes
M Monocytes
E Eosinophils
B Basophils

General Chemistry

Bonding

"HONC"

H requires 1 more electron in its outer shell to become stable.
O requires 2.
N requires 3.
C requires 4.

Cation

The "t" in cation looks like a plus sign: "ca+ion."

Electrochemistry

Reduction occurs at the Cathode; Oxidation at the Anode.

Remember that the terms beginning with consonants are together, and those beginning with vowels are together.

"LEO is A GERC (jerk)"

Loss of Electrons is Oxidation, which occurs at the Anode. Gain of Electrons is Reduction, which occurs at the Cathode.

Electrolysis

"MIT enough"

Moles deposited at an electrode = It/nF

Gibb's Free Energy

"Good Honey Tastes Sweet"

$\Delta G = \Delta H - T\Delta S$

"Gee! Plus Arty! Thank you!"

$\Delta G = \Delta G^\circ + RT\ln Q$

"Delicious Grapefruit - Not For Everyone"

$\Delta G^\circ = -nFE^\circ$

Henderson-Hasselbalch Equation

"HK + AHA"

or "Hong Kong + American Hospital Association"

$pH = pKa + \log_{10}(A^-/HA)$

Hydrogen Bonding

"FON"

When a hydrogen atom is attached to either a fluorine, oxygen, or nitrogen atom, it can form a hydrogen bond between it and another fluorine, oxygen, or nitrogen atom.

Nernst Equation

"We minus Arty (is) enough, thank you."

$E = E^\circ - (RT/nF)\ln Q$

Paramagnetism

If a compound has at least one un**p**aired electron,
it is **P**aramagnetic,
and will be **P**ulled toward a magnetic field.

If not, it is diamagnetic, and is weakly repelled by a magnetic field. There is also a third type of magnetism: ferromagnetism, which is present in what we casually call "magnets," e.g. iron, nickel, cobalt.

Quantum Numbers

"National Library (of) Medicine Sizzles"

n, l, m, s

l Quantum Numbers

"Sensual People Do Foreplay"

s, p, d, f. Then it follows the alphabet: g, h, i, j, k, etc.

State Functions

"VG PHEST" (Very Good Festival)

The following are all state functions:

V for volume
G for Gibb's free energy
P for pressure
H for enthalpy
E for internal energy
S for entropy
T for temperature

Organic Chemistry

Addition of Amine to Carbonyl Group

"SE PI" (or "SEe PIe")

Secondary amine → Enamine
Primary amine → Imine
(Note: tertiary and quaternary amines do not react with the C=0 group.)

Cis/trans (Geometric) Isomers

"Z: Zame Zide
E: Epposite"

Z for same side and E for opposite sides

Conformations

Gauche conformation: It's "gauche" (inappropriate) for one methyl group to stand too close to another group.

Cyclohexane ring: When you have low energy, you sit down in a "CHAIR" to rest. "BOATS" can be tippy, so they are less stable.

Isomers

"SS - ED - CC"

Isomers of a sugar: If the second lowest -OH is on the **L**eft, the molecule is **L**.
If the -OH is on the Right, it's D.

Meso Compounds

"**M**e**S**o compounds have a **M**irror of **S**ymmetry"

Thus, even though they may have stereogenic centers, they are achiral and so do not have enantiomers.

NMR

Downfield is **D**eshielded.

Meta-Directing Groups on a Benezene Ring

"Queen Elizabeth Second's Navy Commands, Controls, Communicates"

Q Quaternary amino -NR_3^+
E Ester -COOR
S Sulfonic acid -SO_3H
N Nitro -NO_2
C Carbonyl -CHO
C Carboxyl -COOH
C Cyano -CN

Ortho- and Para- Directing Groups on a Benezene Ring

"AHA AHA P"

A Alkyl -R
H Halogen -X
A Alkoxyl -OR

A Amino $-NH_2$, -NHR, $-NR_2$ (not $-NR_3^+$)
H Hydroxyl -OH
A Amide -NHCOR

P Phenyl $-C_6H_5$

Types of Reactions

"SEA MOuRNS CANned PEAs"

Substitution Electrophilic - Aromatic
Most Other Reactions - Nucleophilic Substitution
Carbonyl - Addition Nucleophilic
Pi bonds - Electrophilic Addition

Physics

Basic Physical Quantities

"Taking Luxurious Limos More Noxious Than Cycling"

- Temperature (K)
- Length (m)
- Luminous intensity (Cd)
- Mass (kg)
- Number of particles (moles)
- Time (s)
- Charge (C)

Capacitors

"Quintessential Curriculum Vitae"

- Q = CV

"England Hails Queen Victoria"

- E (energy stored) = ½QV

Elastic Modulus

"Essay"

- Elastic modulus = str**es**s / str**ai**n
- i.e. "es" / "ai" or "essay"
  - Stre**ss** is associated with the for**ss** (force) applied.
  - Str**ai**n is the deform**a**tion produced.

Electromagnetic Spectrum

"RIVUXGa"

- Electromagnetic waves in order of increasing frequency:
  - **R**adio waves
  - **I**nfra red
  - **V**isible spectrum
  - **U**ltra violet
  - **X**-rays
  - **Ga**mma rays

Force on a Charge Moving in a Magnetic Field

"Fast Quality Vitalizes Business"

- F = QvB
- (N = C x m/s x T)
- i.e., if the direction of travel is perpendicular to the magnetic field

Heat Capacity

"MCAT"

- $q = mc\Delta T$
- where q is heat energy, m is mass, c is specific heat capacity, and ΔT is the change in temperature.

Optics

"D DUV"

For **D**iverging mirrors and lenses, the image is always **D**iminished, **U**pright, and **V**irtual, regardless of the distance of the object from the mirror or lens.

Prefixes in Units of Measurement

Multiples			
Damned	Deka	da	x 10
Hiccups	Hecto	h	x 10^{2}
Killed	Kilo	k	x 10^{3}
Meg's	Mega	M	x 10^{6}
Gigantic	Giga	G	x 10^{9}
Terrapin	Tera	T	x 10^{12}
Fractions			
Dextrous	Deci	d	x 10^{-1}
Carpenters	Centi	c	x 10^{-2}
Make	Milli	m	x 10^{-3}
Many	Micro	μ	x 10^{-6}
Nice	Nano	n	x 10^{-9}
Picture	Pico	p	x 10^{-12}
Frames	Femto	f	x 10^{-15}

Visible Spectrum

In order of increasing frequency:
"Roy G. Biv"
"Richard Of York Gained Battles In Vain"

Red Orange Yellow Green Blue Indigo Violet