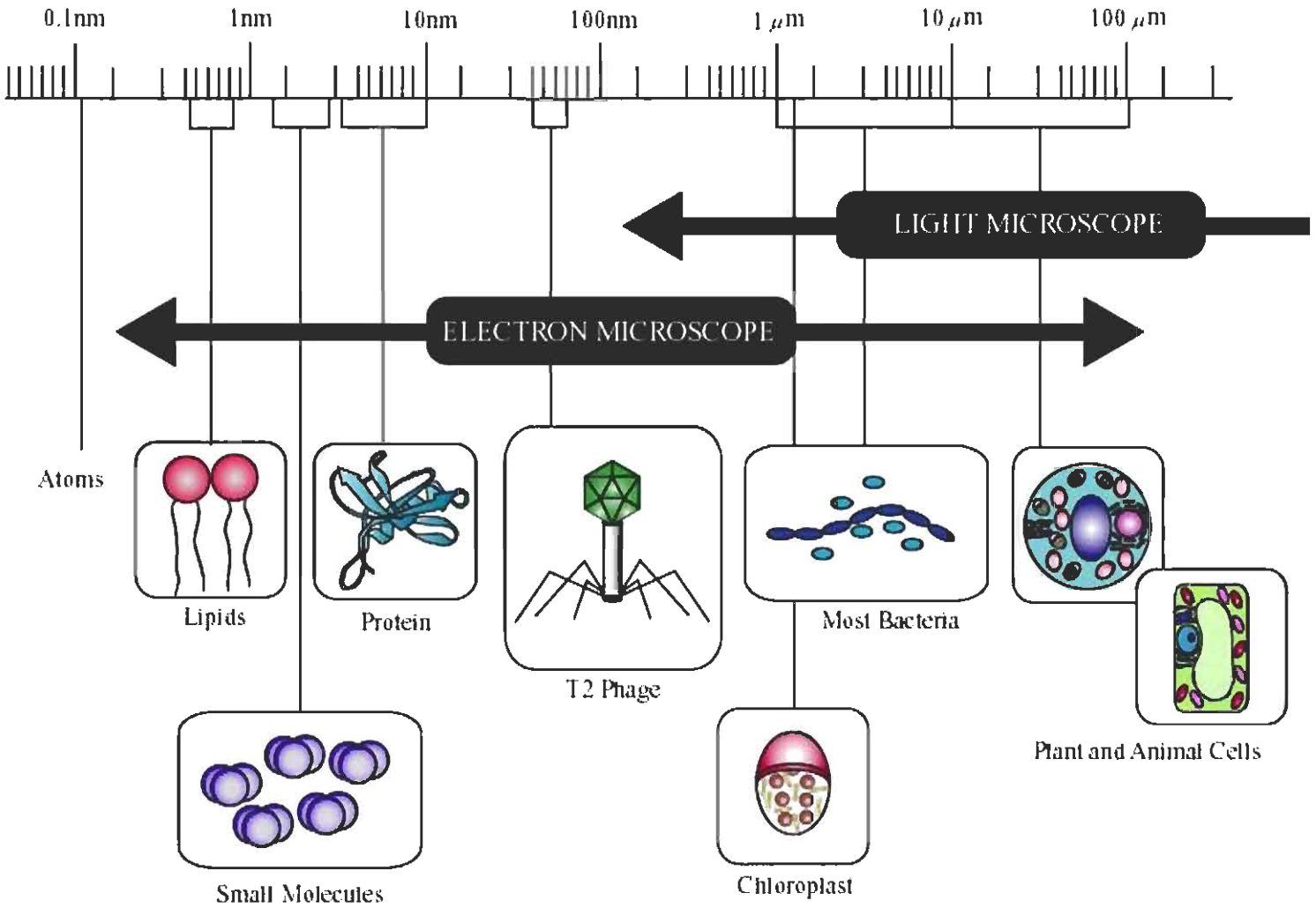
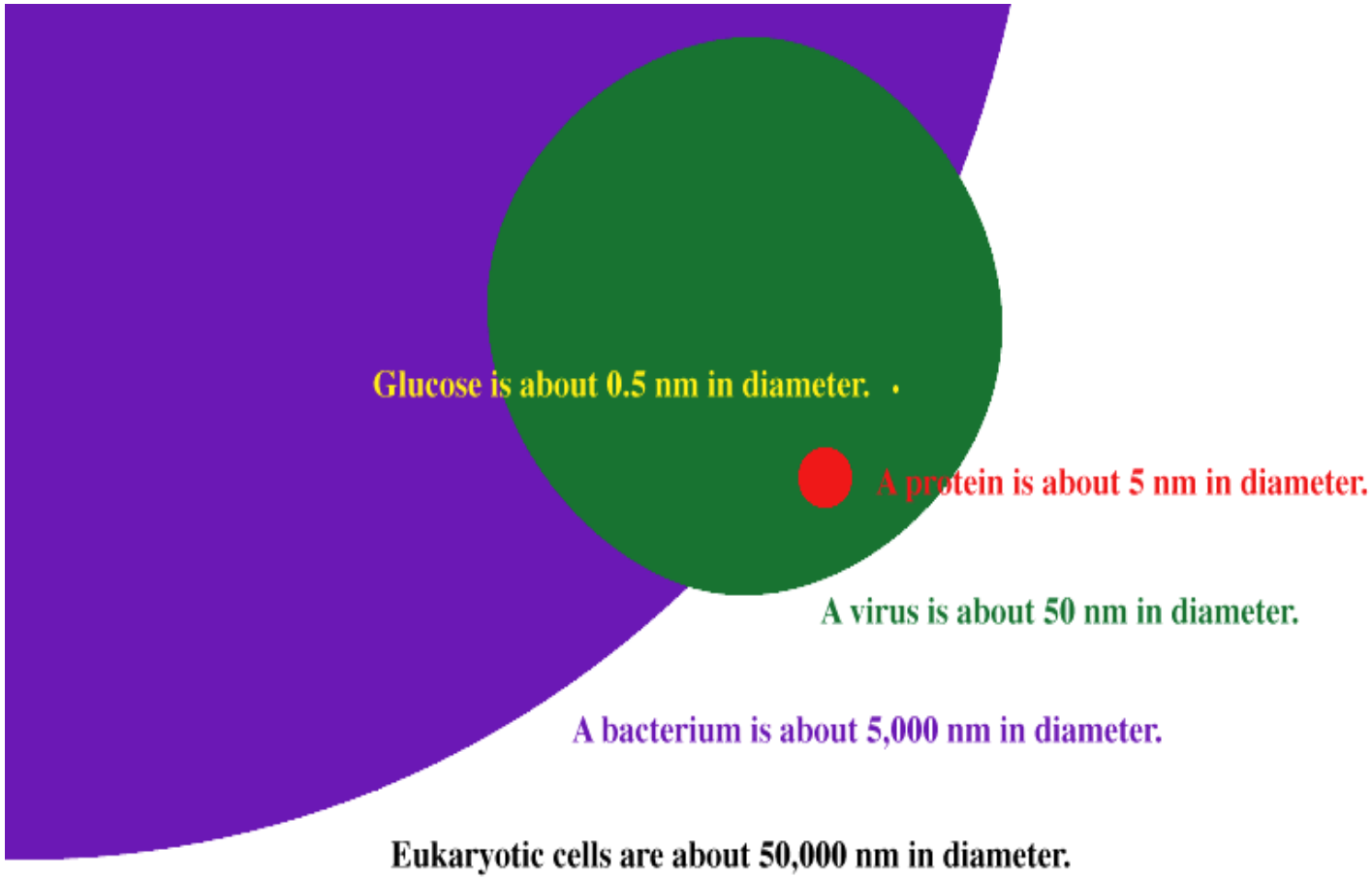
PERIODIC TABLE OF THE ELEMENTS

IA	IIA	IIIB	IVB	VB	VIB	VIIB	—— VIII ——			IB	IIB	IIIA	IVA	VA	VIA	VIIA	INERT GASES VIIIA
1 1.00794 **H** Hydrogen																	2 4.002602 **He** Helium
3 6.941 **Li** Lithium	4 9.012182 **Be** Beryllium											5 10.811 **B** Boron	6 12.011 **C** Carbon	7 14.00674 **N** Nitrogen	8 15.9994 **O** Oxygen	9 18.9984032 **F** Fluorine	10 20.1797 **Ne** Neon
11 22.989768 **Na** Sodium	12 24.3050 **Mg** Magnesium											13 26.981539 **Al** Aluminum	14 28.0855 **Si** Silicon	15 30.973762 **P** Phosphorus	16 32.066 **S** Sulfur	17 35.4527 **Cl** Chlorine	18 39.948 **Ar** Argon
19 39.0983 **K** Potassium	20 40.078 **Ca** Calcium	21 44.955910 **Sc** Scandium	22 47.88 **Ti** Titanium	23 50.9415 **V** Vanadium	24 51.9961 **Cr** Chromium	25 54.93805 **Mn** Manganese	26 55.847 **Fe** Iron	27 58.93320 **Co** Cobalt	28 58.69 **Ni** Nickel	29 63.546 **Cu** Copper	30 65.39 **Zn** Zinc	31 69.723 **Ga** Gallium	32 72.61 **Ge** Germanium	33 74.92159 **As** Arsenic	34 78.96 **Se** Selenium	35 79.904 **Br** Bromine	36 83.80 **Kr** Krypton
37 85.4678 **Rb** Rubidium	38 87.62 **Sr** Strontium	39 88.90585 **Y** Yttrium	40 91.224 **Zr** Zirconium	41 92.90638 **Nb** Niobium	42 95.94 **Mo** Molybdenum	43 98.9063 **Tc** Technetium	44 101.07 **Ru** Ruthenium	45 102.90550 **Rh** Rhodium	46 106.42 **Pd** Palladium	47 107.8682 **Ag** Silver	48 112.411 **Cd** Cadmium	49 114.82 **In** Indium	50 118.710 **Sn** Tin	51 121.75 **Sb** Antimony	52 127.60 **Te** Tellurium	53 126.90447 **I** Iodine	54 131.29 **Xe** Xenon
55 132.90543 **Cs** Cesium	56 137.327 **Ba** Barium	57-71 **La-Lu**	72 178.49 **Hf** Hafnium	73 180.9479 **Ta** Tantalum	74 183.85 **W** Tungsten	75 186.207 **Re** Rhenium	76 190.2 **Os** Osmium	77 192.22 **Ir** Iridium	78 195.08 **Pt** Platinum	79 196.96654 **Au** Gold	80 200.59 **Hg** Mercury	81 204.3833 **Tl** Thallium	82 207.2 **Pb** Lead	83 208.98037 **Bi** Bismuth	84 208.9824 **Po** Polonium	85 209.9871 **At** Astatine	86 222.0176 **Rn** Radon
87 223.0197 **Fr** Francium	88 226.0254 **Ra** Radium	89-103 **Ac-Lr**	104 261.1087 **Unq** Unnilquadium	105 262.1138 **Unp** Unnilpentium	106 263.1182 **Unh** Unnilhexium	107 262.1229 **Uns** Unnilseptium	108 **Uno**	109 **Une**									

		57 138.9055 **La** Lanthanum	58 140.115 **Ce** Cerium	59 140.90765 **Pr** Praseodymium	60 144.24 **Nd** Neodymium	61 146.9151 **Pm** Promethium	62 150.36 **Sm** Samarium	63 151.965 **Eu** Europium	64 157.25 **Gd** Gadolinium	65 158.92534 **Tb** Terbium	66 162.50 **Dy** Dysprosium	67 164.93032 **Ho** Holmium	68 167.26 **Er** Erbium	69 168.93421 **Tm** Thulium	70 173.04 **Yb** Ytterbium	71 174.967 **Lu** Lutetium
		89 227.0278 **Ac** Actinium	90 232.0381 **Th** Thorium	91 231.0359 **Pa** Protactinium	92 238.0289 **U** Uranium	93 237.0482 **Np** Neptunium	94 244.0642 **Pu** Plutonium	95 243.0614 **Am** Americium	96 247.0703 **Cm** Curium	97 247.0703 **Bk** Berkelium	98 251.0796 **Cf** Californium	99 252.0829 **Es** Einsteinium	100 257.0951 **Fm** Fermium	101 258.0986 **Md** Mendelevium	102 259.1009 **No** Nobelium	103 260.1053 **Lr** Lawrencium


0.1nm
1nm
10nm
100nm
1 μm
10 μm
100 μm
LIGHT MICROSCOPE
ELECTRON MICROSCOPE
Atoms
Lipids
Protein
T2 Phage
Most Bacteria
Plant and Animal Cells
Small Molecules
Chloroplast



A type written period in your textbook is about 500,000 nm in diameter.

www.bio.davidson.edu/courses/ genomics/method/sizes.html

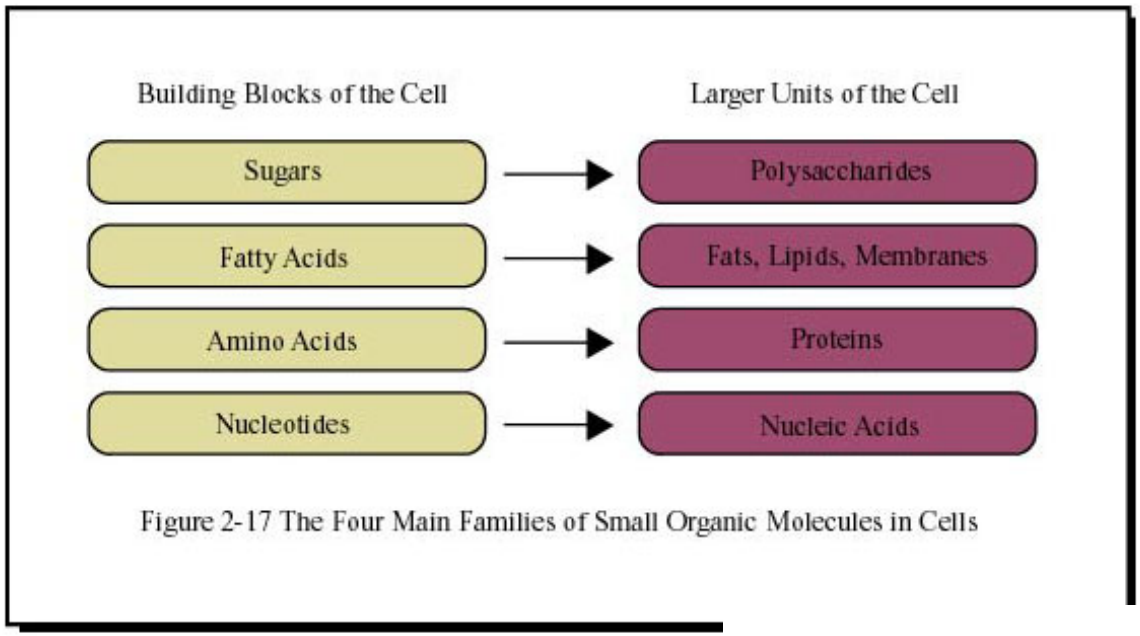


Figure 2-17 The Four Main Families of Small Organic Molecules in Cells

Figure 2–17 The four main families of small organic molecules in cells.

Figure 2–29 Macromolecules are abundant in cells. The approximate composition of a bacterial cell is shown by weight. The composition of an animal cell is similar (see Table 2–4).

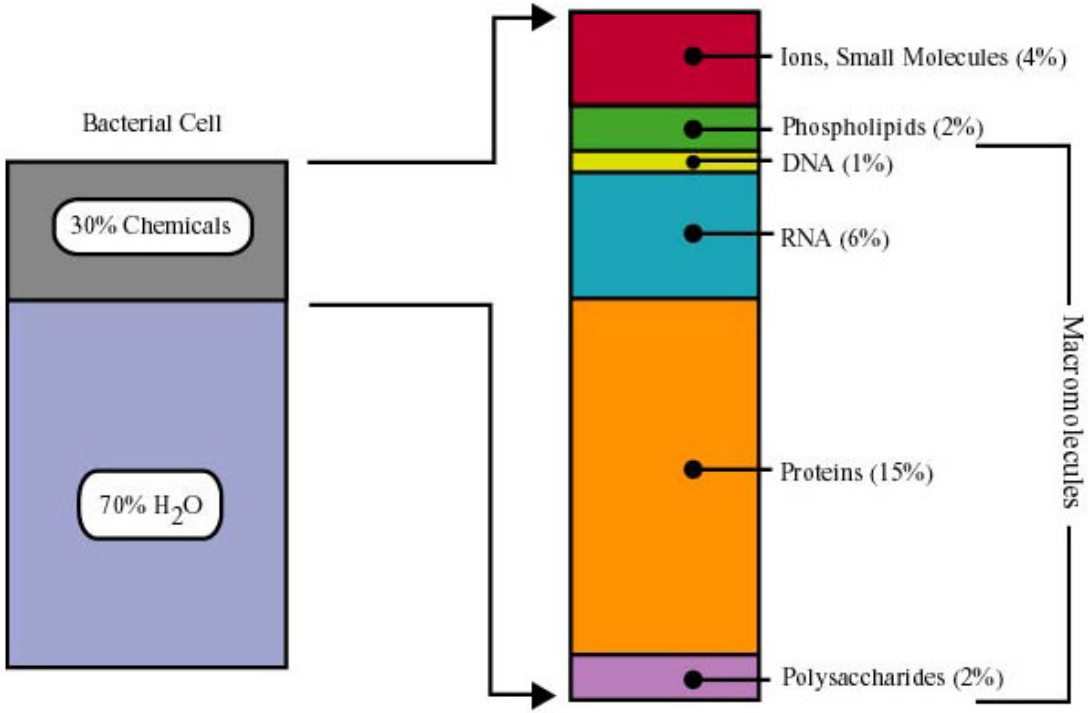
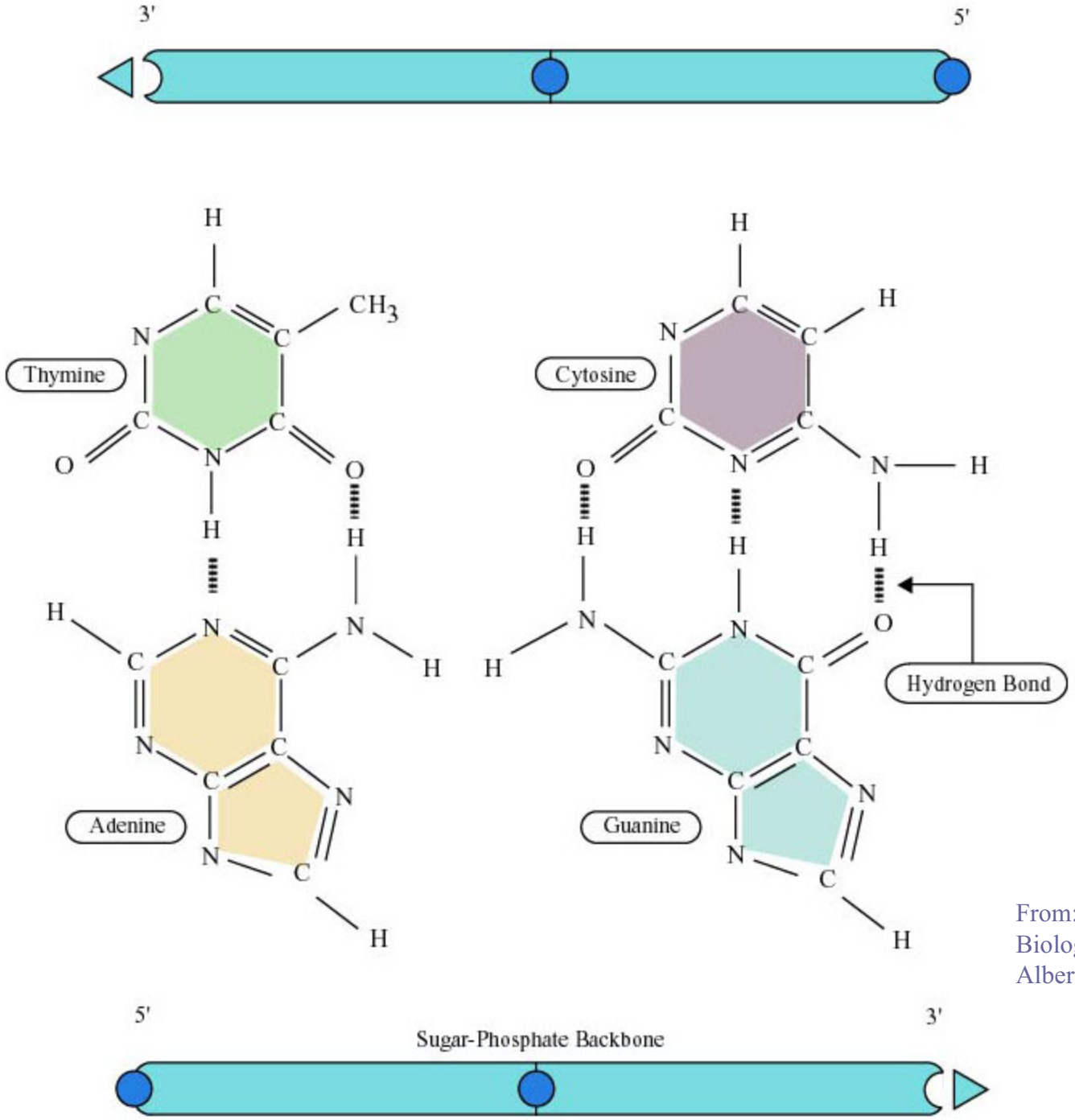
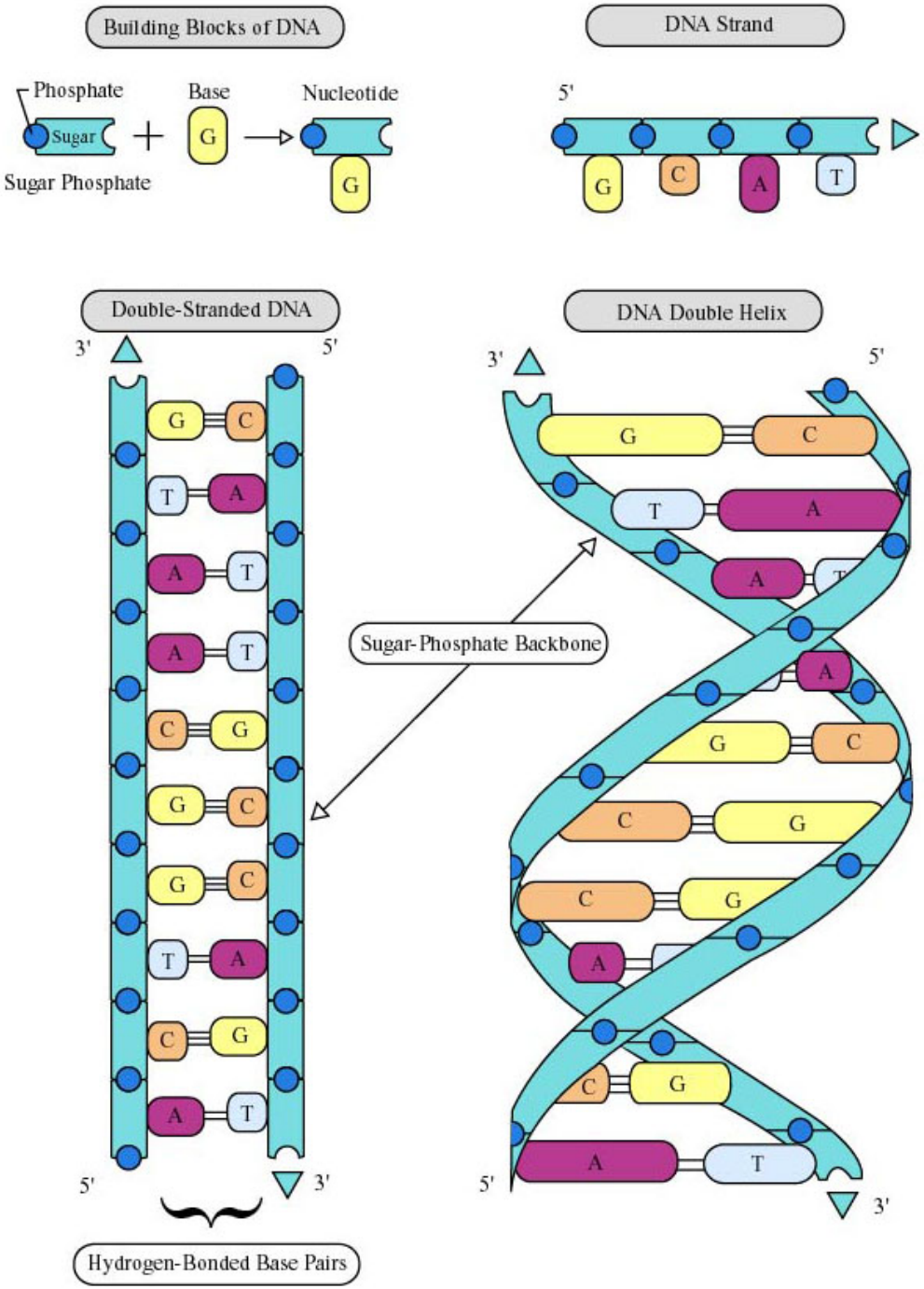


Figure 2-29 Macromolecules are Abundant in Cells.

From: Molecular Biology of the Cell, Alberts et al., 4th Edition

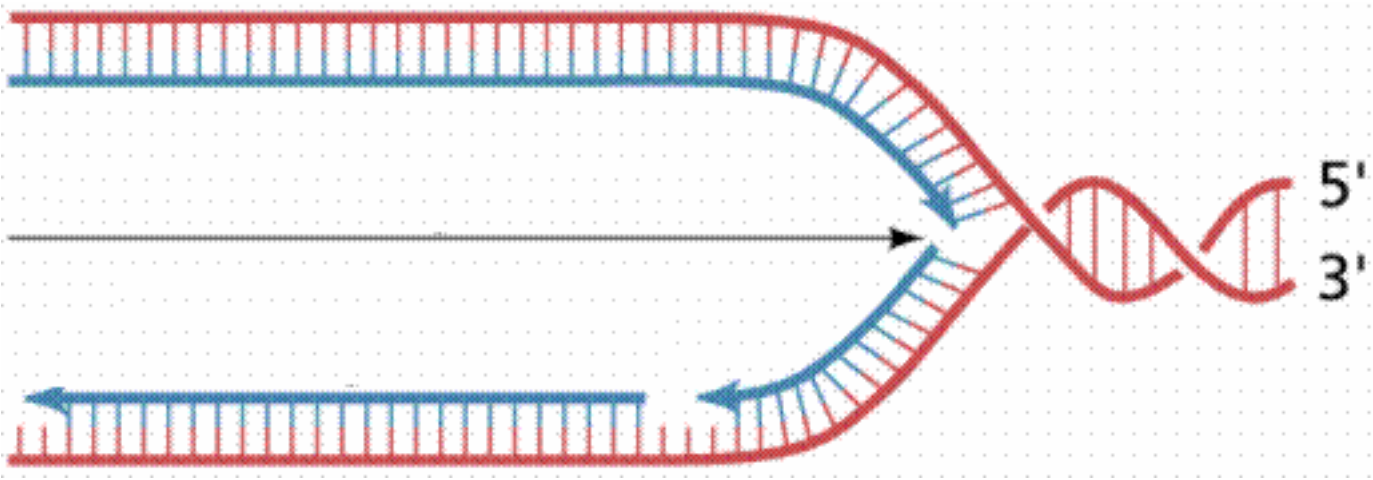


From: Molecular Biology of the Cell, Alberts et al., 4th Ed



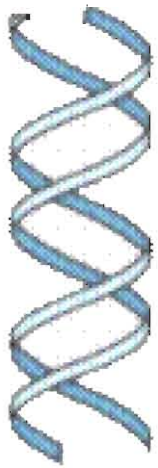
From: Molecular Biology of the Cell, Alberts et al., 4th Edition

DNA replication

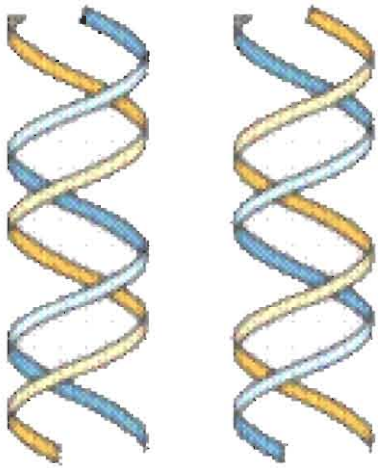


Semiconservative replication

Original DNA
Helix

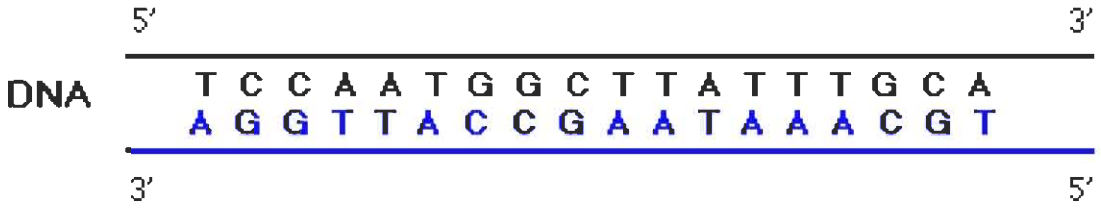


DNA helixes
after one round
of replication

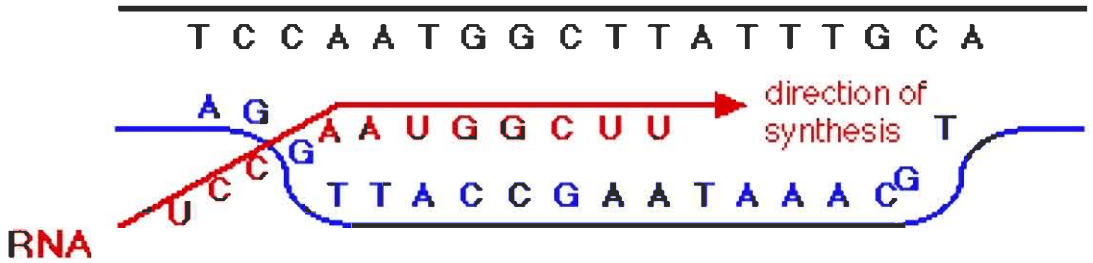


The Central Dogma

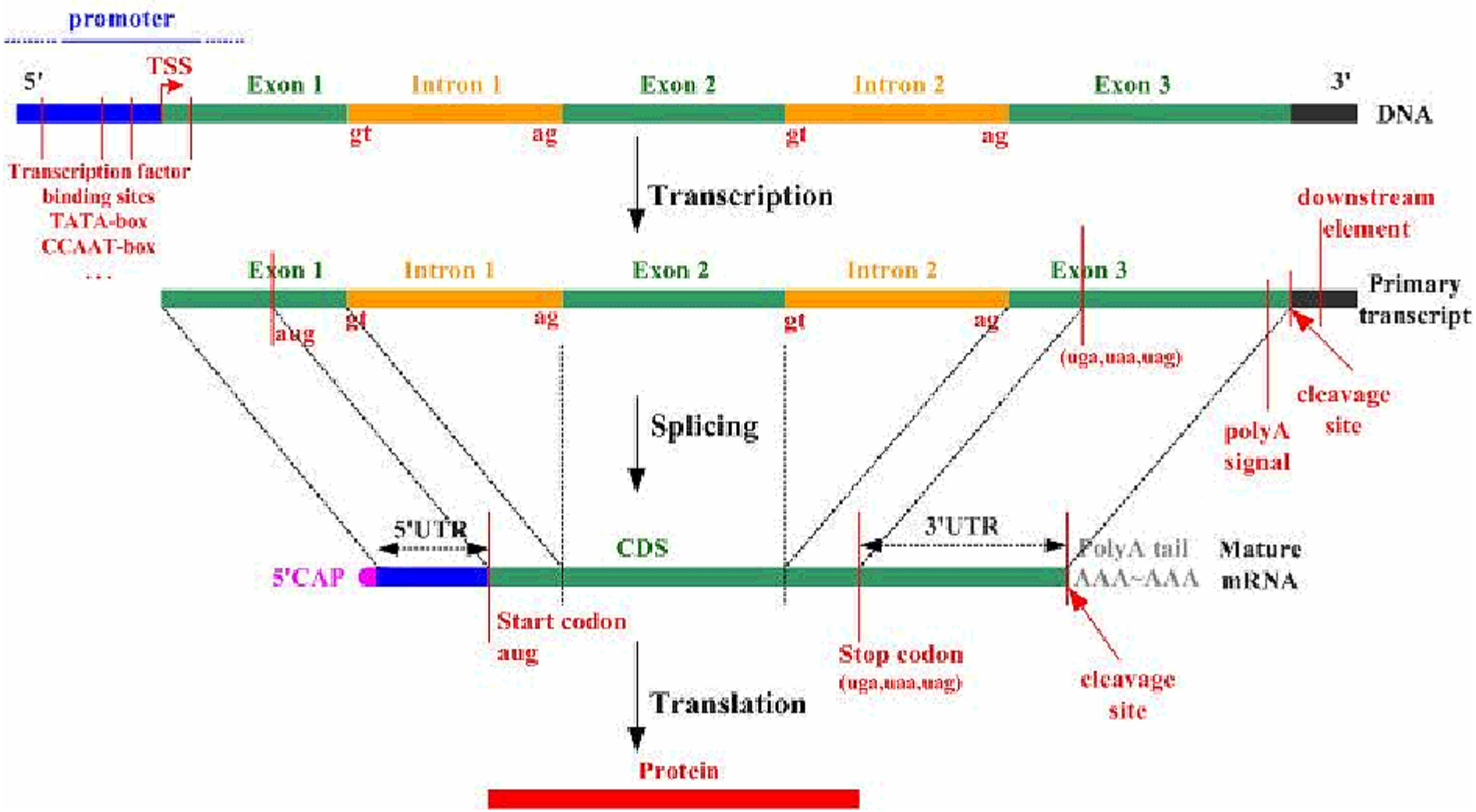
Transcription of RNA from DNA



- The bottom strand of the DNA molecule above is the template for RNA synthesis.
- RNA polymerase makes a copy of the DNA sequence but substitutes uridine (U) in place of thymine (T).



- The botttom strand of the DNA duplex is used as the template to synthesize RNA. However, the sequence of bases in the RNA is the same as in the top strand of the DNA, with U in place of T



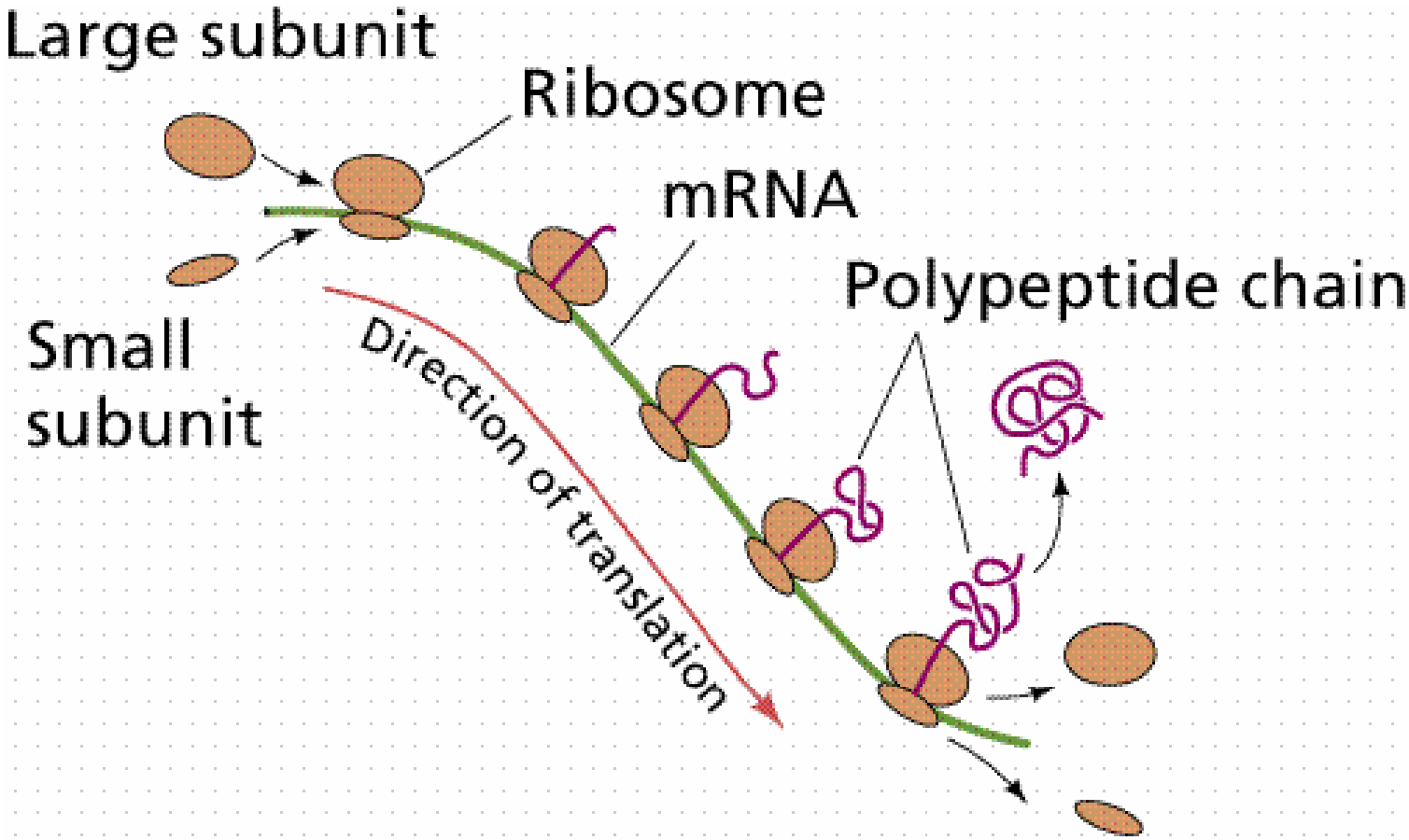
linkage.rockefeller.edu/wli/ gene/dna-rna-protein.jpg

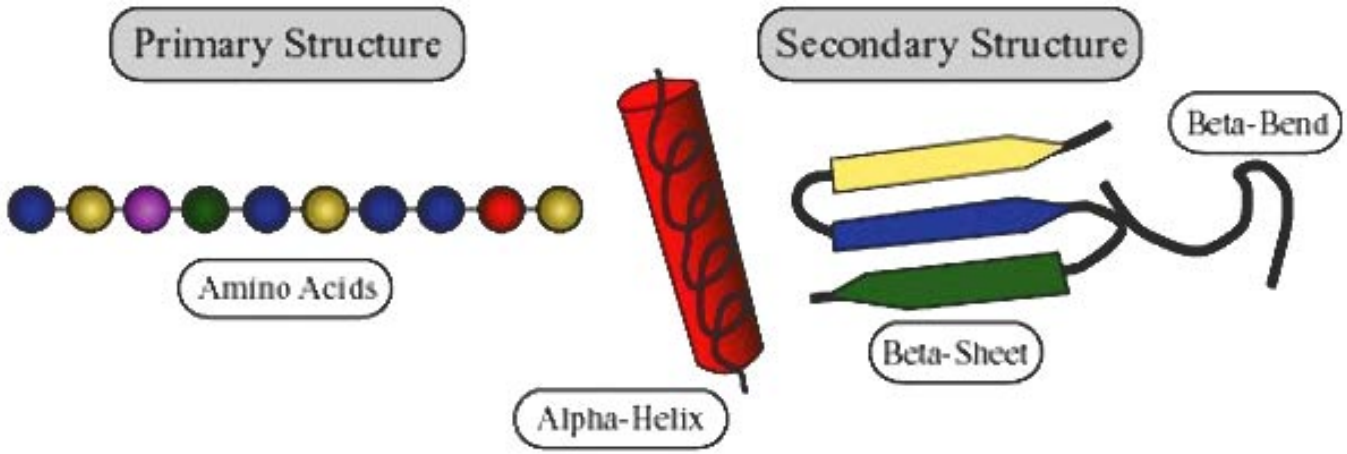
The genetic code. See Purves et al., Life: The Science of Biology, 4th Edition, by Sinauer Associates (www.sinauer.com) and WH Freeman (www.whfreeman.com).

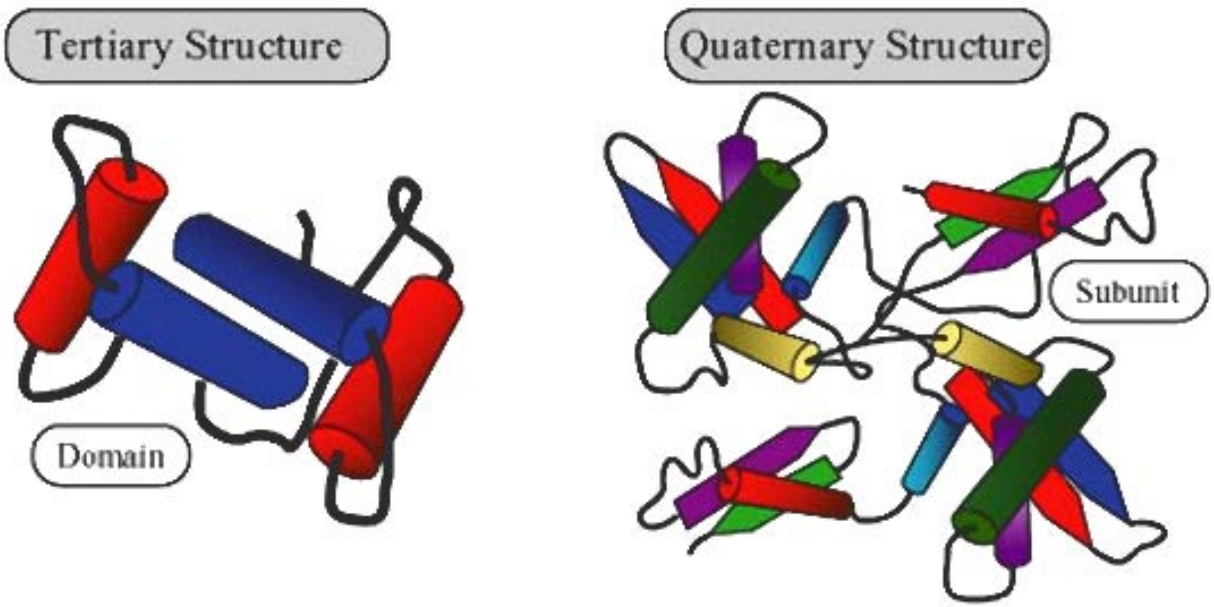
Amino acids with electically charged side chains: Positive

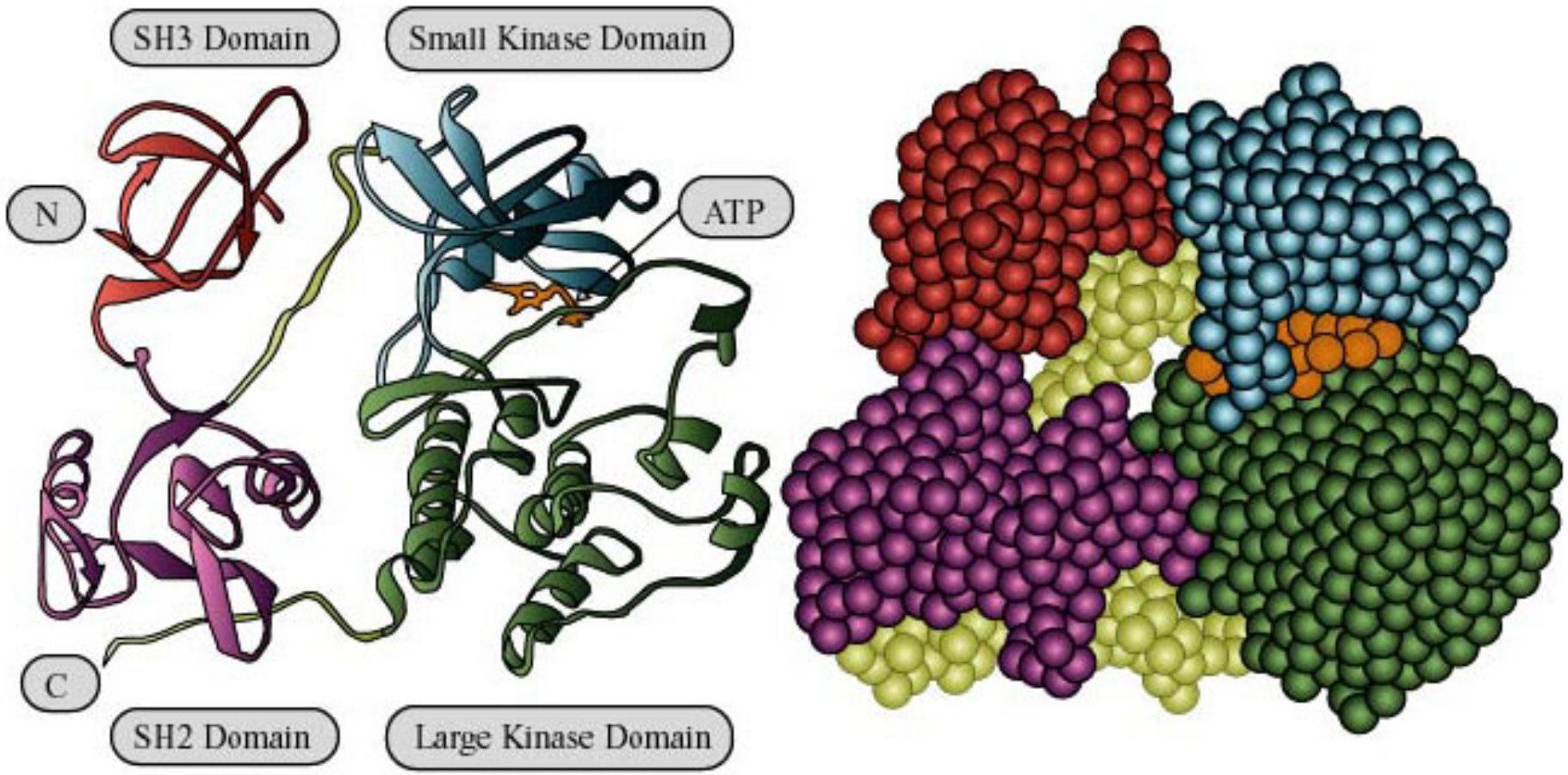
See Purves et al., Life: The Science of Biology, 4th Edition, by Sinauer Associates (www.sinauer.com) and WH Freeman (www.whfreeman.com).

Translation: RNA to Protein




Primary Structure
Amino Acids
Alpha-Helix
Secondary Structure
Beta-Bend
Beta-Sheet


Tertiary Structure
Domain
Quaternary Structure
Subunit



A Protein Formed From Four Domains

Figure 3–12 A protein formed from four domains. In the Src protein shown, two of the domains form a protein kinase enzyme, while the SH2 and SH3 domains perform regulatory functions.

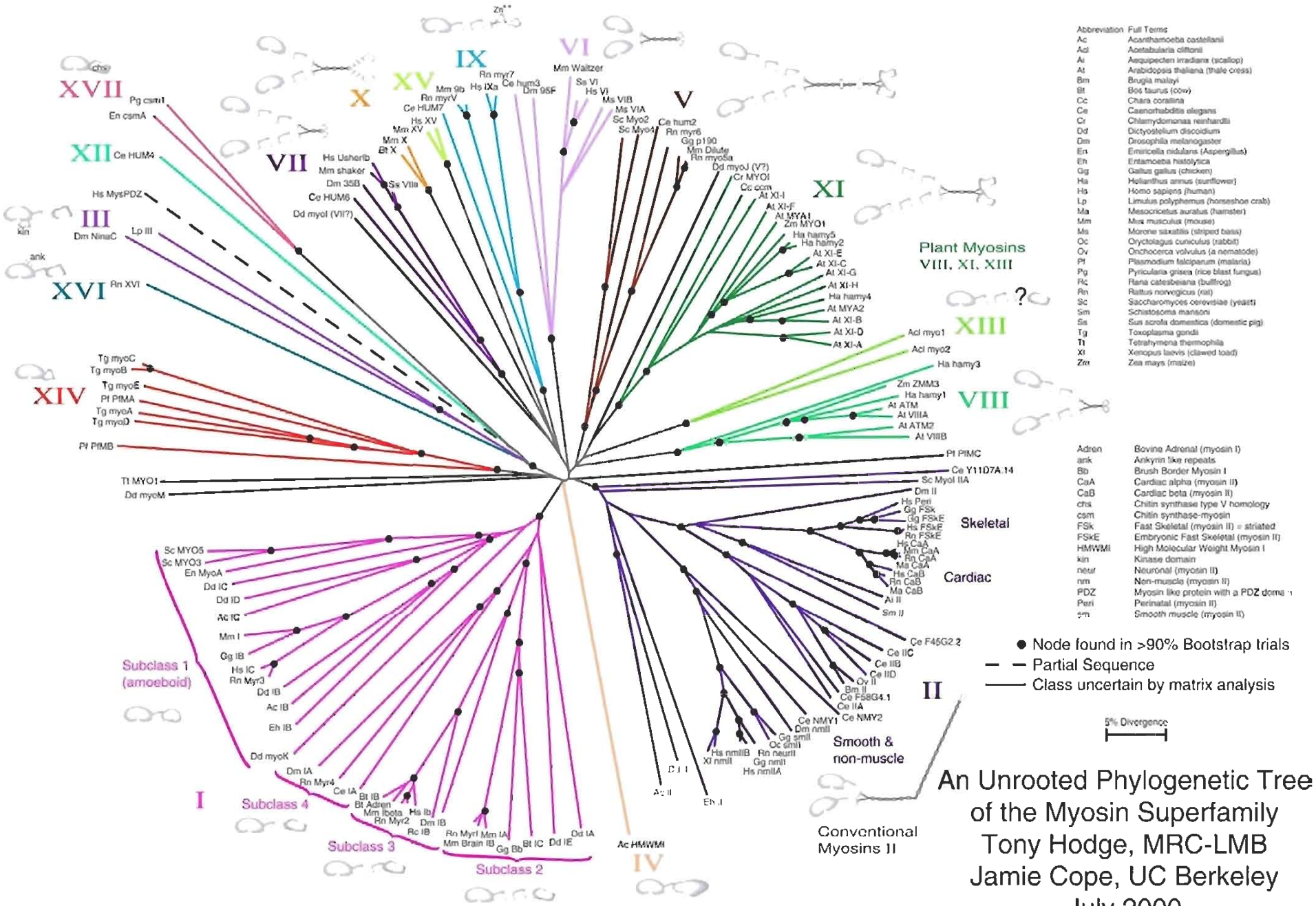
From: Molecular Biology of the Cell,
Alberts et al., 4th Edition

Restriction Enzyme

See www.rcsb.org/pdb/molecules/

Collagen

See www.rcsb.org/pdb/molecules/


XVII
Pg csmA
En csmA
XII
Ce HUM4
Hs MysPDZ
III
Dm NinaC
Lp III
kin
ank
XVI
Rn XVI
XIV
Tg myoC
Tg myoB
Tg myoE
Pf PfMA
Tg myoA
Tg myoD
Pf PfMB
Tl MYO1
Dd myoM
Sc MYO5
Sc MYO3
En MyoA
Dd IC
Dd ID
Ac IC
Mm I
Gg IB
Hs IC
Rn Myr3
Dd IB
Ac IB
Eh IB
Dd myoK
Dm IA
Rn Myr4
Ce IA
Bt IB
Bt Adren
Mm Ibeta
Hs Ib
Rn Myr2
Dm IB
Rc IB
Rn Myr1
Mm IA
Mm Brain IB
Gg Bb
Bt IC
Dd IE
Dd IA
Subclass 1 (amoeboid)
Subclass 4
Subclass 3
Subclass 2
I
Ac HMWMI
IV
Ac II
Eh II
Dd II
Ce NMY1
Dm nmII
Gg smII
Oc smII
Hs nmIIB
Xl nmII
Rn neurII
Gg nmII
Hs nmIIA
Ce NMY2
Ce F58G4.1
Ce IIA
Bm II
Ce IID
Ov II
Ce IIB
Ce IIC
Ce F45G2.2
Sm II
Ma CaB
Rn CaB
Hs CaB
Ma CaA
Rn CaA
Mm CaA
Hs CaA
Rn FSkE
Hs FSkE
Gg FSkE
Gg FSk
Hs Peri
Dm II
Skeletal
Cardiac
Smooth & non-muscle
II
Conventional Myosins II
Pl PfMC
Ce Y11D7A.14
Sc Myo1 IIA
Ha hamy3
Acl myo1
Acl myo2
Zm ZMM3
Ha hamy1
At ATM
At VIIIA
At ATM2
At VIIIB
VIII
Plant Myosins VIII, XI, XIII
?
XIII
Ha hamy5
Ha hamy2
At XI-E
At XI-C
At XI-G
At XI-H
Ha hamy4
At MYA2
At XI-B
At XI-D
At XI-A
At XI-I
At XI-F
At MYA1
Zm MYO1
XI
Cr MYO1
Cc ccm
Dd myoJ (V?)
Rn myo5a
Mm Dilute
Gg p190
Ce hum2
Rn myr6
Sc Myo4
Sc Myo2
Ms VIA
Ms VIB
Hs VI
Ss VI
V
Mm Waltzer
VI
Rn myr7
Ce hum3
Dm 95F
Hs IXa
IX
Mm 9b
Rn myrV
Ce HUM7
Hs XV
Mm XV
Mm X
Bt X
XV
X
Hs Usher1b
Mm shaker
Dm 35B
Ce HUM6
Dd myoI (VII?)
Ss VIIa
VII
Zn++
chs
Abbreviation Full Terms
Ac Acanthamoeba castellanii
Acl Acetabularia clittonii
Ai Aequipecten irradians (scallop)
At Arabidopsis thaliana (thale cress)
Bm Brugia malayi
Bt Bos taurus (cow)
Cc Chara corallina
Ce Caenorhabditis elegans
Cr Chlamydomonas reinhardtii
Dd Dictyostelium discoidium
Dm Drosophila melanogaster
En Emericella nidulans (Aspergillus)
Eh Entamoeba histolytica
Gg Gallus gallus (chicken)
Ha Helianthus annus (sunflower)
Hs Homo sapiens (human)
Lp Limulus polyphemus (horseshoe crab)
Ma Mesocricetus auratus (hamster)
Mm Mus musculus (mouse)
Ms Morone saxatilis (striped bass)
Oc Oryctolagus cuniculus (rabbit)
Ov Onchocerca volvulus (a nematode)
Pf Plasmodium falciparum (malaria)
Pg Pyricularia grisea (rice blast fungus)
Rc Rana catesbeiana (bullfrog)
Rn Rattus norvegicus (rat)
Sc Saccharomyces cerevisiae (yeast)
Sm Schistosoma mansoni
Ss Sus scrofa domestica (domestic pig)
Tg Toxoplasma gondii
Tt Tetrahymena thermophila
Xl Xenopus laevis (clawed toad)
Zm Zea mays (maize)
Adren Bovine Adrenal (myosin I)
ank Ankyrin like repeats
Bb Brush Border Myosin I
CaA Cardiac alpha (myosin II)
CaB Cardiac beta (myosin II)
chs Chitin synthase type V homology
csm Chitin synthase-myosin
FSk Fast Skeletal (myosin II) = striated
FSkE Embryonic Fast Skeletal (myosin II)
HMWMI High Molecular Weight Myosin I
kin Kinase domain
neur Neuronal (myosin II)
nm Non-muscle (myosin II)
PDZ Myosin like protein with a PDZ doma
Peri Perinatal (myosin II)
sm Smooth muscle (myosin II)
● Node found in >90% Bootstrap trials
– – Partial Sequence
—— Class uncertain by matrix analysis
5% Divergence
An Unrooted Phylogenetic Tree of the Myosin Superfamily
Tony Hodge, MRC-LMB
Jamie Cope, UC Berkeley
July 2000

Plasma membrane

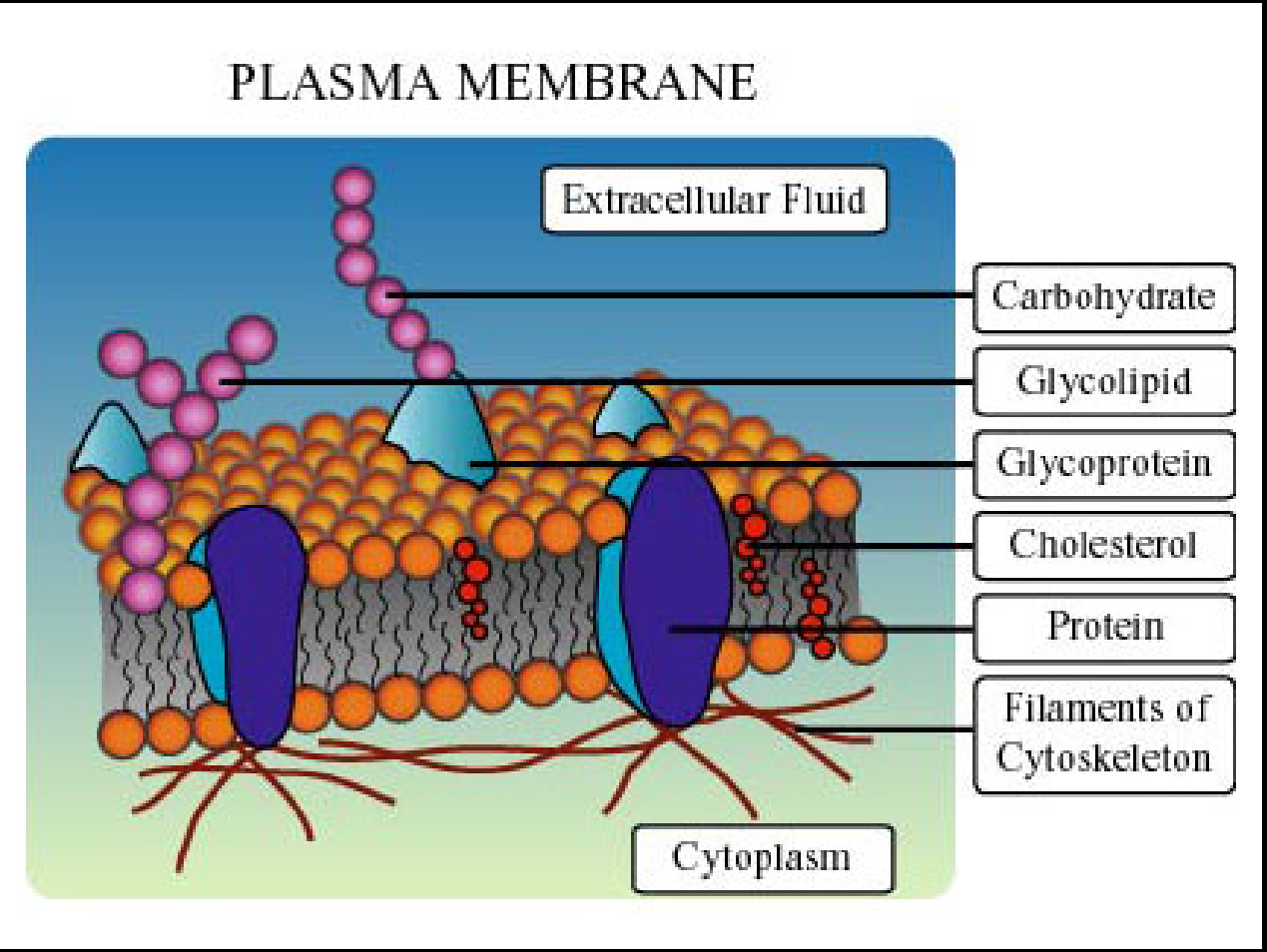
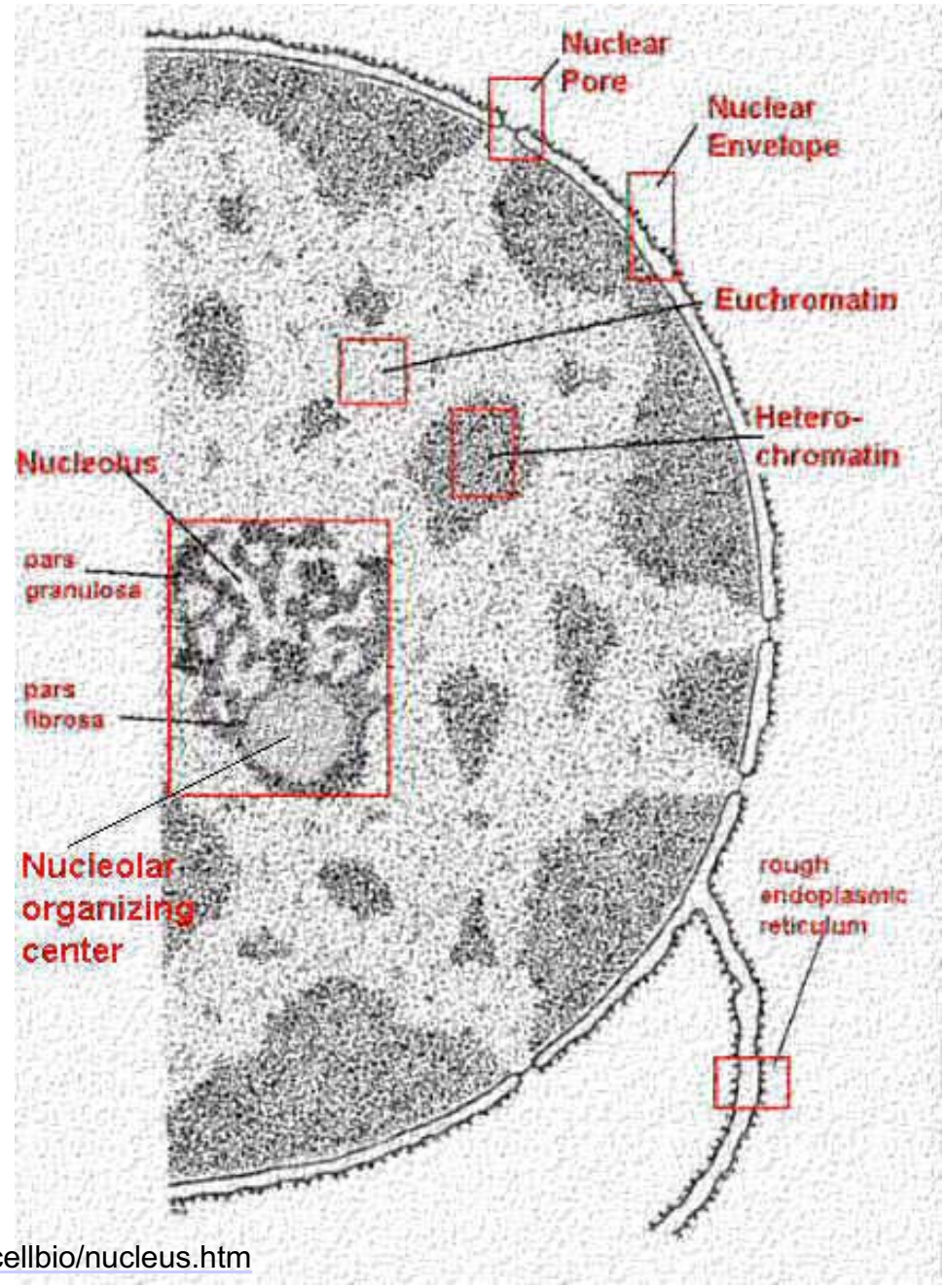


fig.cox.miami.edu/Faculty/ Dana/105F00_4.html

Cell Nucleus



Source: http://cellbio.utmb.edu/cellbio/nucleus.htm