

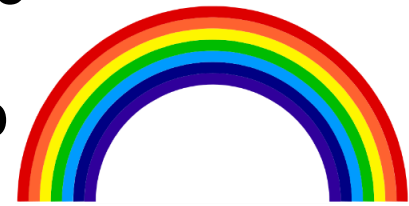


I. Announcements Nutrition Analyses this Thursday!
Please record diet on p 3-7 LM & begin analysis using
<https://www.supertracker.usda.gov/> Bring flash drive? Q?

II. Introduction to Genetics LS 2012 ch 2 p 20-1 + Appendix C
A. How does DNA differ from RNA? pp A-20 thru A-22
B. Genetic code? pp A-22, A-23
C. How & where are proteins made? fig C-7, C-9
D. Class skit: Making proteins @ ribosomes!

III. Nutrition PrimerSizer & Whitney (S&W) Sci Lib

- A. Essential Nutrients: H₂O, 1^o Carbohydrates, 2^o Fats, 3^o Proteins, Vitamins, Minerals; Macro- vs Micro-?
- B. **Blue Zones?** US AMDR? Adjusted Macronutrient Dist...
Pondering Paleo, Marlene Zuk, *Nutrition Action* Sep 2015.
- C. Dietary Guidelines: USDA, AICR, Eat Like the **Rainbow!**
- D. Diet or exercise? Diet composition & endurance?
Zuti & Golding 1976! Fasting?
- E. **Beware of Nutrition Quackery** S. Kleiner & Monaco 1990!



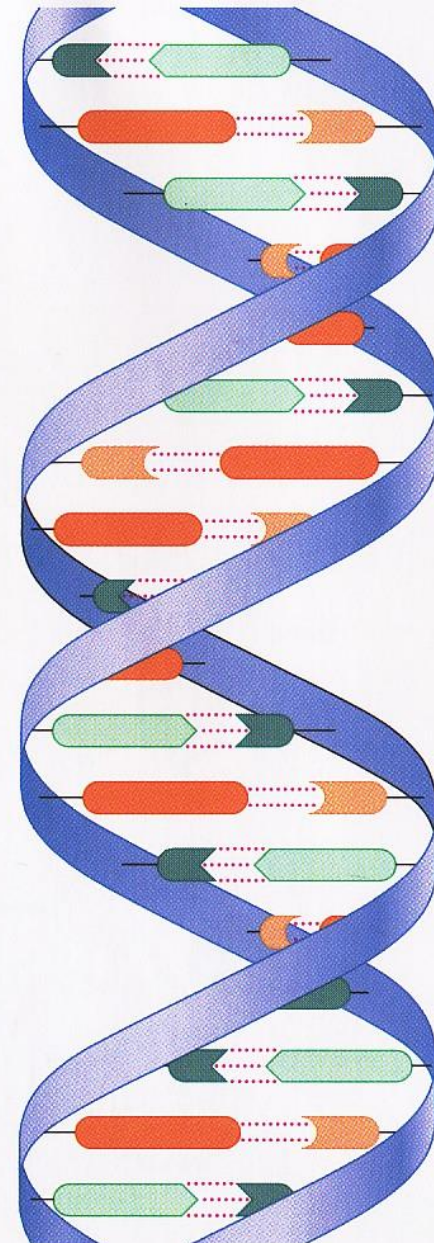
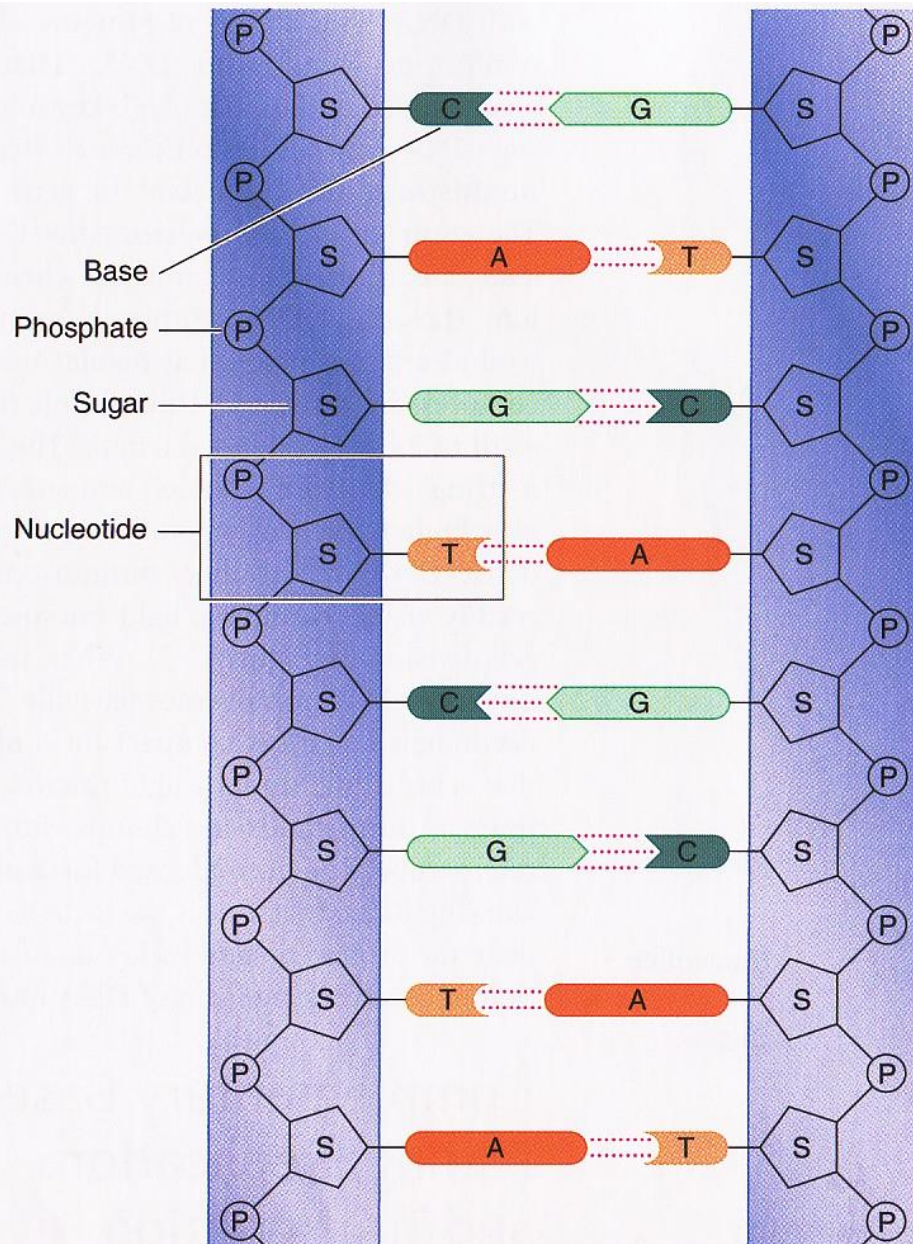
IV. Nutrition in the News Gain weight by drinking calories?

V. Introduction to Digestion Steps + hydrolysis

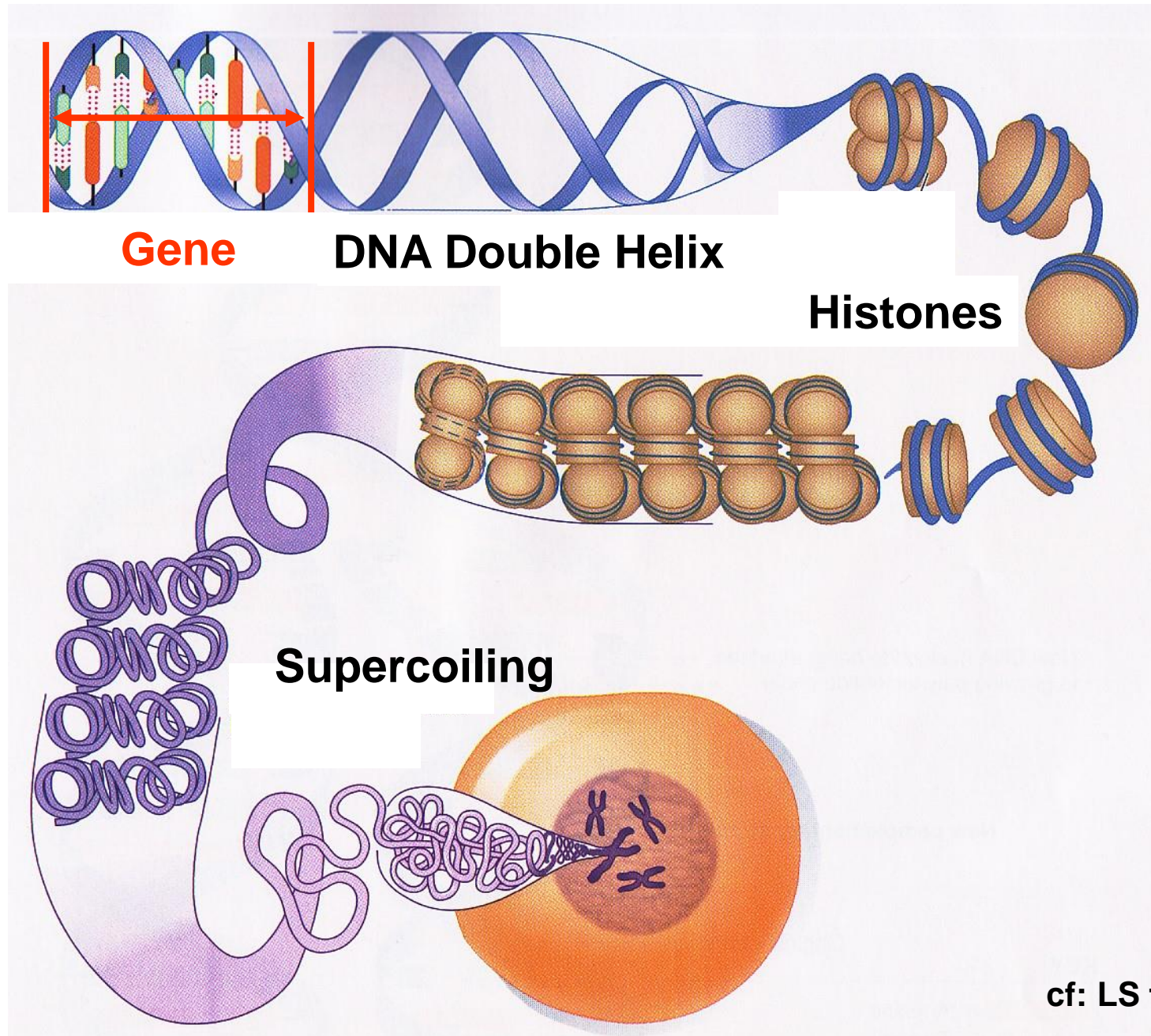
What are DNA's major functions? Heredity + Day-to-Day Cell Function



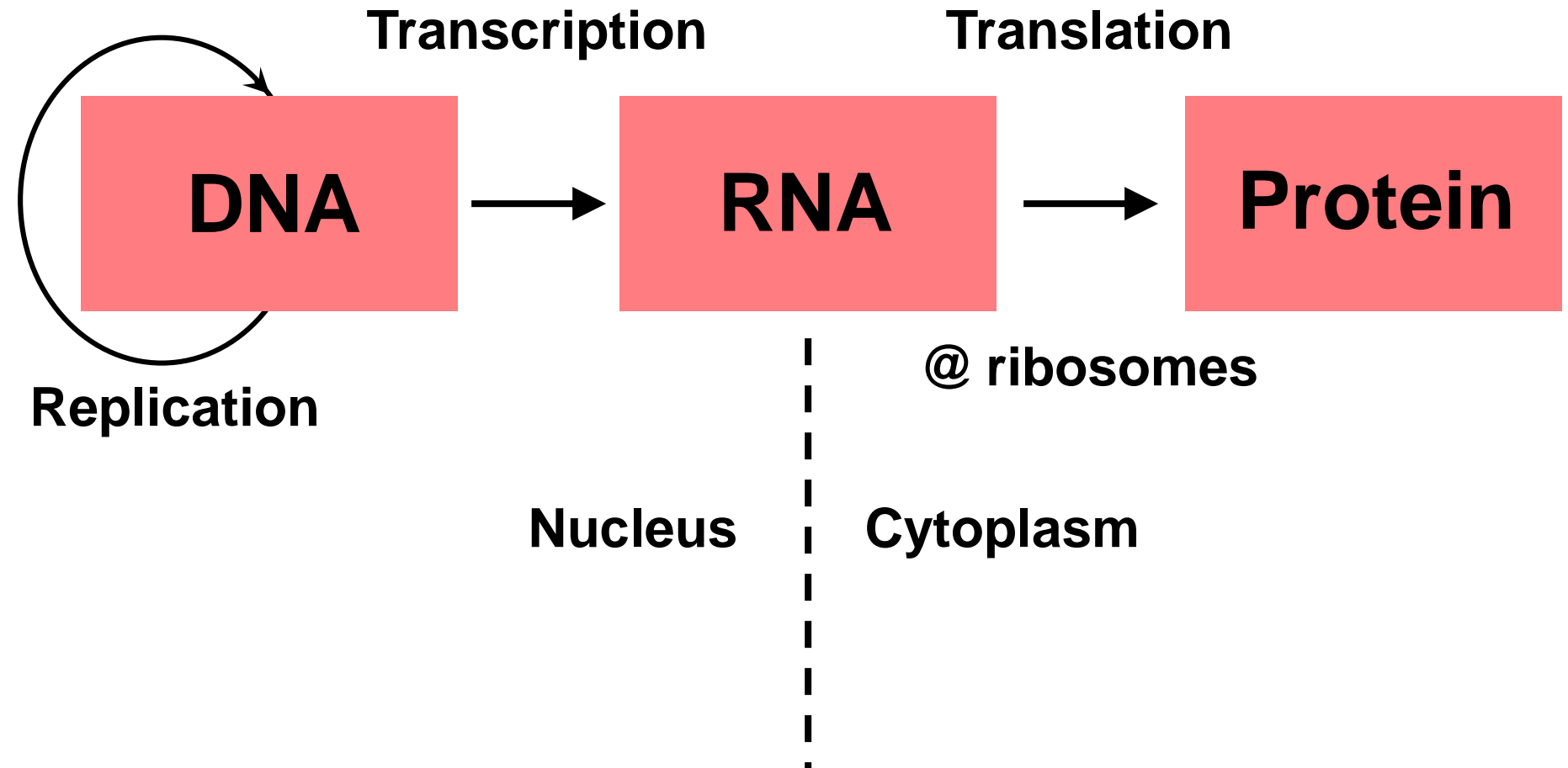
What does DNA look like? Double-helix!!



Gene = *Stretch of DNA that codes for a protein*



What does DNA do, day-to-day?



DNA vs RNA?

1. Double-stranded

2. Deoxyribose
(without oxygen)

3. A, T, C, G
Thymine

4. Self-replicative
(can copy itself)

5. Nucleus
(+mitochondria)

1. Single-stranded

2. Ribose
(with oxygen)

3. A, U, C, G
Uracil

4. Needs DNA as
template

5. 1^o Cytoplasm
(but Nucleus origin)

6. mRNA, rRNA, tRNA

*Triplets of bases code for amino acids,
the building blocks of proteins*

DNA

mRNA

tRNA

code word

codon

anti-codon

TAT

AUA

UAU

ACG

UGC

ACG

TTT

AAA

UUU

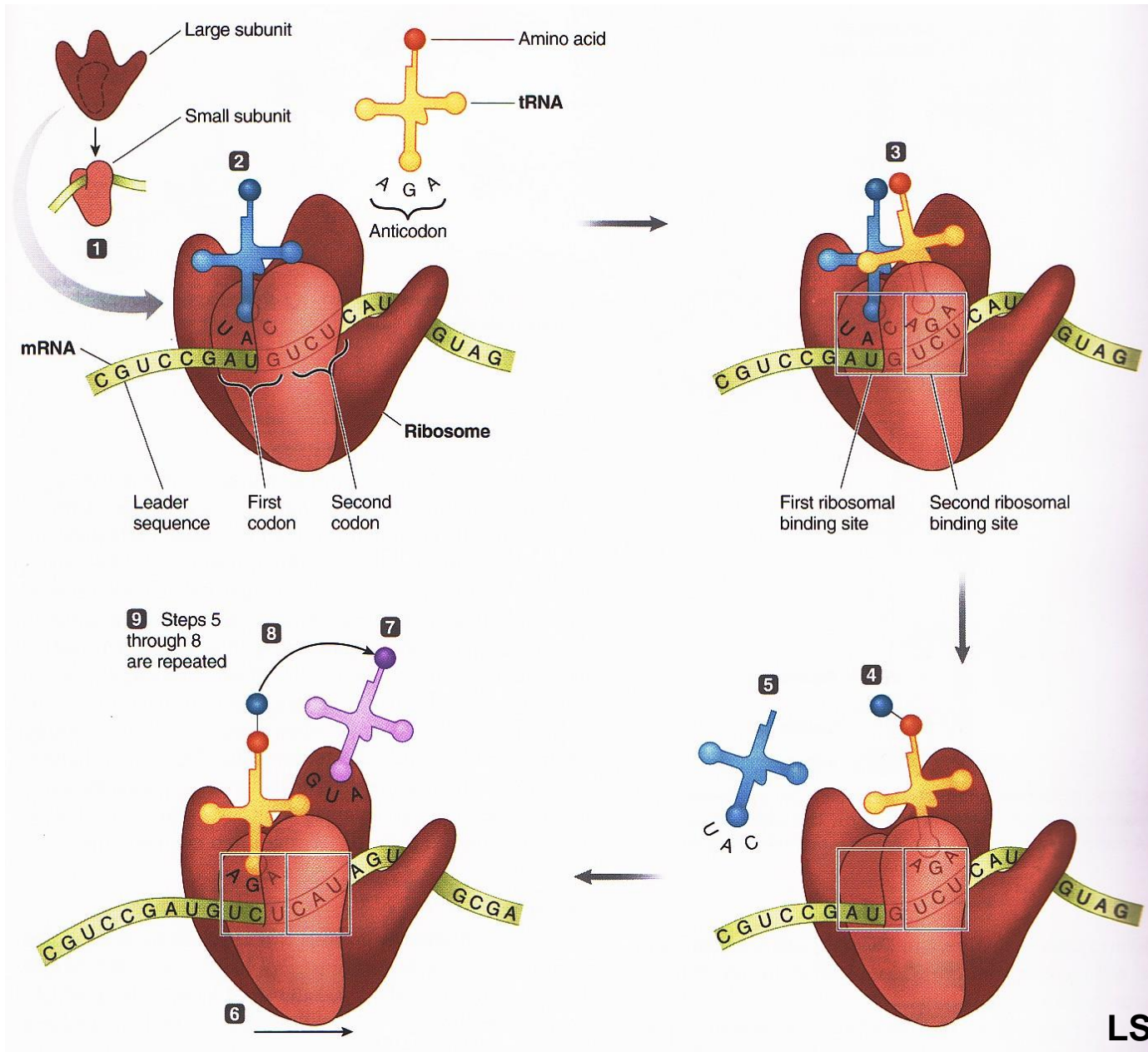
TAC

AUG

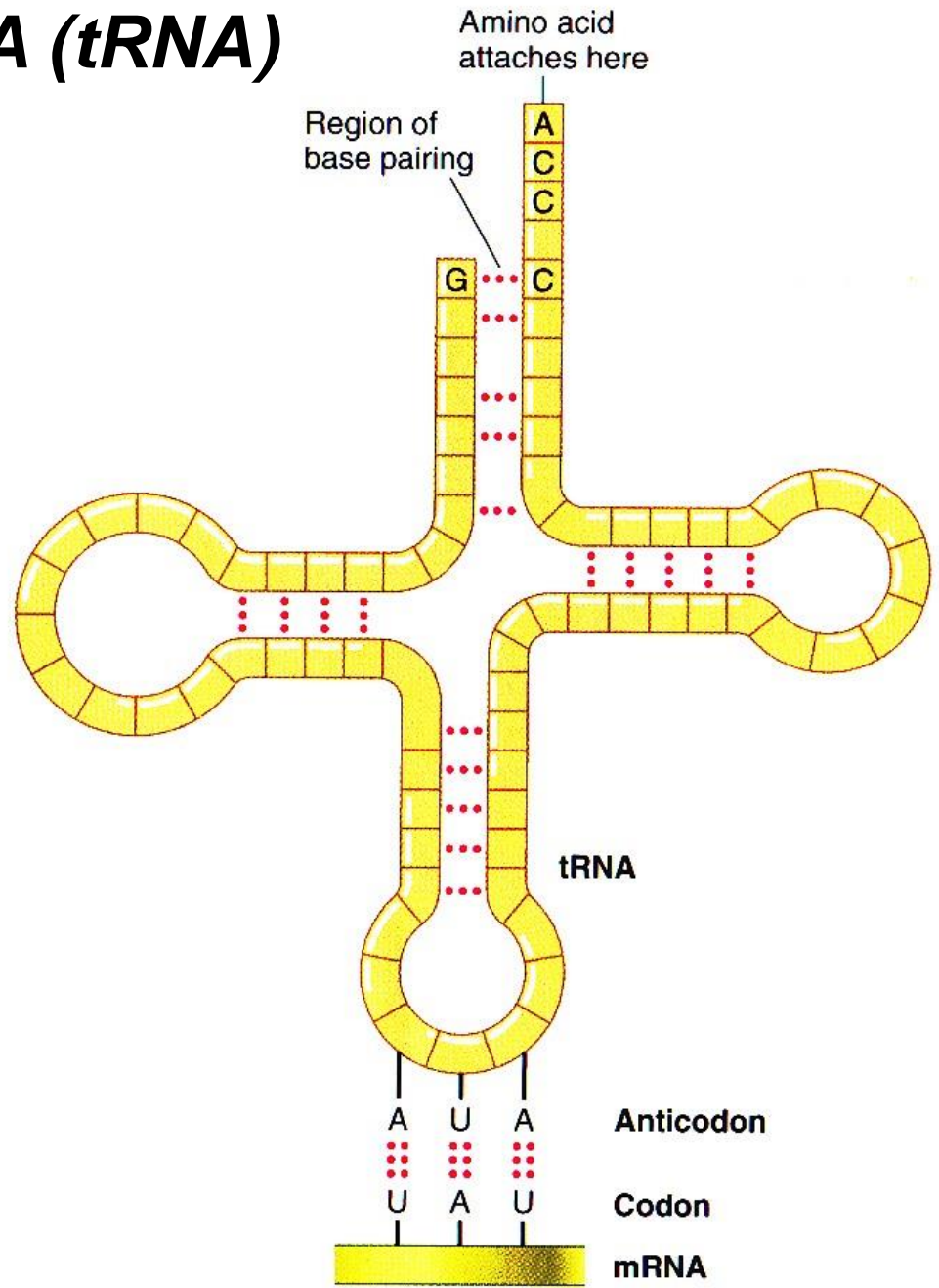
UAC

		Second base of codon				
		U	C	A	G	
First base of codon	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } Ser UCC } UCA } UCG }	UAU } Tyr UAC } UAA } Stop UAG } Stop	UGU } Cys UGC } UGA } Stop UGG } Trp	U
	C	CUU } Leu CUC } CUA } CUG }	CCU } Pro CCC } CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } Arg CGC } CGA } CGG }	C
	A	AUU } Ile AUC } AUA } AUG } Met Start	ACU } Thr ACC } ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	A
	G	GUU } Val GUC } GUA } GUG }	GCU } Ala GCC } GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } Gly GGC } GGA } GGG }	G
						Third base of codon

Translation? Ribosomes Make Proteins

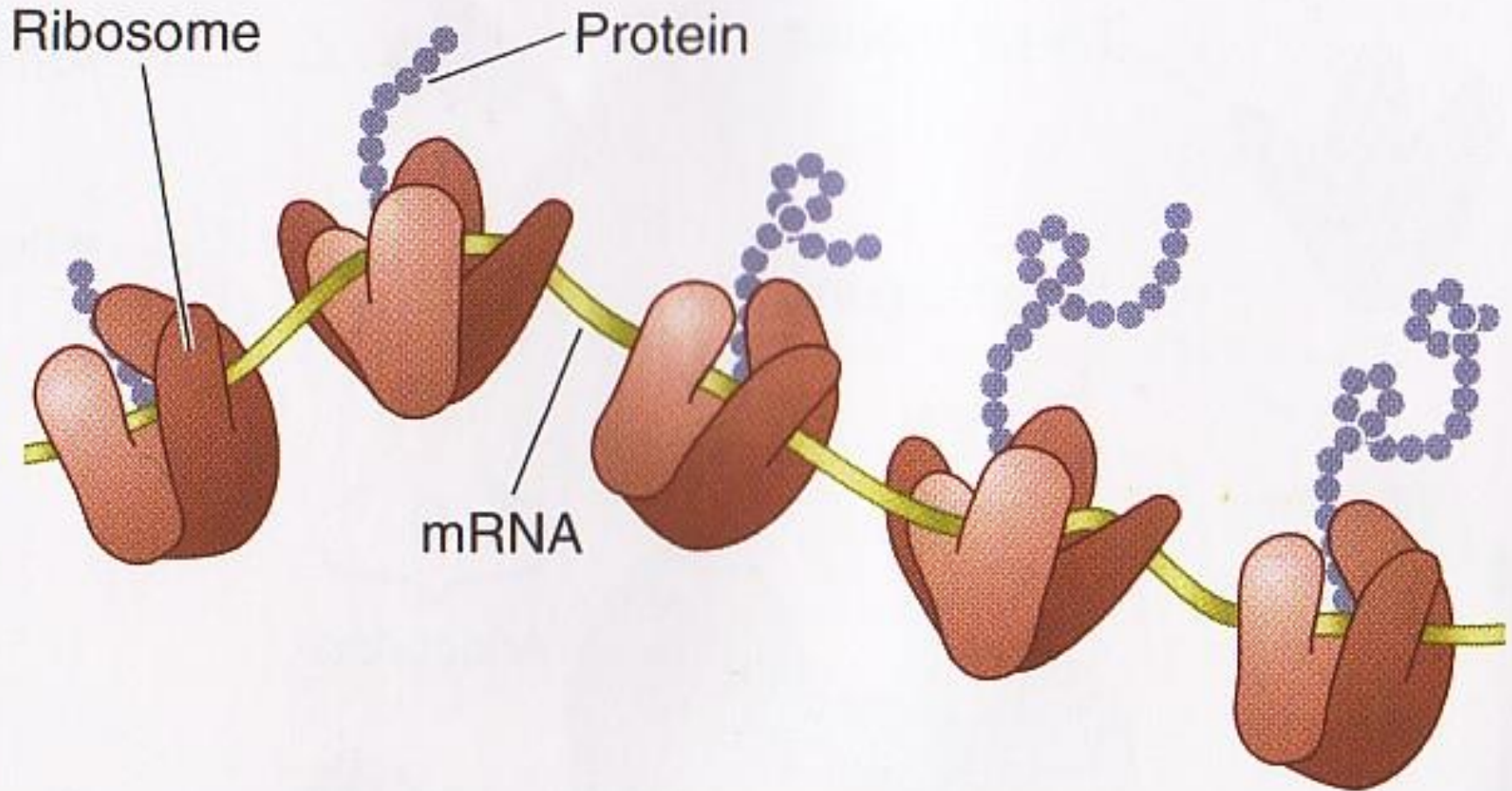


Transfer RNA (tRNA)



LS fig C-8

A Polyribosome. Which Way is Synthesis?



Class Skit on Translation!



A *protein* synthesizing factory, where *translation* takes place!

What's a ribosome?



You rock, baby!



Questions + Discussion



Macronutrients & Micronutrients Essential for Life

Macronutrients

H₂O/Water

➔ 1^o Carbohydrates

➔ 2^o Fats/Triglycerides/Lipids

➔ 3^o Proteins

Micronutrients

Vitamins (A, D, E, K; C + B)

Minerals (K⁺, Na⁺, Ca²⁺, Mg²⁺,
Fe²⁺, Zn²⁺,...)

Sample Food Sources

Water, other drinks, fruits
& vegetables

Grains, vegetables, fruits,
dairy products

Meats, full-fat dairy
products, oils

Meats, legumes, dairy
vegetables

NB: Need only minute quantities!

Vegetables, vegetable oils,
fruits, citrus, grains, dairy

Fruits, vegetables, grains,
nuts, dairy, meats,
processed foods

➔ **Energy nutrients = yield ATP**



The World's Longest-Lived People!

○ Blue Zones! ○



<https://www.cbsnews.com/news/blue-zones-do-people-who-live-in-certain-areas-live-longer/>, Aug 2013.

Buettner, D. *National Geographic*, Nov 2005.

M Poulain & Coworkers. *Experimental Gerontology*, Sep 2004

Loma Linda, United States

Plant-based!

1. Eat a little bit better!
2. Move a little bit more!
3. Socialize more!
4. Strong sense of purpose!



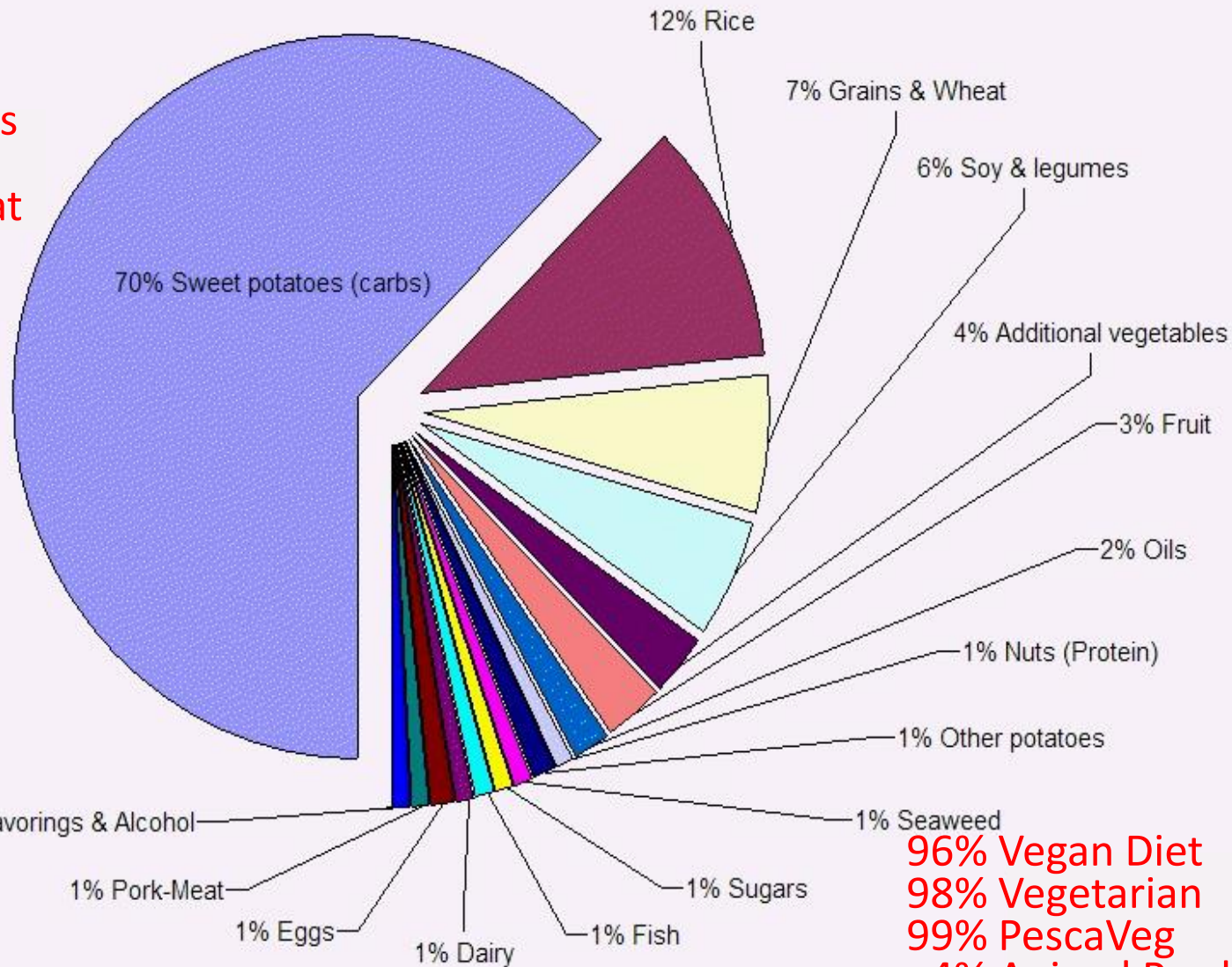
https://en.wikipedia.org/wiki/Blue_Zone

<https://bluezones.com/>

<http://www.sciencedirect.com/science/article/pii/S0531556504002141>

OKINAWA LONGEVITY DIET

- 70% Sweet Potatoes
- 12% Rice
- 7% Grains & Wheat
- 6% Soy & legumes
- 4% Additional vegetables
- 3% Fruit
- 2% Oils
- 1% Nuts (Protein)
- 1% Other potatoes
- 1% Seaweed
- 1% Sugars
- 1% Fish
- 1% Dairy
- 1% Eggs
- 1% Pork-Meat
- 1% Flavorings & Alcohol



85% Carbohydrates
 9% Protein
 6% Fat
 85-10-5
 1785 Calories

96% Vegan Diet
 98% Vegetarian
 99% PescaVeg
 <4% Animal Prod
 <1% Fish
 <1% Meat-Pork

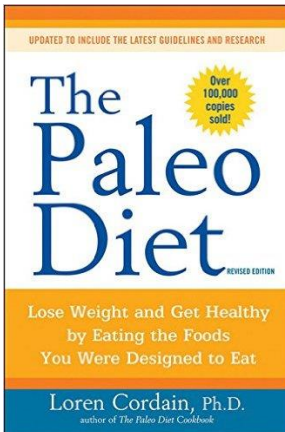
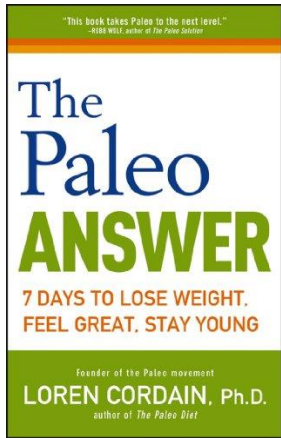
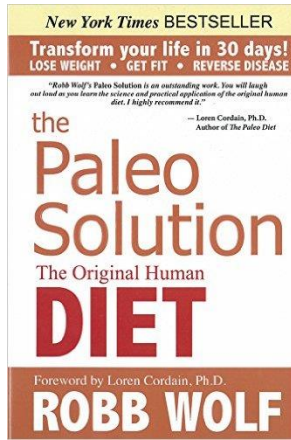
SCIENTIFIC STUDY: "The Diet of the World's Longest-Lived People and Its Potential Impact on Morbidity and Life Span"
 JOURNAL: Annals of the Academy of Sciences - Volume 1114: 434-455 (2007).

Note: These are the Actual Food Measurements of the Centenarians, not the diet of All island Okinawans or the ones who died, but the ones who lived.

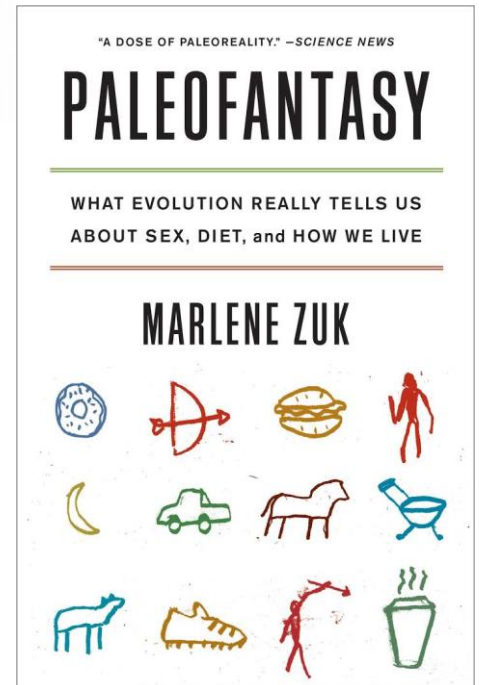
***US Dietary Recommended Intakes (DRI)
Committee Acceptable Macronutrient
Distribution Ranges (AMDR)!***

<u>Energy Nutrient</u>	<u>% Total Calories</u>
Carbohydrate	45-65%
Fat	20-35%
Protein	10-35%

Pondering Paleo?



**Evolutionary Biologist
Behavioral Ecologist
U Minnesota**



<http://www.nutritionaction.com/daily/how-to-diet/pondering-paleo/>

MyPlate launched June 2, 2011

2. Focus on fruits.
Whole fruit preferable to juice, but any fruit counts!
Fill $\frac{1}{2}$ your plate with fruits & vegetables!



3. Make at least $\frac{1}{2}$ of your grains whole grains!

5. Get your calcium-rich foods. Buy skim or 1% milk. Go easy on cheese!

1. Vary your veggies.
Fill $\frac{1}{2}$ your plate with fruits & vegetables!

4. Go lean with protein. Keep protein to $< \frac{1}{4}$ plate! Nuts, beans, peas, seeds, poultry, lean meat, seafood,...

Diet & Health Guidelines for Cancer Prevention

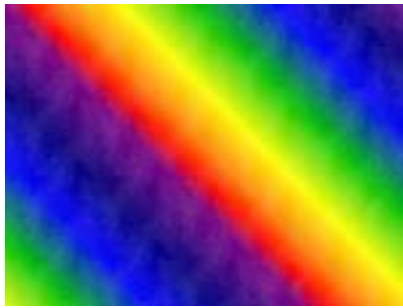
- 1. Choose a diet rich in variety of plant-based foods.**
- 2. Eat plenty of vegetables & fruits.**
- 3. Maintain a healthy weight & be physically active.**
- 4. Drink alcohol only in moderation, if at all.**
- 5. Select foods low in fat & salt.**
- 6. Prepare & store food safely.**

And always, remember...

Do not smoke or use tobacco in any form.



American Institute for Cancer Research (AICR)



Eating the Rainbow Hawaiian Style!!



Your plate should be the size of a Frisbee, not a manhole cover.

When it comes to colorful foods, Fruit Loops don't count.

A surprising number of people get 1/5 of their calories from sodas or other liquids.

If you look at the label & need a chemistry degree to read it, put the item back on the shelf!



SOURCE: P. Rath, *Honolulu Advertiser*, Sept 11, 2008 citing D. Chong & N. Kerr.



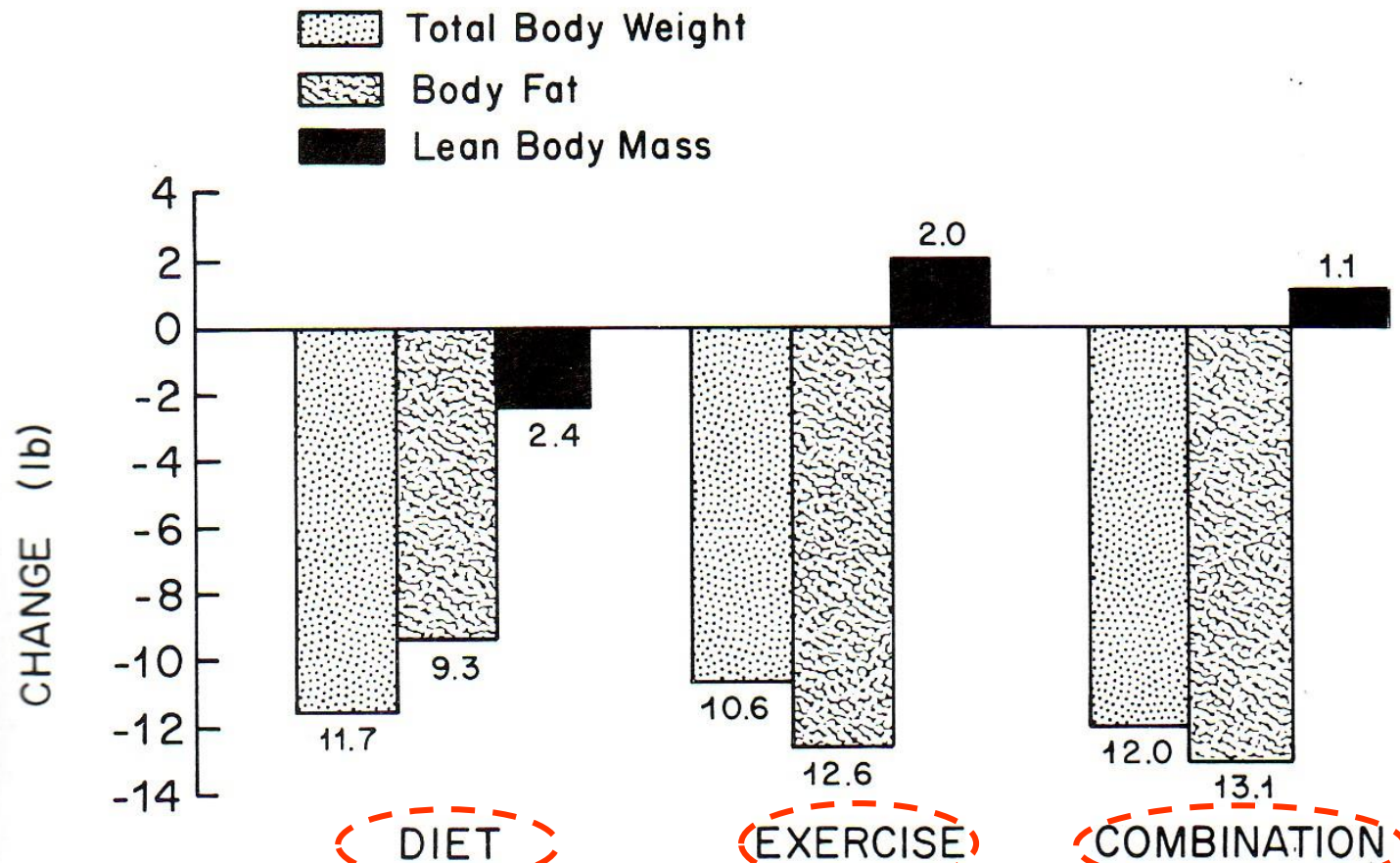


Figure 4-9. Changes in body weight, body fat, and lean body weight for diet, exercise, and combination groups. (From Zuti W. B., and Golding, L. A.: Comparing diet and exercise as weight reduction tools. *Phys. Sportsmed.* 4:49-53, 1976.)

NB: Each group 500 kcal deficit/day, 16 weeks



Exercise is better than dieting in lowering body fat & preserving muscles!



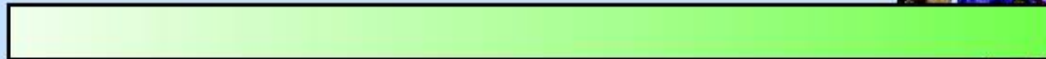
Dietary Composition & Physical Endurance

eg, Atkins!

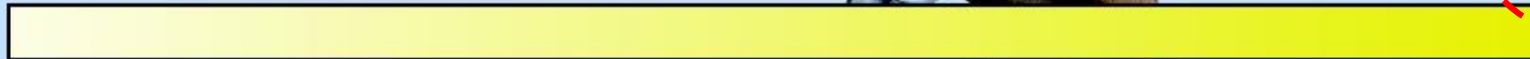
High-fat diet



Normal mixed diet



High-carbohydrate diet



~ 1/3 endurance!

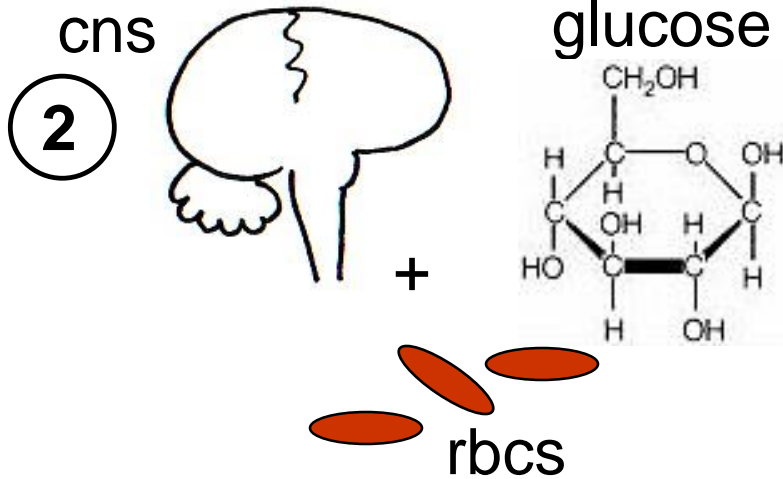
Maximum endurance time:

57 min

114 min

167 min





Negative Effects of Low Carbohydrate

1



- ① ↑ fatigue/exhaustion central & peripheral!
- ② ↓ glucose – brain+spinal cord, rbcs thrive upon.
- ③ ↓ variety which reduces intake of phytochemicals, vitamins, minerals & fiber.
- ④ ↑ risk of respiratory infections.

4



+ gall stones,
↓ thermoregulation...

We're better at storing fat vs carbohydrate!

Dietary Fat



3 % Kcal

Body Fat



23 % Kcal

**Dietary
Carbohydrate**



**To Help Lower Body Wt & %Fat
EXERCISE!! +*Minimize* These!!**



FAT 9 Kcal/g

ETOH 7 Kcal/g

CARB 4 Kcal/g

PRO 4 Kcal/g

**NB: Minimize not *Eliminate!*
Moderation not *Abstinence!!***

***I'm not sure I believe you!
Why can't I just starve to
lose weight?***



TOTAL FAST =
No Energy Nutrients
(No Carbohydrates, Fats
or Proteins)

ONLY

- 1. Water**
- 2. Vitamins**
- 3. Minerals**

60-day Fast???

Lost 60 lb!! Wow!!

Yet

26 lb Water

20 lb Lean Body Mass

14 lb Fat

Fat < $\frac{1}{4}$ total wt loss!

> $\frac{3}{4}$

***You can lose weight by
starving – but it's mostly
water & muscle! Also, there
can be complications!***



Potential Complications of Total Fasting

**Nausea, diarrhea, persistent vomiting,
postural hypotension, nutritional
deficiencies, menstrual irregularities,
and...sudden death.**

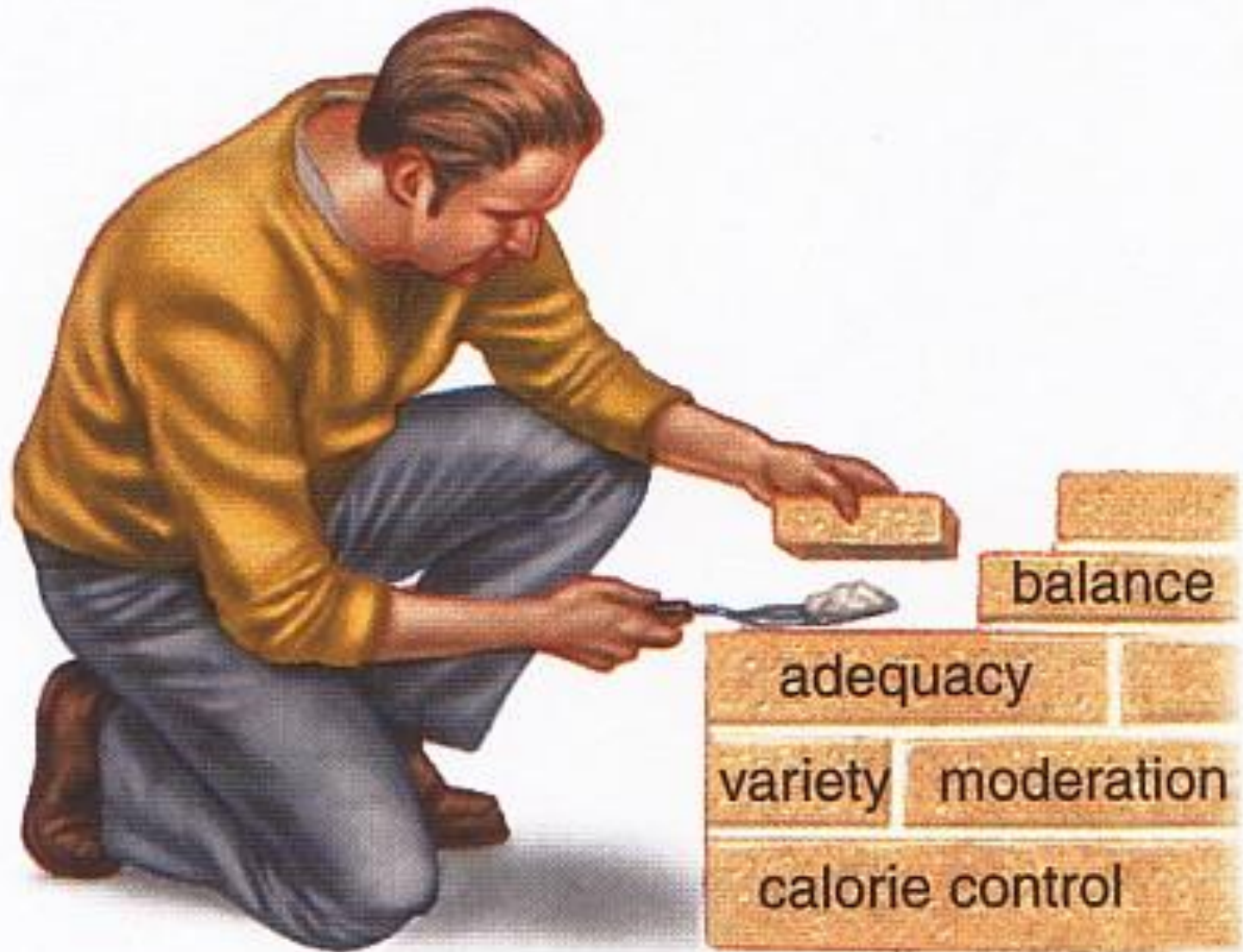
Positive Aspect??

**General loss of appetite within
first 2 days, maintained
throughout fasting period.**

Emphasize ABCs + Variety & Moderation!



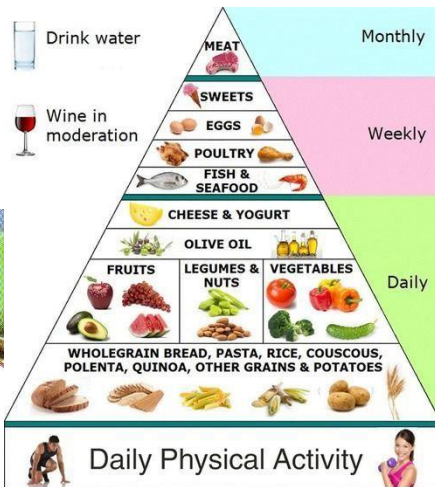
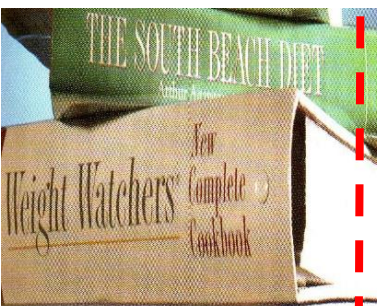
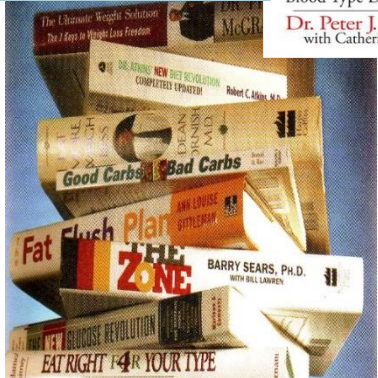
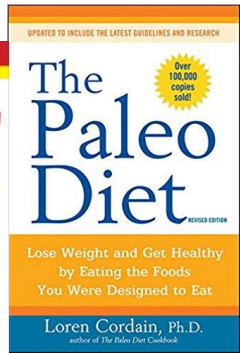
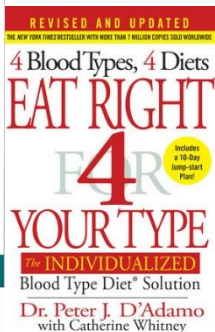
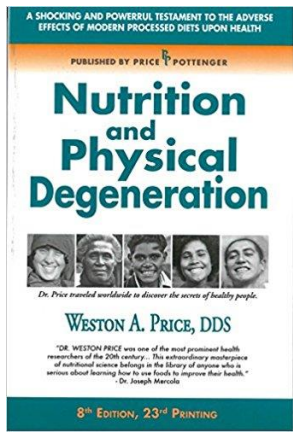
*All of these factors help to build
a nutritious diet.*



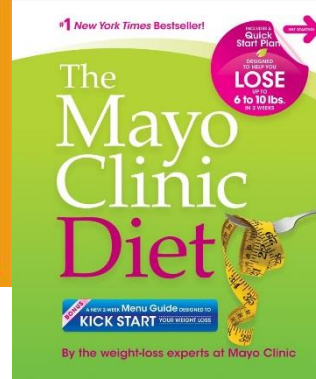
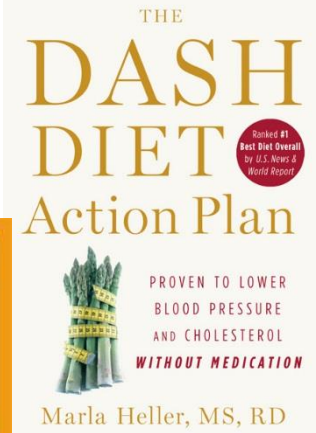
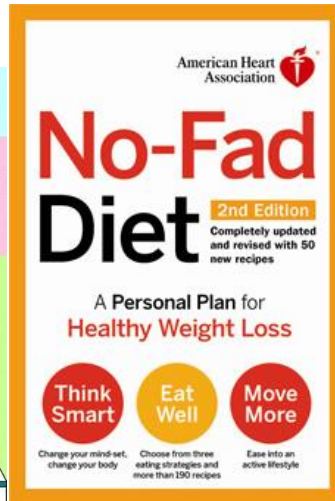
Kleiner's & Monaco's Top 10 Hit List for Nutrition Quackery

1. Treatment based on unproven theory calling for non-toxic, painless therapy.
2. Author's/purveyor's credentials aren't recognized in scientific community.
3. No reports in scientific, peer-reviewed literature but rather mass media used for marketing.
4. Purveyors claim medical establishment is against them & play on public's paranoia about phantom greed of medical establishment.
5. Treatments, potions, drugs manufactured according to secret formula.
6. Excessive claims promising miraculous cures, disease prevention or life extension.
7. Emotional images rather than facts used to support claims.
8. Treatments require special nutritional support including health food products, vitamins and/or minerals.
9. Clients are cautioned about discussing program to avoid negative.
10. Programs based on drugs or treatments not labeled for such use.

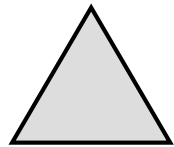
Which Diets are Best?



Mediterranean Diet



Not Plant-based
Lower Carbohydrate



Plant-based
Lower Fat



Not Peer-Reviewed = Trade Book
→ Opinion



Peer-Reviewed = Text Books
→ Research

5 times per wk? \equiv 106,600 calories/yr \equiv \pm 30.5 lb fat/yr



Starbucks
Cinnamon
Dolce Latte,
whipped cream
Venti (20 oz.)

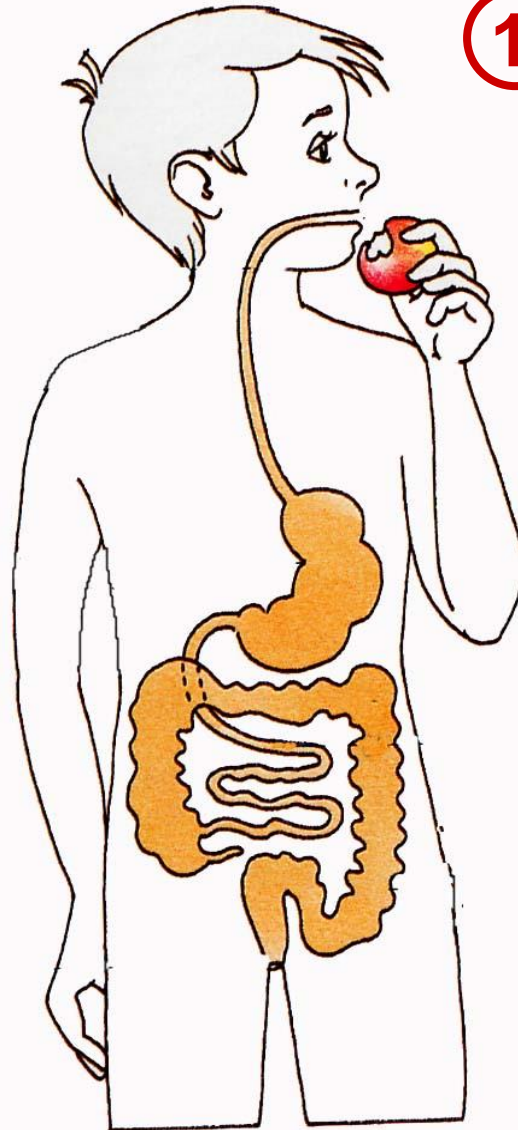
410 calories

Jogging | **50 min.**



**Better
choices!**

Digestion Steps



① Ingestion

② Mechanical Digestion

③ Chemical Digestion

④ Peristalsis

⑤ Absorption

⑥ Storage

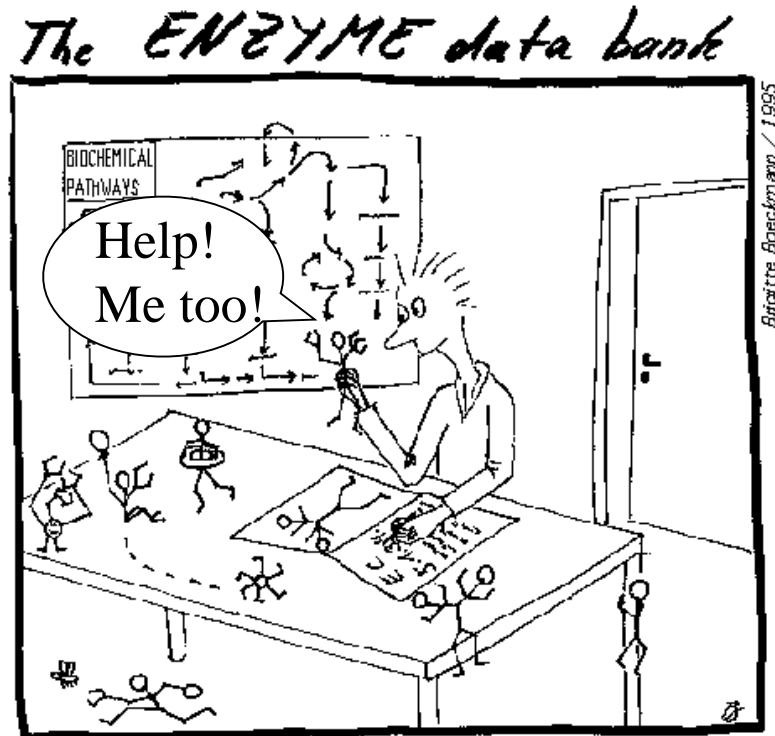
⑦ Defecation

Hydrolysis of Energy Nutrients

Hi gang!!
You need me
for digestion!!



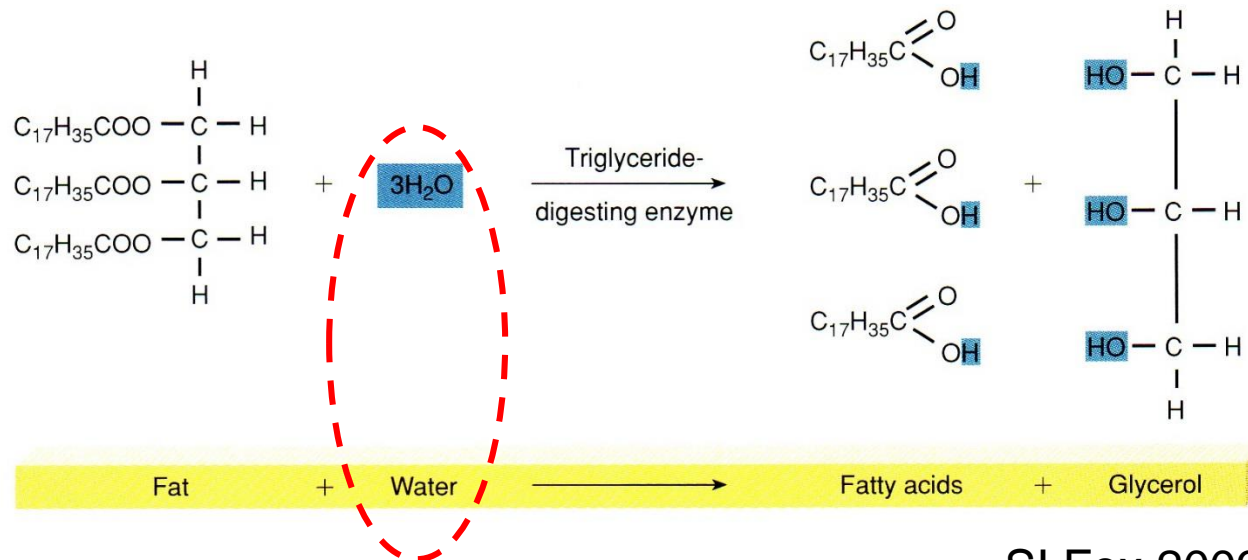
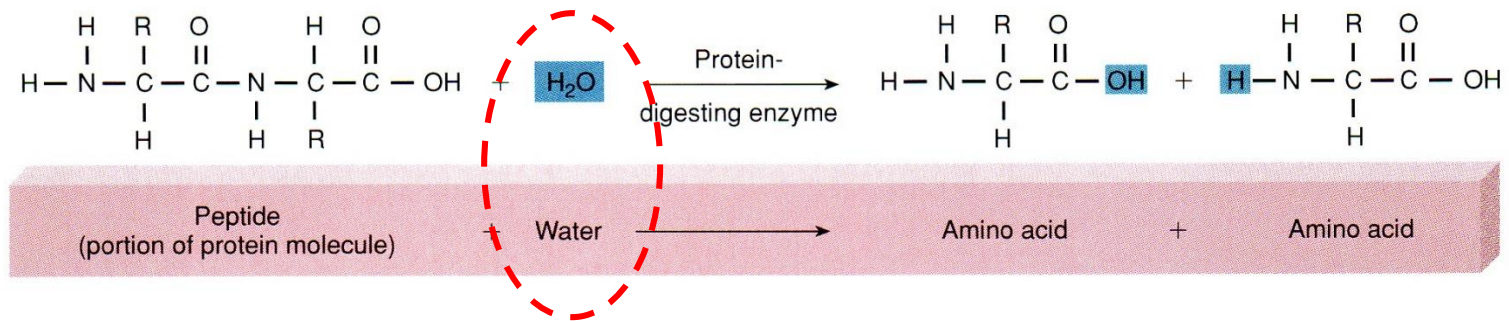
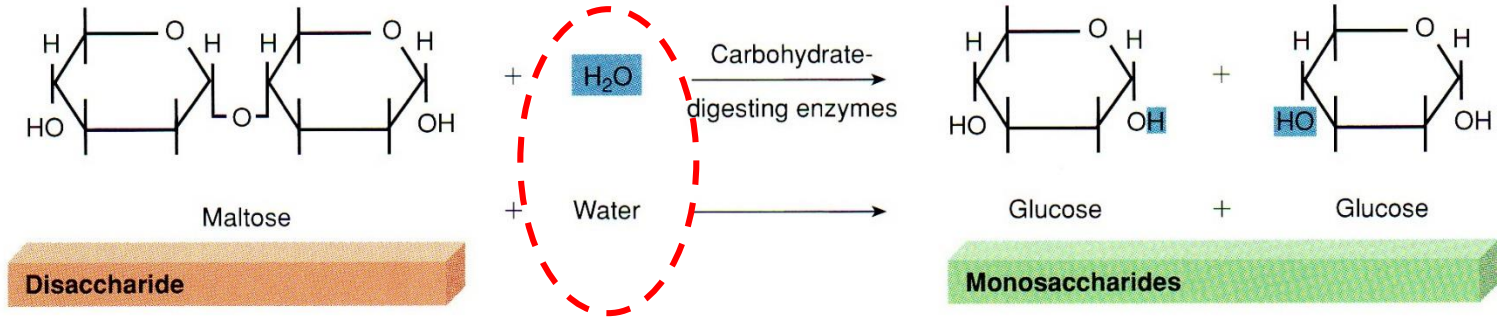
+



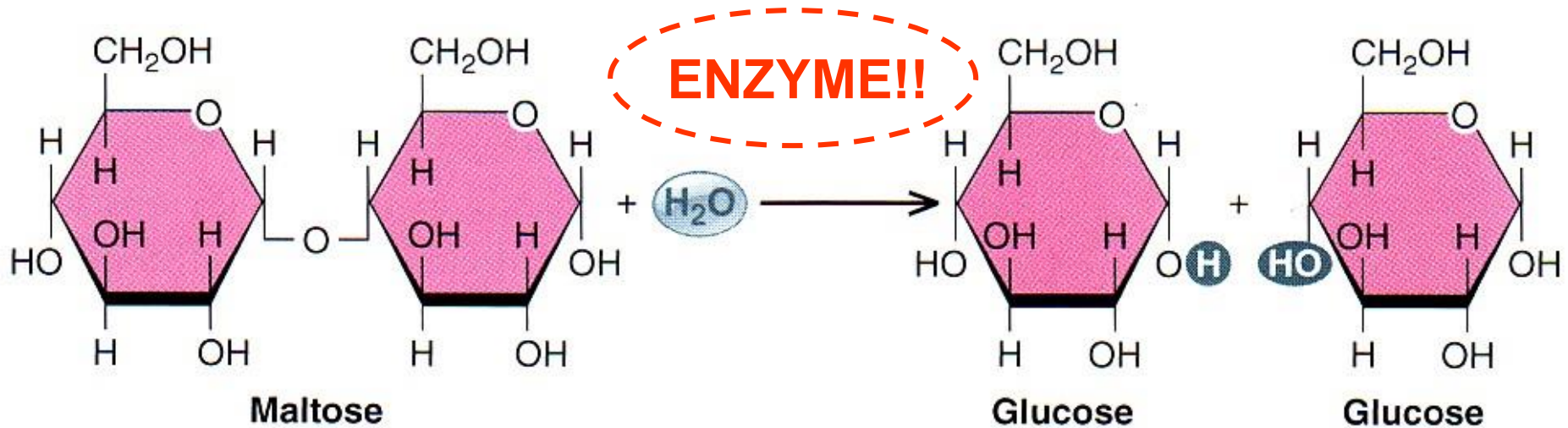
H₂O

+

Enzyme



What's missing?

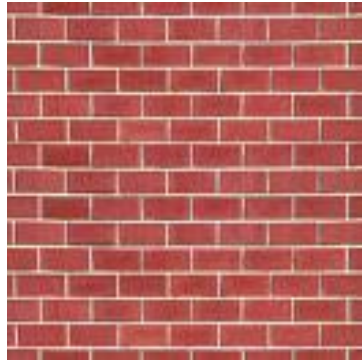


● **FIGURE 15-1** An example of hydrolysis. In this example, the disaccharide maltose (the intermediate breakdown product of polysaccharides) is broken down into two glucose molecules by the addition of H₂O at the bond site.

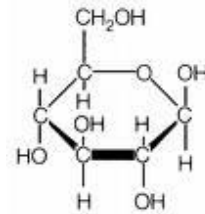
Polymer to Monomer (Many to One)



...Central-linking theme!!

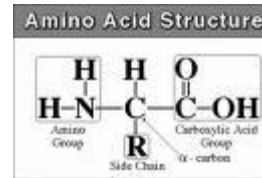


Carbohydrate

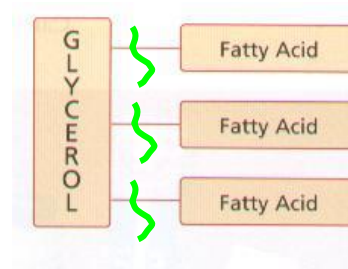


Glucose

Protein
+
Fat



Amino Acids



Fatty Acids
+
Glycerol