BI 358 Lecture 6  **…Gorgeous photos by Lennart Nilsson of Nova fame!**
http://www.lennartnilsson.com/human_body.html

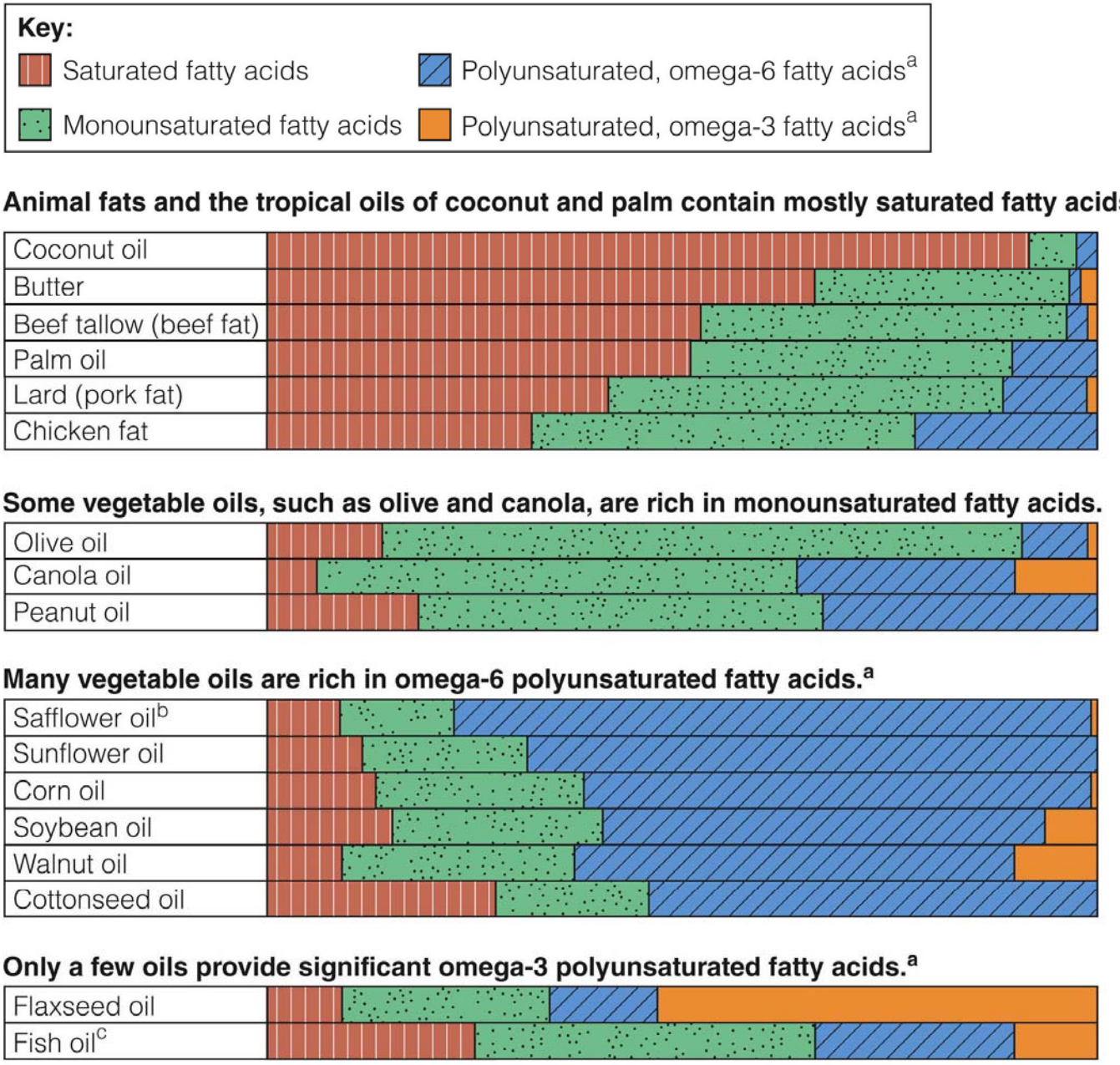
I. ***Announcements*** **Quiz 2 on Tuesday covers Lectures 4 & 5, GI Physiology & Nutrition. Please review slides 78-89 from last t! Lifetime information! Nutrition reports by e-mail to Conor or Emile by 5 pm next Tuesday. Update on outlines. Q?**

II. ***Nutrition Connections*** **Q in lab on coconut *vs.* other oils.**

III. ***Blood + Body Resistance to Infection I***

G&H ch 32, 33, LS, Stuart Fox, Daniel Chiras (DC), Basiro Davey

A. **Blood: cell + fragments vs liquid (plasma vs serum) LS**
B. **Red blood cells, white blood cells, platelets, Demo? LS, DC**
C. **Red blood cell production, hemoglobin G&H pp 413-9**
   G&H fig 32-1 thru 32-6 +..., Fox
D. **Pathogen? Microbe that causes disease, Davey pp 5-6**
E. **Barriers to infection Davey fig 2.1 p 12, fig 2.2 p 13**
F. ***National Geographic,* The Wars Within, Lennart Nilsson**
G. **WBC effectors: Innate & adaptive immunity G&H pp 433-7**
   G&H fig 34-1 + Davey fig 2.2 p 13, fig 3.4 p 24, fig 3.12 p 36
H. **Medical Physiology News Handwashing to prevent infection!**
   US Centers for Disease Control



[a]*These families of polyunsaturated fatty acids are explained in a later section.*

[b]*Salad or cooking type over 70% linoleic acid.*

[c]*Fish oil average values derived from USDA data for salmon, sardine, and herring oils.*

S&W 2014 fig 5-5 p 162

The Amazing BENEFITS of Coconut Oil

Nutritional Content in Coconut Oil:

- Anti oxidants
- MCT Medium-Chain Triglycerides
- Lauric Acid
- Caprylic Acid
- Capric Acid

The Health & Healing Benefits of Coconut Oil:

Skin Care

The ***MCT*** in Coconut oil act as a natural skin conditioner. Deeply penetrating & moisturizing, they protect against environmental & free radical damage. It also helps with anti-aging, ezcema & even provides some sun protection.

Hair Care

Coconut oil is one of the best ways to provide nutrients to your hair. The fatty acids condition deeply from the insides of the strands out. Providing protein, eliminating dandruff & aiding in re-growth. Many people use it as a conditioner!

Stress Relief

Coconut oil is very soothing. The natural aroma of coconut is also very soothing. You can apply the oil to your head & gentlly massage to help remove mental fatigue.

Weight Loss

The Fatty Acids in coconut oil destroy candida, (yeast overgrowth) which triggers weight gain, carbohydrate cravings & fatigue. They're easily digested & converted into energy, which helps to speed up metabolism & help burn stored fat.

Immunity

The unique saturated fats of coconut oil contain antibacterial, antiviral, anti-fungal, and anti-parasitic properties that help strengthen the immune system. Consuming coconut oil regularly will reduce incidences of sickness.

Infections

Lauric Acid (found only in breast milk & coconut oil) is converted into monolaurin in the body. This may destroy bacterial & viral infections like measles, influenza, hepatitis C & even HIV. Monolaurin may also eliminate Athlete's foot.

Digestion

MCT molecules in coconut oil are small so they are easily digested with less strain on the pancreas & digestive system. People suffering from diabetes, obesity, gallbladder disease, or Crohn's disease may benefit greatly from coconut oil.

Diabetes

Coconut oil may improve insulin sensitivity & glucose tolerance over time. It helps regulate blood sugar levels & protects against insulin resistance. It can even help prevent Type II Diabetes.

Heart Health

The fat in cocnut oil does ***not*** have a negative effect on cholesterol. In fact, it helps improve your cholesterol profile. It helps prevent heart attack & stroke and may even cure heart disease.

TIP: Buy Organic, Unrefined, Cold-Pressed, Extra-Virgin Coconut Oil!

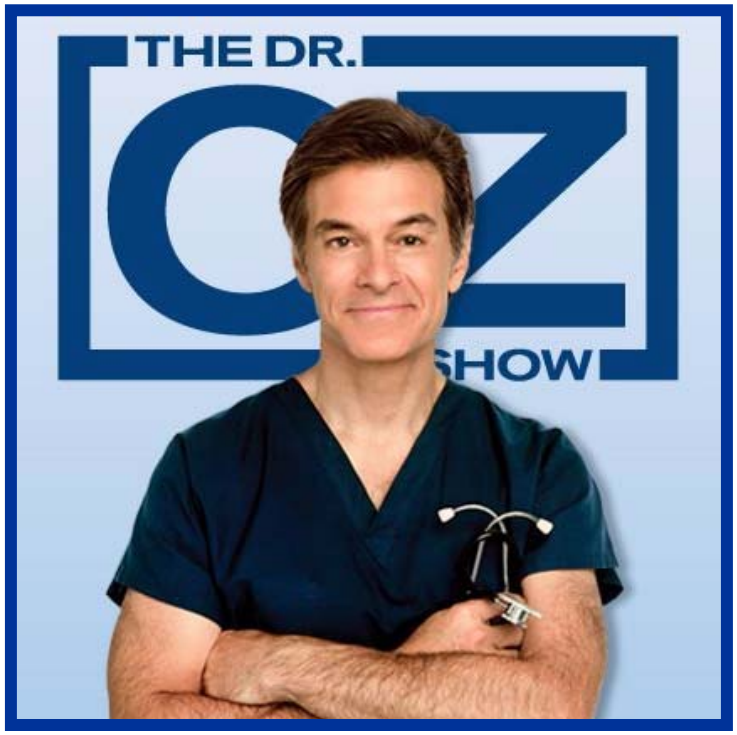
Natural healthy concepts

SOURCES:

http://www.coconutresearchcenter.org
http://http://www.organicfacts.net
http://www.naturalnews.com

www.NaturalHealthyConcepts.com

Many claims with little scientific, peer-reviewed, research support



http://www.doctoroz.com/videos/surprising-health-benefits-coconut-oil

Coconut Oil Health Benefits

- Improves or Reverses Alzheimer's Disease
- Improves Type 2 AND Type 1 Diabetes
- Improves or Heals Many Skin Diseases
  - Fungal Infections
  - Acne
  - Eczema
  - Keratosis Polaris
  - Psoriasis
  - Rosacea
- Provides Peak Performance Energy
  - Drug-free Energy
  - Longer Endurance
- Kills Candida Fungus
- Helps with Hypothroidism
  - Increases Metabolism
  - Raises Body Temperature
- Conditions and Strengthens Hair
  - Penetrates Roots
  - Kills Lice
  - Improves Dandruff
- Kills many Bacteria AND Viruses
- Promotes Weight Loss
  - Preserves Muscle Mass
  - Promotes Ketosis

Find all the research at: CoconutOil.com

Coconut Oil Nutritional Wonder?

Claims?

http://coconutoil.com/about-us/

Review articles, last 5 yr (1) on health benefits?

http://www.ncbi.nlm.nih.gov/pubmed/?term=coconut+oil+health+benefits

Other articles?

http://www.ncbi.nlm.nih.gov/pubmed/10948851

http://www.ncbi.nlm.nih.gov/pubmed/22260106

The bottom line?

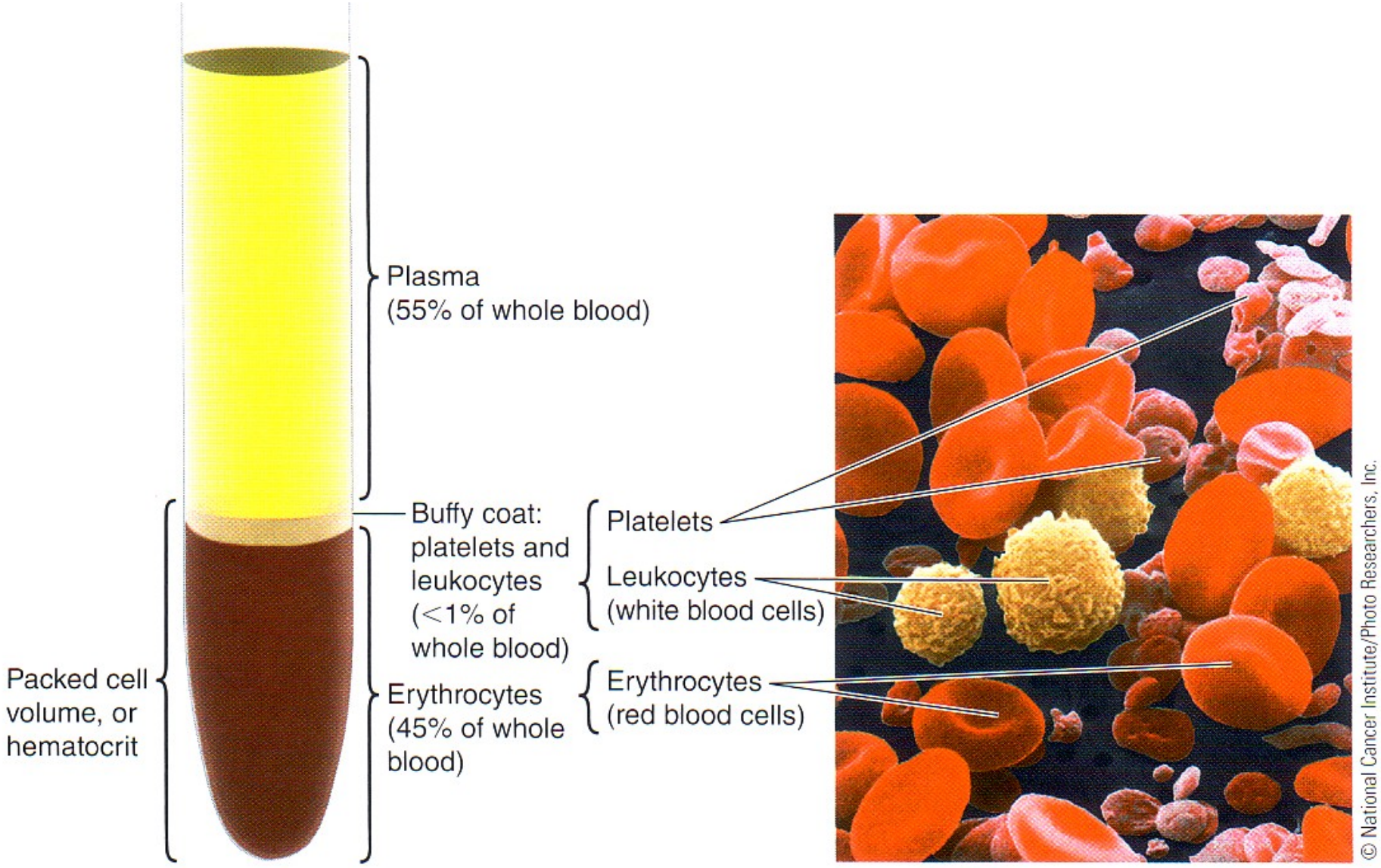
http://www.cspinet.org/nah/articles/coconut-oil.html

http://www.health.harvard.edu/newsletters/Harvard_Health_Letter/2011/May/coconut-oil

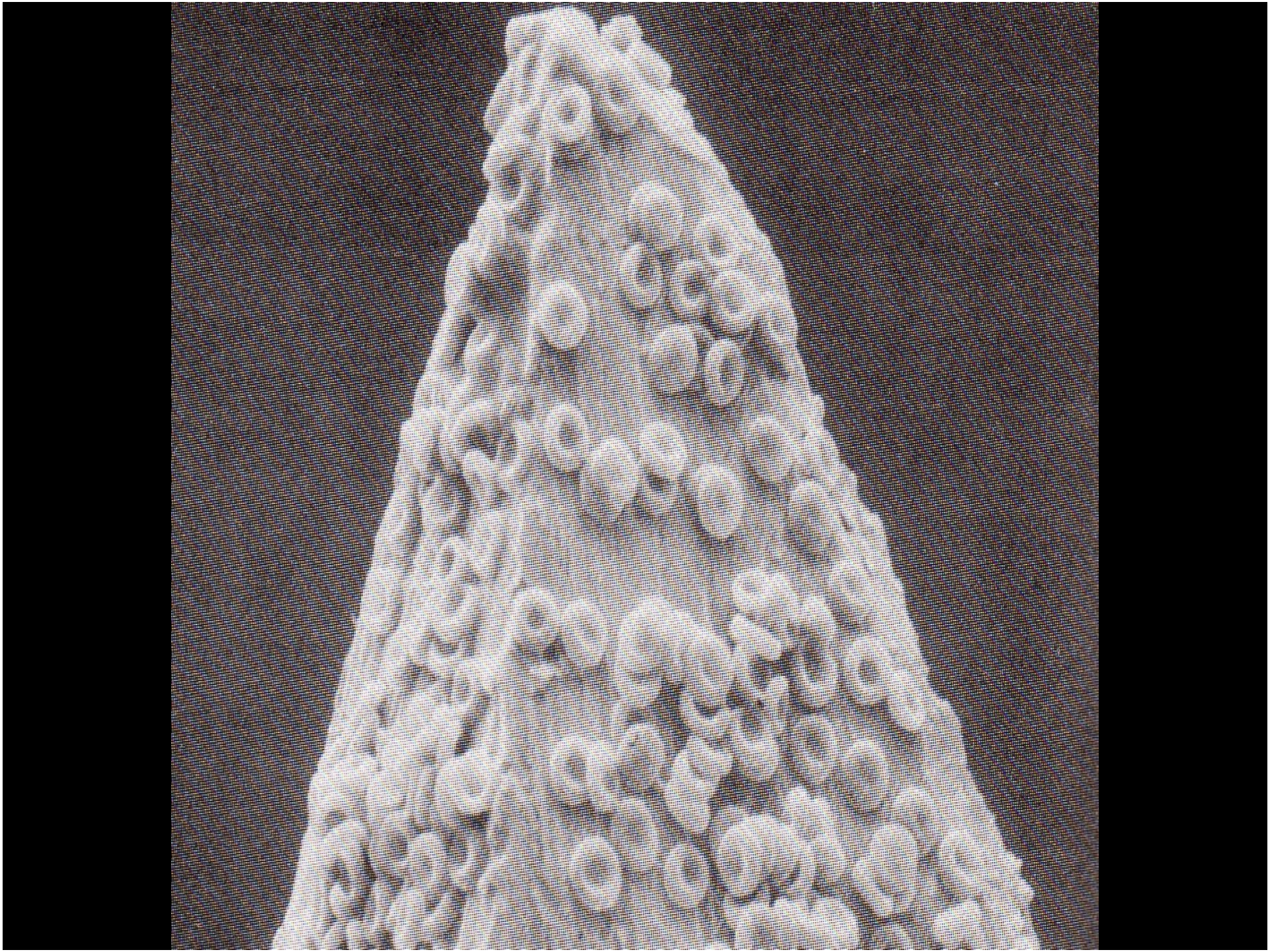
http://health.clevelandclinic.org/2012/05/heart-healthy-cooking-oils-101/

http://en.wikipedia.org/wiki/Smoke_point

What's in Blood? Plasma & Blood Cells

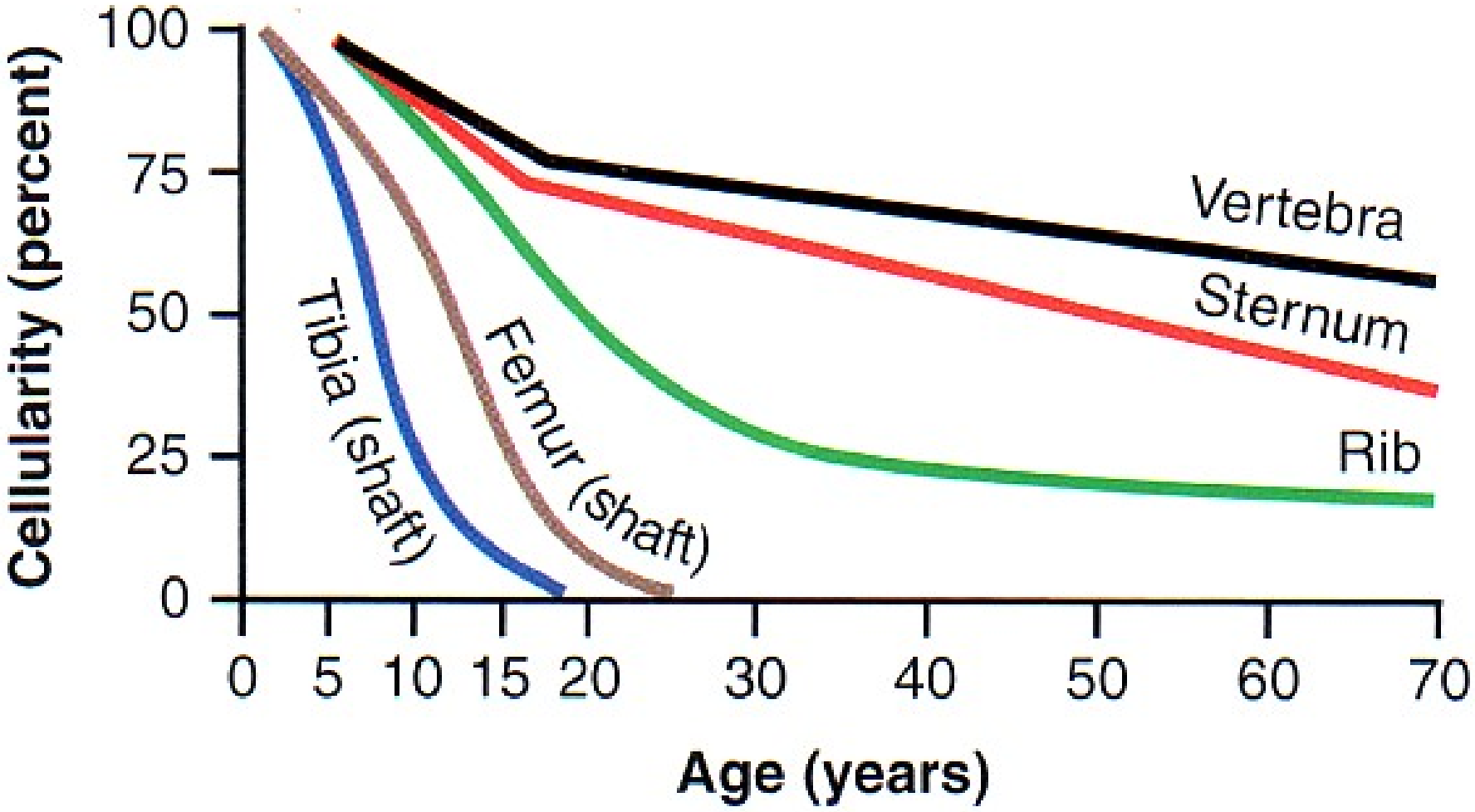


LS 2012 fig 11-1



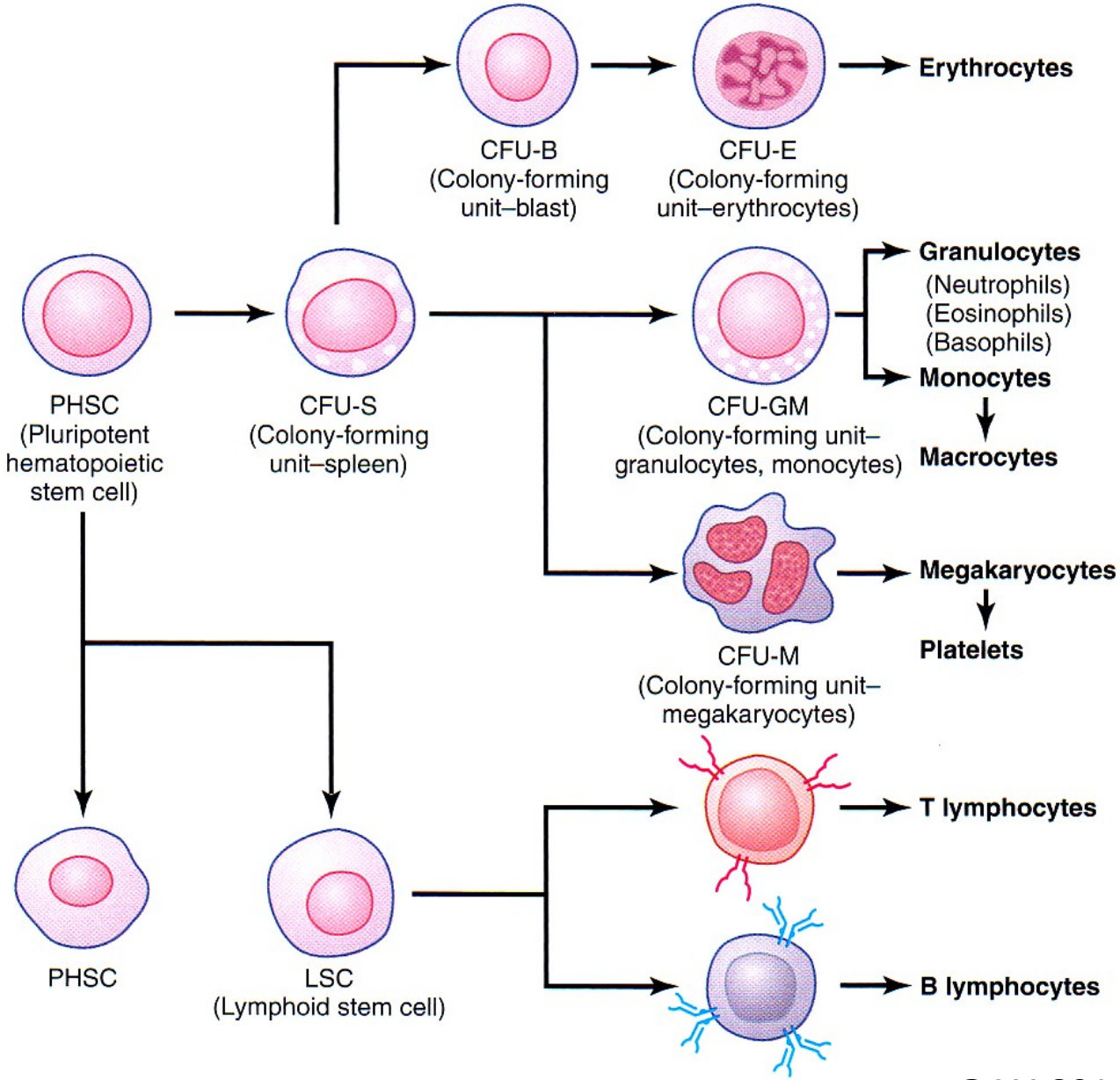

2000 x GMBH,
Nat Geog 1986
Jun p 714

Dermal bone production of red blood cells



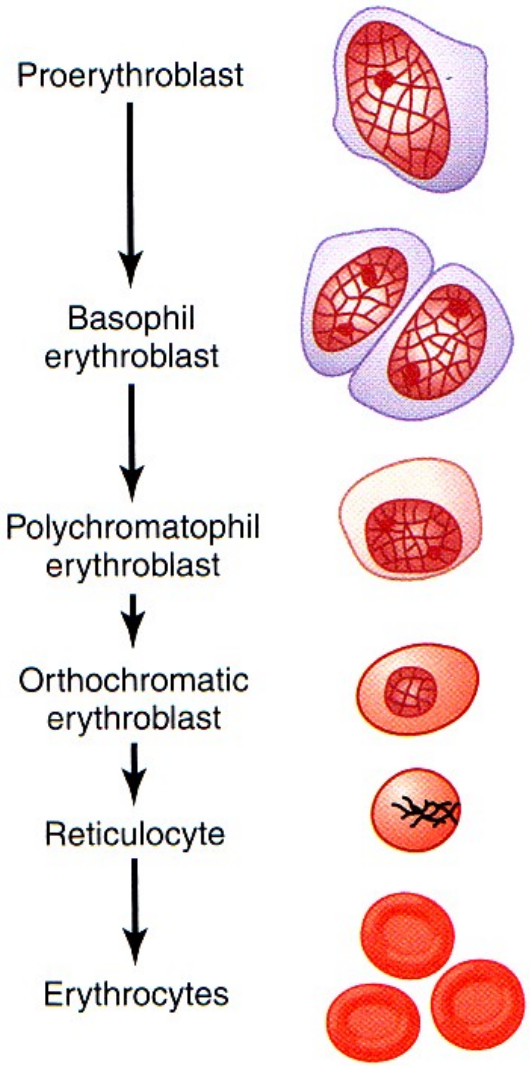
G&H 2011 fig 32-1 p 414

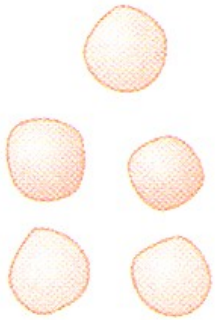
Pluripotent Hematopoietic Stem Cell Lines



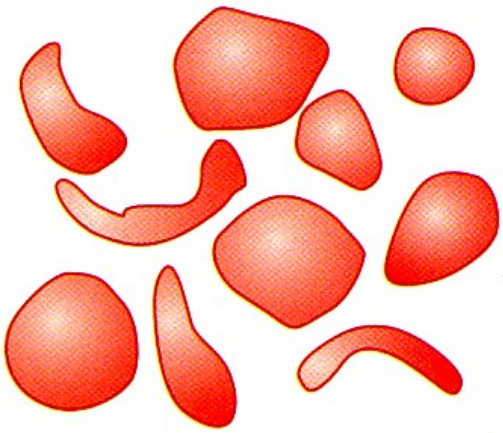
G&H 2011 fig 32-2 p 414

Red Blood Cell Genesis

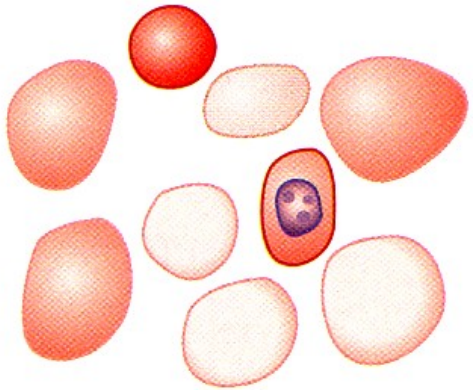




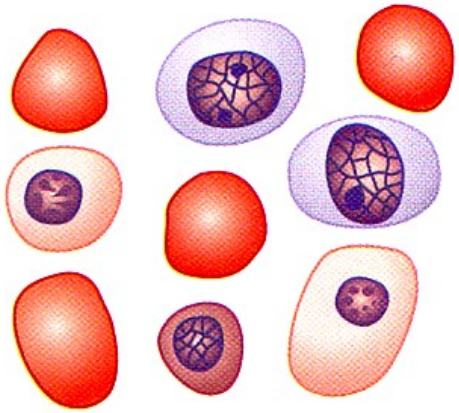
Microcytic, hypochromic anemia



Sickle cell anemia



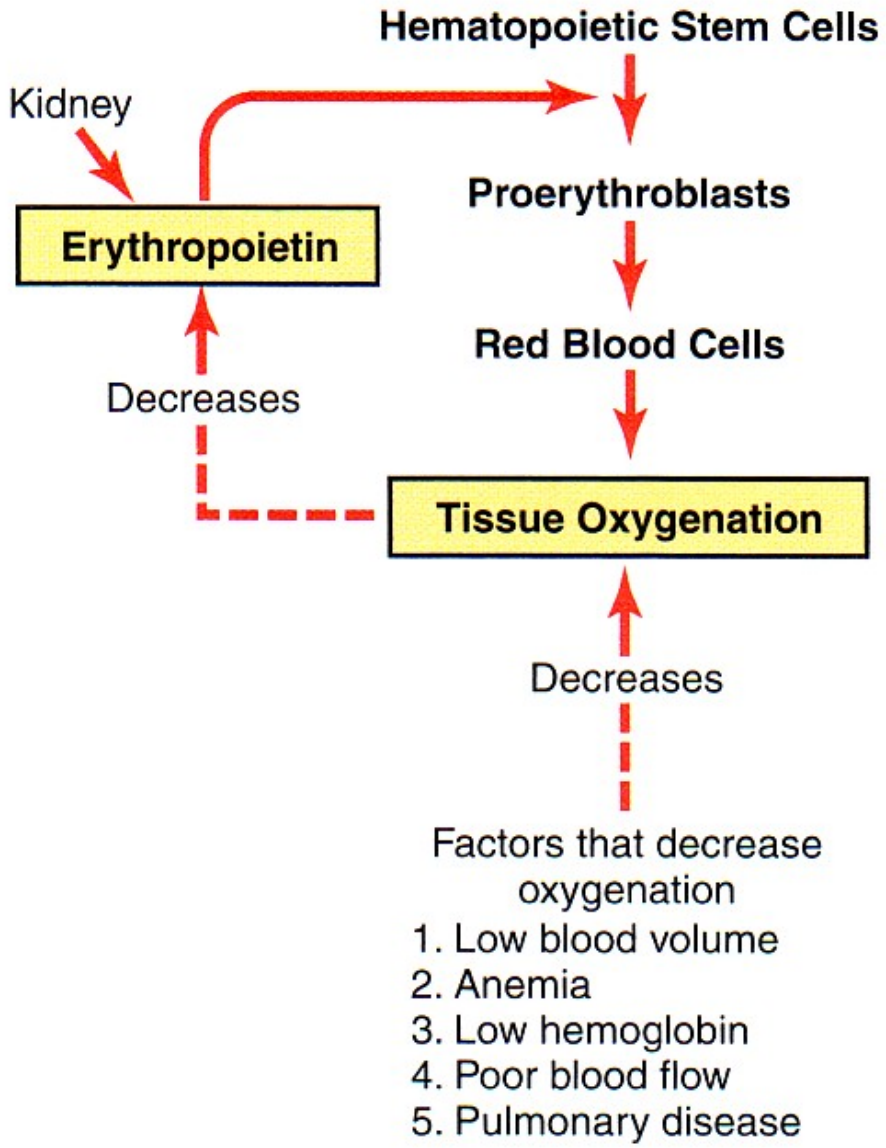
Megaloblastic anemia



Erythroblastosis fetalis

G&H 2011 fig 32-3 p 415

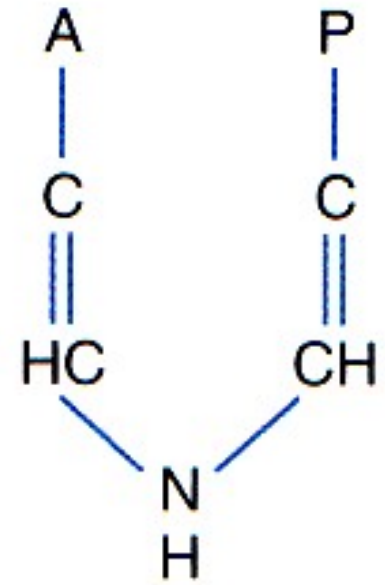
Erythropoietin Regulates RBC Production



G&H 2011 fig 32-4 p 416

Hemoglobin Formation

Citric Acid Cycle

I. 2 succinyl-CoA + 2 glycine → 

(pyrrole)

II. 4 pyrrole → protoporphyrin IX

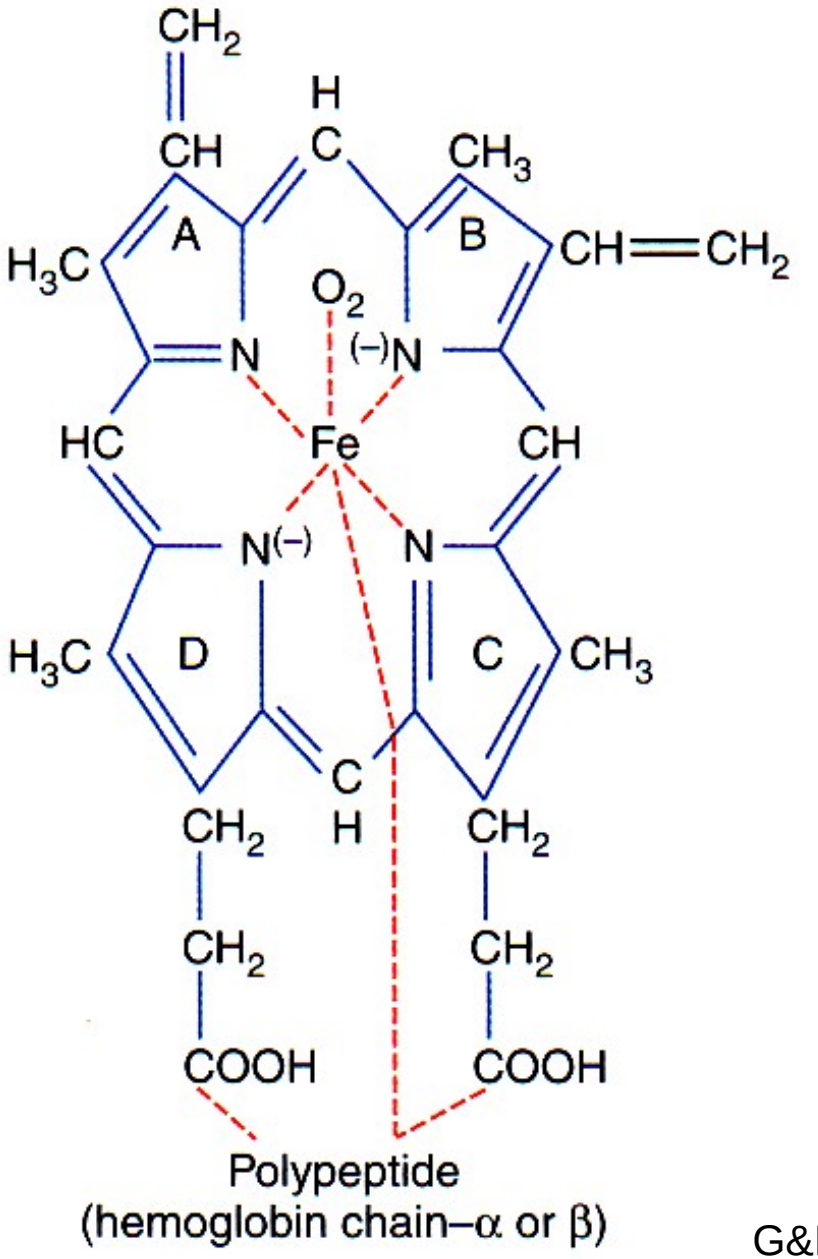
III. protoporphyrin IX + Fe^{++} → heme

IV. heme + polypeptide → hemoglobin chain (α or β)

V. 2 α chains + 2 β chains → hemoglobin A

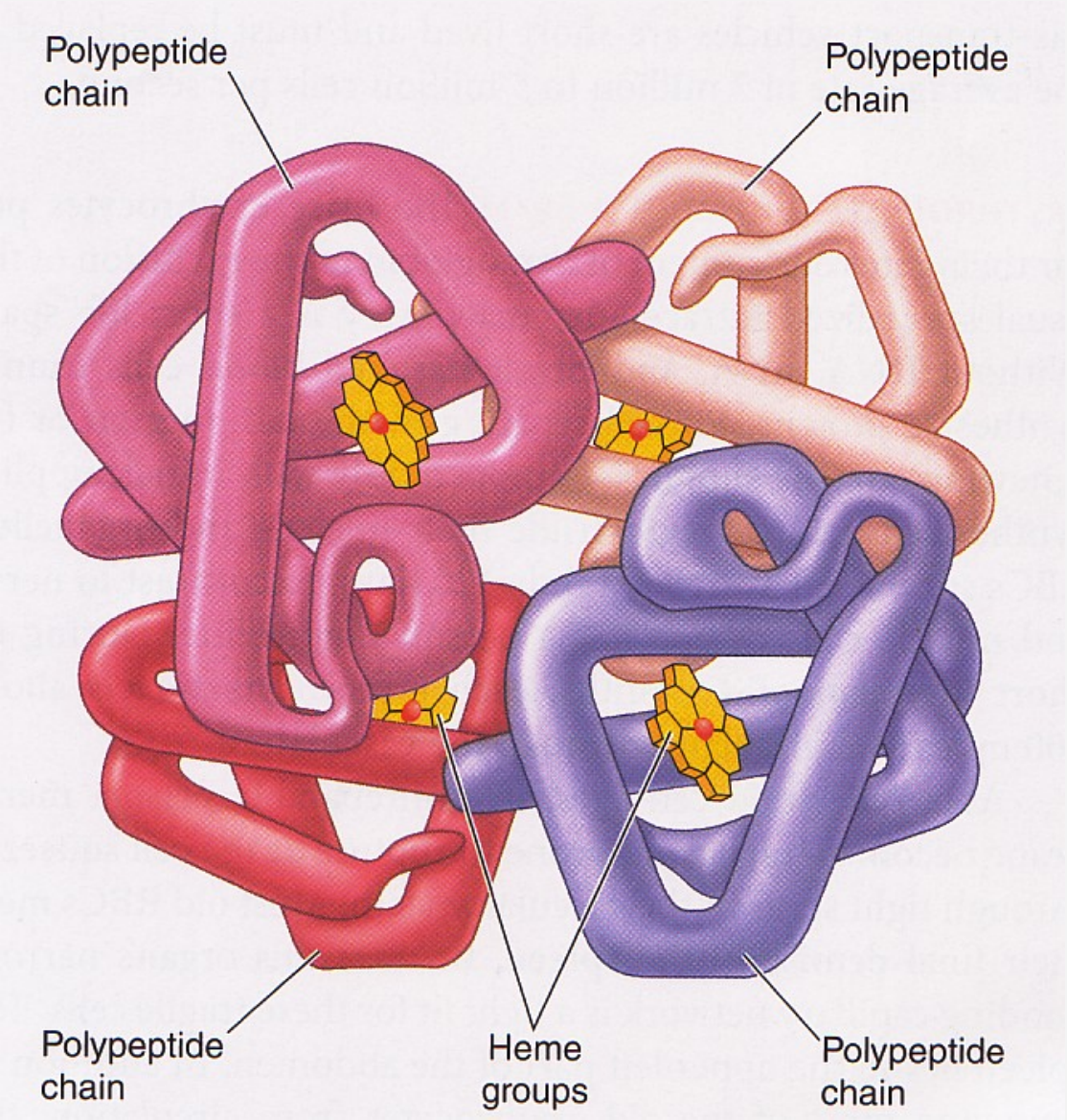
G&H 2011 fig 32-5 p 417

Heme Structure



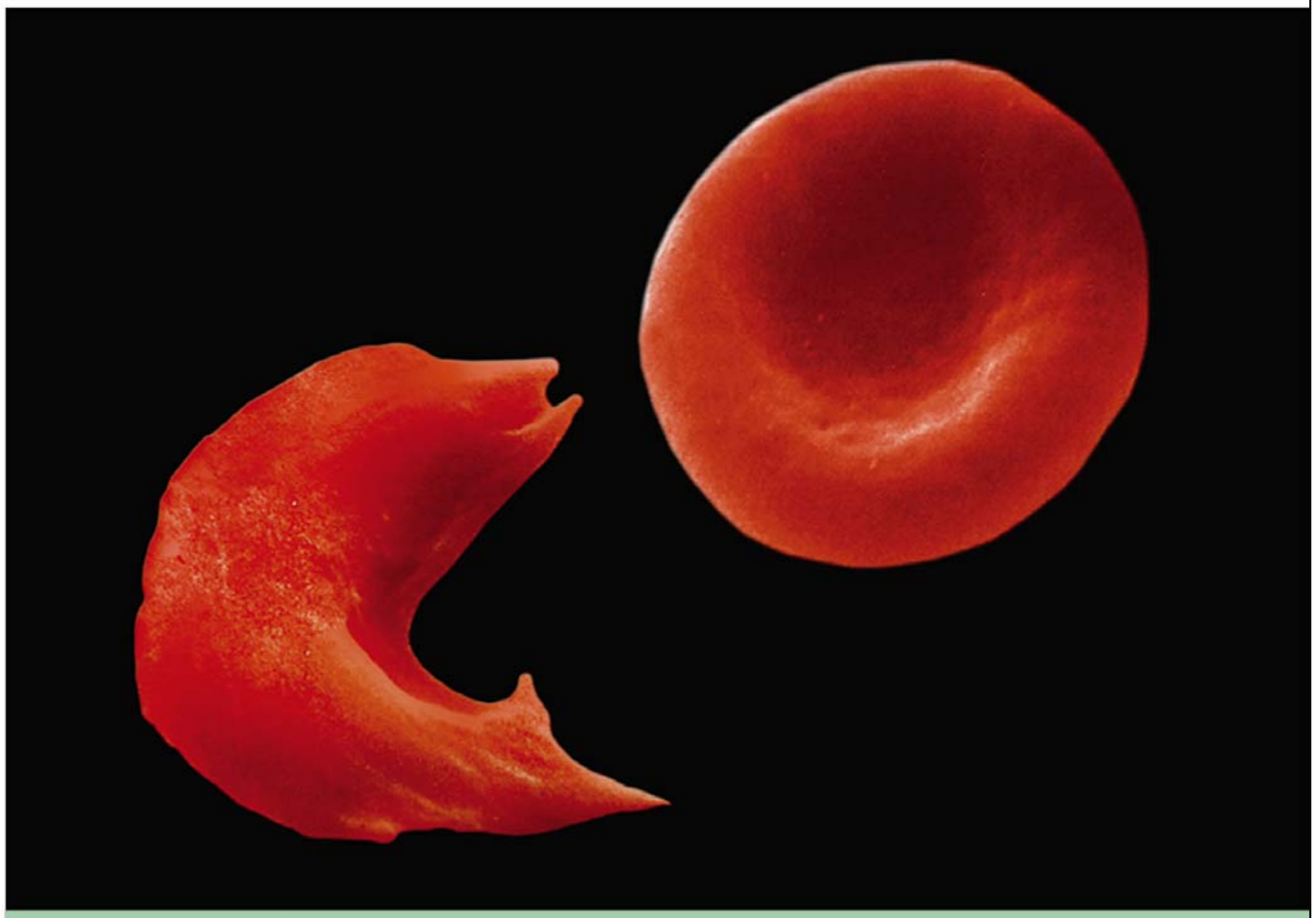
G&H 2011 fig 32-6 p 418

Hemoglobin Structure



L Sherwood 2011 fig 11-2

Sickle-shaped blood cells Normal red blood cells



What a difference one amino acid can make!

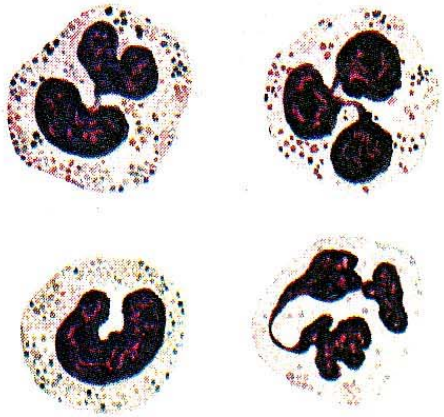
Amino acid sequence of normal hemoglobin:

Val–His–Leu–Thr–Pro–Glu–Glu

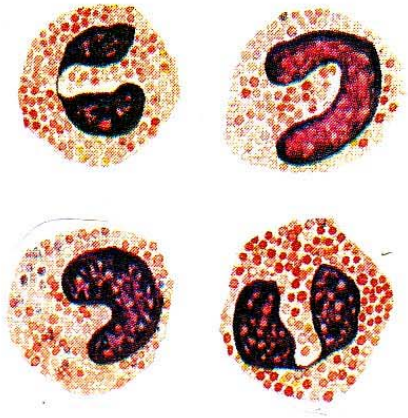
Amino acid sequence of sickle-cell hemoglobin:

Val–His–Leu–Thr–Pro–Val–Glu

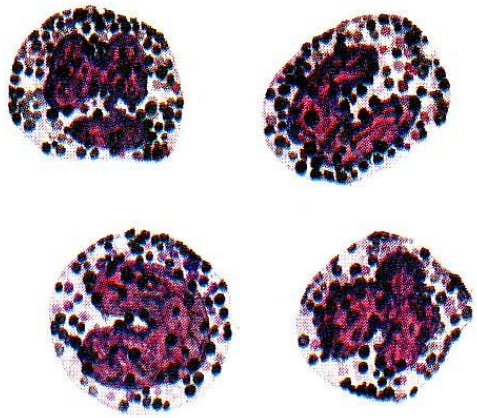
S&W 2011 fig 6-5 p 194



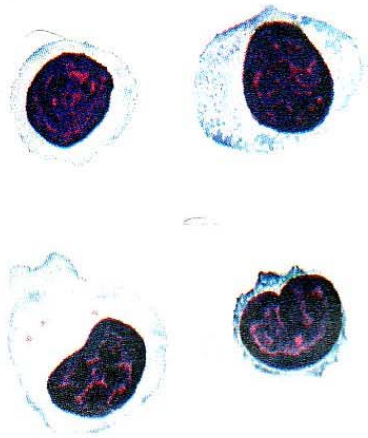
NEUTROPHILS



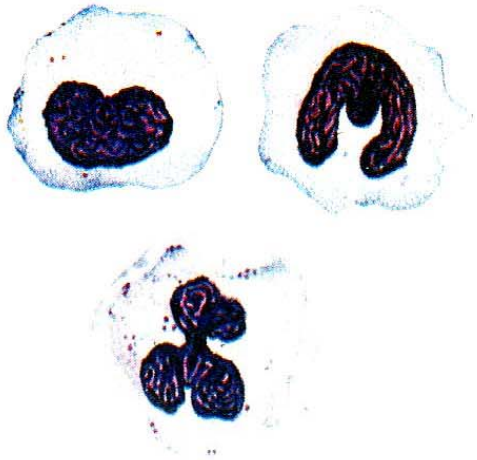
EOSINOPHILS



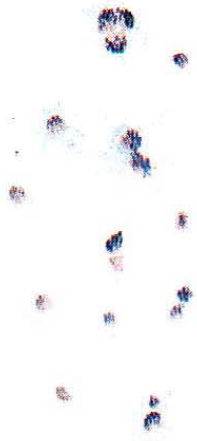
BASOPHILS



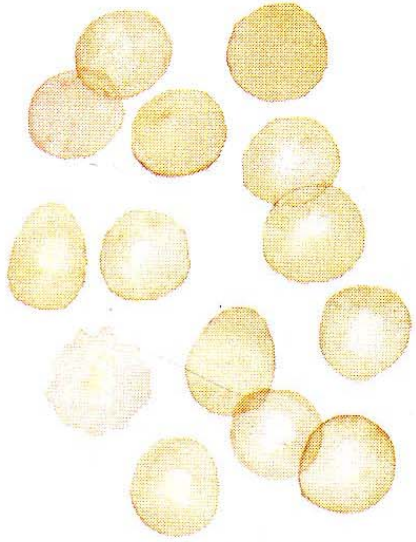
LYMPHOCYTES



MONOCYTES

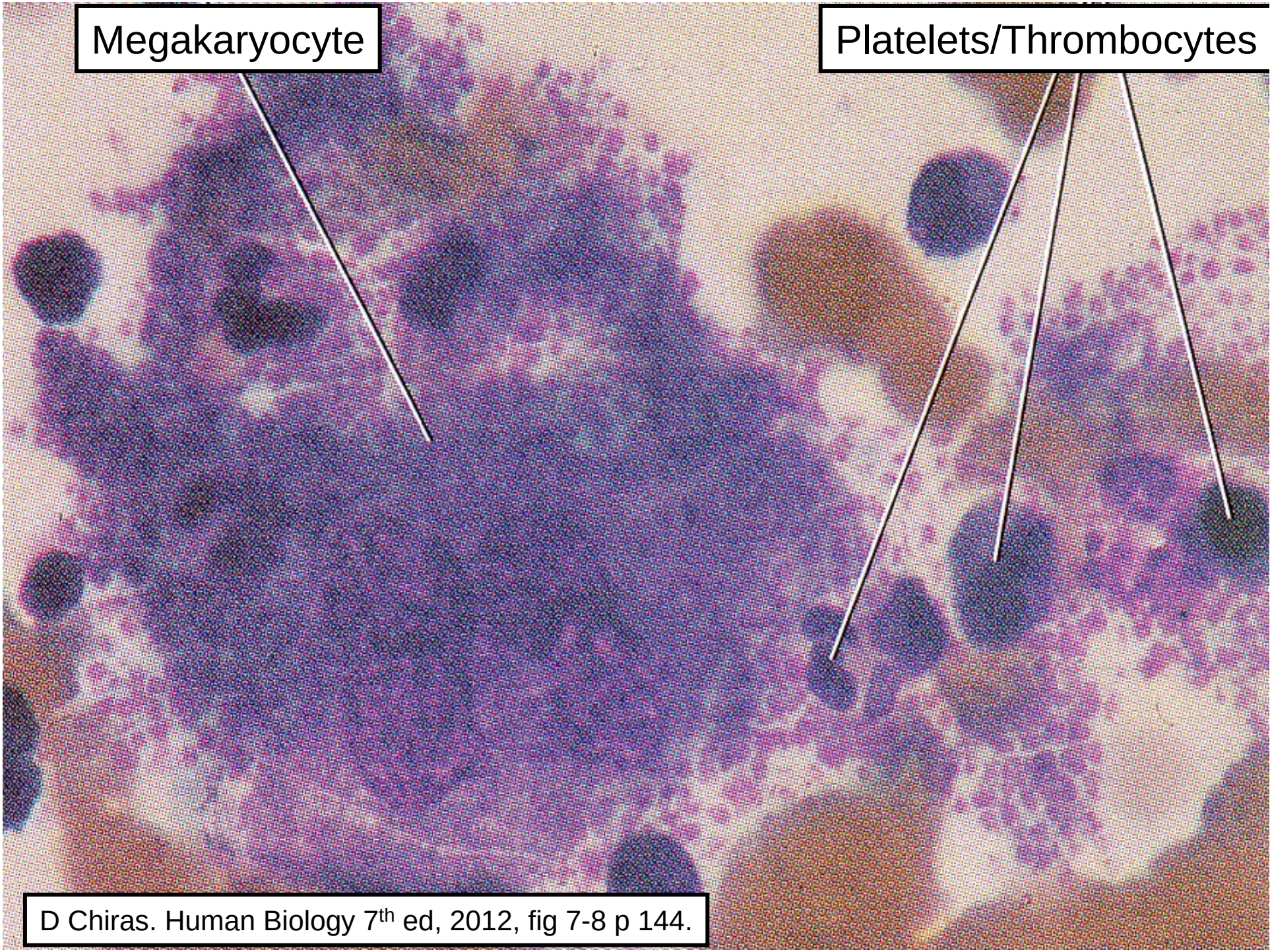


PLATELETS



ERYTHROCYTES

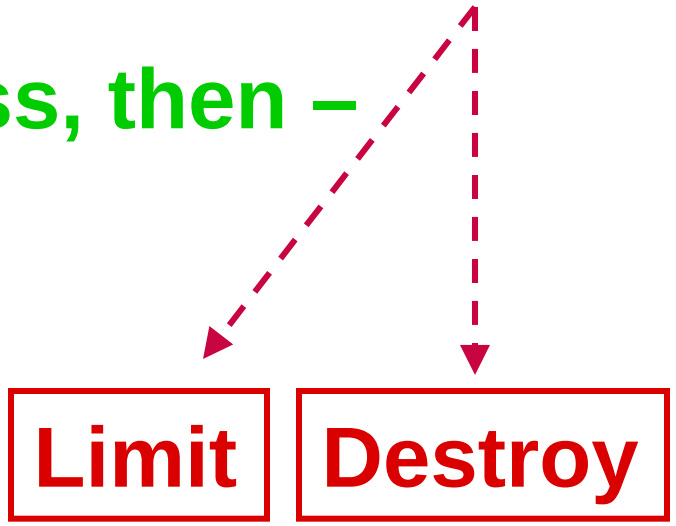
SI Fox 1987 p 376



D Chiras. Human Biology 7th ed, 2012, fig 7-8 p 144.

Immune Response

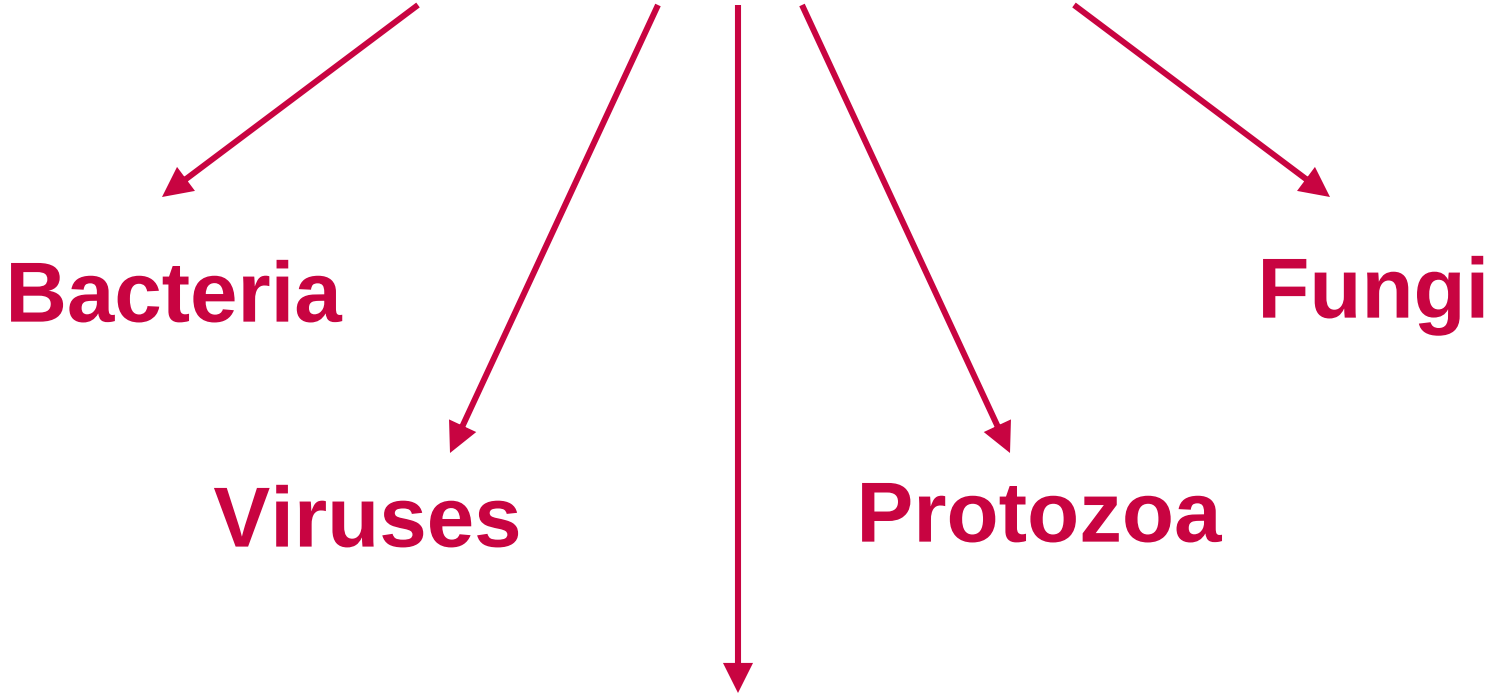
1. **Detect invader or ID toxic product.**
2. **Communicate to network.**
3. **Recruit coordinated, multi-pronged attack.**
4. **Amplify & if yes to success, then –**
5. **Suppress**



Davey 1990 p 6

Pathogen?

Microbes that cause disease!



Davey 1990 p 5

Pathogens & Parasites Cause:

1. **70-80% of deaths in less developed countries**
2. **Tens of millions of deaths due to infectious diseases**
3. **> 20 million childhood deaths per year in Asia, Africa & Latin America due to diarrheal infections alone**
4. **Yet < 2% deaths in modern, industrialized countries!**

Davey 1990 p 5

World Health Organization 2011 Statistics +
http://www.who.int/whosis/whostat/2011/en/index.html
http://www.who.int/bulletin/volumes/86/9/07-050054.pdf

Why such striking differences across the world?

1. **Poor sanitation**
2. **Contaminated water supply**
3. **Contaminated food supply**
4. **Malnutrition**
5. **Existing infections**
6. **Patchy, inadequately-funded vaccinations**
7. **AIDS superimposed on top of 1-6!**

Davey 1990 p 5

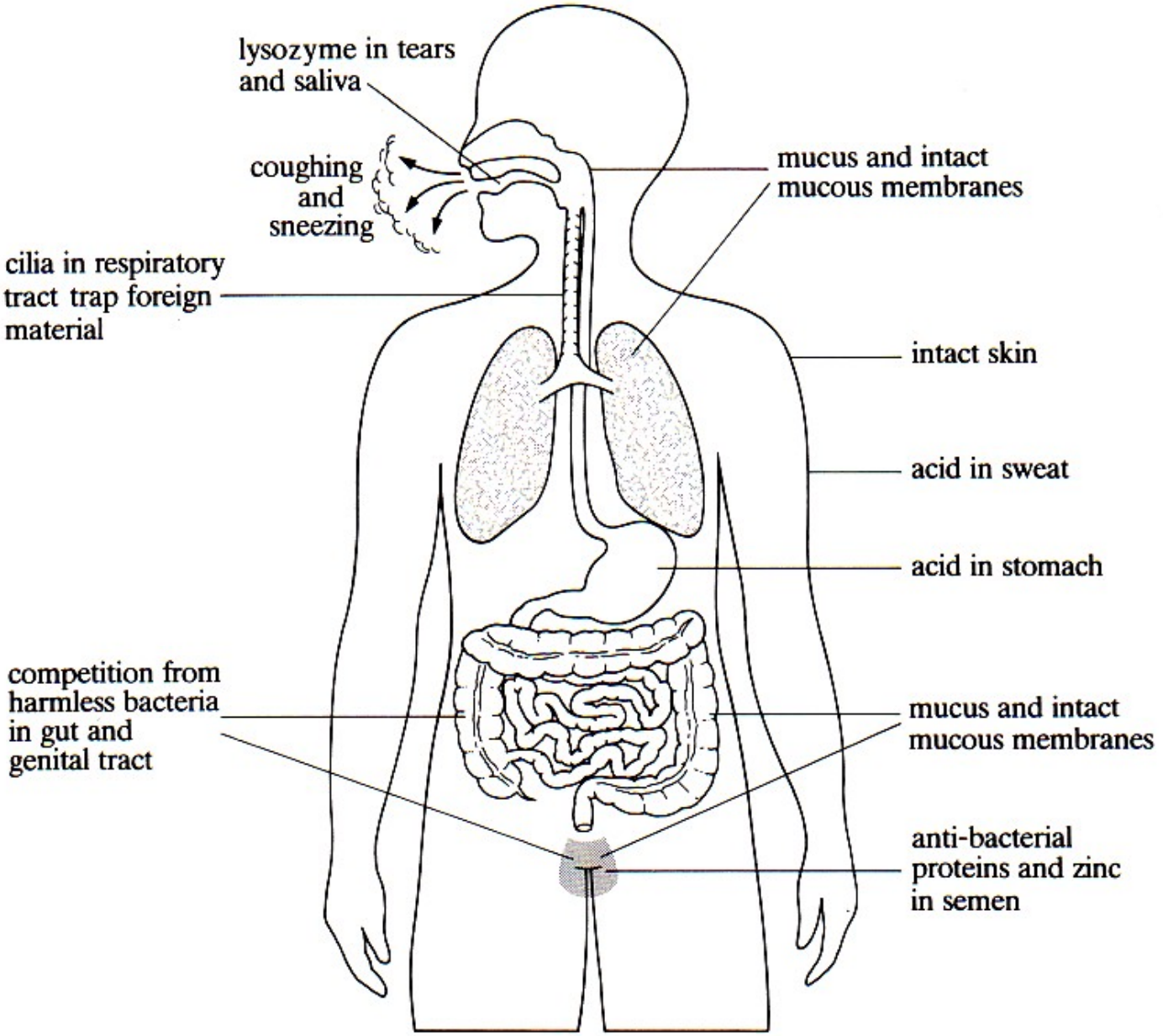
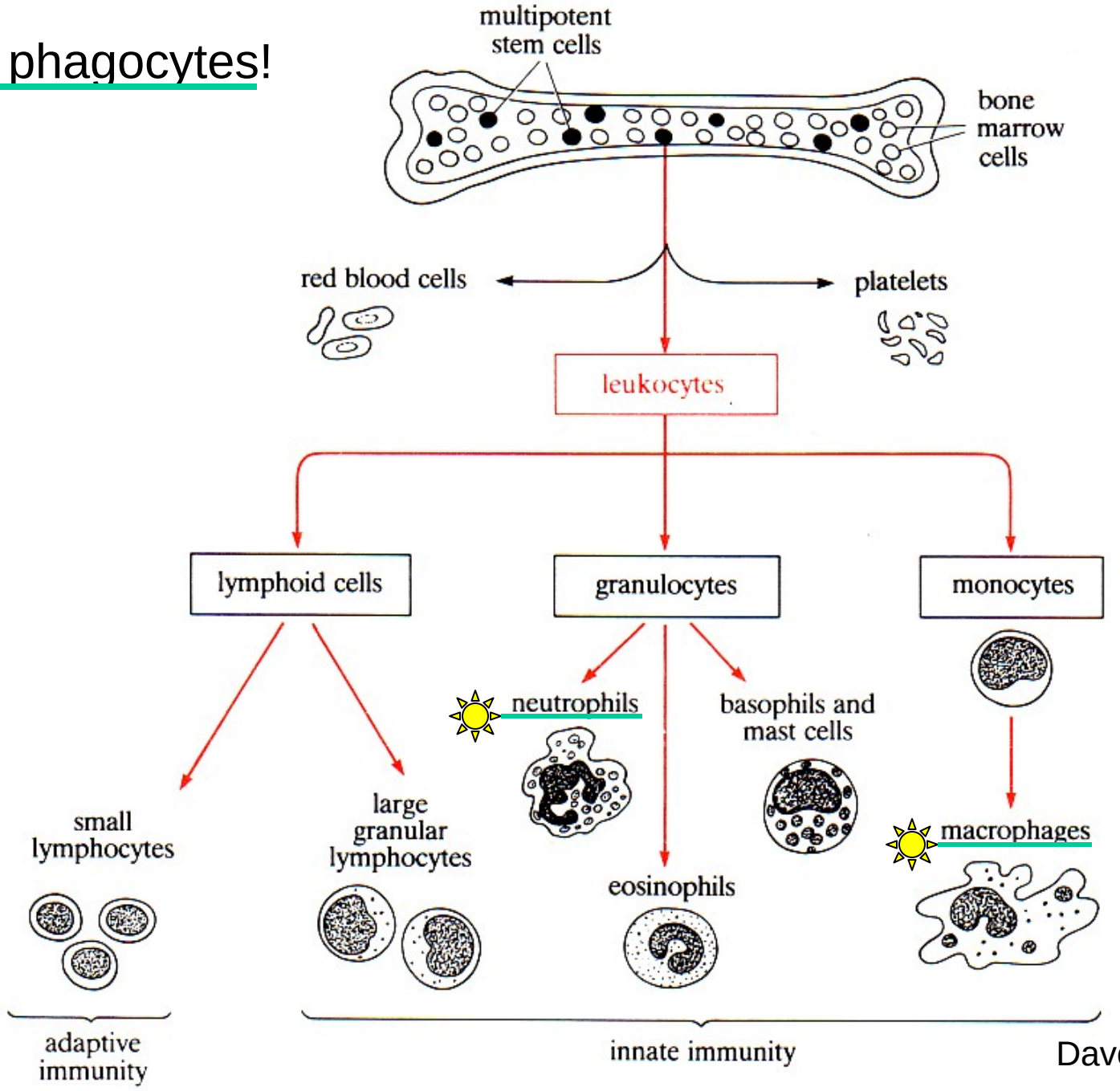


FIGURE 2.1 Summary of the main physical, chemical and mechanical barriers to infection entering the human body.

Davey 1990 p 12

Good phagocytes!



Davey 1990 p 13

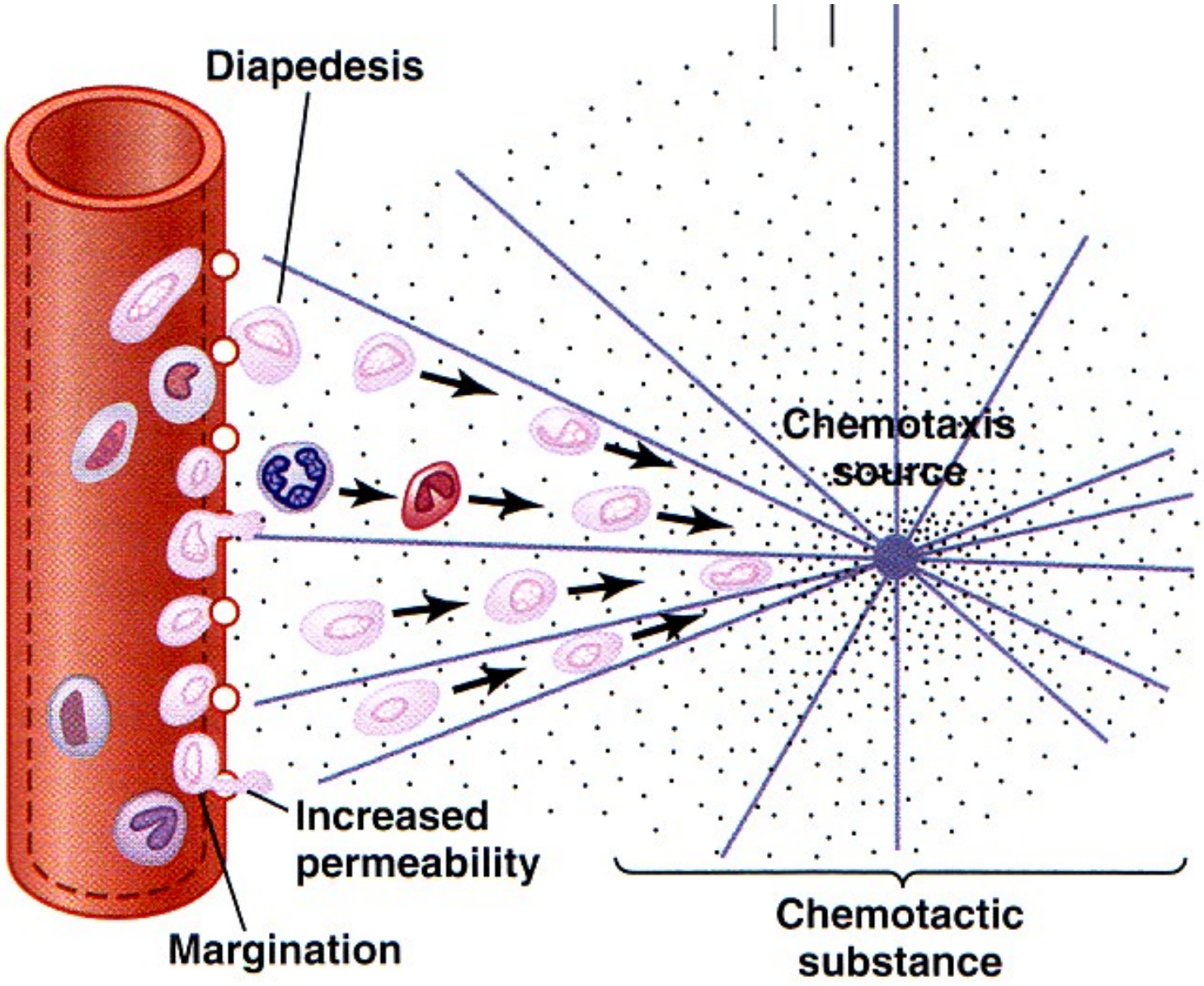
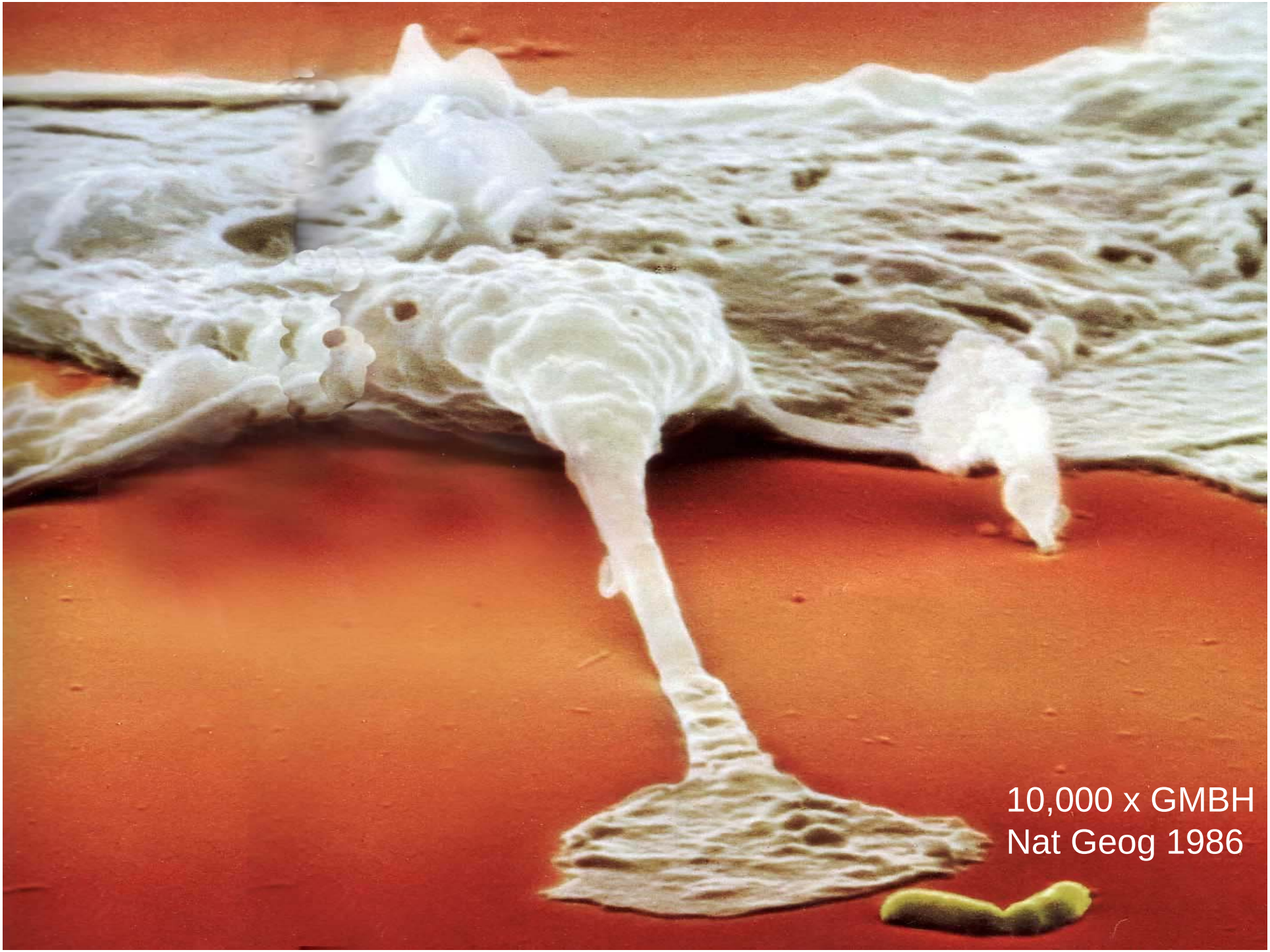
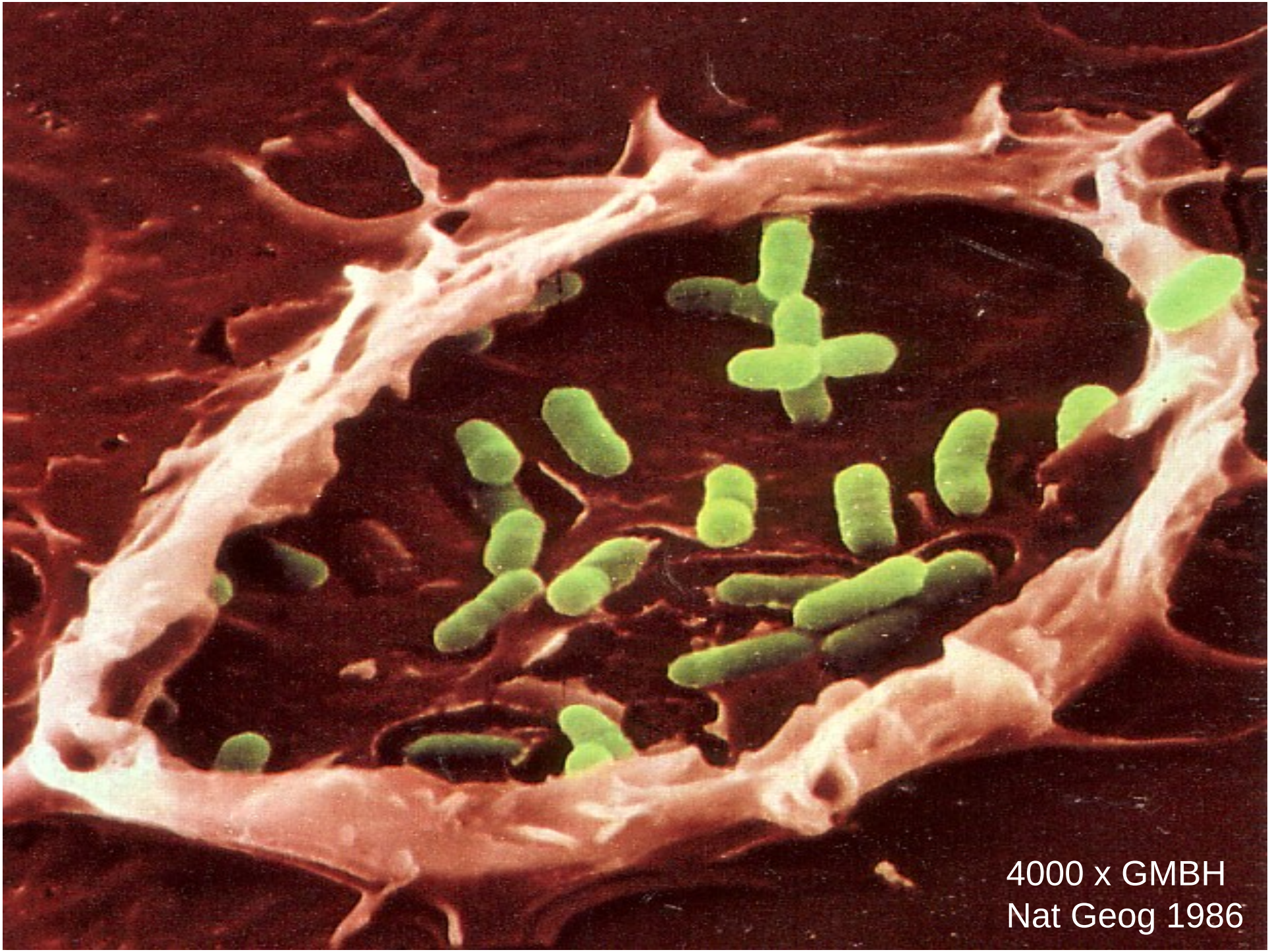
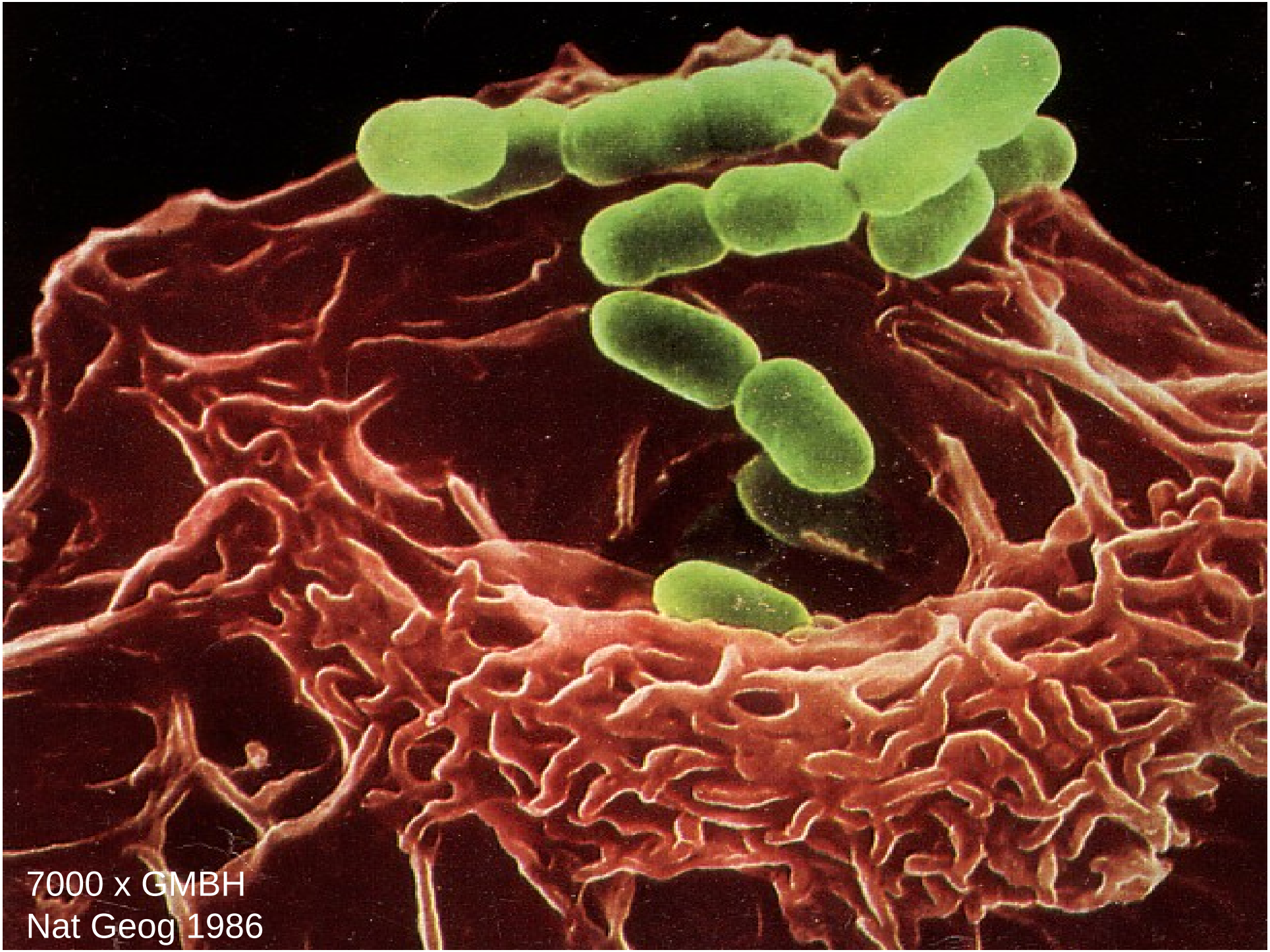
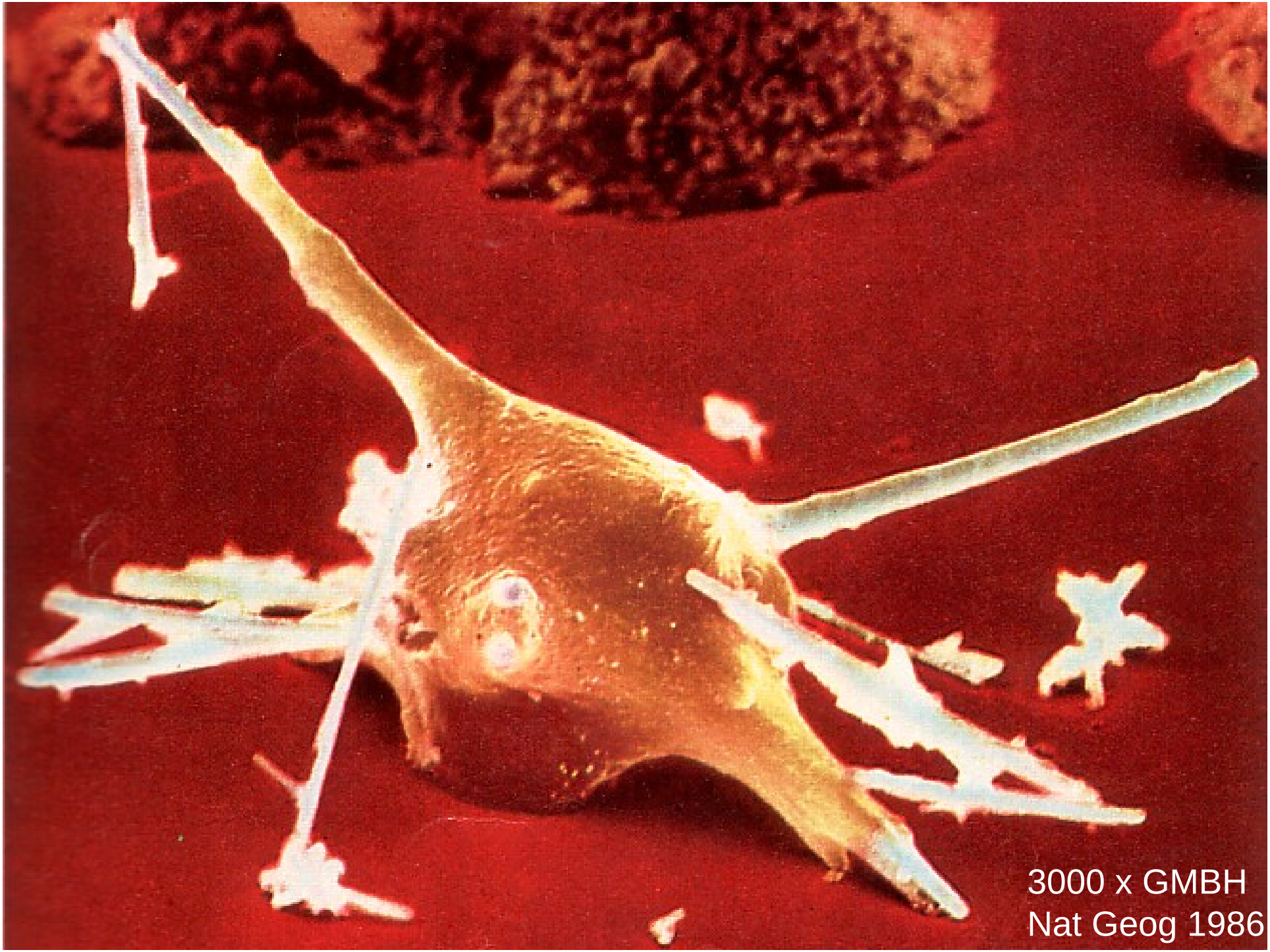


Figure 33-2 Movement of neutrophils by *diapedesis* through capillary pores and by *chemotaxis* toward an area of tissue damage. G&H 2011

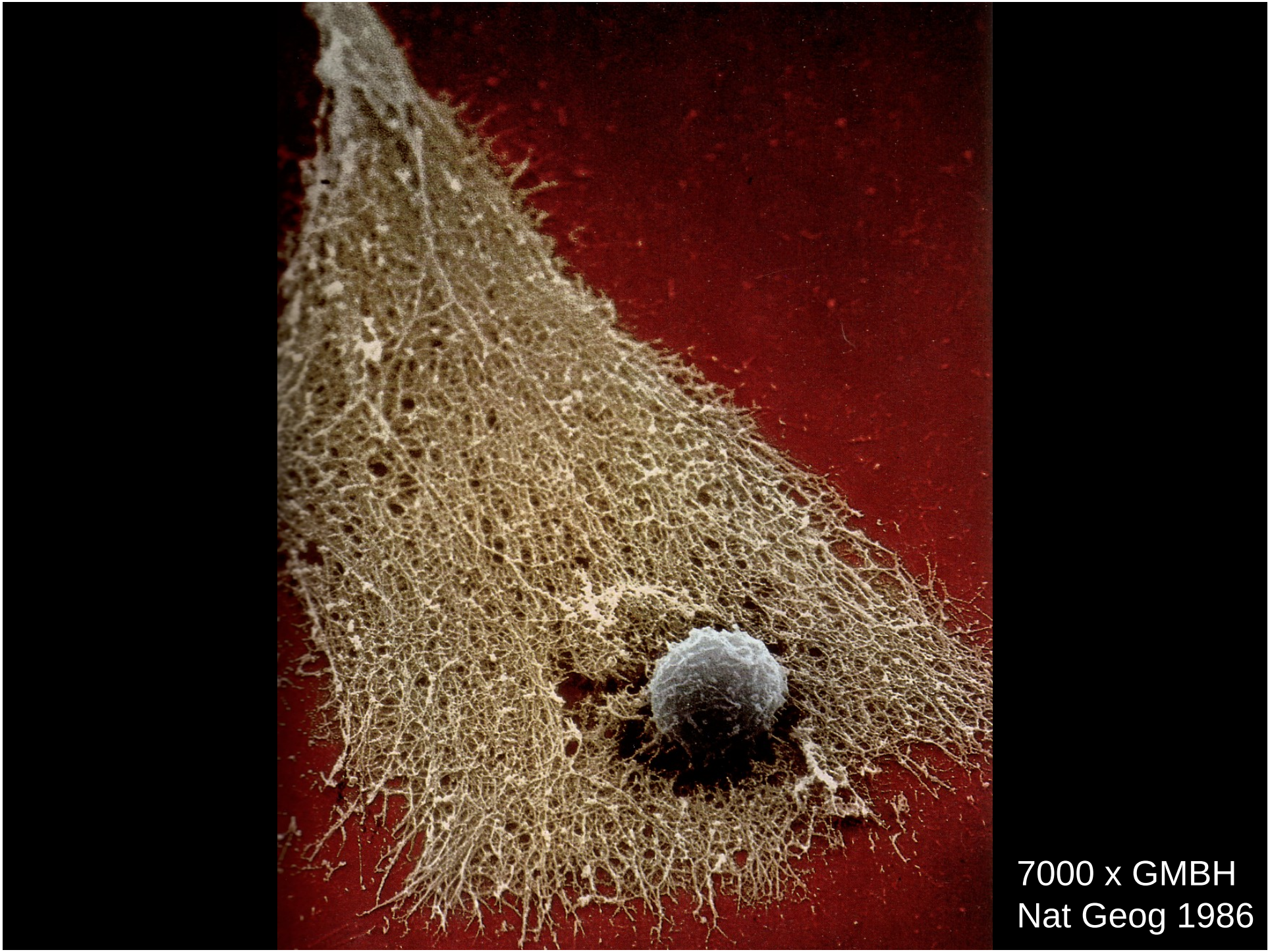

10,000 x GMBH
Nat Geog 1986


4000 x GMBH
Nat Geog 1986


7000 x GMBH
Nat Geog 1986


3000 x GMBH
Nat Geog 1986

10,000 x GMBH
Nat Geog 1986


7000 x GMBH
Nat Geog 1986

Hand-washing

The right way to wash your hands:

Thoroughly wash with soap and warm running water — rubbing your hands together for at least 10 seconds.

Hand-washing is the single most effective thing you can do to reduce the spread of colds and other infectious disease.

It's not necessary to use anti-bacterial soaps when washing up. Regular soap and water do the job just fine.

Also, using germicidal soaps too often may produce antibiotic-resistant bacteria.

Source: Hospital Infections Program, U.S. Centers for Disease Control and Prevention

***NB*: Happy Birthday Song 20-30 sec!!!**

http://www.squidsoap.com/