

Types of Lipids

- Triglycerides
- Waxes
- Phospholipids
- Sterols

Triglycerides

- Fats and oils used for long-term energy storage
 - 38 KJ of energy per gram (2X carbs)
 - Slower to build up and break down than carbs



Fat

Figure 3-12a Biology: Life on Earth, 8/e
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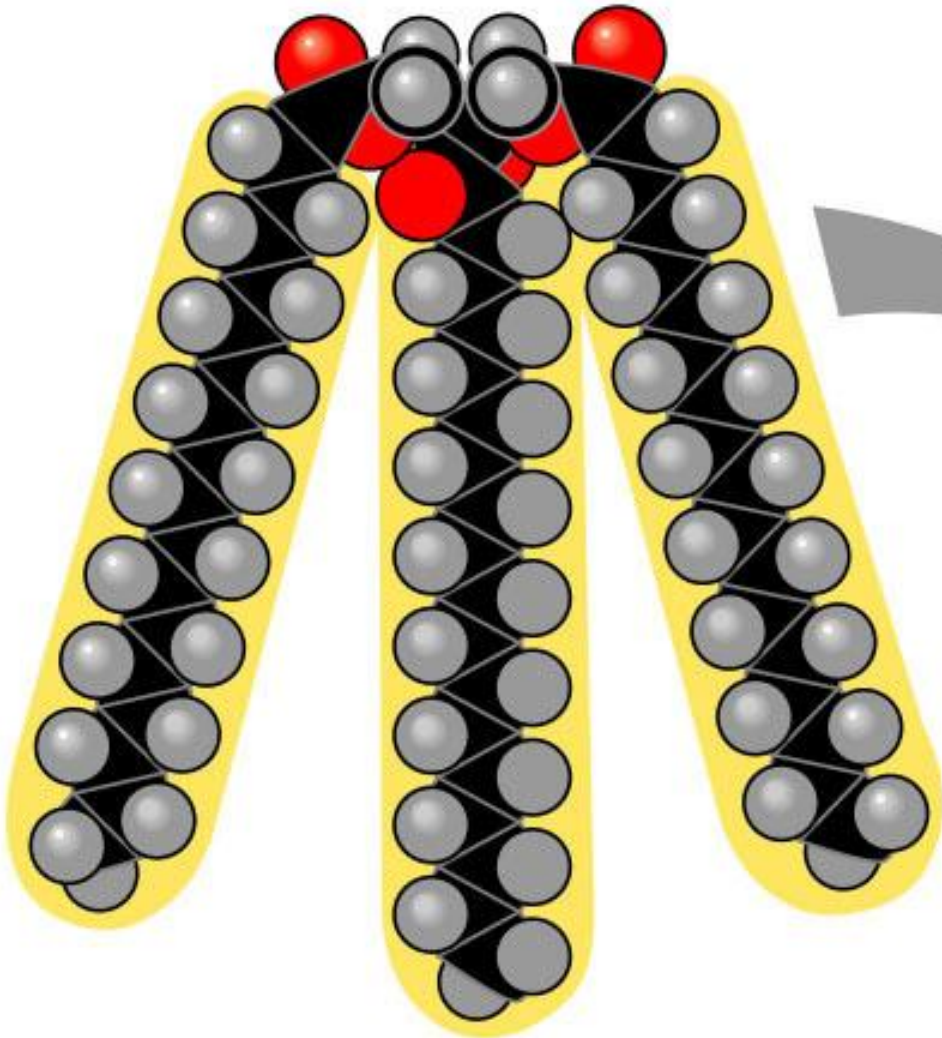




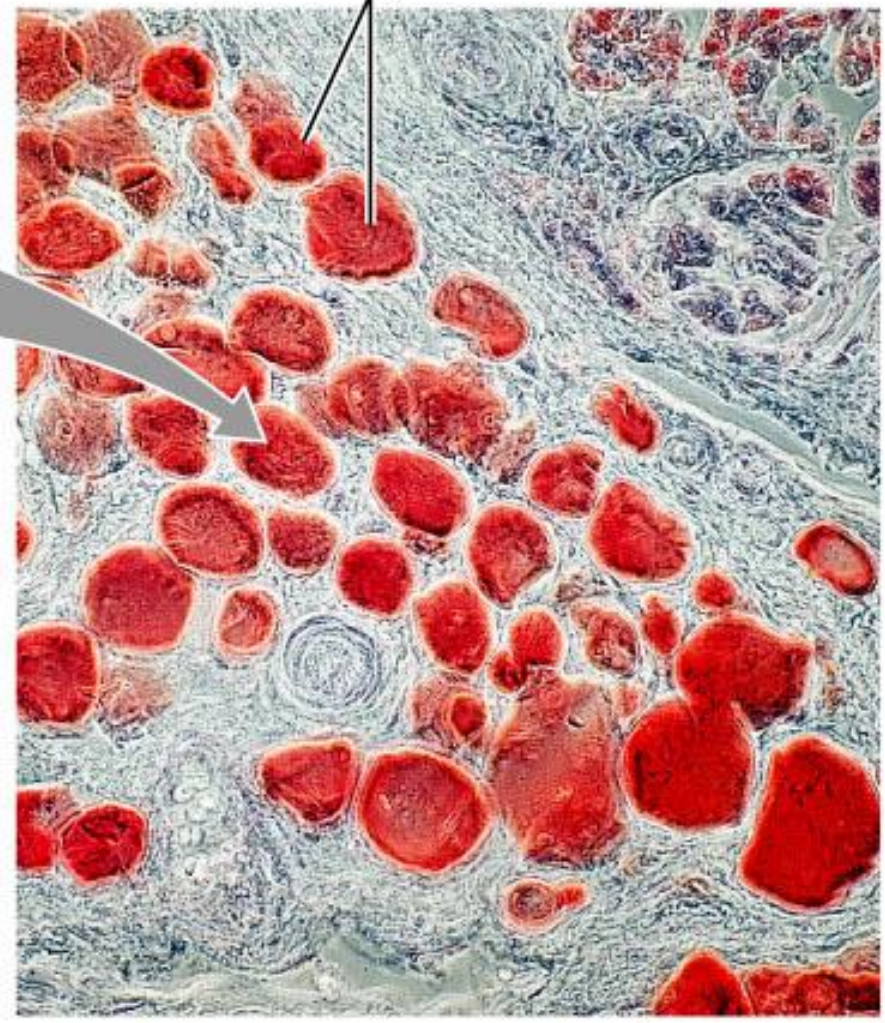








Fat droplets (stained red)



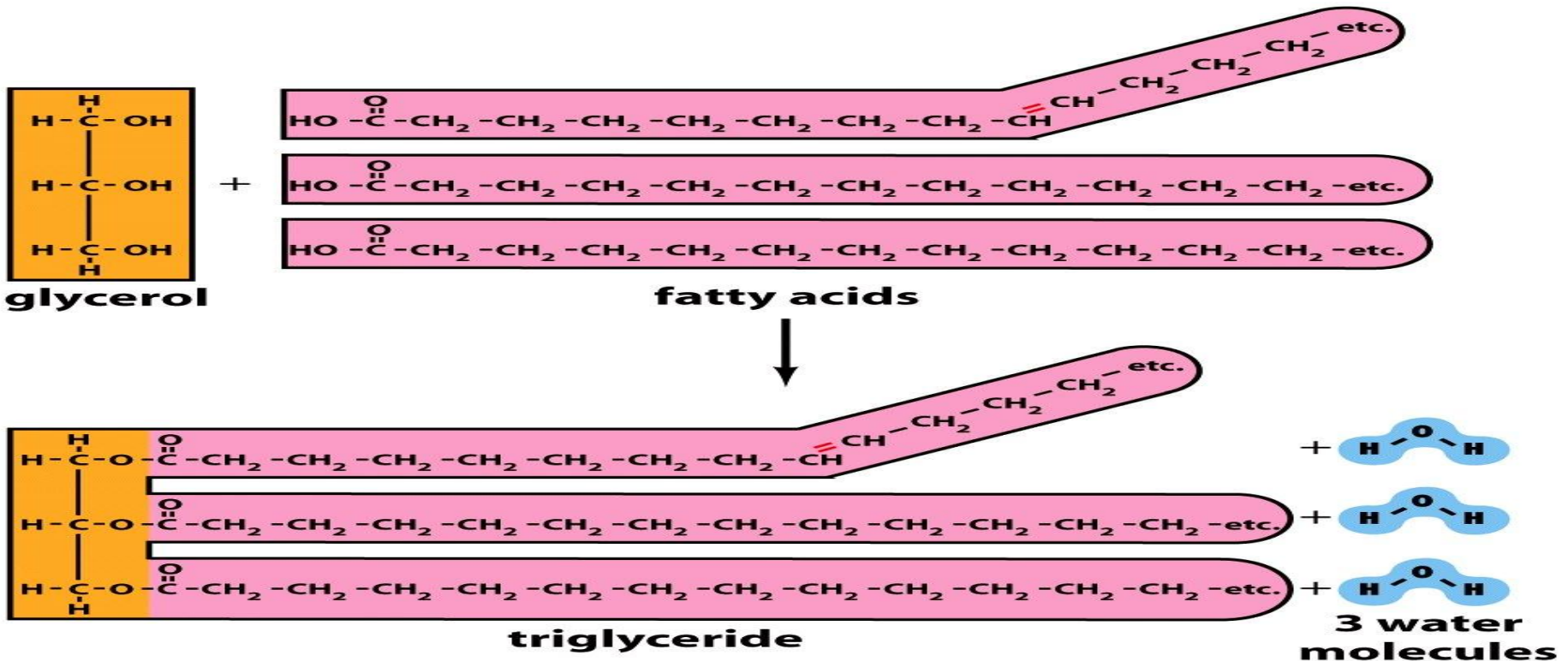
100 μm

(a) A fat molecule

(b) Mammalian adipose cells

Triglycerides

- Formed by condensation reactions
 - 3 fatty acids + glycerol → triglyceride



A fatty acid is a long chain of mostly carbon and hydrogen atoms with a COOH group (“carboxyl”) at one end.

Fatty Acid Structure

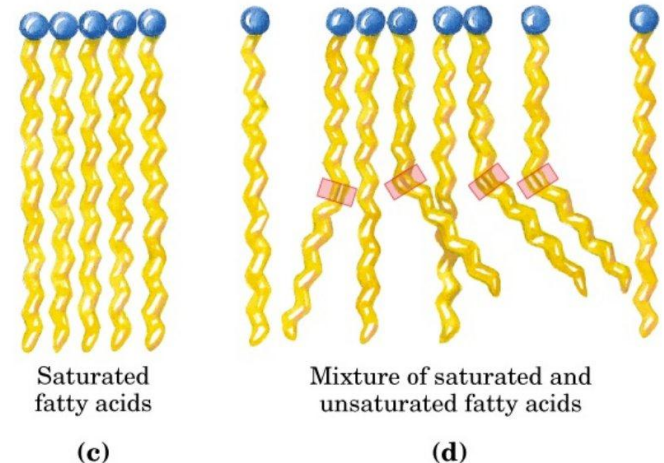
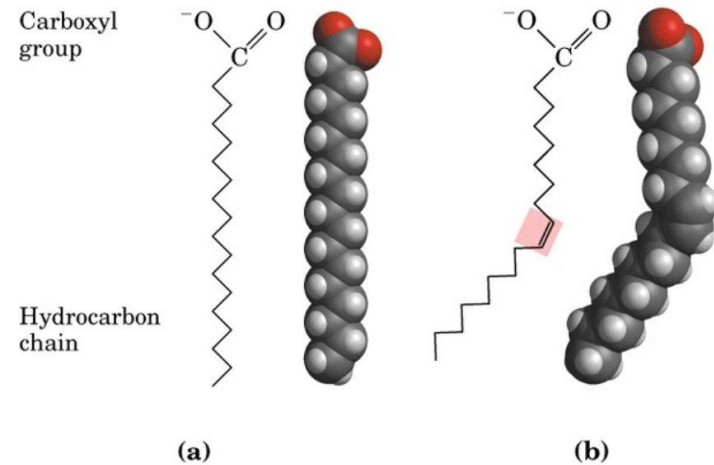
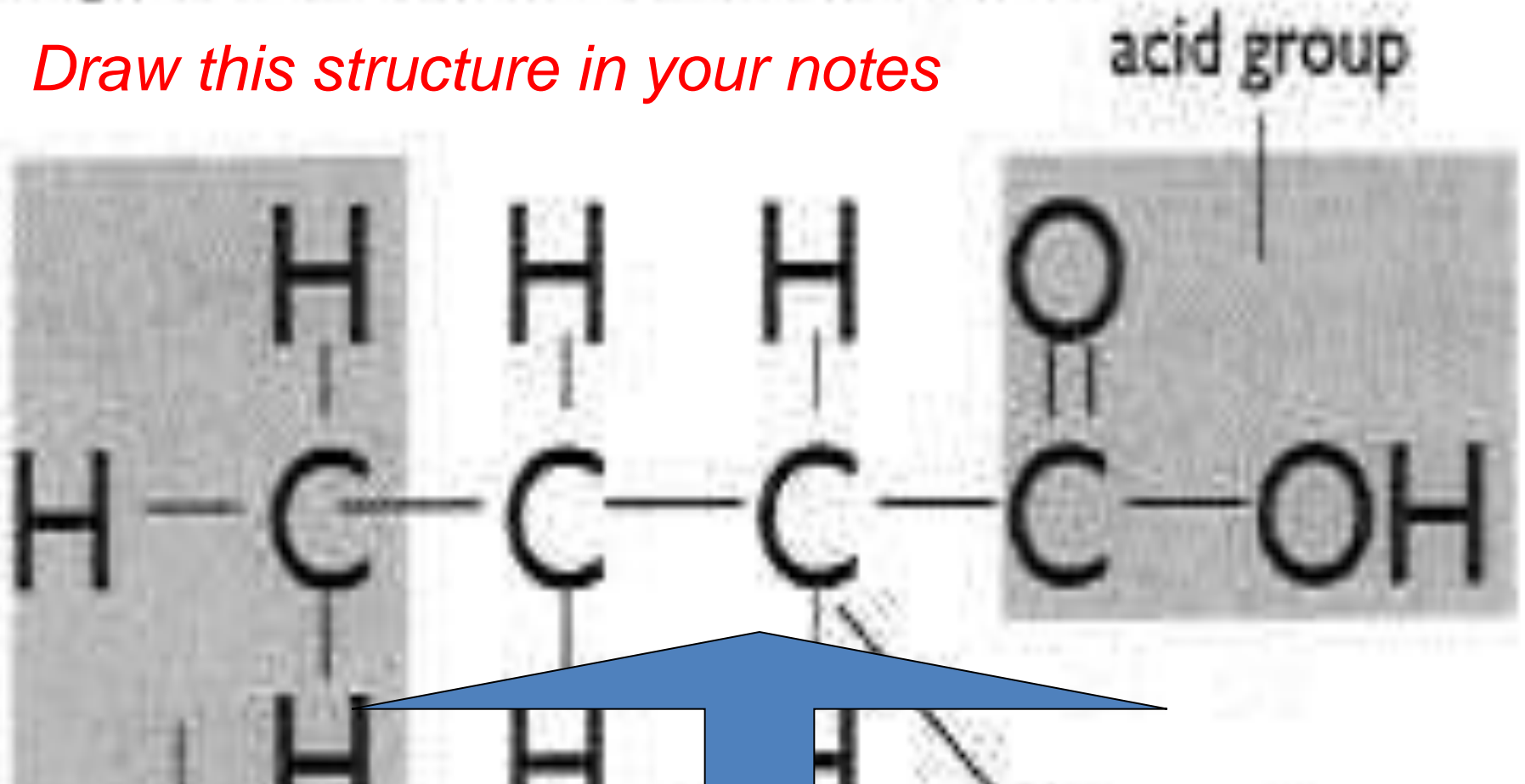


Figure 2. Structure of a fatty acid

Draw this structure in your notes



The hydrocarbon chain can vary in length ...
from 4 to about 24 carbons long,
depending on the type of fatty acid.

(in humans, 16 and 18 are the most common)

BILL

Draw a 4 carbon fatty acid

Highlight and label the carboxyl group

Highlight and label the methyl group

Try to do this without looking in your notes.

CHALLENGE:

Draw the skeleton structure:

(don't show C's and H's)

Build a 4 carbon fatty acid



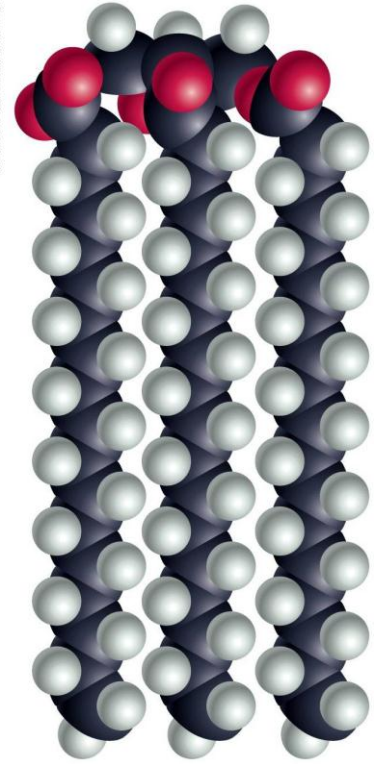
Stamp when complete

Think...pair...share

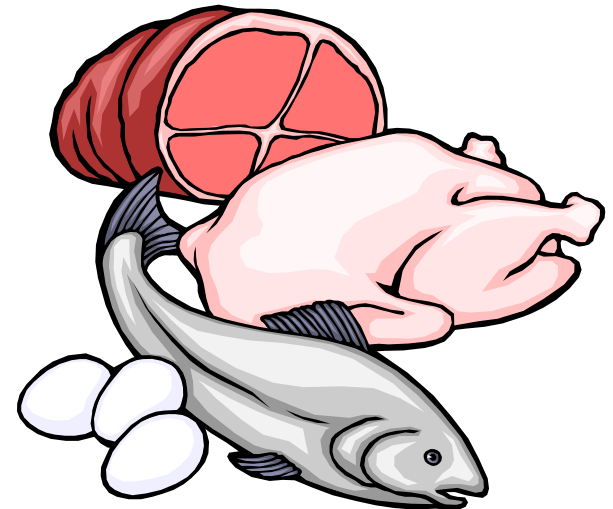
SATURATED VS. UNSATURATED

Saturated Fatty Acid

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- Have mostly single C-C bonds in the fatty acid chains
- Are typically solid at room temperature
- Are often from animal sources

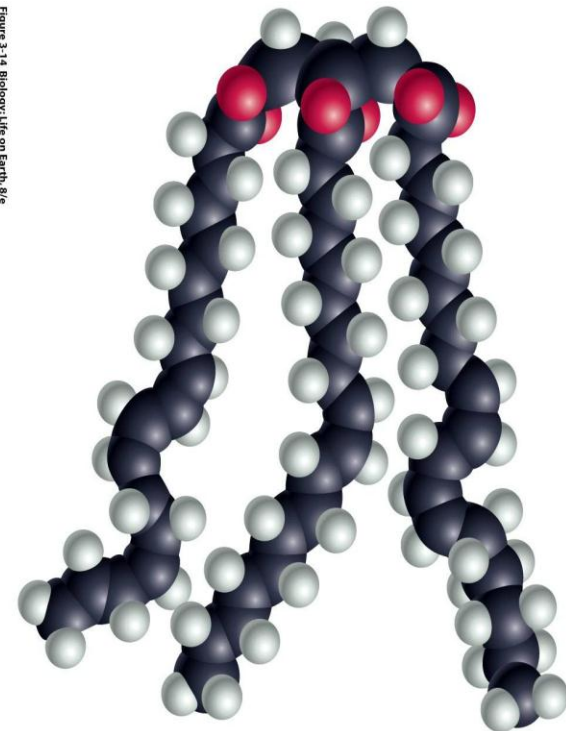


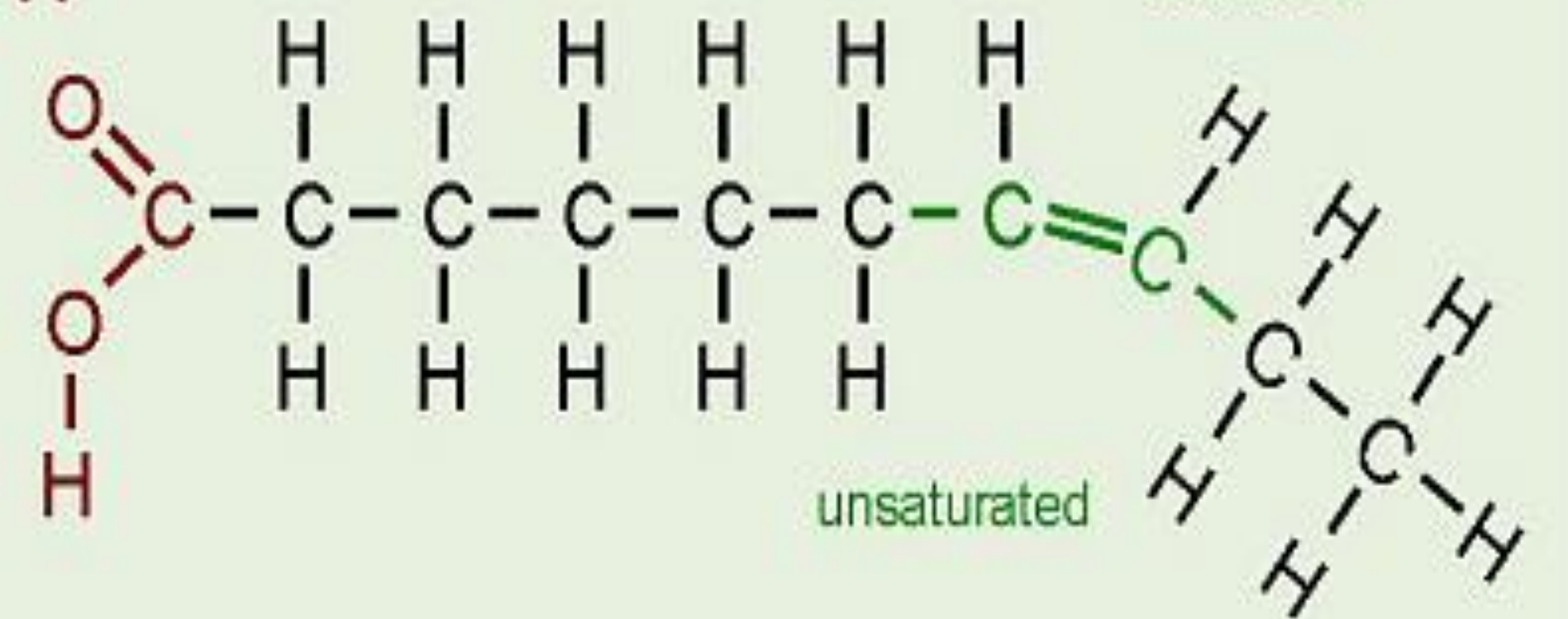
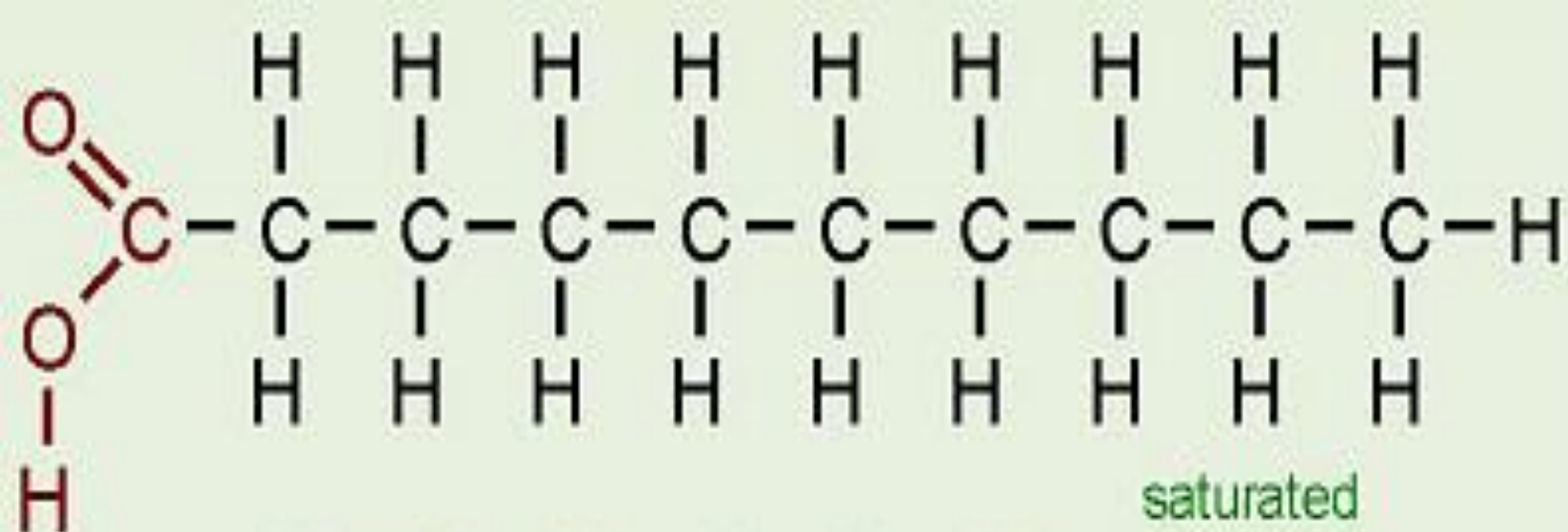
Unsaturated Fatty Acids

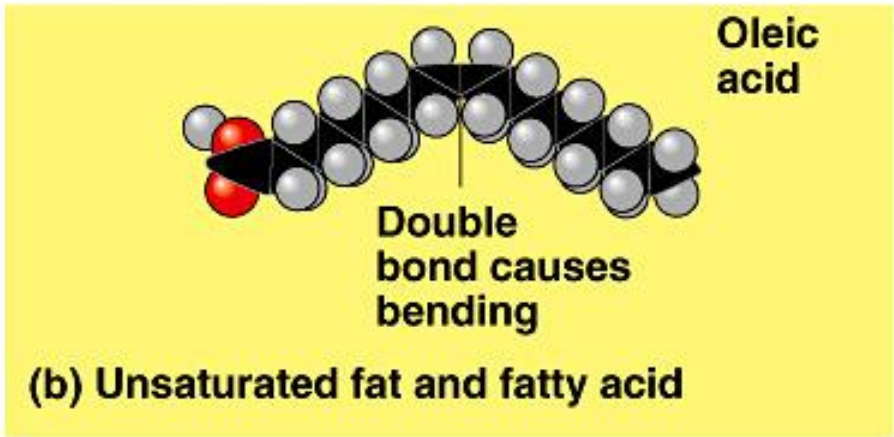
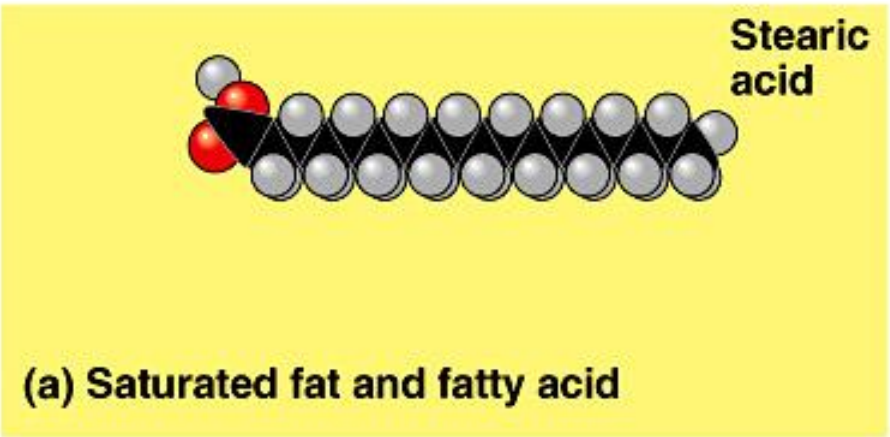
- Have one or more C=C double bond in the fatty acid chain
- Are typically liquid at room temperature, because kinks in the tails prevent tight packing
- Are often from plant sources



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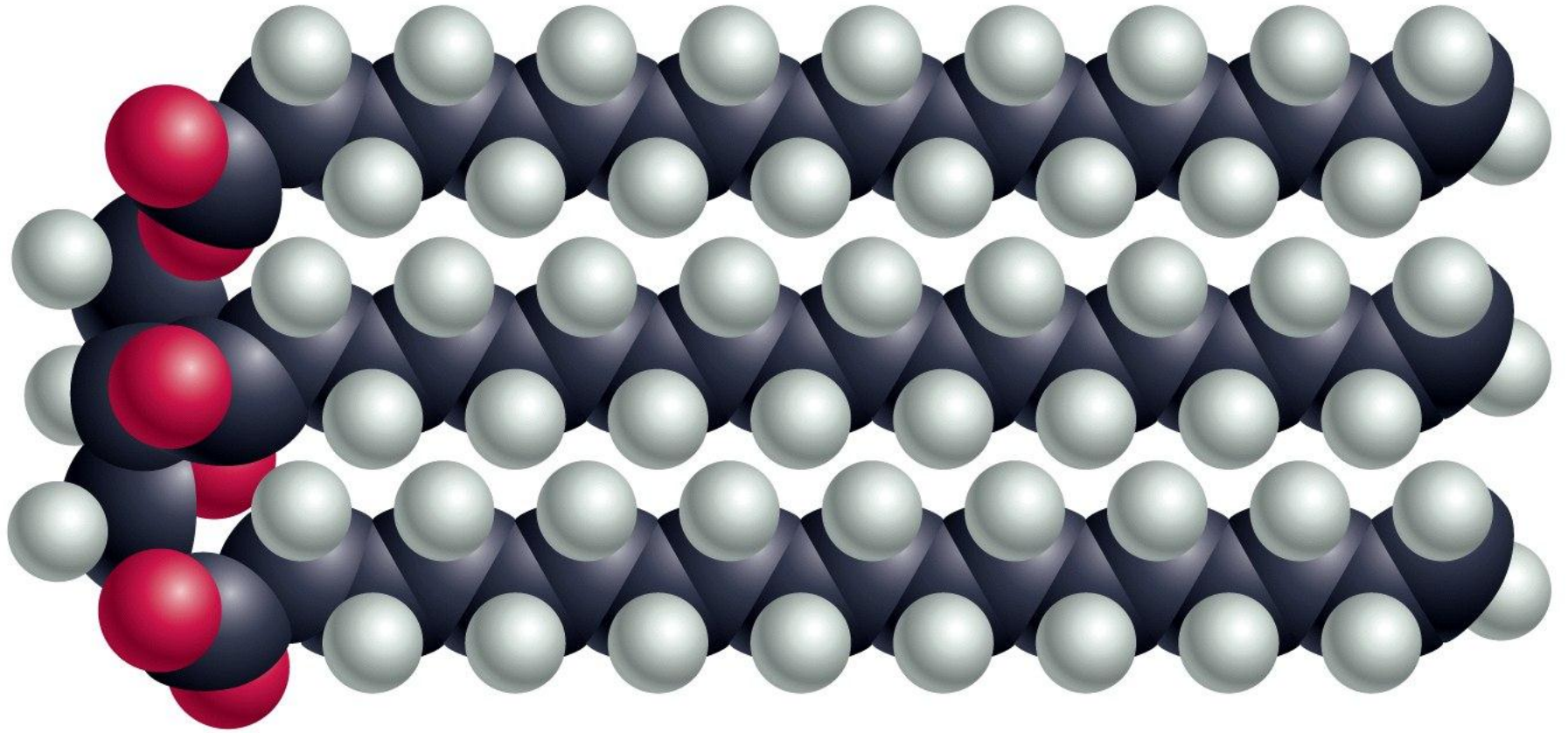


Figure 3-13 *Biology: Life on Earth, 8/e*
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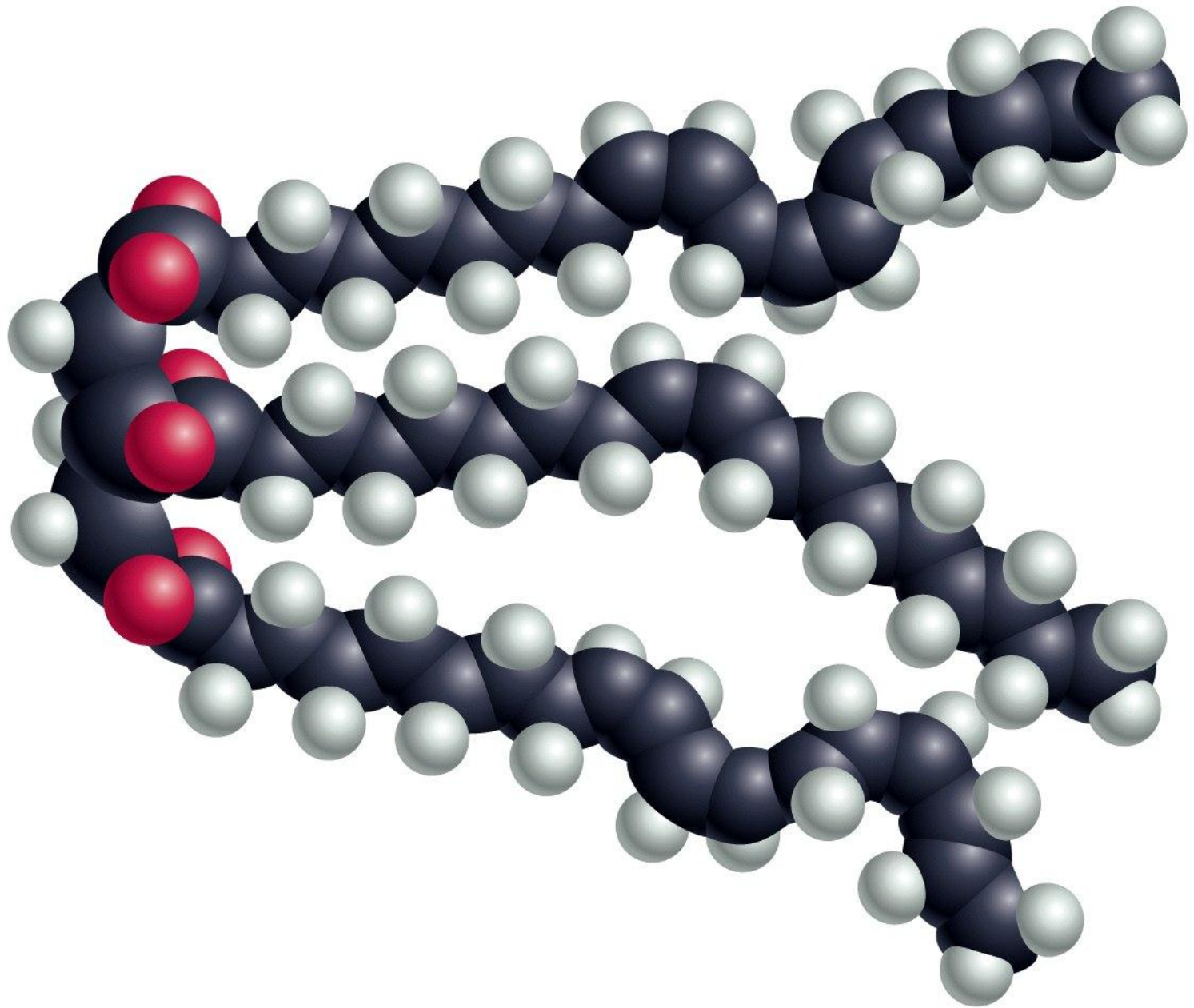


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Peanut-butter can separate!

Is this peanut butter made up of more saturated or unsaturated fats? How can you tell?

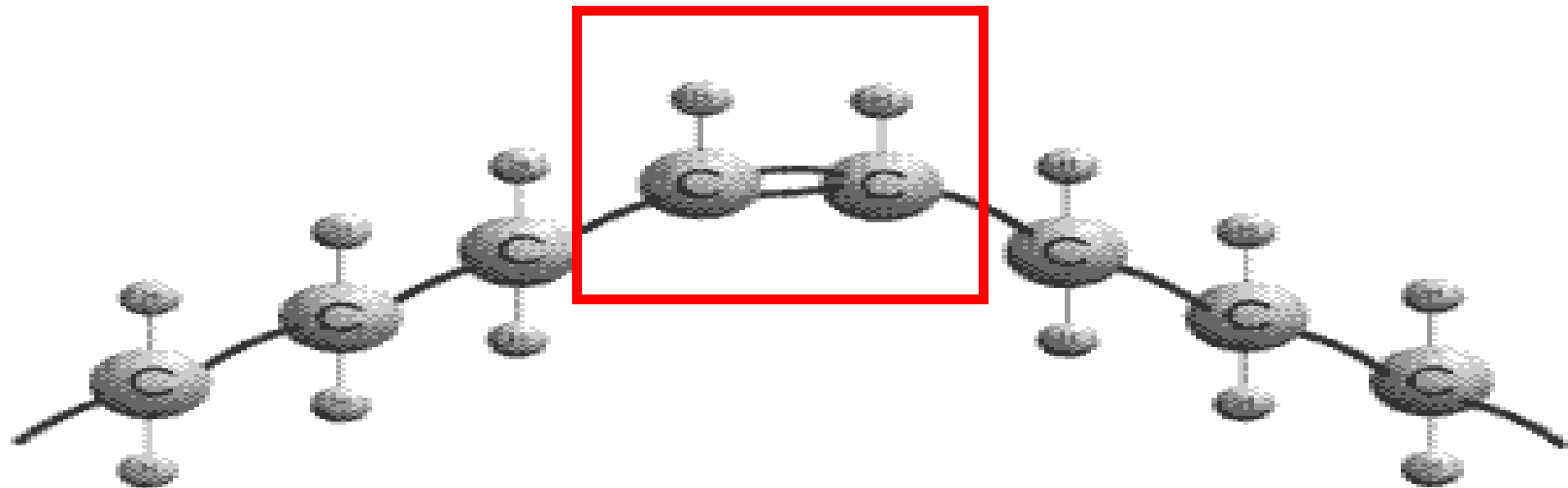


BILL

**Create a t-chart
comparing saturated
and unsaturated fatty
acids.**

Cis-unsaturated fatty acids

- Naturally occurring
- ***Cis*** is a Latin word meaning "on the same side"
- Causes a kink in the fatty acid chain



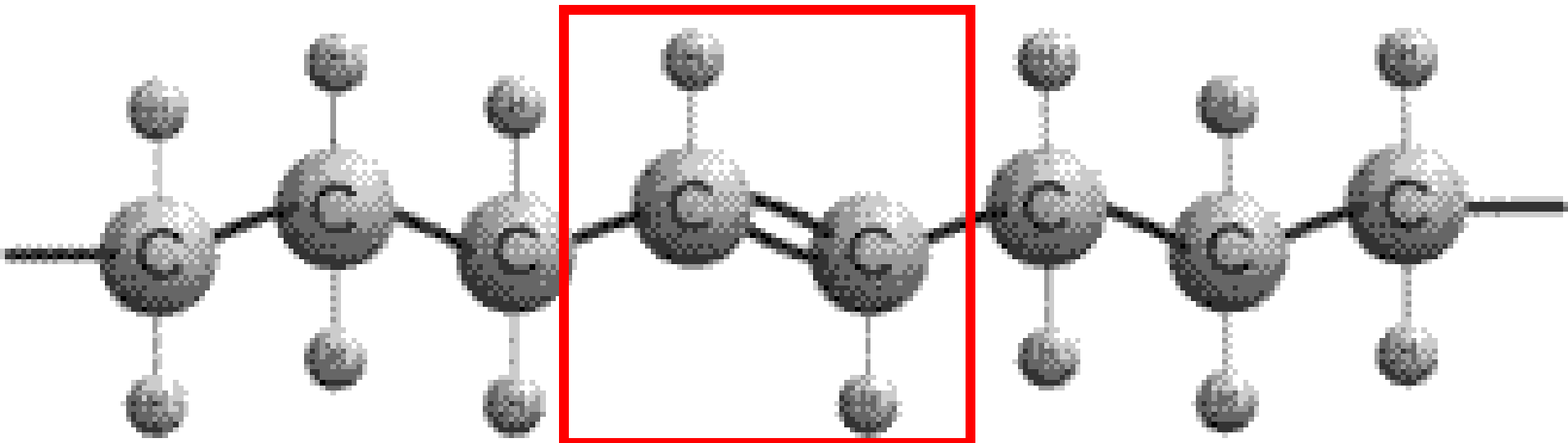
BILL

- 1. Draw a 4 carbon cis-unsaturated fatty acid**
- 2. Highlight and label the “cis” portion of the molecule.**

Try to do this without looking in your notes.

Trans-unsaturated fatty acids

- Are not found in nature and are the result of human processing
- **Trans** is a Latin word meaning "across", "on the opposite side"
- Causes a straight(er) fatty acid chain (even though it is unsaturated)



BILL

- 1. Draw a 4 carbon trans-unsaturated fatty acid**
- 2. Highlight and label the “trans” portion of the molecule.**

Try to do this without looking in your notes.

With a partner, build a triglyceride with:

1 saturated fatty acid

1 cis-unsaturated fatty acid

1 trans-unsaturated fatty acid

Stamp when complete

BILL

List the four major classes of lipid molecules.

What elements do lipids contain?

How can you tell lipids from carbohydrates given a formula or structure?