127 Digestion & Absorption
A simplified version of starch digestion

A starch molecule

Starch Digesting Enzymes

Separate glucose molecules (bonds between them are broken)
A simplified version of protein digestion

A Protein Molecule

Protein Digesting Enzymes

Separate, individual Amino acid molecules
Illustration of the Digestive System

Esophagus
Liver
Pancreas (behind stomach indicated by dashes)
Stomach
Small intestine
Colon
Rectum & anus
X-Ray Image of the Stomach

Image from the Department of Radiology, Albert Szent-Gyorgyi Medical University
X-Ray Image of part of the Small Intestine

Image from Gastrolab (www.gastrolab.net/welle.htm)
X-Ray Image of the Small & Large Intestine

Blue line indicates path of the large intestine (colon)

All else here is small intestine

Rectum

Hip bone and hip joint (pelvic bone & femur)

Image from the Department of Radiology, Albert Szent-Gyorgyi Medical University
Anatomy of the Surface of the Small Intestine

Small intestine cut

These little finger-like projection are the villi of the small intestine

Enlargement

The next slide shows an endoscopic photograph. Endoscopy is a technique in which a flexible probe, with a camera at the end for viewing the intestinal tissue, is inserted along the alimentary canal.
Endoscopic Image of the Small Intestine

Note that the villi are not visible because they are microscopic.

Image from Gastrolab (www.gastrolab.net/wel1e.htm)
This is an electron micrograph that reveals the 3-dimensional relationship of the villi on the intestinal surface.

Image from the University of California Davis School of Medicine (medocs.ucdavis.edu/CHA/402/course.htm)
Cartoon of Two Villi

Intestinal epithelial cells

Central Lacteal (in yellow)

Capillaries (in red)
Location of central lacteal and capillaries

Intestinal epithelial cells

Image from the University of Delaware Department of Biological Sciences (www.udel.edu/Biology/Wags/histopage/histopage.htm)
Location of central lacteal and capillary

Intestinal epithelial cells

Image from the University of Delaware Department of Biological Sciences
(www.udel.edu/Biology/Wags/histopage/histopage.htm)
Lacteal & blood vessels would be located here.
Special Staining of Capillaries of the Villus

Image from BIODIDAC
Fatty acids & cholesterol

Sugars & Amino Acids

Look carefully at where the different nutrients are going.
Illustration of Nutrient Transport to the Liver

- Central Lacteal: Fatty acid or Cholesterol
- Villus capillary: Sugar or Amino acid
- Vein (near the heart)