3.4 Small Intestine

The small intestine is the primary site of digestion. It is divided into three sections: the duodenum, jejunum, and ileum (shown below). After leaving the stomach, the first part of the small intestine that chyme will encounter is the duodenum.

![Figure 3.41 Three sections of the small intestine](image1)

The small intestine consists of many layers, which can be seen in the cross section below.

![Figure 3.42 Cross section of the small intestine](image2)

Examining these layers closer, we are going to focus on the epithelium, which comes into contact with the chyme and is responsible for absorption. The area contained within the epithelium is the lumen (area considered outside the body).
Figure 3.43 Cross section of small intestine with the structures labeled

The organization of the small intestine is in such a way that it contains circular folds and finger-like projections known as villi. The folds and villi are shown in the next few figures.

Figure 3.44 Folds in the small intestine

Figure 3.44 Folds in the small intestine
If we were to zoom in even closer, we would be able to see that enterocytes (small intestine absorptive cells) line villi as shown below.
The side, or membrane, of the enterocyte that faces the lumen is not smooth either. It is lined with microvilli, and is known as the brush border (aka apical) membrane, as shown below.

Together these features (folds + villi + microvilli) increase the surface area ~600 times versus if it was a smooth tube. More surface area leads to more contact with the enterocytes and thus, increased absorption.

Going even closer, we discover that the surface of the microvilli is covered by the hair-like glycocalyx, which is glycoproteins and carbohydrates as shown below.
Figure 3.49 Glycocalyx lines the microvilli

Now that we’ve set up the anatomy of the small intestine, the following subsections go through the its different digestive processes.

Subsections:

3.41 Digestive Hormones, Accessory Organs, & Secretions
3.42 Carbohydrate Digestion in the Small Intestine
3.43 Protein Digestion in the Small Intestine
3.44 Lipid Digestion in the Small Intestine

References & Links
1. http://commons.wikimedia.org/wiki/Image:Illu_small_intestine_catal%C3%A0.png