In specimens of gall bladder observed, there was an inner longitudinal and an incomplete outer circular or oblique layer.

Studies on the pancreas substantiated Clara's (1924) work that the pancreas had three lobes: dorsal, ventral, and splenic; and that the splenic lobe had no separate excretory duct. The presence of both alpha and beta islets as described by Nagelschmidt (1939) and Oakberg (1949) was confirmed. The writer agreed with Böhm (1904) that the islets of Langerhans were not set off from the surrounding tissue by connective tissue. Centroacinar cells were found, in agreement with Zietschmann (1911), Krause (1922), and Bradley and Grahame (1951).

The pancreatic ducts were similar to the bile ducts as Zietschmann (1911) stated.

Observations made on the remnant of the yolk stalk indicated that it is constantly present as Muthmann (1913), Latimer (1924), and Bradley and Grahame (1951) thought. It is a continuation of the intestine, and it becomes degenerated with age as Maumus (1902) observed.

The writer found a thin serosa in the bursa cloacae as did Osawa (1911). Involuntary muscle was present in its walls as Gadow (1891a) and Jolly (1915) observed. This muscle presented an outer circular and inner longitudinal arrangement as Osawa (1911) found. Retterer (1885) found the opposite. No blood vessels were observed in the medullary portion. Wenckebach (1889 and 1896) and Schumacher (1903) also made this observation. Schumacher's (1903) observations that the epithelium varied from cuboidal to tall columnar to pseudostratified types were verified. Goblet cells were present. Gadow (1891a) found them, but Wenckebach (1889) did not.

A valve was present over the opening into the bursa cloacae. Forbes (1877) could not find one, while Retterer (1885) observed one in the murre (*Uria aalge*).

SUMMARY

A microscopic study of the digestive tract with its appendages was made on chickens of different ages.

The general structure of the wall was as follows: a mucous membrane comprised of an inner epithelial lining, a tunica propria, and a muscularis mucosae; a thin submucosa; a lamina muscularis with an inner circular muscle layer and an outer longi-

tudinal muscle layer; and an outer adventitia or serosa depending on the location of the organ.

The epithelium of the mouth contained many epihelial papillae which projected posteriorly. The muscularis mucosae was absent as far back as the caudal part of the pharynx. Uniformly constructed salivary glands were observed in groups in the submucosa.

Large mucous glands were present in the tunica propria of the esophagus. No glands were found in the diverticulum of the crop but were confined to the esophageal wall of that organ.

The stratified squamous epithelium of the esophagus changed into simple columnar epithelium at the junction with the proventriculus and continued as such as far as the anus.

The proventriculus contained mucosal plicae which were concentrically arranged about the openings of multilobular deep proprial glands to form macroscopic papillae. Between these papillae the plicae were irregularly arranged.

Between the proventriculus and the gizzard was an intermediary zone characterized by the disappearance of the deep proprial glands and surface plicae and the appearance of a keratinized inner layer.

The gizzard was characterized by a keratinized inner layer. Tubular glands, which emptied on the surface, were arranged in groups in the tunica propria. The lamina muscularis was a single layer of involuntary muscle.

The intestine from the gizzard to the anus, including the caeca, was characterized by villi. No Brunner's glands were present in the duodenum. No Peyer's patches were found.

The caeca contained many plicae circulares. The villi were low to absent in the blind end.

The cloaca contained many transverse folds and plicae circulares in its walls and exhibited three compartments.

The anus was lined with stratified squamous epithelium, and contained voluntary muscle in its walls.

The liver and the pancreas were similar in structure to those of mammals. The three pancreatic and the two bile ducts opened into the duodenal papilla.

The bursa cloacae was an organ of lymphoid-epithelial structure found only in chickens under one year of age.