

THE DIGESTIVE SYSTEM OF MACROSIPHUM
SOLANIFOLII (ASH.)

(APHIDAE: HOMOPTERA)

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This work was undertaken as a special problem on the internal anatomy of insects. The Aphid, *M. solanifolii* (Ash.) was chosen because of the writer's interest in the Aphidae, the economic importance of this particular aphid, and the fact that so far as known an account of the digestive system of an aphid in this genus has not been published.

The writer is indebted to Dr. C. H. Kennedy, under whom this work was carried on, for his suggestions and criticisms as the work progressed.

The digestive tract is rather simple in the Aphidae, consisting of a coiled tube. In *M. solanifolii* it is approximately three times the length of the body, lies slightly ventrad to the center of the body and is folded as illustrated (Fig. 1). The various parts of the tube are free and not closely associated or joined with the other portions of the tube. Apparently this is the case with a good many species of aphids. However, Knowlton, 1925, in reporting on *Longistigma caryae* (Harris), states: "For a short distance the tube is complicated by the anterior end of the mid-intestine doubling back and forming a loop through the muscle wall of the posterior end of the mid-intestine and the anterior end of the hind-intestine. This loop enters through the muscle wall of the hind-intestine and enlarges where the folds of the oesophageal valve return and join the stomach epithelium."

Morphologically the alimentary tract consists of three parts, the fore-, mid-, and hind-intestine. In *M. solanifolii* the union of the fore- and mid-intestine is marked by the oesophageal valve (Fig. 4) which extends into the lumen of the mid-intestine. The union of the mid- and hind-intestine (Fig. 3) is not well defined because the pyloric valve and malpighian tubules are lacking. The mid-intestine gives way to a rather structureless hind-intestine. A similar condition was found by Knowlton in *L. caryae* but Pelton (1937) states, "The pyloric valve (*Prociophilus tessellata* (Fitch)) consists of

a slight constriction and differentiation of cells. The large irregular cells of the mid-intestine end abruptly and the irregular columnar cells of the hind-intestine arise."

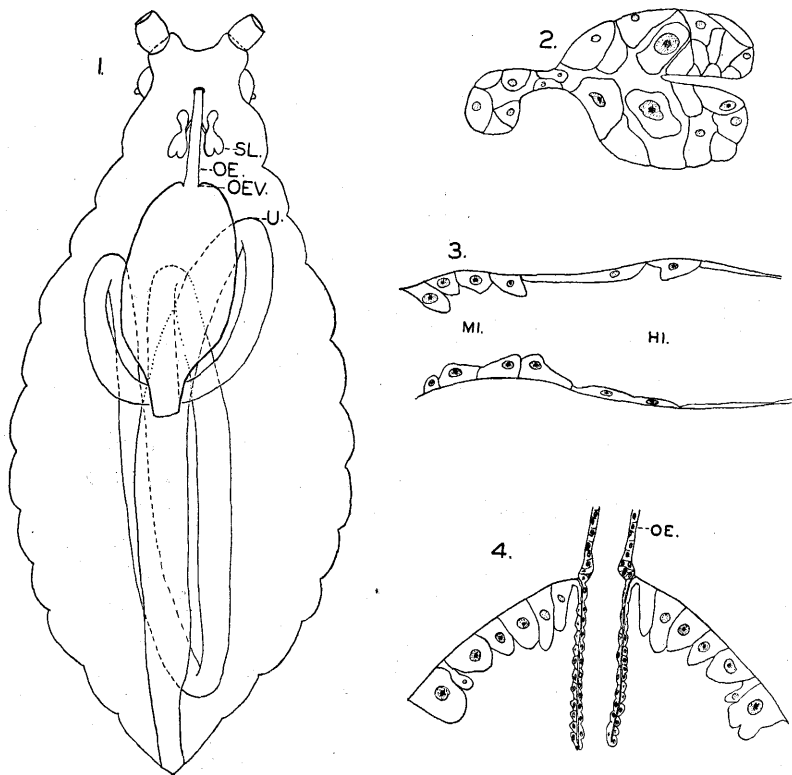


Fig. 1. Dorsal view of the alimentary canal.

Fig. 2. Longitudinal section of salivary gland, showing anterior and posterior lobes and posterior notch as outlined in the left gland in Figure 1.

Fig. 3. Longitudinal section at union of mid- and hind-intestine.

Fig. 4. Longitudinal section through a portion of the oesophagus, the oesophageal valve and part of the stomach.

EXPLANATION OF ABBREVIATIONS

HI—hind-intestine.	OEV—oesophageal valve.
MI—mid-intestine.	SL—salivary gland.
OE—oesophagus.	U—union of mid- and hind-intestine.

THE DIGESTIVE SYSTEM

The mouth or oral opening is situated on the ventral surface of the head, bounded anteriorly by the labrum and posteriorly by the labium. Laterally it is bounded by the mandibles and maxillae.

The mouth opens upward into a relatively large, distensible chamber, the pharynx. The pharynx is well supplied with muscles, the majority of which are attached to the anterior flexible wall. The posterior or ventral wall is strengthened by a stout layer of chitin. As seen in transverse sections the pharynx is crescentic in shape, its greatest transverse diameter being near the oral end.

The salivary glands lie obliquely in the thorax, above the oesophagus, and consist of a small anterior gland and a large posterior gland, situated on each side of the median line. The salivary duct from each side unites in the mid-ventral line with the duct from the opposite side to form a median salivary duct which opens at the posterior end of the buccal cavity.

The oesophagus is a long slender tube leading from the pharynx, up over the tentorium to the stomach. The posterior end of the oesophagus projects into the stomach, or the dilated region of the mid-intestine, forming the oesophageal valve.

The oesophageal valve (Fig. 4), as seen in longitudinal sections, consists of the invagination of the oesophagus into the stomach, its walls being reflected back to become continuous with the walls of that structure.

The mid-intestine is marked anteriorly by the oesophageal valve and posteriorly by the rather structureless hind-intestine. The anterior portion of the mid-intestine is considerably enlarged to form the stomach which is the widest part of the alimentary canal.

The pyloric valve is not present. The most evident mark of transition from the mid- to the hind-intestine is the ending of the large epithelial cells of the mid-intestine, and the beginning of the long, thin cells of the hind-intestine.

The hind-intestine connects with the anus by the rectum which horizontally has a wide, thin opening through the center.

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