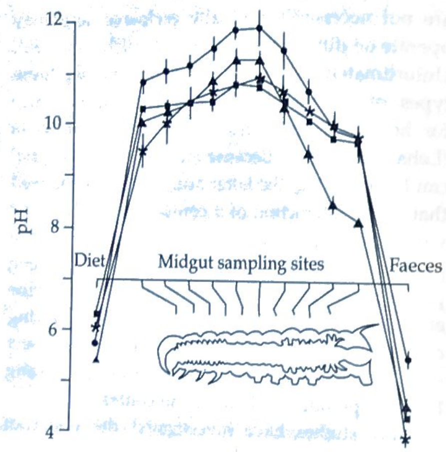

Figure 2.6 Midgut pH profile for four larval lepidopterans, with values for food and faeces shown for comparison.

Note: In all cases, haemolymph pH was 6.7. Species: circles, *Acherontia atropos* (Sphingidae); triangles, *Manduca sexta* (Sphingidae); squares, *Lichnoptera felina* (Noctuidae); and asterisks, *Lasiocampa quercus callunae* (Lasiocampidae). Mean ± SE, $n = 4$.

Source: Dow (1984).

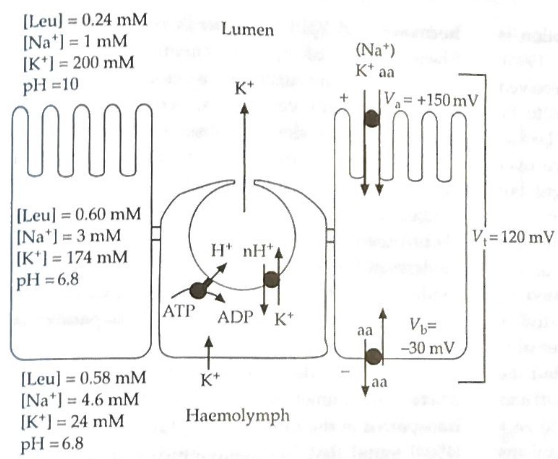

Figure 2.7 Model of amino acid absorption in the midgut of a caterpillar (*Philosamia cynthia*).

Note: A goblet cell is shown between two columnar absorptive cells. The left columnar cell shows leucine, Na^+ and K^+ concentrations and pH values in the lumen, cell and haemolymph. The goblet cell shows mechanisms involved in K^+ transport. The right columnar cell shows mechanisms involved in amino acid (aa) absorption and apical (V_a), basal (V_b) and transepithelial (V_t) electrical potential differences. Basal exit mechanisms for amino acids are less well known.

Source: *Biology of the Insect Midgut*, 1996, pp. 265–292, Sacchi and Wolfersberger, with kind permission of Kluwer Academic Publishers.

Na^+/K^+-ATPase are located on apical and basal membranes, respectively.

The plasma membrane V-ATPase of *M. sexta* is well characterized (Harvey *et al.* 1998). When feeding ceases in preparation for a larval–larval moult, downregulation of the V-ATPase is thought to be achieved by reversible dissociation of the

2.3.3 Absorption of nutrients

Gut absorption was reviewed by Turunen (1985). Absorption includes transport across both apical and basal membranes, but there is more information on apical mechanisms. These are usefully studied by using purified plasma membranes