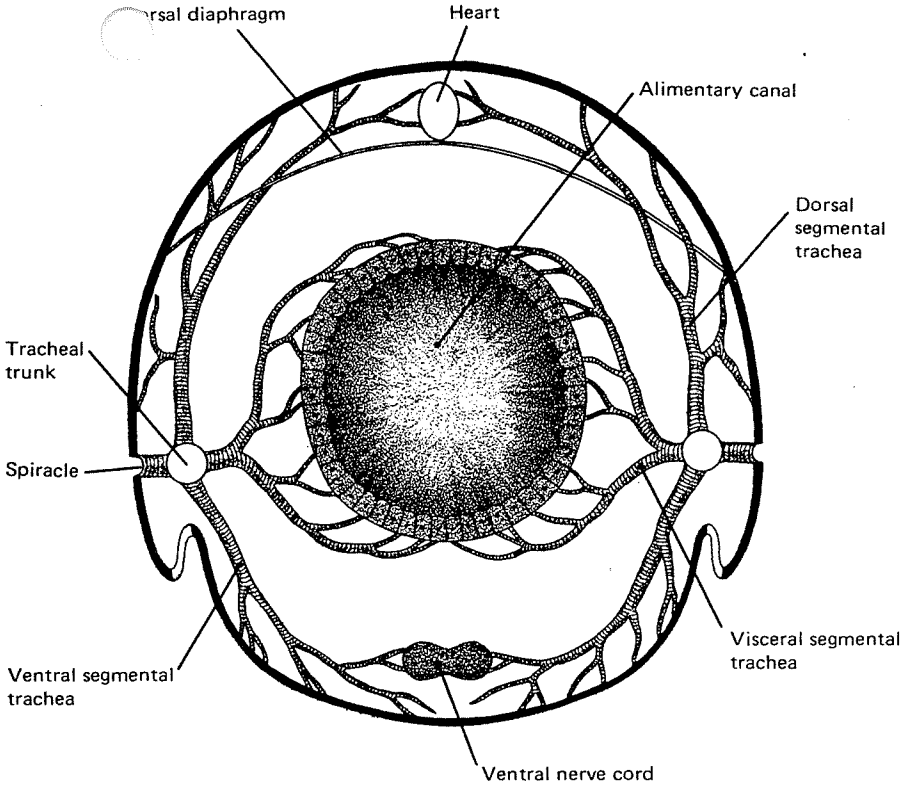

Figure 63. Cross section through the abdomen illustrating some of the tracheation. (Redrawn with slight modifications from Snodgrass, 1935)

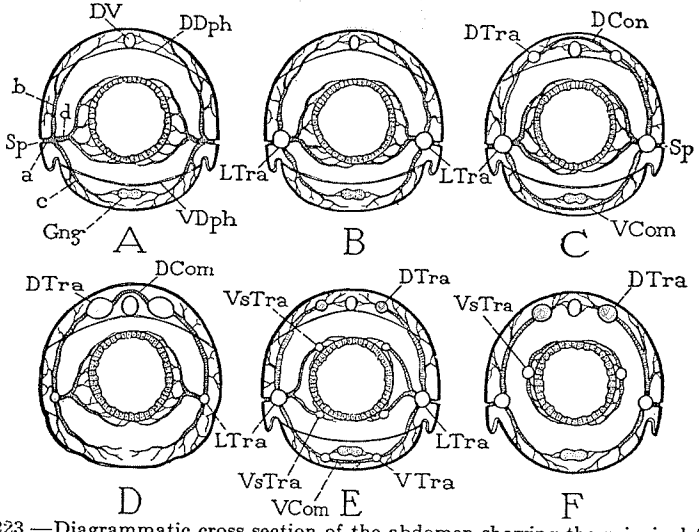

FIG. 223.—Diagrammatic cross section of the abdomen showing the principal tracheae and tracheal trunks. *a*, spiracular trachea; *b*, *c*, *d*, dorsal, ventral, and visceral segmental tracheae; *DCom*, dorsal commissure; *DDph*, dorsal diaphragm; *DTra*, dorsal plurisegmental tracheal trunk; *DV*, dorsal blood vessel; *LTra*, lateral plurisegmental tracheal trunk; *Sp*, spiracle; *VCom*, ventral commissure; *VDph*, ventral diaphragm; *VsTra*, visceral plurisegmental tracheal trunk; *VTra*, ventral plurisegmental tracheal trunk.

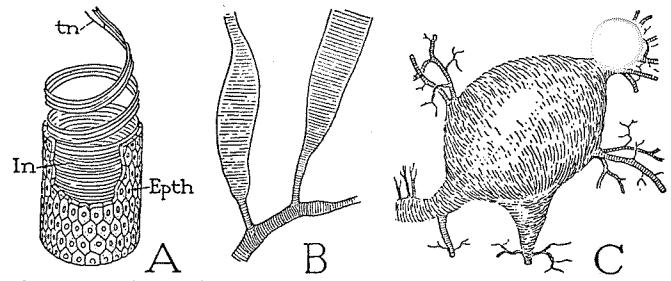

FIG. 236.—Structure of a tracheal tube, and examples of tracheal air sacs. *Epth*, epithelium; *In*, intima; *tn*, taenidium in spiral band of cuticular intima artificially separated.

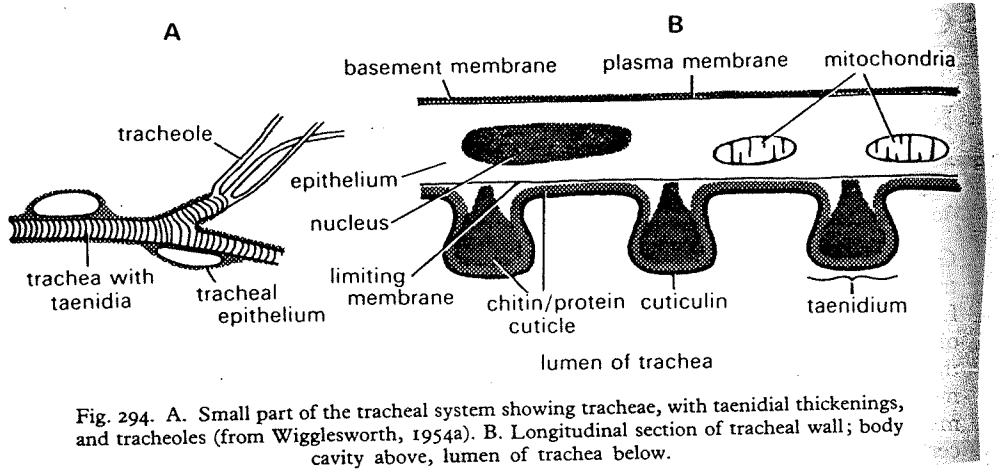

Fig. 294. A. Small part of the tracheal system showing tracheae, with taenidial thickenings, and tracheoles (from Wigglesworth, 1954a). B. Longitudinal section of tracheal wall; body cavity above, lumen of trachea below.

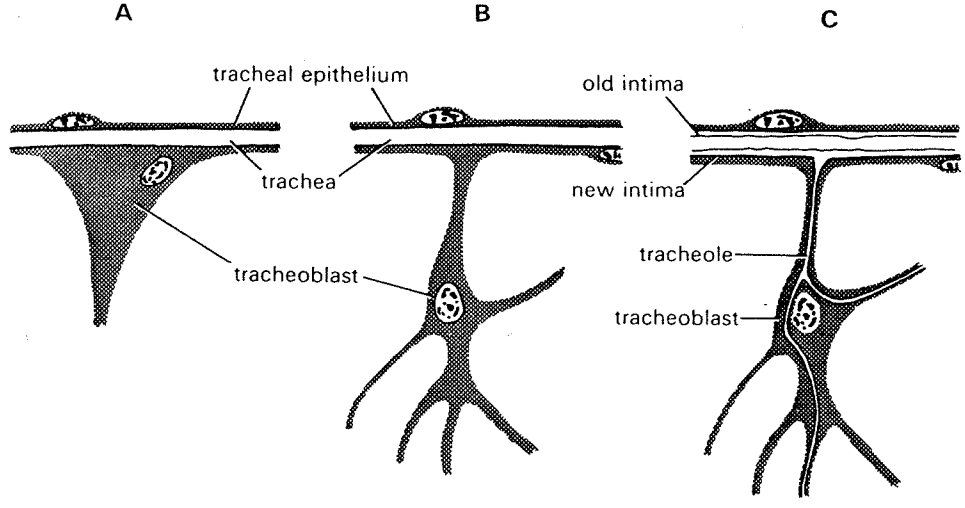

Fig. 295. The development of a tracheole. A. Tracheoblast developing from tracheal epithelial cell. B. Tracheoblast with extensive cytoplasmic processes. C. Tracheole develops within tracheoblast and connects with the trachea at the moult (after Keister, 1948).

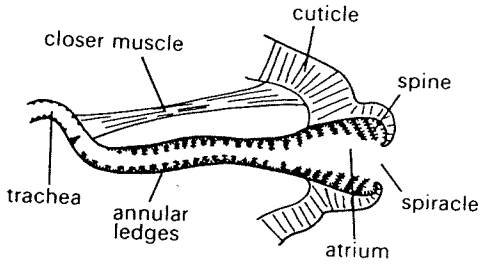

Fig. 304. Longitudinal section of the spiracle of a louse, *Haemotopinus*, showing the dust-catching spines and ledges (after Webb, 1948).

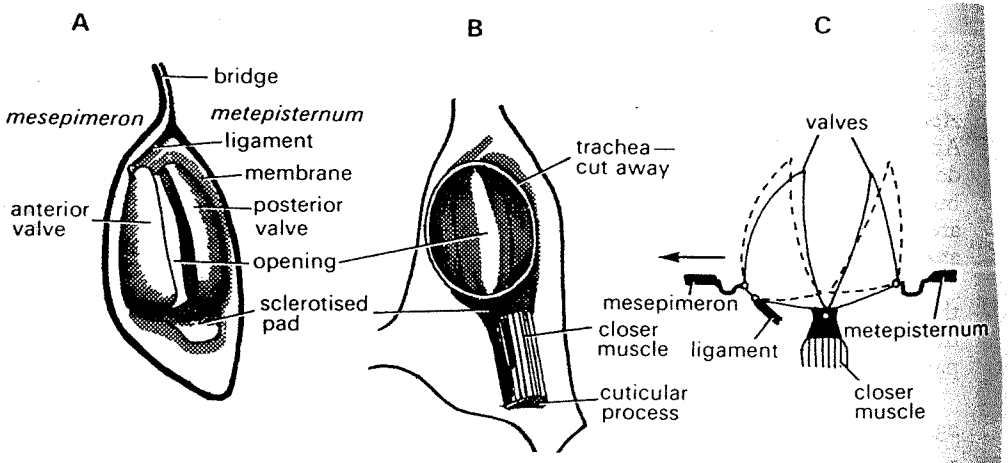

Fig. 305. The second thoracic spiracle of a locust. A. External view. B. Internal view. C. Diagrammatic transverse section showing how movement (indicated by arrow) of the mesepimeron causes the valves to open wide (after Miller, 1960b).

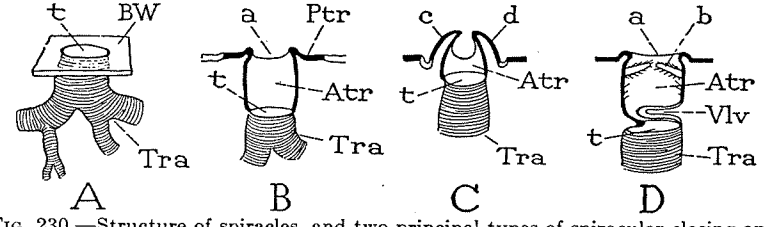

FIG. 230.—Structure of spiracles, and two principal types of spiracular closing apparatus. A, simple spiracle without an atrium. B, an atriate spiracle. C, atriate spiracle with lip type of closing apparatus. D, atriate spiracle with closing valve at inner end of atrium. *a*, atrial orifice; *Atr*, atrium; *b*, filter apparatus; *BW*, body wall; *c*, *d*, anterior and posterior lips of atrium; *Ptr*, peritreme; *t*, tracheal orifice; *Tra*, trachea; *Vlv*, valve.

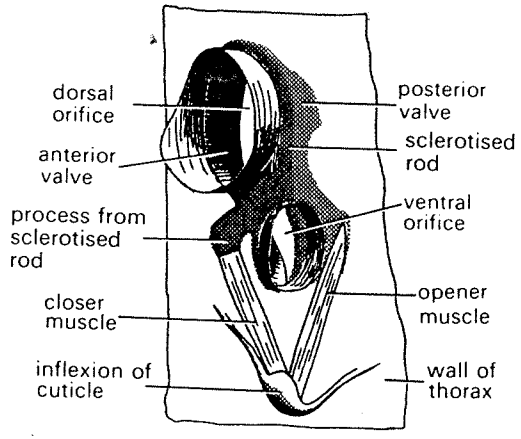

Fig. 306. The first thoracic spiracle of a locust, internal view (modified after Snodgrass, 1935; and Miller, 1960b).

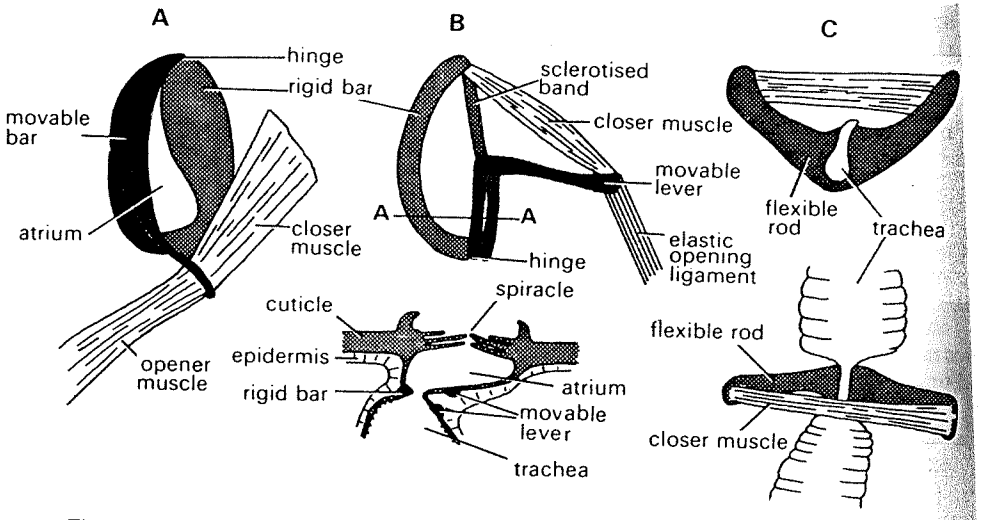

Fig. 307. Closing mechanisms internal to the spiracles. A. Abdominal spiracle of *Dissosteira* (Orthoptera) (from Snodgrass, 1935). B. Spiracle of lepidopterous larva; inner view above, horizontal section through AA below (from Imms, 1957). C. Constricting mechanism of trachea of flea; transverse section through the mechanism above, dorsal view below (after Wigglesworth, 1965).

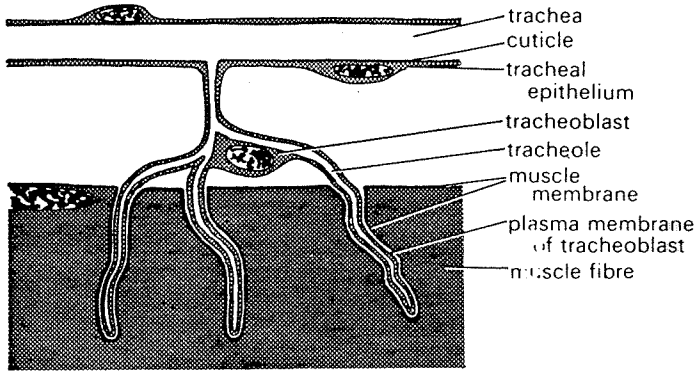

Fig. 296. Diagrammatic representation of tracheoles indenting the membrane of a muscle fibre to become functionally intracellular within the fibre.

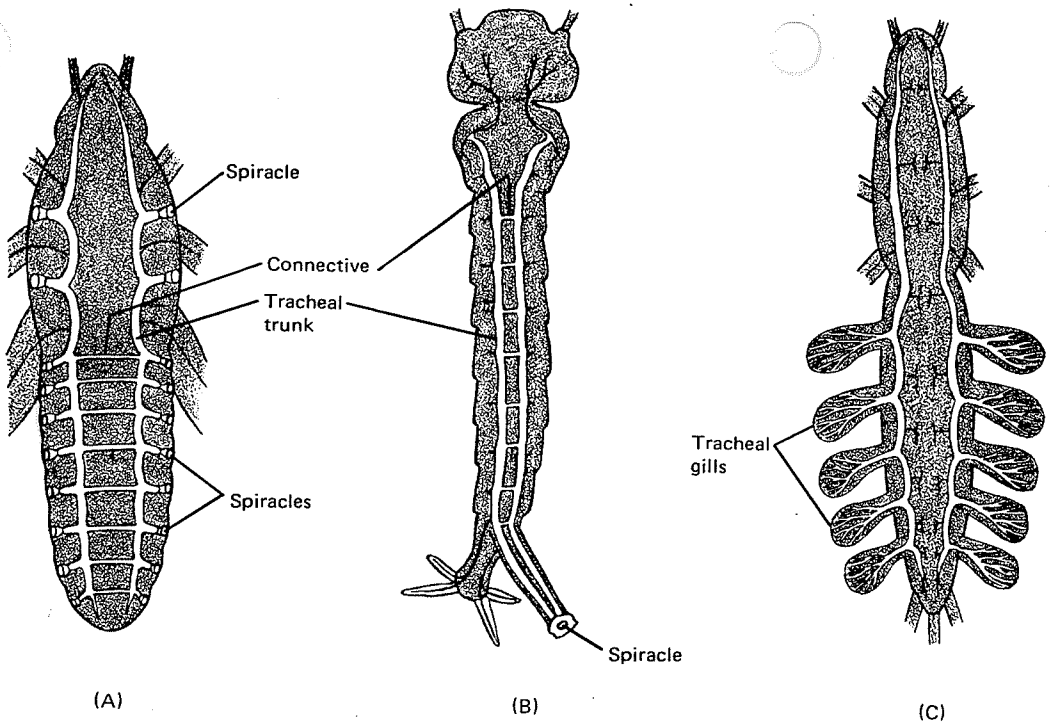

Figure 64. Some variation on the tracheal system of insects. (A) typical type of open system; (B) open system with reduction in number of spiracles; (C) closed system with cutaneous and tracheal gill gas exchange.

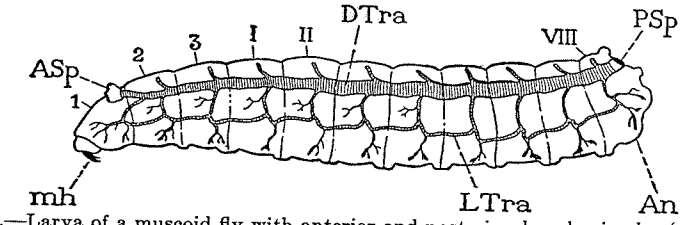

FIG. 229.—Larva of a muscoid fly with anterior and posterior dorsal spiracles (*ASp*, *PSp*) at ends of dorsal tracheal trunk; lateral spiracles absent.

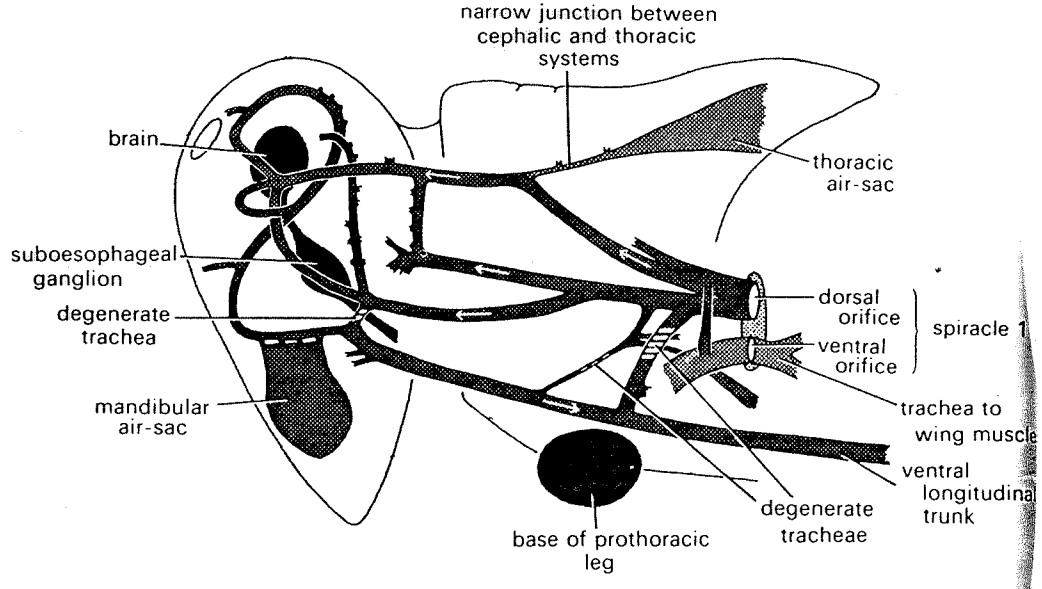

Fig. 299. Diagram of the main tracheae to the head of *Schistocerca*. Arrows indicate the probable direction of air-flow resulting from abdominal ventilation (after Miller, 1960c).

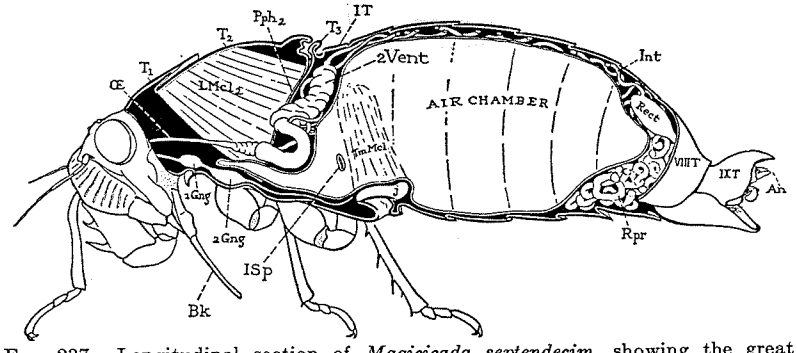

FIG. 237.—Longitudinal section of *Magicicada septendecim*, showing the great air chamber occupying most of the abdomen and opening to the exterior through the first abdominal spiracles (*ISp*).

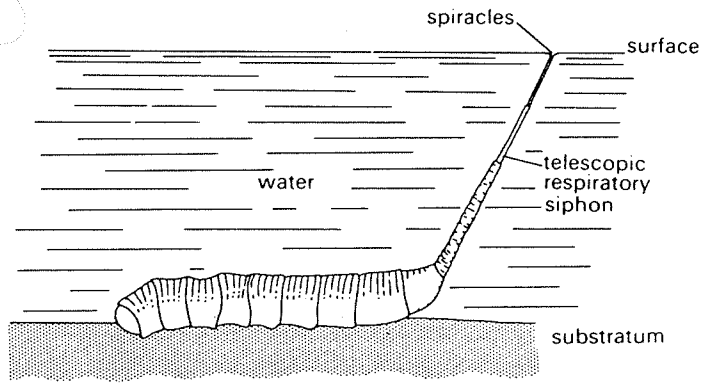

Fig. 316. Larva of *Eristalis* with the respiratory siphon partly extended (after Imms, 1947).

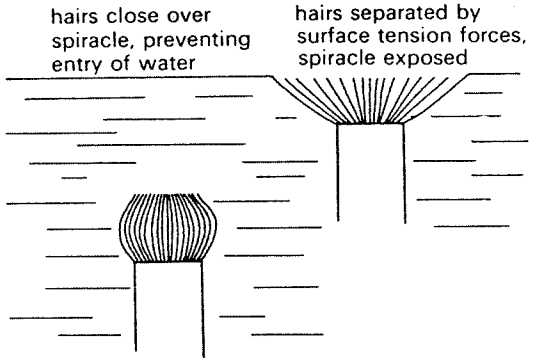

Fig. 315. Diagrams to show the movements of hydrofuge hairs surrounding a spiracle when the insect is submerged and at the surface. The movement of the hairs is entirely passive, depending on physical forces acting between the hairs and the water (modified after Wigglesworth, 1965).

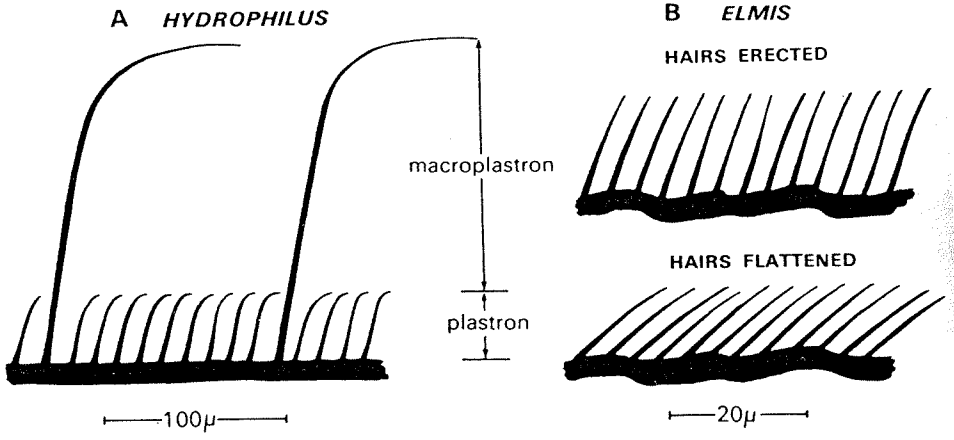

Fig. 323. Diagrams of the arrangement of hairs in (A) *Hydrophilus* and (B) *Elmis*, showing the mode of formation of a macroplastron (based on data in Thorpe and Crisp, 1949).

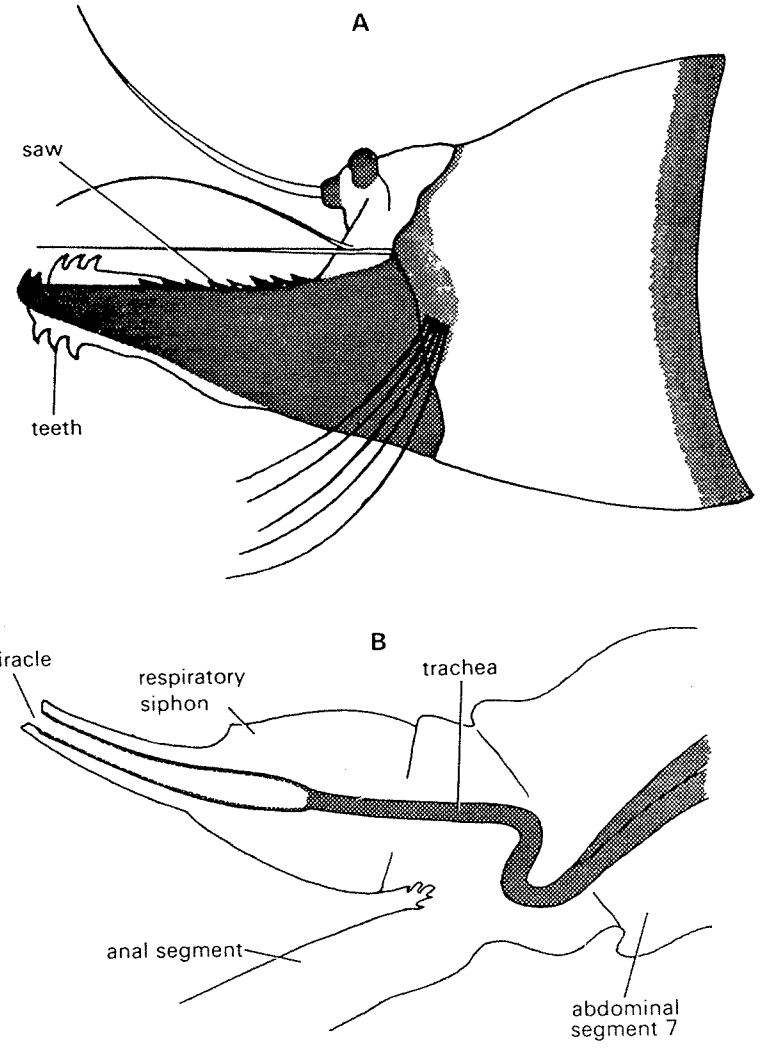

Fig. 318. A. Postabdominal respiratory siphon of *Mansonia* larva. B. Section of posterior end of larva to show tracheae and the terminal spiracle (after Keilin, 1944).