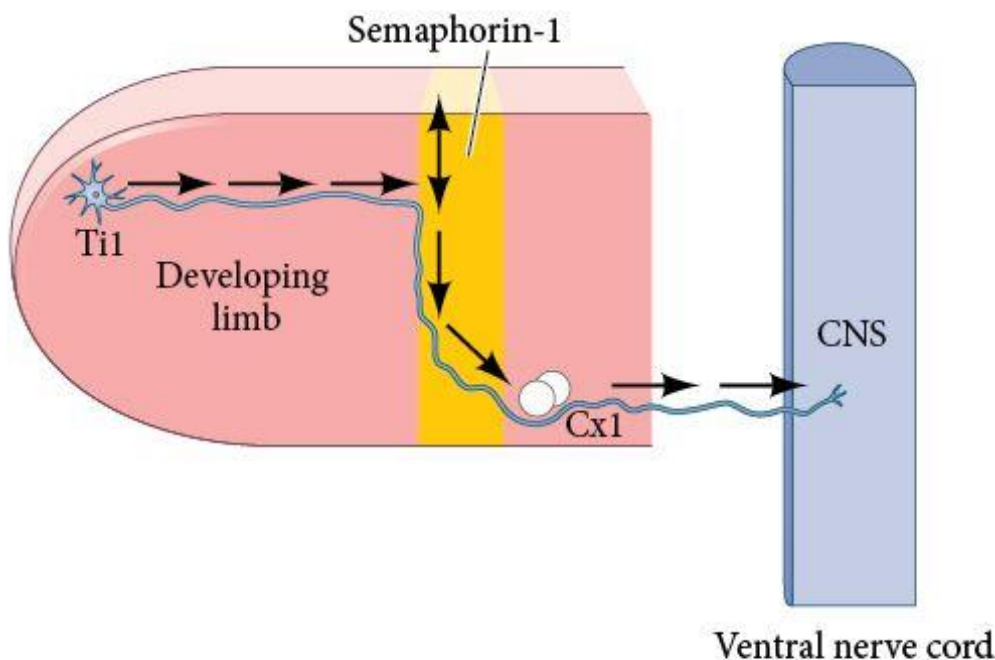


The Classic Example of Semaphorin-Mediated Repulsion of the Grasshopper Sensory Axon

Found throughout the animal kingdom, the semaphorins usually guide growth cones by selective repulsion. They are especially important in forcing “turns” when an axon must change direction. Semaphorin-1, for example, is a transmembrane protein that is expressed in a band of epithelial cells in the developing insect limb. This protein appears to inhibit the growth cones of the Ti1 sensory neurons from moving forward, thus causing them to turn (Figure 1; Kolodkin et al. 1992, 1993). In *Drosophila*, semaphorin-2 is secreted by a single large thoracic muscle. In this way, the thoracic muscle prevents itself from being innervated by inappropriate axons (Matthes et al. 1995).



After A. L. Kolodkin et al. 1993. *Cell* 75: 1389–1399.

Figure 1 Action of semaphorin-1 in the developing grasshopper limb. The axon of sensory neuron Ti1 projects toward the central nervous system. (The arrows represent sequential steps en route.) When it reaches a band of semaphorin-1-expressing epithelial cells, the axon reorients its growth cone and extends ventrally along the distal boundary of the semaphorin-1-expressing cells. When its filopodia connect to the Cx1 pair of cells, the growth cone crosses the boundary and projects into the central nervous system. When semaphorin-1 is blocked by antibodies, the growth cone searches randomly for the Cx1 cells.

Literature Cited

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