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Damming of axoplasm in constricted nerve: a sign of perpetual growth in nerve fibers.¹

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The following phenomenon of "axon damming" was observed constantly in several thousand nerve fibers of rat, rabbit and chicken nerves subject to chronic local constriction. Just proximal to the constriction, the axons become greatly distended and often twisted into corkscrew shape. Farther proximally, they are beaded, with the average number of swellings per millimeter declining with increasing distance from the constriction. Axon damming is confined to that part of the fiber lying between central cell body and the near end of the constricted zone. Occasional swellings at the far side seem to belong to recurrent fibers of regenerated nerves.

Typical axon damming appears within 1 week after the constriction is applied, and continues as long as the constriction lasts; it was still observed undiminished after 8 months. After releasing a nerve from chronic constriction, the swellings spread centrifugally and the axon diameter may become equalized within a matter of days.

Mechanical considerations and model experiments, reproducing the phenomenon, suggest that the observed damming and coiling in front of a throttling "bottleneck" result from the piling up of growing axon substance pressing distad. Mature axons thus seem to grow perpetually from their cells, undergoing commensurate peripheral dissipation, which latter phase we may tentatively identify with the discharge of substances (e.g., acetylcholin and other "neurohumors") from peripheral nerve.

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