

at these points: these are known as the **nodes of Ranvier** (Figs. 631 and 633). The portion of nerve fiber between two nodes is called an **internodal segment**. The neurolemma or primitive sheath is not interrupted at the nodes, but passes over them as a continuous membrane. If the fiber be treated with silver nitrate the reagent penetrates the neurolemma at the nodes, and on exposure to light reduction takes place, giving rise to the appearance of black crosses, **Ranvier's crosses**, on the axis-cylinder. There may also be seen transverse lines beyond the nodes termed **Frommann's lines** (Fig. 634); the significance of these is not understood. In addition to these interruptions oblique clefts may be seen in the medullary sheath, subdividing it into irregular portions, which are termed **medullary segments**, or **segments of Lantermann** (Fig. 631); there is reason to believe that these clefts are artificially produced in the preparation of the specimens. Medullated nerve fibers, when examined in the fresh condition, frequently present a beaded or varicose appearance: this is due to manipulation and pressure causing the oily matter to collect into drops, and in consequence of the extreme delicacy of the primitive sheath, even slight pressure will cause the transudation of the fatty matter, which collects as drops of oil outside the membrane.

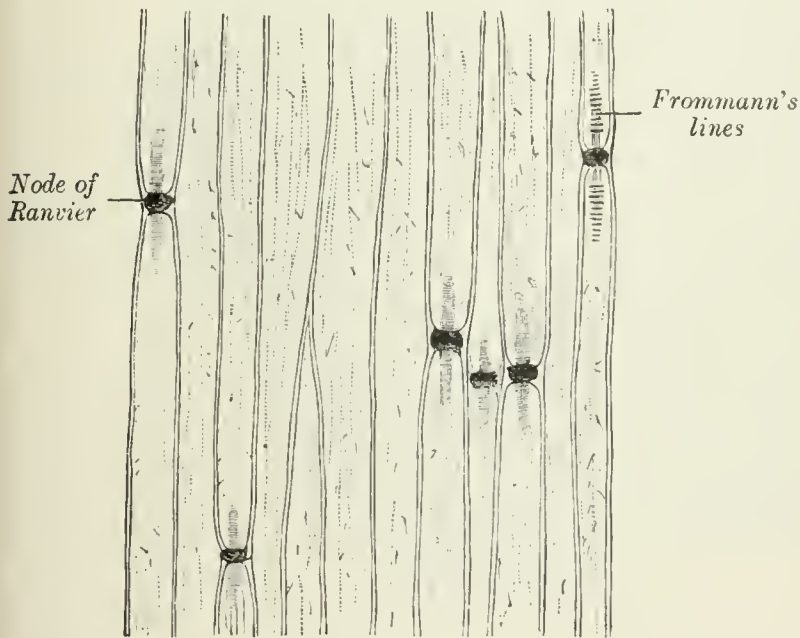


FIG. 634.—Medullated nerve fibers stained with silver nitrate.

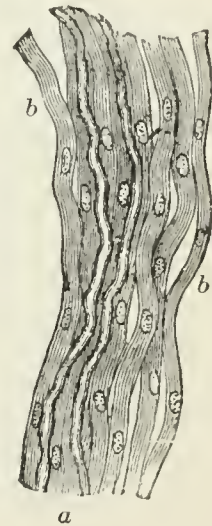


FIG. 635.—A small nervous branch from the sympathetic of a mammal. *a*. Two medullated nerve fibers among a number of gray nerve fibers, *b*.

The **neurolemma** or **primitive sheath** presents the appearance of a delicate, structureless membrane. Here and there beneath it, and situated in depressions in the white matter of Schwann, are nuclei surrounded by a small amount of protoplasm. The nuclei are oval and somewhat flattened, and bear a definite relation to the nodes of Ranvier, one nucleus generally lying in the center of each internode. The primitive sheath is not present in all medullated nerve fibers, being absent in those fibers which are found in the brain and medulla spinalis.

**Wallerian Degeneration.**—When nerve fibers are cut across, the central ends of the fibers degenerate as far as the first node of Ranvier; but the peripheral ends degenerate simultaneously throughout their whole length. The axons break up into fragments and become surrounded by drops of fatty substance which are formed from the breaking down of the medullary sheath. The nuclei of the primitive sheath proliferate, and finally absorption of the axons and fatty substance occurs. If the cut ends of the nerve be sutured together regeneration of the nerve fibers takes place by the downgrowth of axons from the central end of the nerve. At one time it was believed that the regeneration was peripheral in origin, but this has been disproved, the proliferated nuclei in the peripheral portions taking part merely in the formation of the so-called scaffolding along which the new axons pass.