

therefore they wrote "frost crack" in quotation marks.

People frequently tear off or scrape off patches of bark from the stem. The exposed cambial sheath dies as it dries, so that neither new wood cells nor new bark cells develop on the patch. Fortunately the edge of the surrounding live cambial sheath responds with excessive growth of callus, as explained above for healing of frost cracks. The callus overgrows the patch from all sides and completely covers it during following years, but it does not intergrow with the patch surface and leaves a fissure along the original patch surface. Callus growing from opposite sides over the patch does not intergrow either, and leaves a radial separation. This separation, due to its notch ef-

fect, may spread and develop into the frost crack when frost shrinkage generates tangential tension. Hence, we should realize that healed wounds still remain a potential danger for the tree.

#### Literature Cited

1. Butin, H., and A. L. Shigo. 1981. Radial shakes and "frost cracks" in living oak trees. USDA Forest Service Research Paper NE-478. Northeast For. Exp. Stn., Broomall, PA. 21 p.
2. Kubler, H. 1983. *Mechanism of frost crack formation in trees—a review and synthesis*. For. Sci. 29:559-568.

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## Abstract

Shigo, A. A. 1986. **Journey to the center of a tree**. Am. Forests 92 (6): 18-22, 46-47.

Trees are so common that we often forget how extraordinary they really are. They live on all continents except Antarctica and in an astonishing variety of environments, from tropical to subarctic, rainforest to desert fringe. How have trees been able to survive and thrive? The answers lie within that tree out your window. As we journey to the center of that tree—or any tree—we'll find that the answers lie more specifically in the structural properties and growth processes of a tree. You'll also see that a better understanding of these can have practical applications, such as helping you prune your trees to their advantage and prevent unnecessary wounds. But a journey to the center of a tree will require you to visualize and think about trees in a way that you probably never have before. Trees can adapt to changes in the environment, *when change occurs too quickly, they may not be able to respond fast enough*. Two species, American chestnut and American elm, were driven to near extinction when people imported other species of chestnut and elm infected with diseases that indigenous trees were not adapted to resist. A journey to the center of these trees would have revealed that they were not able to compartmentalize quickly enough to fight off the unexpected foreign invaders. Our journey has shown us that trees are far more complex than what appears when we look out our window. We have also found that trees rely on structures and processes that no other organisms possess. Perhaps this is how they have survived all these eons and have watched dinosaurs come and go.