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Photographic Guide of Selected External Defect Indicators and Associated Internal Defects in Black Cherry

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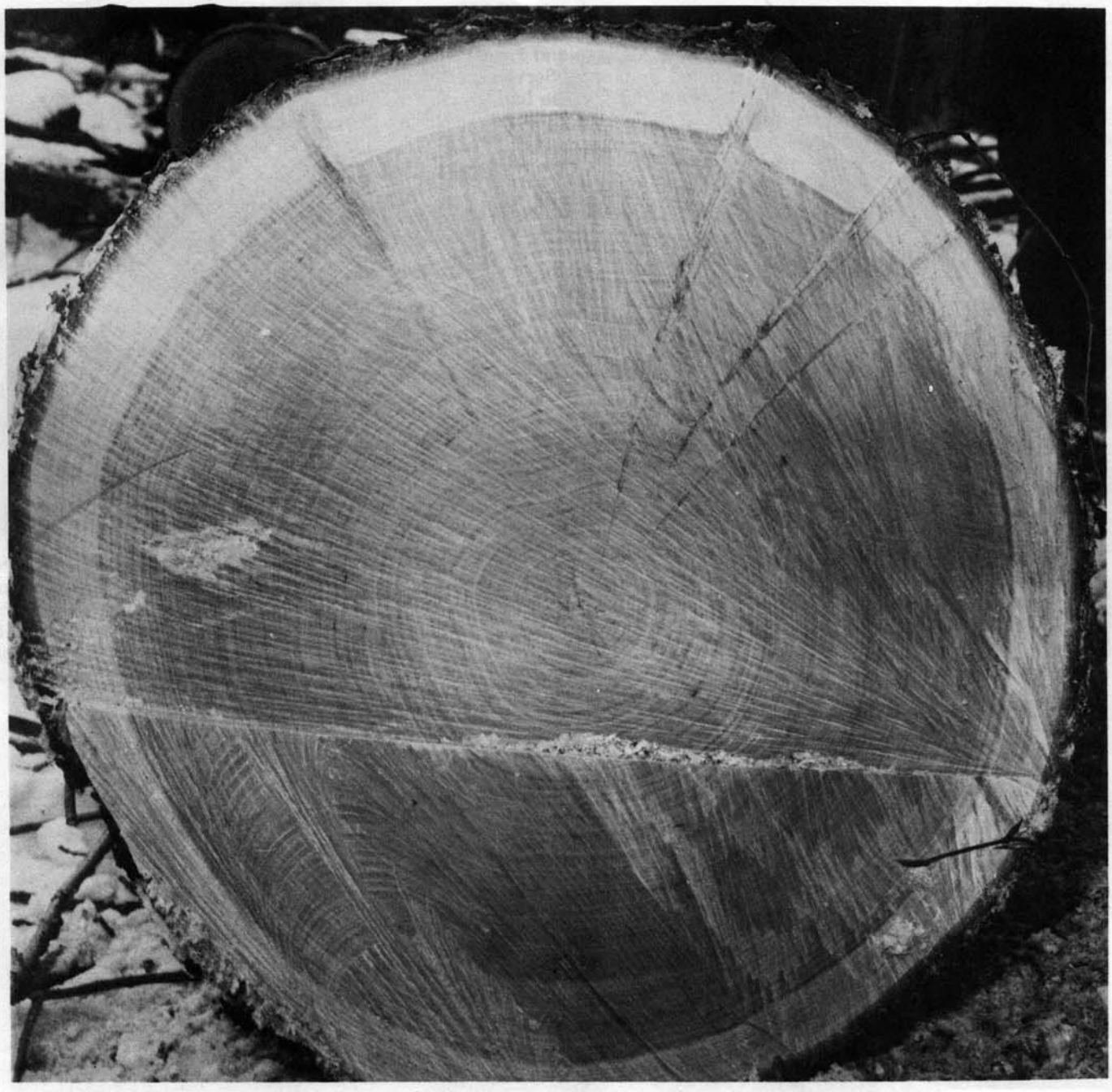

The Authors

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Abstract

To properly classify or grade logs or trees, one must be able to correctly identify defect indicators and assess the effect of the underlying defect on possible end products. This guide aids the individual in identifying the surface defect indicator and also shows the progressive stages of the defect throughout its development for black cherry. It illustrates and describes seven types of external defect indicators and associated defects that are particularly difficult to evaluate.

Introduction

This photographic guide on black cherry is the second in a series to aid in the understanding of the relationship between exterior defect indicators and the underlying defect. This study, like the previous one on northern red oak (Rast 1982), was conducted at a veneer slicing plant which enabled us to photograph defect characteristics at intervals of 1/32 of an inch (one sheet of veneer).

Procedure

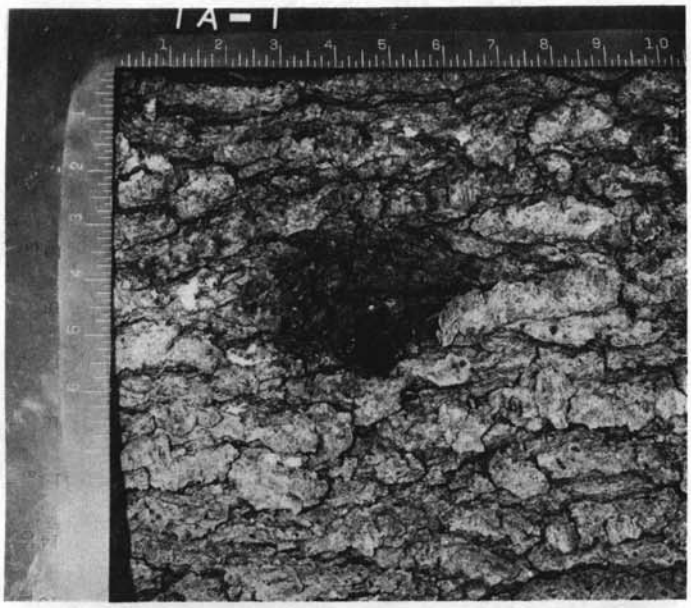
The only procedural change from the 1982 study was that these logs were selected and photographed in the woods. They came from an almost pure stand of black cherry in north central Pennsylvania. The defect indicators reported in this publication are gum lesion; suppressed bud; suppressed bud cluster; light, medium, and heavy bark distortions; sound and unsound wounds; seam; and burl.

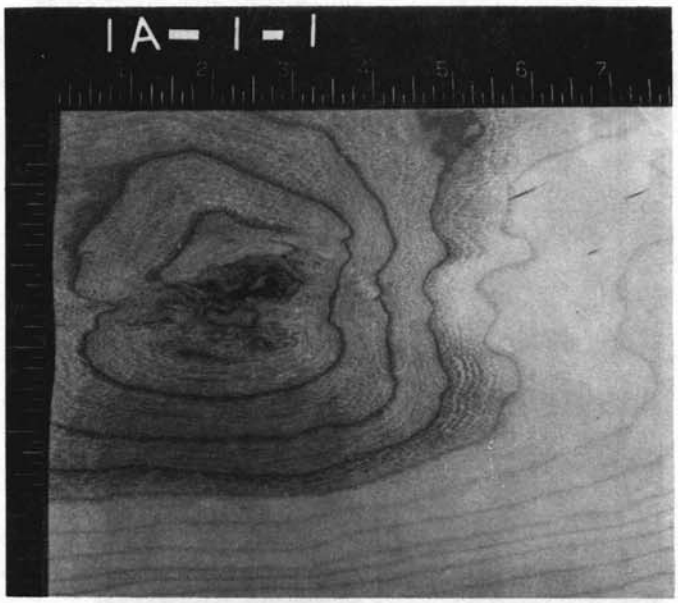
Discussion of Defects

We feel that the selected defect indicators are often difficult to evaluate in terms of their effect on end-product quality. Graders normally have little difficulty recognizing and evaluating the obvious grading defects such as limbs, holes, forks, bulges, or butt scars.

The descriptions listed below the photo of the defect indicator (see Fig. 1) describe its size in terms of

Figure 1.—Gum lesions and associated internal defects.





Defect size ..... 3 x 2 inches
Log diameter ..... 18.6 inches
Log diameter at defect ..... 19.9 inches
Flitch thickness at defect ..... 8.9 inches
Slab + round-up thickness at defect ... 1.3 inches
Log position ..... butt log

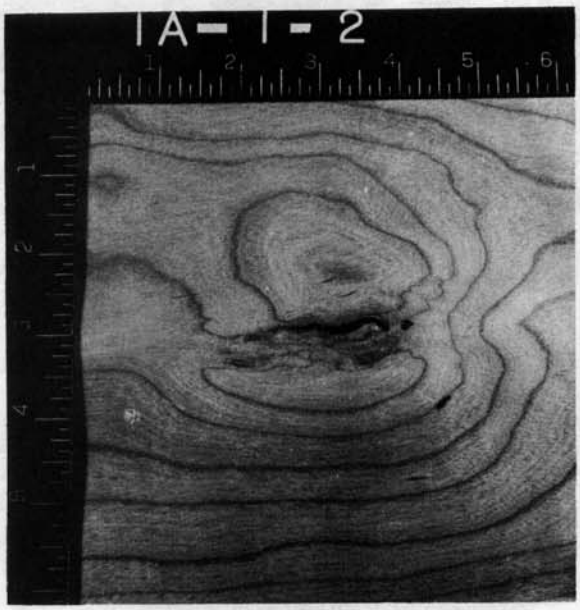
Depth below—

Log surface	First sheet of veneer
1.3 inches	0.0 inches

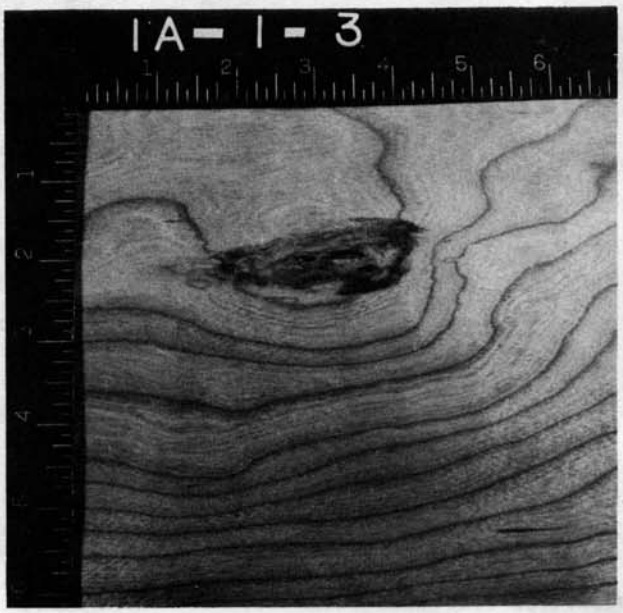
length (along the grain), width (across the grain), and height (above the normal bark surface); log diameter, inside-the-bark small end; log diameter, inside-the-bark at the defect; flitch thickness at the defect; slab plus round-up thickness at the defect; and log position. The information listed under the interior defect (see Fig. 1) indicates distance below the log surface (inside-the-bark) as well as the distance from the first slice of veneer to that particular photographed defect. The last photograph in each defect series also lists cumulative veneer thickness, which is the distance from the initial slice of useable veneer to the last slice of veneer. A point of interest is that the National Hardwood Lumber Association grading rules on black cherry allows small knots or their equivalent not exceeding 1/8 inch in diameter in the cuttings (NHLA 1982).

Gum Lesion

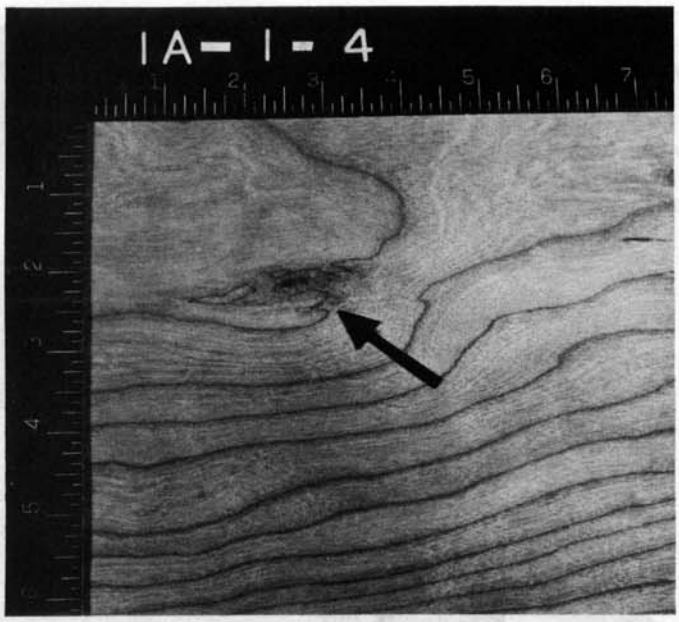
Gum lesions (Fig. 1) appear as slightly darker than normal bark to an almost black area on the already reddish bark of black cherry. Clear to amber-colored exudate is almost always present on the bark surface. Gummosis, the production of this exudate, can result from many causes such as peach tree borer, wounding, bacteria, fungi or even poorly aerated soils (Boyce 1948, Esau 1965). If only gum exudate is present, the defect depth is seldom great, but if the bark appears discolored, the gum and some grain distortion usually extend into the high-quality wood.



Depth below—	
Log surface	First sheet of veneer
1.8 inches	0.5 inches

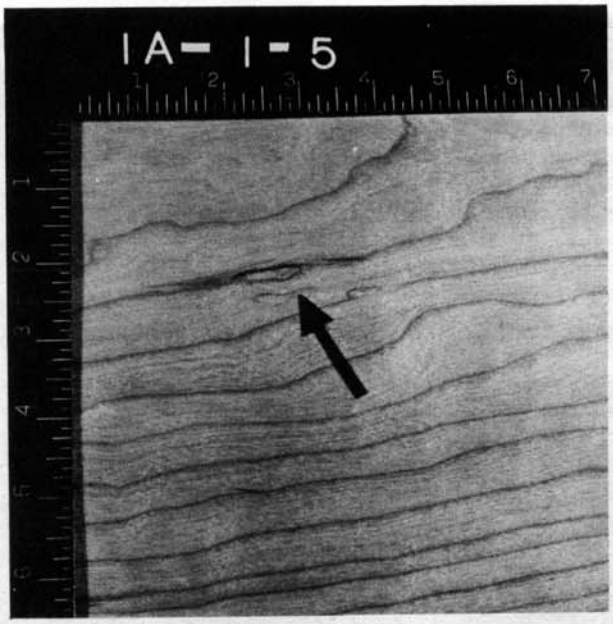


Depth below—	
Log surface	First sheet of veneer
2.3 inches	1.0 inches



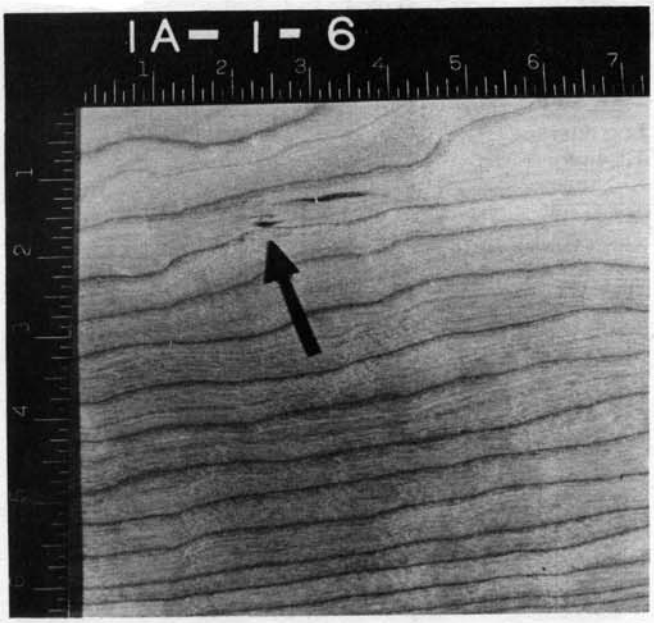
Depth below—

Log surface	First sheet of veneer
2.8 inches	1.5 inches



Depth below—

Log surface	First sheet of veneer
3.3 inches	2.0 inches



Depth below—

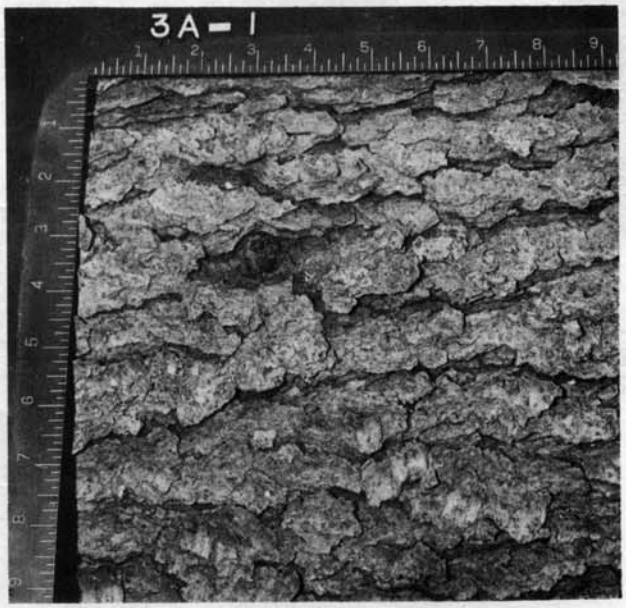
Log surface	First sheet of veneer
3.6 inches	2.2 inches

Total veneer thickness—6.9 inches

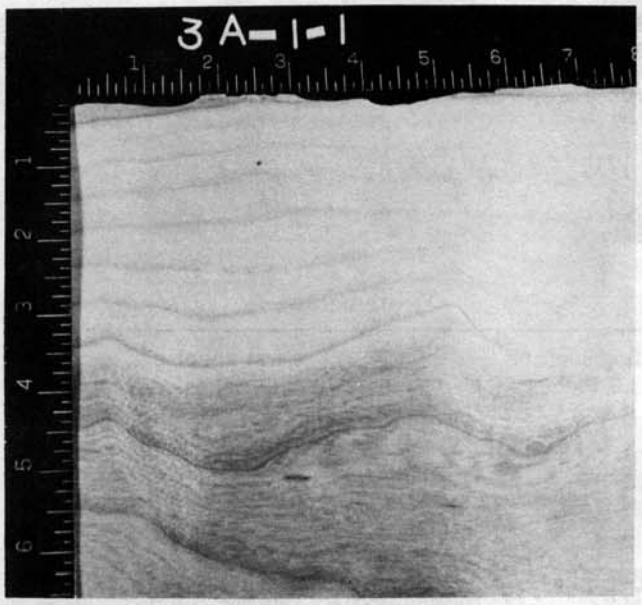
Suppressed Buds

Suppressed buds (commonly referred to as adventitious buds or dormant buds) can persist for many years as just a bud trace (Kormanik 1969), yet never become an epicormic branch (Fig. 2). However, these buds can sprout suddenly after a thinning, or when attacked by insects or infected by disease. Figure 3 shows a cross-section of a log (17.5 inches inside-the-bark) that was sawn right through several of these buds. Each of the bud traces goes from the bark to the pith, with little or no exterior indication that they existed.

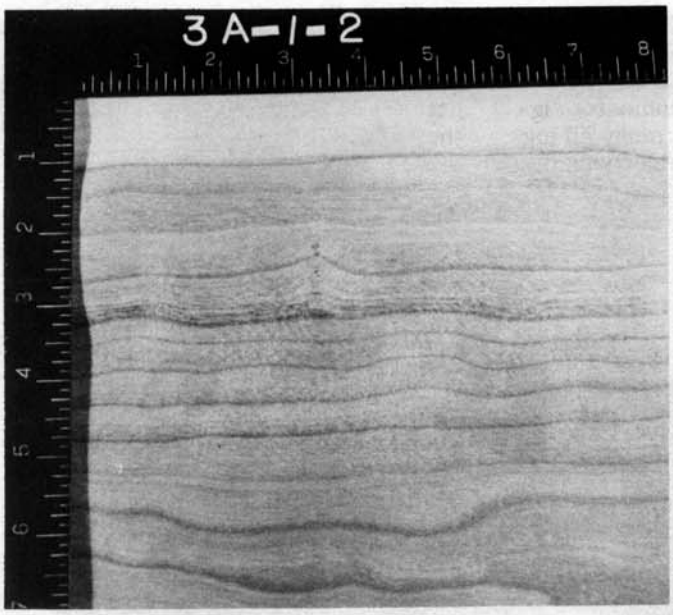
Figure 2.--Suppressed buds and associated internal defects.



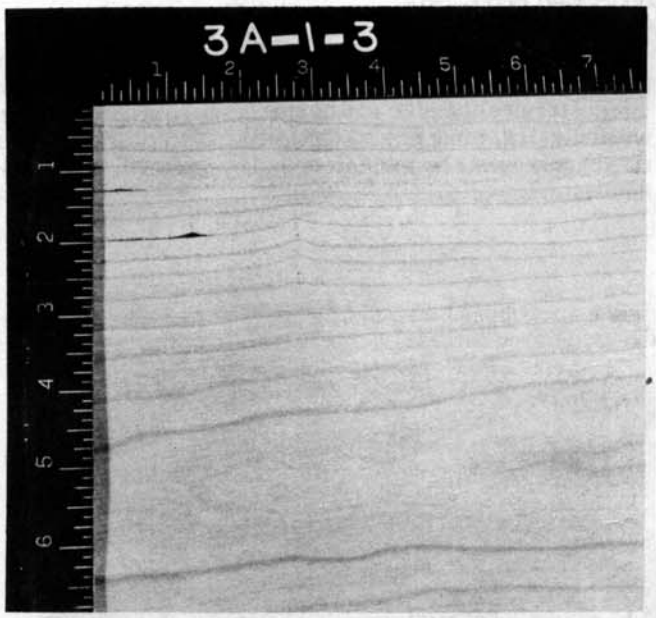
Defect size ..... 1/2 x 1/2 x 1/2 inch
Log diameter ..... 18.3 inches
Log diameter at defect ..... 18.9 inches
Flitch thickness at defect ..... 8.7 inches
Slab + round-up thickness at defect ... 1.5 inches
Log position ..... butt log



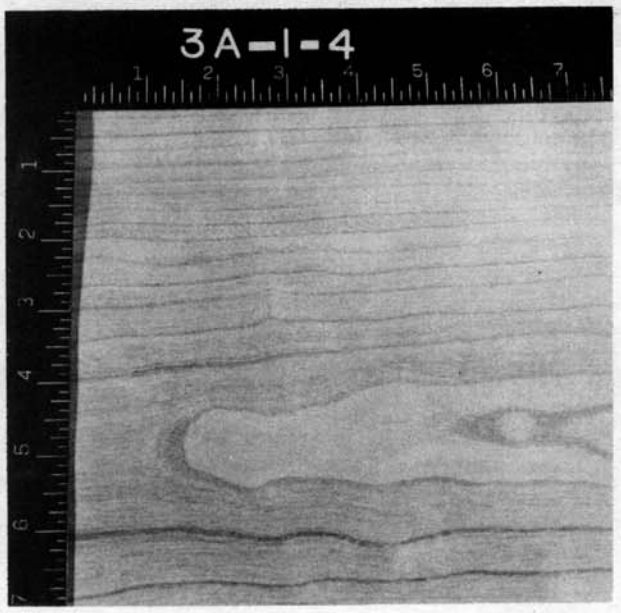
Depth below—	
Log surface	First sheet of veneer
1.5 inches	0.0 inches



Depth below—	
Log surface	First sheet of veneer
4.5 inches	3.0 inches



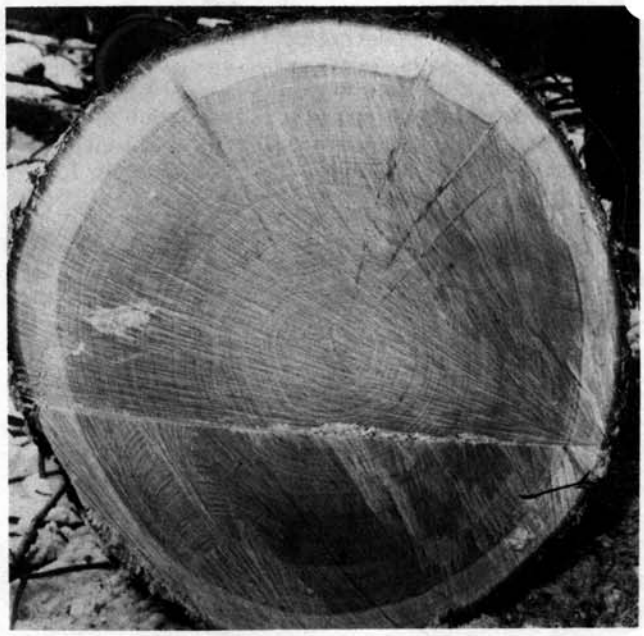
Depth below—	
Log surface	First sheet of veneer
6.5 inches	5.0 inches



Depth below—	
Log surface	First sheet of veneer
8.0 inches	6.5 inches

Total veneer thickness--6.7 inches

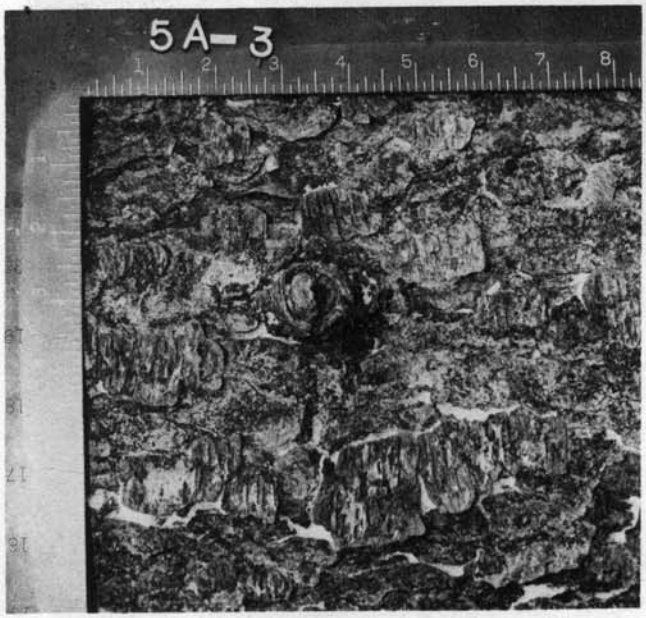
Figure 3.—Cross-sectional view of log showing bud traces of suppressed buds.

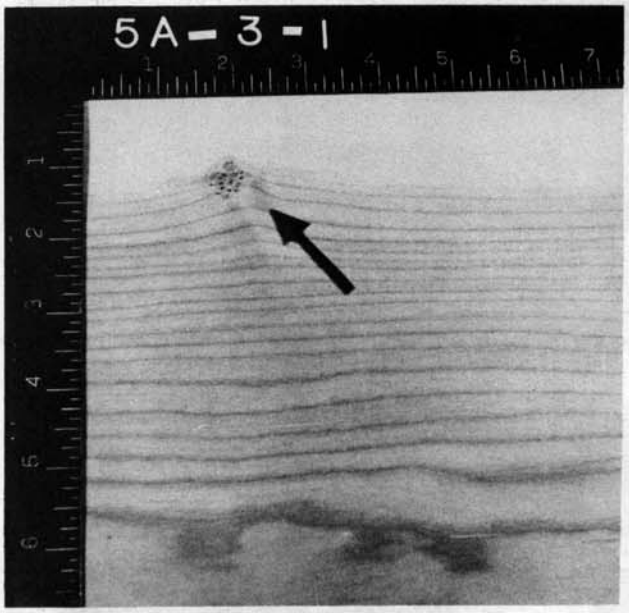


Suppressed Bud Cluster

The major differences between a single bud (or only 2 or 3 buds) and a bud cluster are the size of the defect indicator, evidence of concentric rings around the indicator, and the clustering of numerous knots that can be seen in the wood. Figure 4 shows both the concentric rings around the defect indicator on the bark surface and the many adventitious knots in the underlying wood.

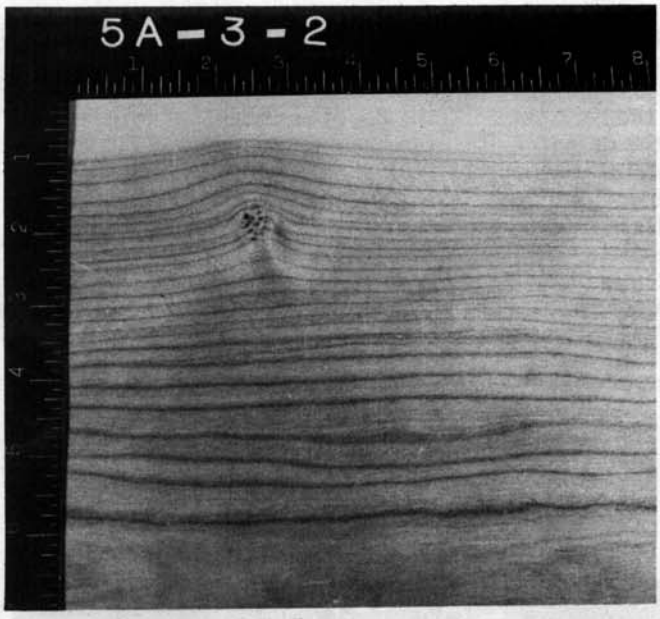
Figure 4.—Suppressed bud cluster and associated internal defects.





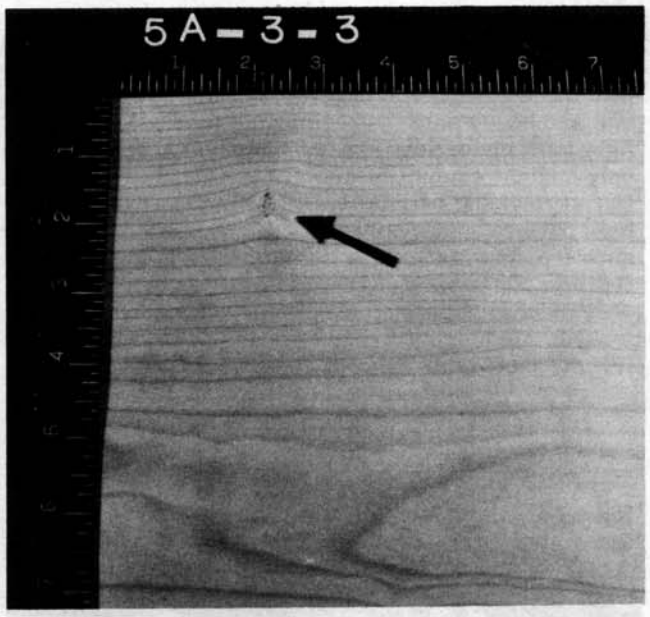
Defect size	1 1/2 x 1 x 1 inches
Log diameter	15.6 inches
Log diameter at defect	15.8 inches
Flitch thickness at defect	6.6 inches
Slab + round-up thickness at defect	2.4 inches
Log position	upper log

Depth below—	
Log surface	First sheet of veneer
2.4 inches	0.0 inches



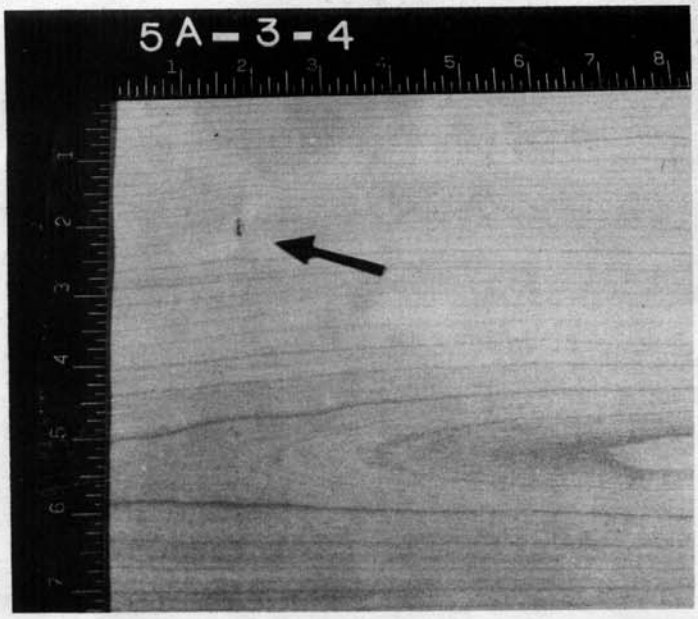
Depth below—

Log surface	First sheet of veneer
4.4 inches	2.0 inches



Depth below—

Log surface	First sheet of veneer
5.4 inches	3.0 inches



Depth below—

Log surface	First sheet of veneer
5.9 inches	3.5 inches

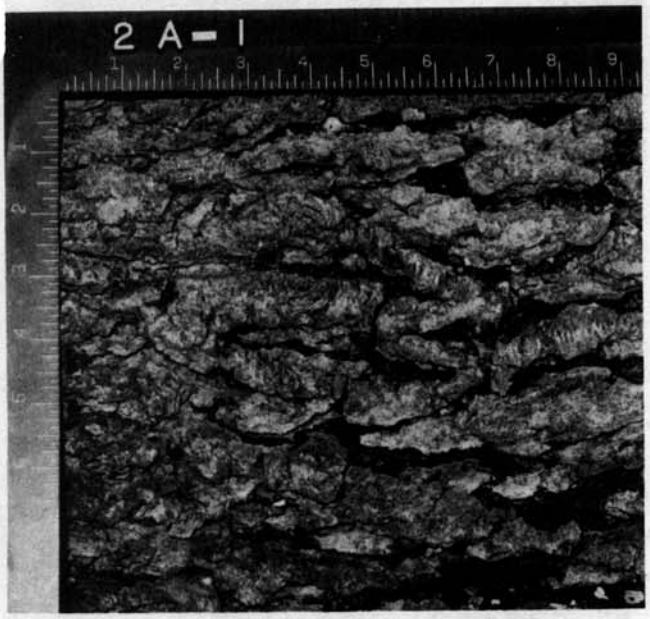
Total veneer thickness—3.7 inches

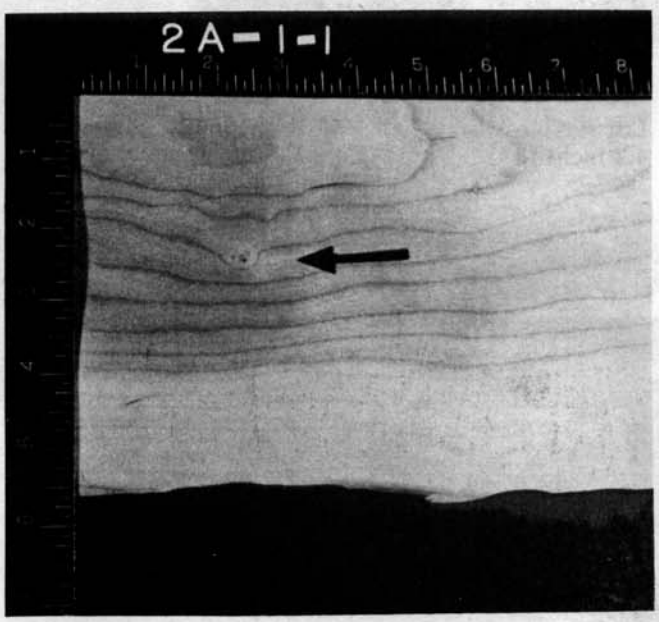
Bark Distortions

Bark distortions—those that are flush with the bark—are subdivided into three categories: light, medium, and heavy bark distortions. A light bark distortion (Fig. 5) shows only a slight amount of curvature in the surrounding bark plates, and the bark pattern shows only slight variance from normal. Because of these features, light bark distortions are very inconspicuous and often overlooked. Medium bark distortions (Fig. 6) show more signs of the concentric circles, but they are broken by flat bark plates or regular bark patterns. Also, there is usually a well-defined break in the bark pattern in the center of the defect indicator. Heavy bark distortions (Fig. 7) are normally identified by the characteristic pattern of concentric circles encompassing the defect indicator. Often in black cherry these rings are concentrated on one side of the defect indicator.

All bark distortions will result in some product degrade, but the amount of degrade will decrease as the depth to the initial defect below the log surface increases. For these bark distortions, if we adjusted for log diameter, then the depth below the log surface to the first sign of the defect would be 5-1/2 inches, 3-1/2 inches, and less than 1/2 inch, respectively.

Figure 5.--Light bark distortion and associated internal defects.



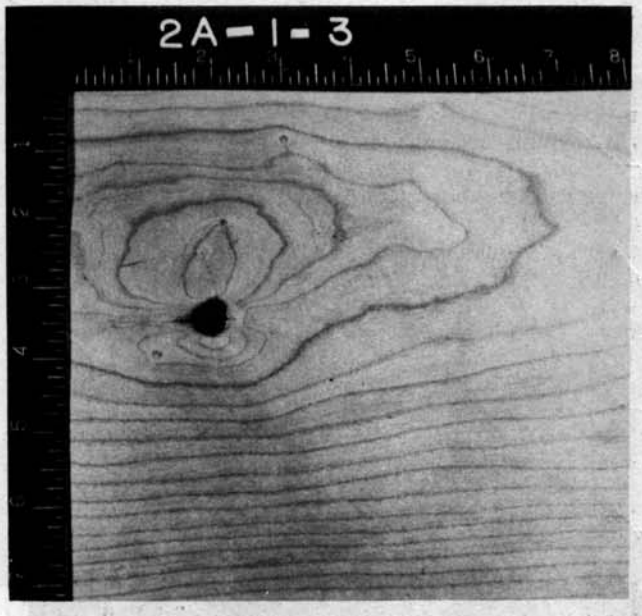


Defect size	2 x 2 inches
Log diameter	17.5 inches
Log diameter at defect	18.1 inches
Flitch thickness at defect	7.2 inches
Slab + round-up thickness at defect	2.1 inches
Log position	upper log

Depth below—	
Log surface	First sheet of veneer
2.6 inches	0.5 inches

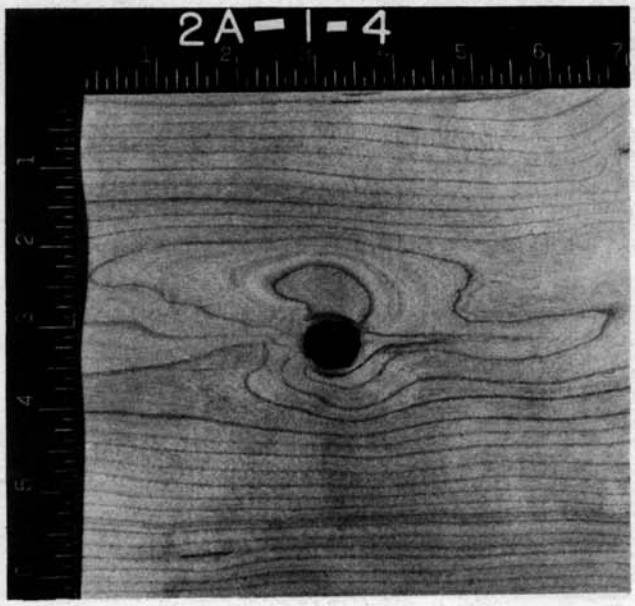
Depth below—

Log surface	First sheet of veneer
4.1 inches	2.0 inches



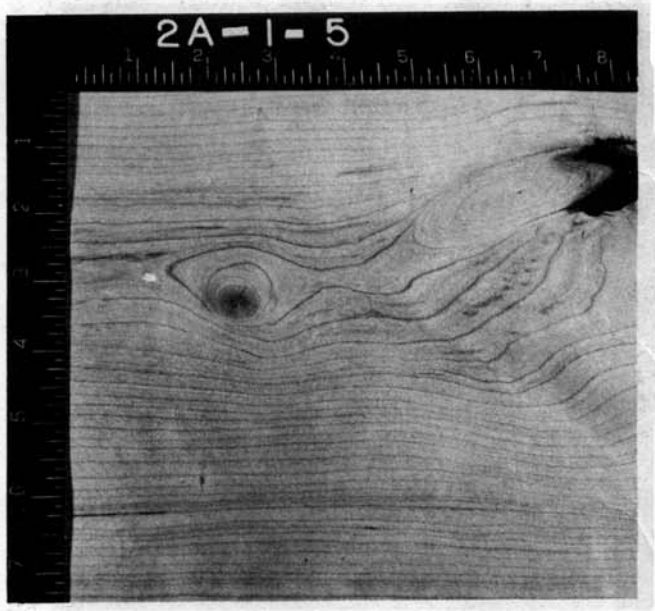
Depth below—

Log surface	First sheet of veneer
4.6 inches	2.5 inches



Depth below—

Log surface	First sheet of veneer
6.6 inches	4.5 inches

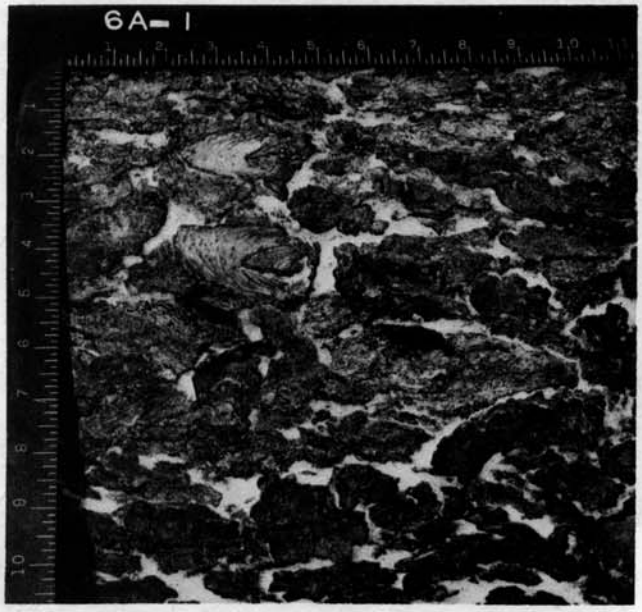


Depth below—

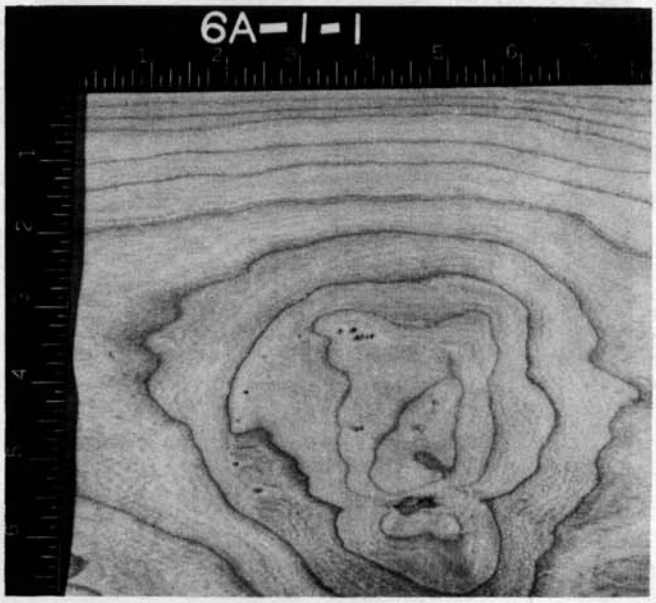
Log surface	First sheet of veneer
7.3 inches	5.2 inches

Total veneer thickness—5.2 inches

Figure 6.—Medium bark distortions and associated internal defects. (Both are medium bark distortions—data on lower one).

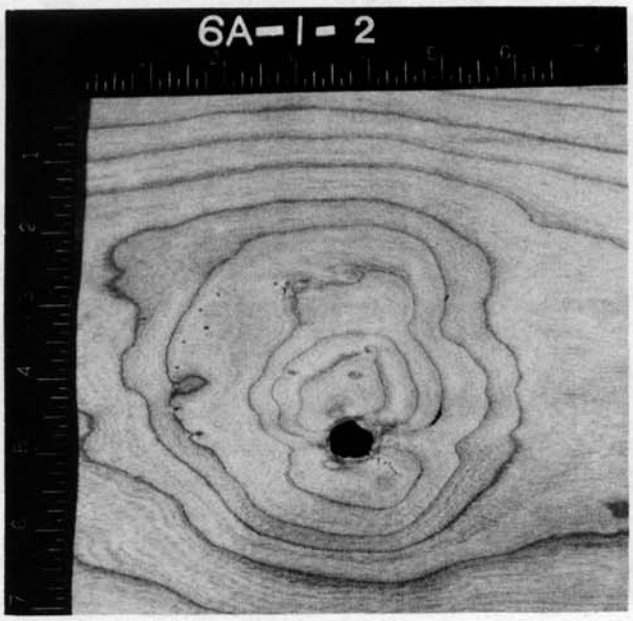


Defect size ..... 1 1/2 x 3 inches
Log diameter ..... 20.2 inches
Log diameter at defect ..... 20.4 inches
Flitch thickness at defect ..... 9.4 inches
Slab + round-up thickness at defect ... 1.3 inches
Log position ..... butt log



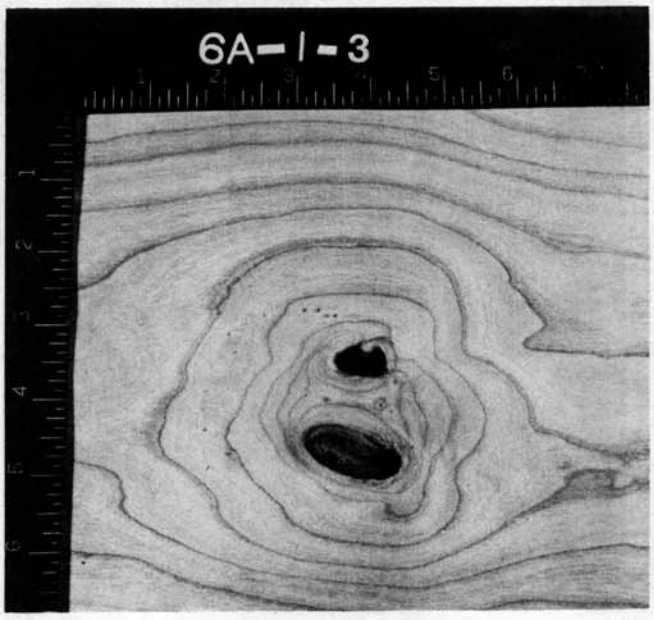
Depth below—

Log surface	First sheet of veneer
3.8 inches	2.5 inches



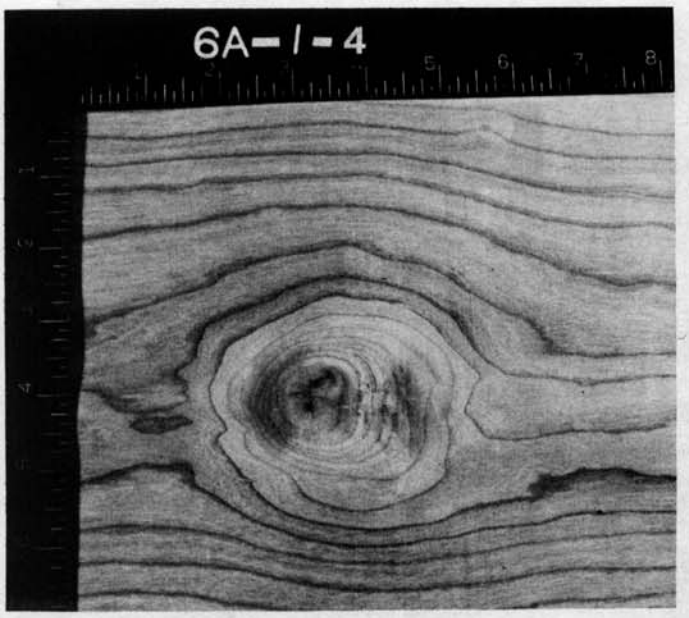
Depth below—

Log surface	First sheet of veneer
4.3 inches	3.0 inches

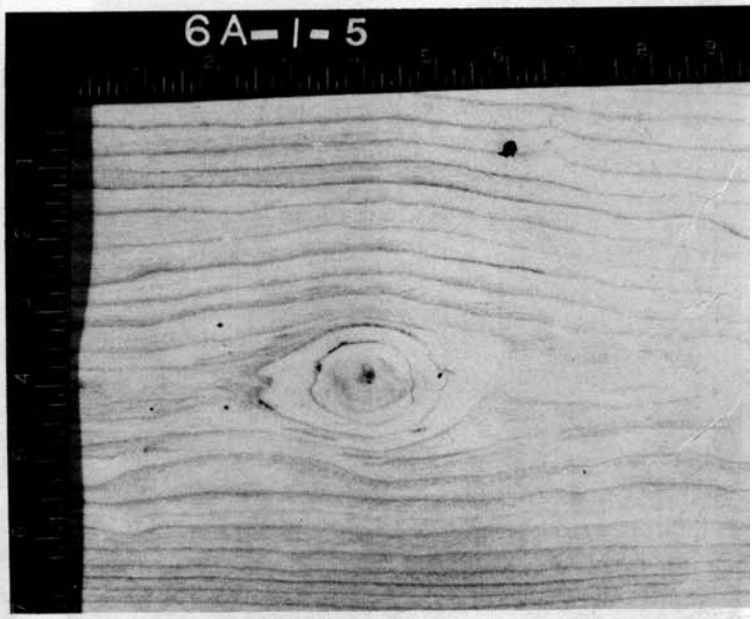


Depth below—

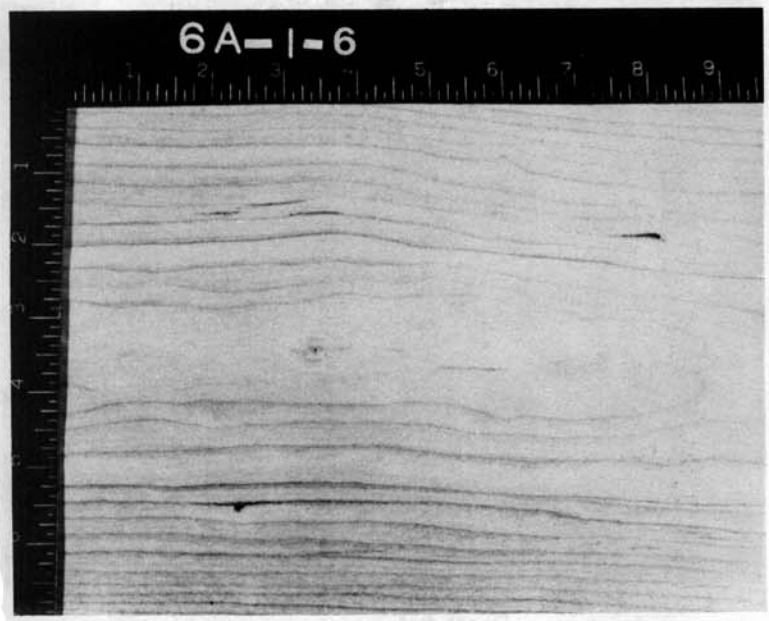
Log surface	First sheet of veneer
4.8 inches	3.5 inches



Depth below—	
Log surface	First sheet of veneer
5.8 inches	4.5 inches



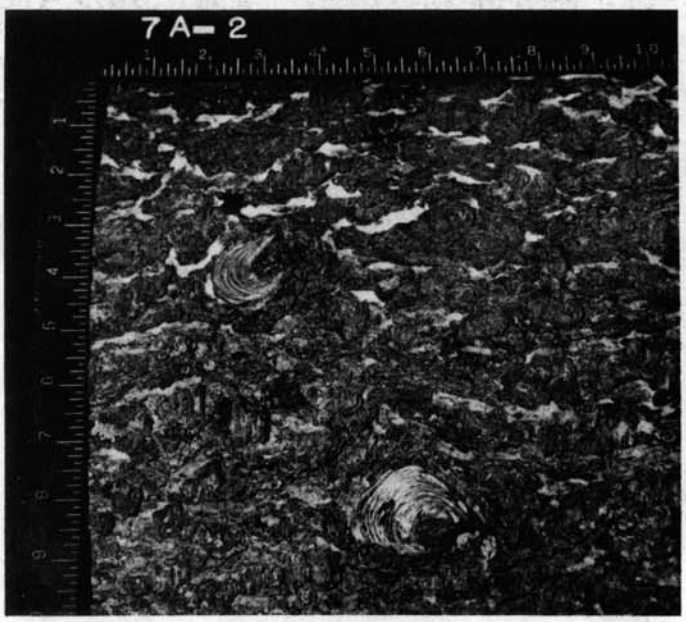
Depth below—	
Log surface	First sheet of veneer
6.3 inches	5.0 inches



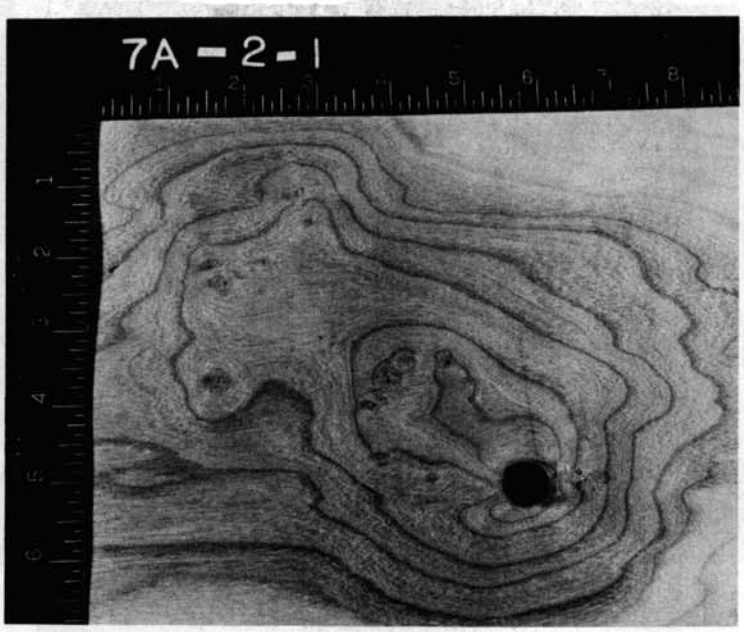
Depth below—	
Log surface	First sheet of veneer
6.8 inches	5.5 inches

Total veneer thickness—7.0 inches

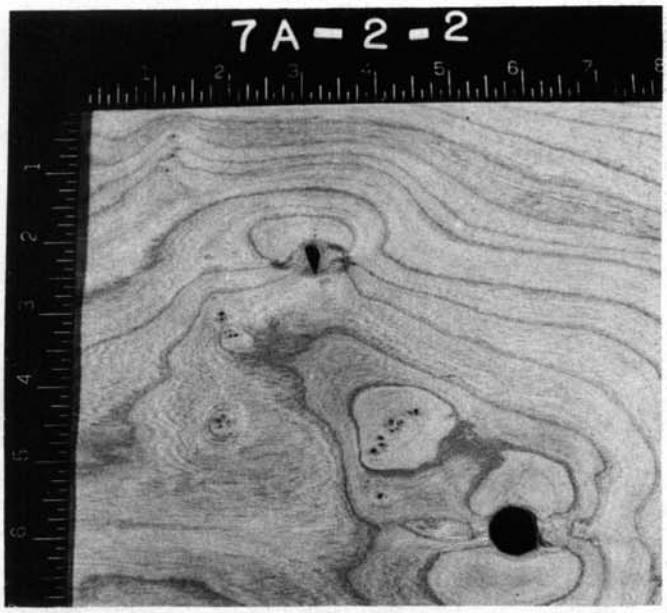
Figure 7.--Heavy bark distortions and associated internal defects. (Both are heavy bark distortions--data on lower one.)



Defect size ..... 1 1/2 x 2 inches
Log diameter ..... 20.6 inches
Log diameter at defect ..... 21.1 inches
Flitch thickness at defect ..... 10.5 inches
Slab + round-up thickness at defect ... 0.5 inches
Log position ..... butt log

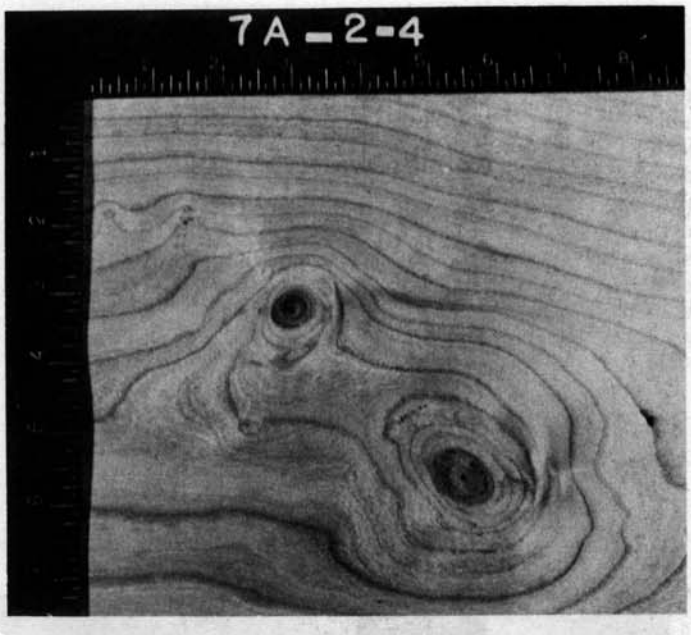


Depth below--	
Log surface	First sheet of veneer
0.5 inches	0.0 inches

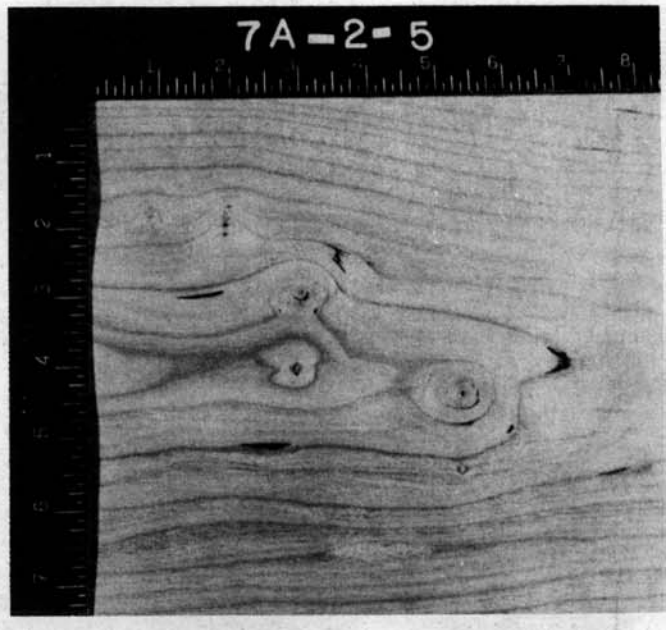


Depth below--	
Log surface	First sheet of veneer
1.5 inches	1.0 inches

Depth below--	
Log surface	First sheet of veneer
2.5 inches	2.0 inches



Depth below—	
Log surface	First sheet of veneer
3.2 inches	2.7 inches



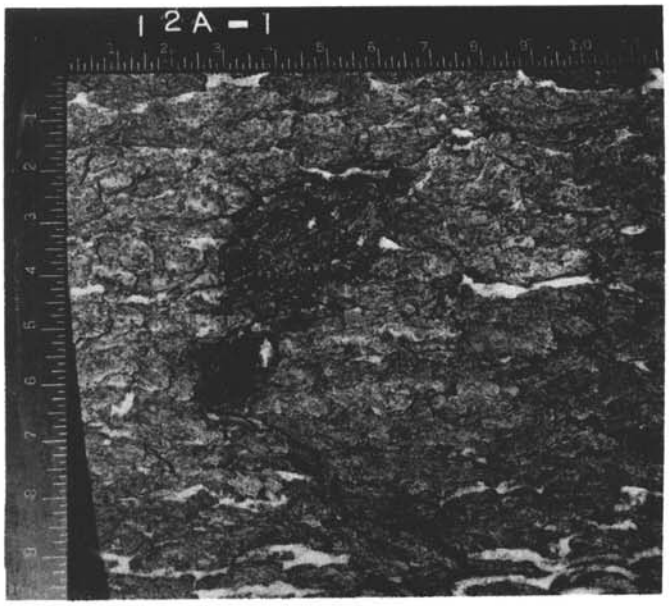
Depth below—	
Log surface	First sheet of veneer
4.5 inches	4.0 inches

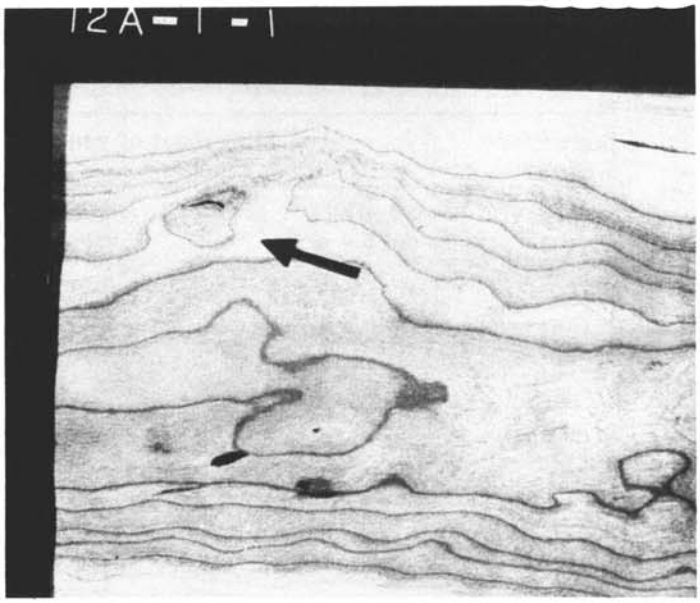
Total veneer thickness—8.2 inches

Wounds

Wounds fall into two categories: sound and unsound. Sound wounds may or may not be degraders depending on their age and depth. If a wound is recent and will be slabbed off during sawing, or deep and likely to be contained in the heart center of the log, then it results in very little degrade. Figure 8 shows a sound wound that did not slab off, but would not be a degrader based on USDA Forest Service grades for factory lumber logs (Rast et al. 1973) since its maximum depth in the logs is only 2.5 inches (15 percent of the log diameter is 2.7). But for veneer logs, this defect is a degrader since it affects the first 40 sheets of veneer. The surrounding bark plates show a distinct break from the callus tissue over the wound, but some breaks showing across the wound callus itself are characteristic of this type of wound.

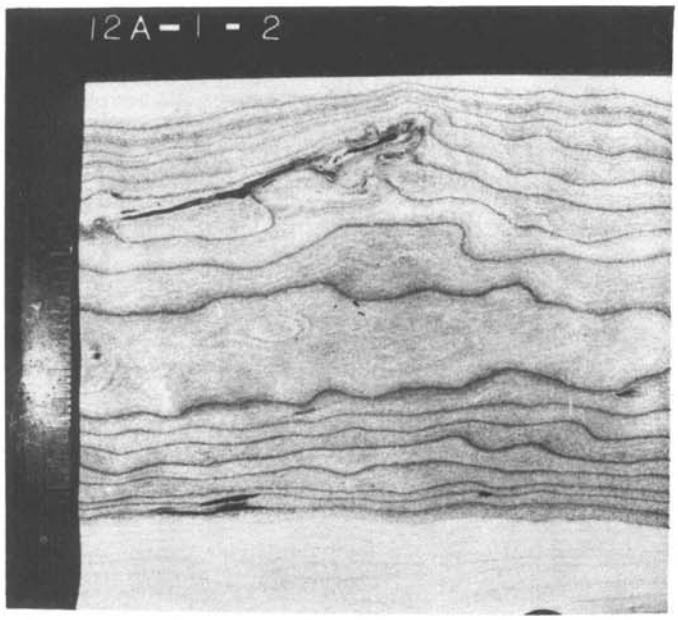
Figure 8.--Overgrown sound wound and associated internal defects.





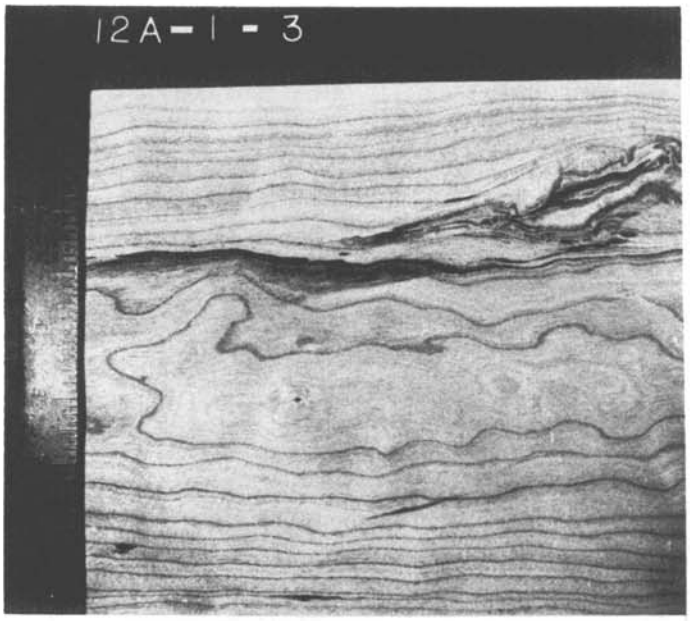
Defect size ..... 3 1/2 x 3 inches
Log diameter ..... 17.3 inches
Log diameter at defect ..... 17.7 inches
Flitch thickness at defect ..... 8.5 inches
Slab + round-up thickness at defect ... 1.3 inches
Log position ..... butt log

Depth below--	
Log surface	First sheet of veneer
1.3 inches	0.0 inches



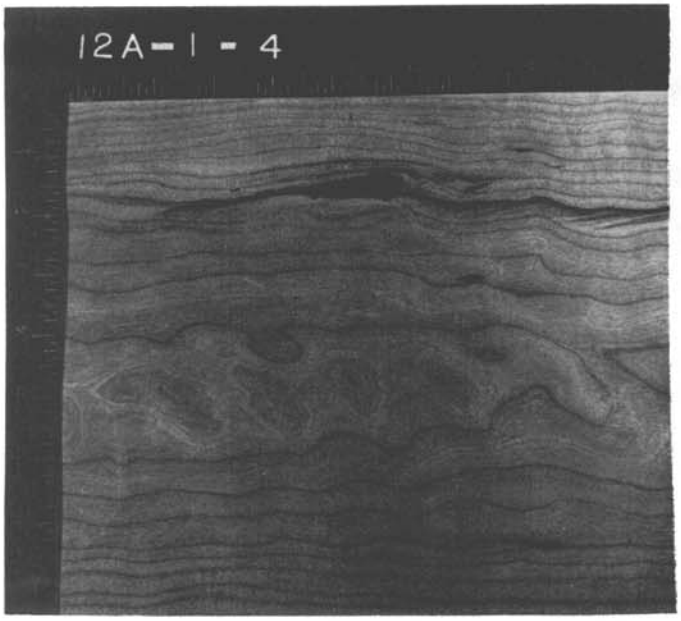
Depth below—

Log surface	First sheet of veneer
1.5 inches	0.2 inches



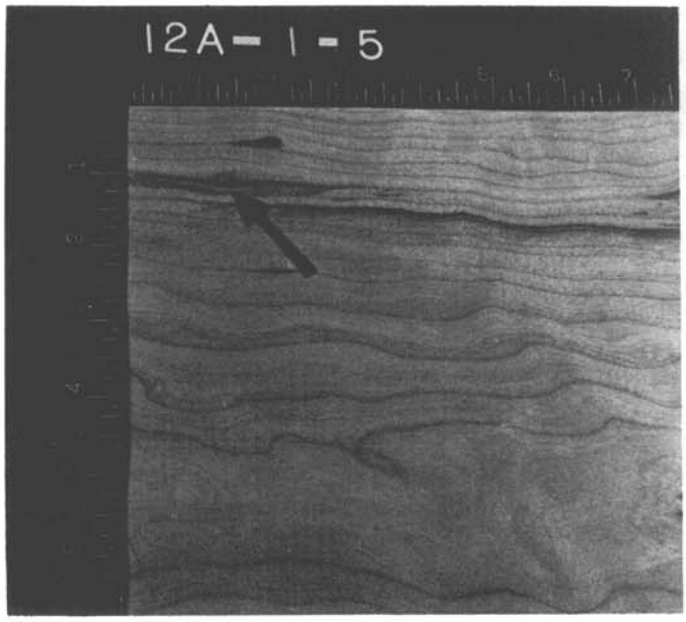
Depth below—

Log surface	First sheet of veneer
1.8 inches	0.5 inches



Depth below—

Log surface	First sheet of veneer
2.2 inches	0.9 inches



Depth below—

Log surface	First sheet of veneer
2.5 inches	1.2 inches

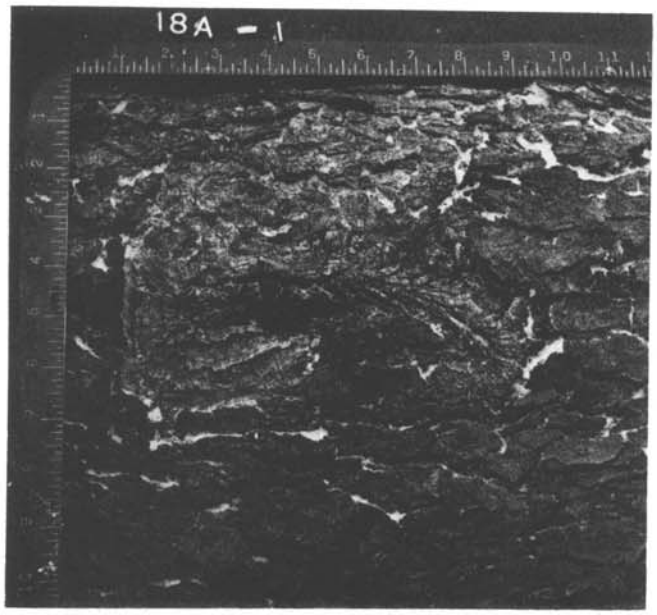
Total veneer thickness—5.4 inches

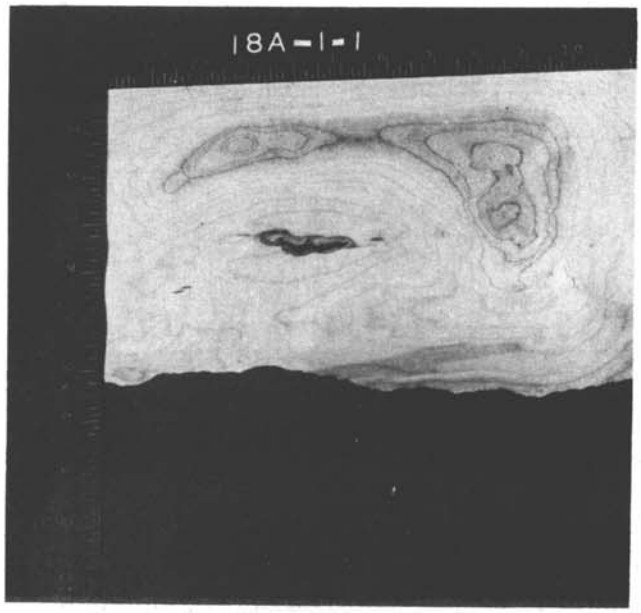
Wounds that develop callus tissue above the normal curvature of the log surface (height) normally have rot associated with them. The size (8 x 4 inches) and the height (1 inch) of the unsound wound shown in Figure 9 are good indicators of the major degrade caused by this type of defect. In the last defect photos, you can see that this wound occurred over an overgrown knot.

Seams

Overgrown seams, one of the exterior indicators of radial shakes, are serious degraders in logs and trees. A common misconception is that seams are caused by frost, but most often they are initiated by wounds or limb stubs (Butin 1981; Shigo 1969). However, frost is one of the major factors in maintaining the stress that causes the seams to persist for many years. Seams with a line of callus and a depressed area (Fig. 10) normally have encased bark that is evidenced as a hole in sliced veneer. This type of defect is serious in logs used to produce lumber or veneer.

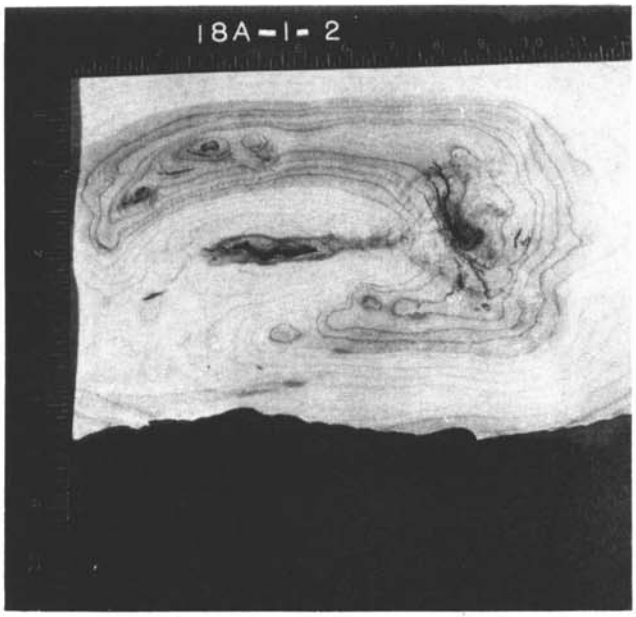
Figure 9.—Overgrown unsound wound and associated internal defects.





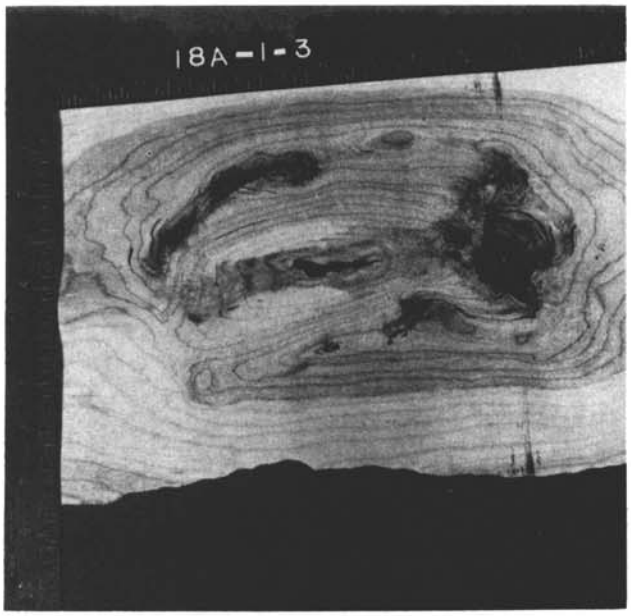
Defect size	8 x 4 x 1 inches
Log diameter	15.1 inches
Log diameter at defect	15.4 inches
Flitch thickness at defect	6.8 inches
Slab + round-up thickness at defect	1.0 inches
Log position	butt log

Depth below—	
Log surface	First sheet of veneer
1.0 inches	0.0 inches



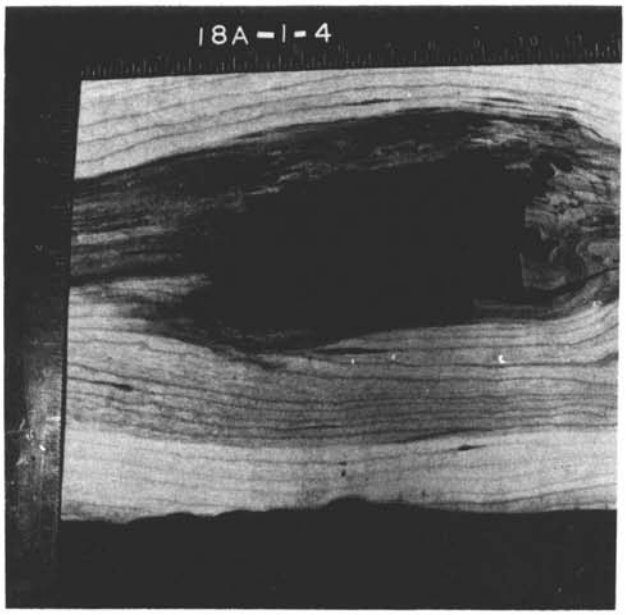
Depth below—

Log surface	First sheet of veneer
1.2 inches	0.2 inches



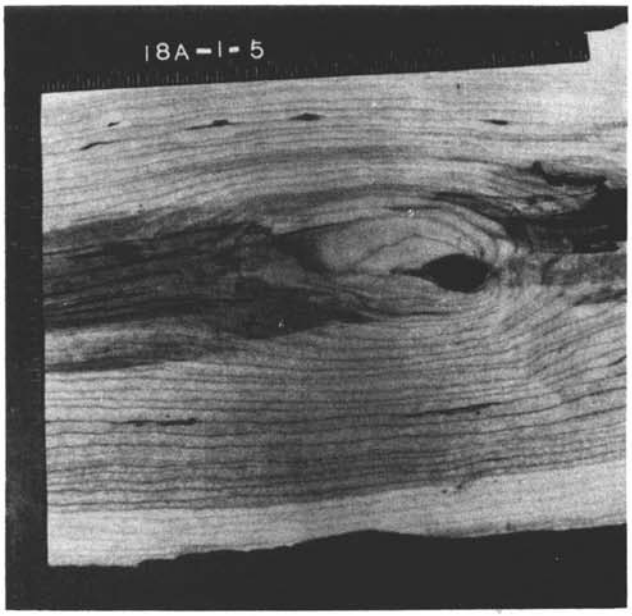
Depth below—

Log surface	First sheet of veneer
1.5 inches	0.5 inches



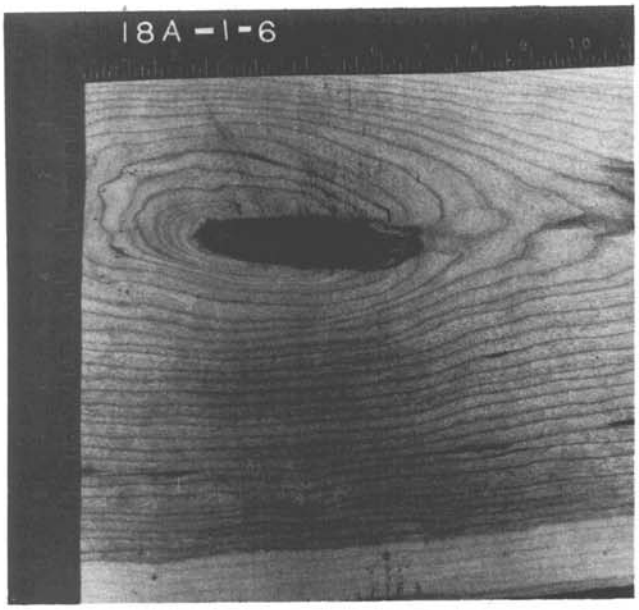
Depth below—

Log surface	First sheet of veneer
2.0 inches	1.0 inches



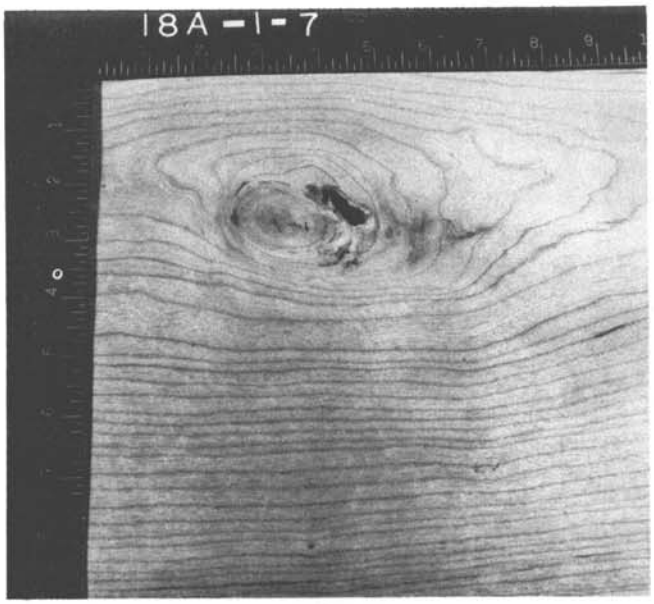
Depth below—

Log surface	First sheet of veneer
2.5 inches	1.5 inches



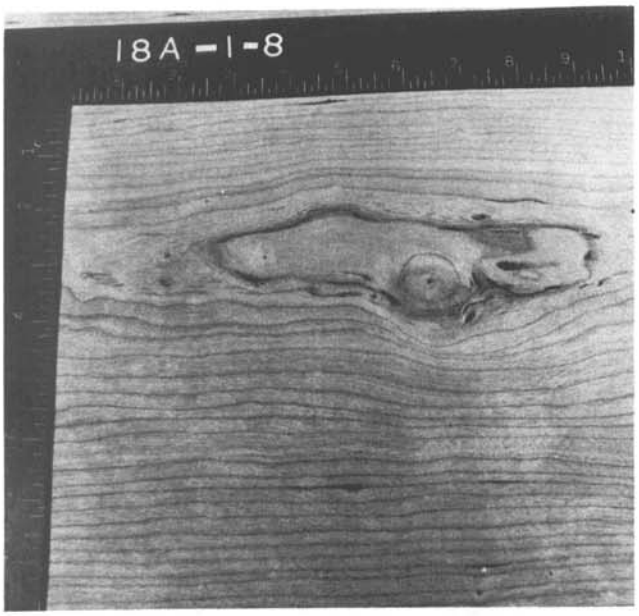
Depth below—

Log surface	First sheet of veneer
3.0 inches	2.0 inches



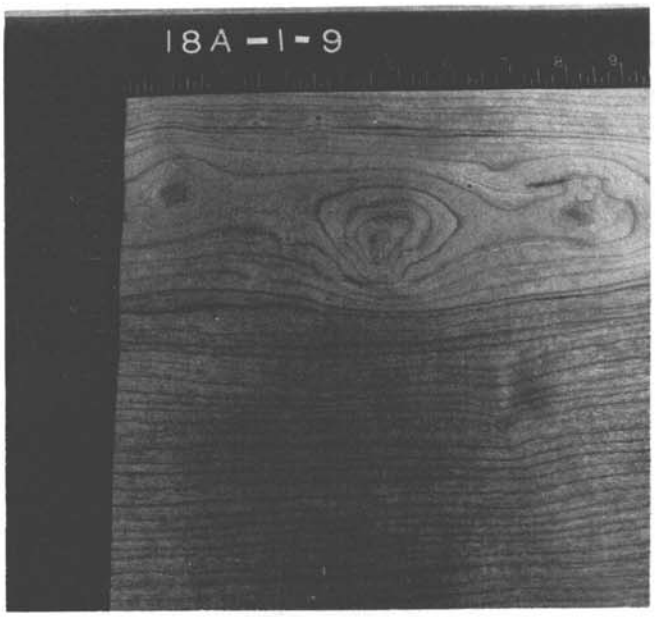
Depth below—

Log surface	First sheet of veneer
4.0 inches	3.0 inches



Depth below—

Log surface	First sheet of veneer
4.5 inches	3.5 inches

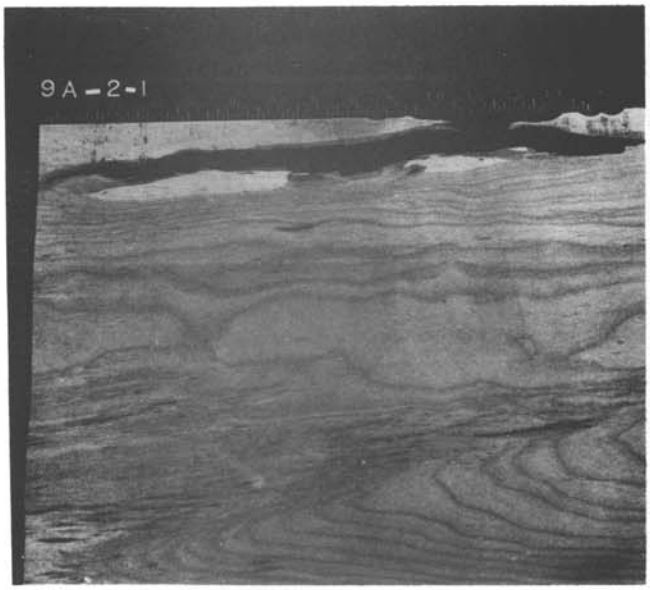


Depth below—

Log surface	First sheet of veneer
5.0 inches	4.0 inches

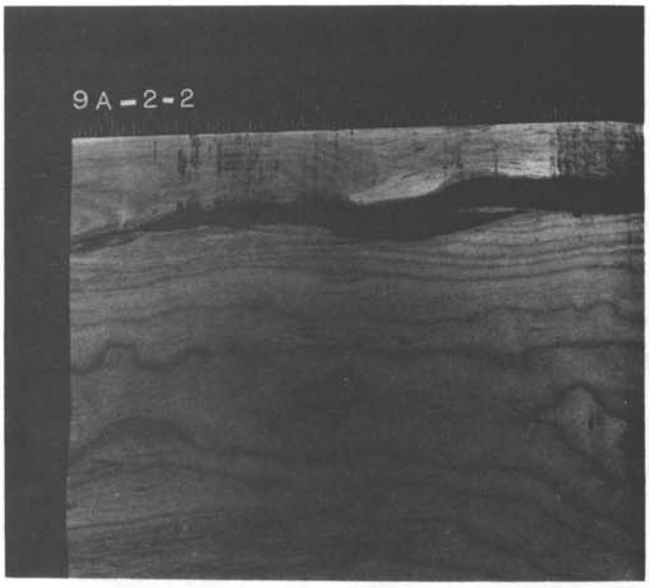
Total veneer thickness—4.9 inches

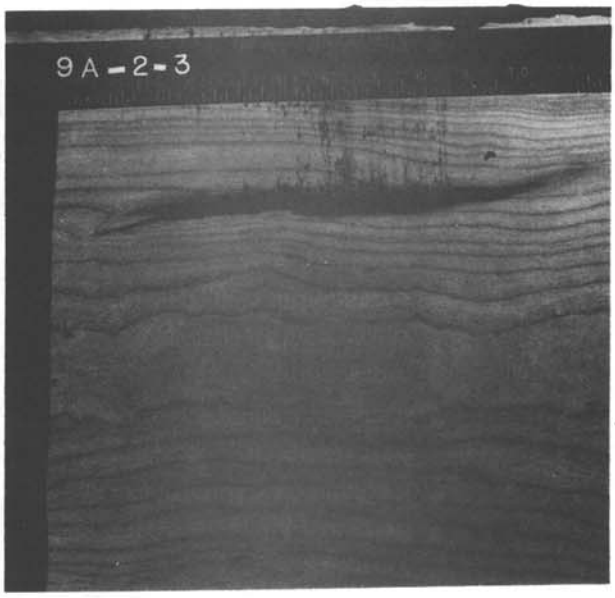
Figure 10.—Overgrown seam and associated internal defects.



Defect size ..... 14 x 2 inches
Log diameter ..... 17.2 inches
Log diameter at defect ..... 17.3 inches
Flitch thickness at defect ..... 7.3 inches
Slab + round-up thickness at defect ... 2.8 inches
Log position ..... butt log

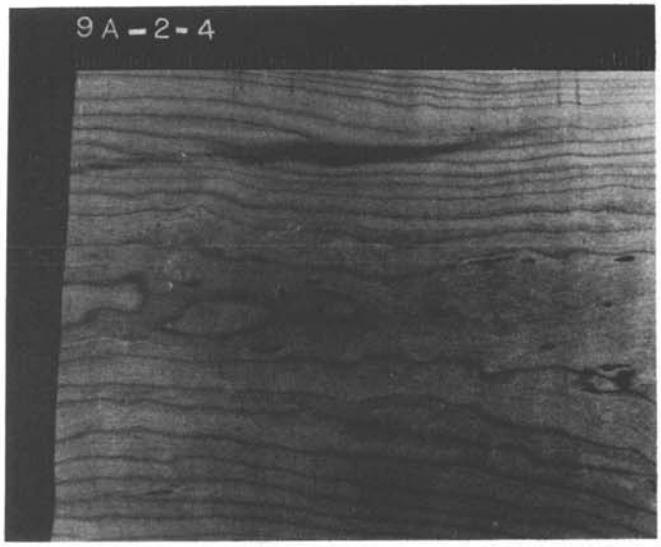
Depth below—	
Log surface	First sheet of veneer
2.8 inches	0.0 inches



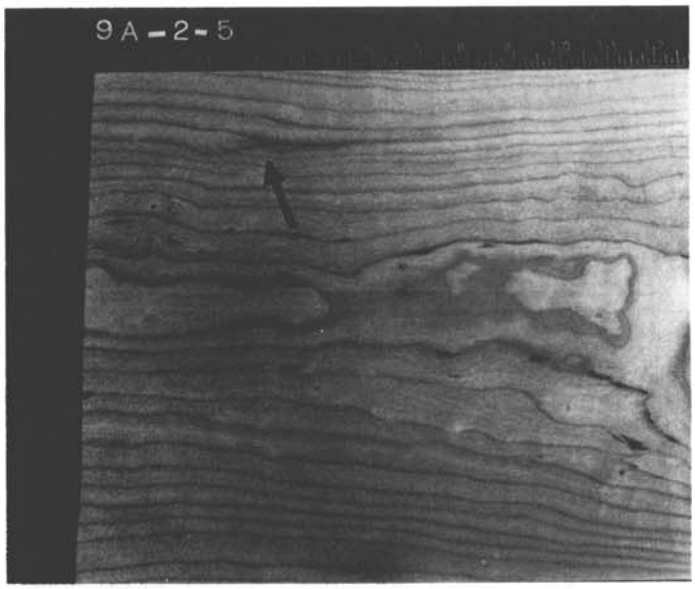


Depth below—	
Log surface	First sheet of veneer
3.8 inches	1.0 inches

Depth below—	
Log surface	First sheet of veneer
4.0 inches	1.2 inches



Depth below—	
Log surface	First sheet of veneer
4.1 inches	1.3 inches



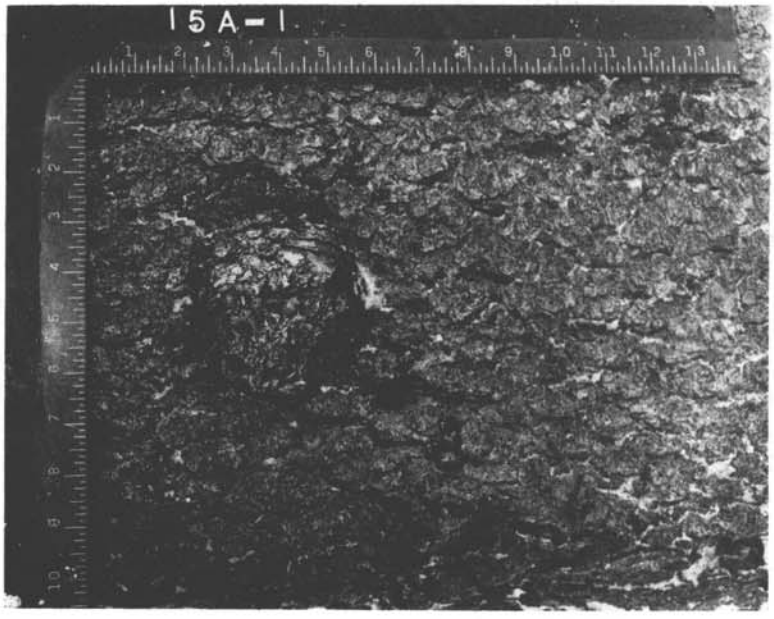
Depth below—	
Log surface	First sheet of veneer
4.2 inches	1.4 inches

Total veneer thickness—3.7 inches

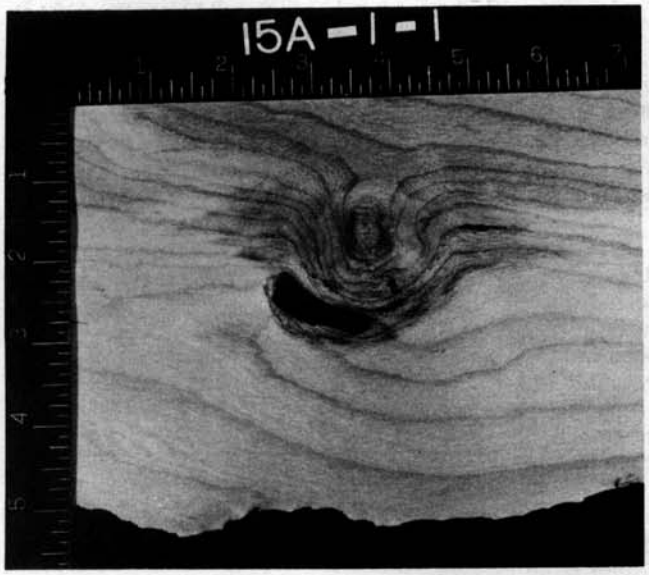
Figure 11.—Burl and associated internal defects.

Burls

Burls are the surface indicators of distorted grain, and often they contain ingrown bark, rot, and epicormic knots. Figure 11 shows a typical burl on black cherry with a small amount of ingrown bark. Since this burl occurred less than one foot above the stump, more than 2 inches was slabbed off due to butt swell, yet the bark and distorted grain are still evident.

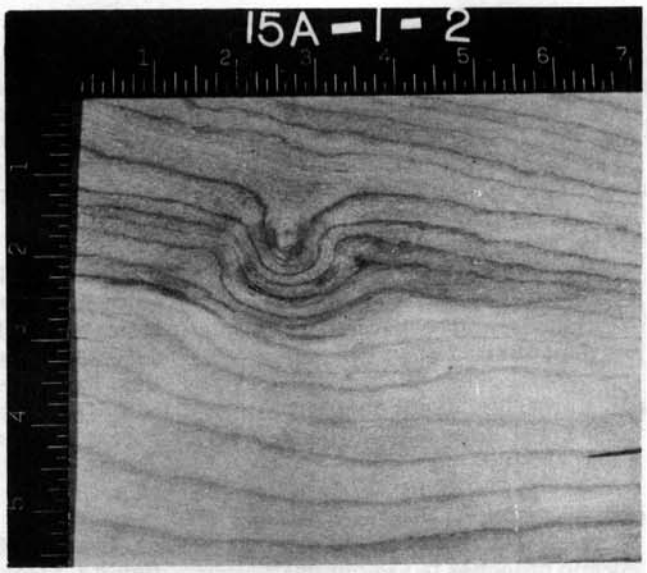


Defect size ..... 3 x 3 x 1 1/2 inches
Log diameter ..... 18.2 inches
Log diameter at defect ..... 19.2 inches
Flitch thickness at defect ..... 7.8 inches
Slab + round-up thickness at defect ... 3.1 inches
Log position ..... butt log



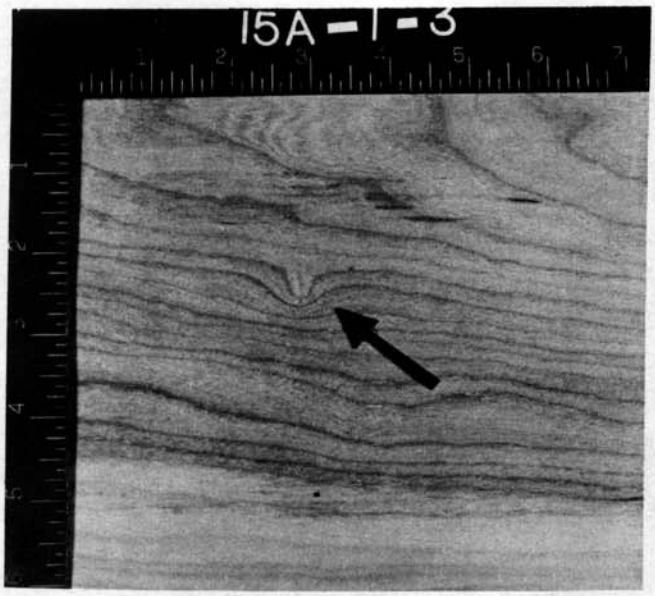
Depth below—

Log surface	First sheet of veneer
3.1 inches	0.0 inches



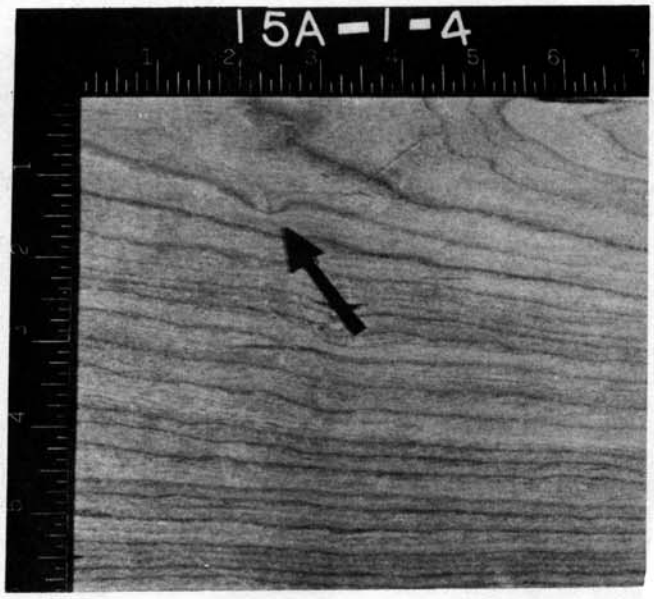
Depth below—

Log surface	First sheet of veneer
3.6 inches	0.5 inches



Depth below—

Log surface	First sheet of veneer
4.1 inches	1.0 inches



Depth below—

Log surface	First sheet of veneer
4.6 inches	1.5 inches

Total veneer thickness—4.8 inches

Literature Cited

Boyce, John S. **Forest pathology.** New York: McGraw-Hill Book Co., Inc; 1948. 550 p.

Butin, Heinz; Shigo, Alex L. **Radial shakes and "frost cracks" in living trees.** Res. Pap. NE-478. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1981. 21 p.

Esau, Katherine. **Plant anatomy.** New York: John Wiley & Sons; 1965: 767 p.

Kormanik, Paul P.; Brown, Claud L. **Origin and development of epicormic branches in sweetgum.** Res. Pap. SE-54. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1969. 17 p.

National Hardwood Lumber Association. **Rules for the measurement and inspection of hardwood and cypress.** Memphis, TN: National Hardwood Lumber Association; 1982. 115 p.

Rast, Everette D. **Photographic guide of selected external defect indicators and associated internal defects in Northern Red Oak.** Res. Pap. NE-511. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982. 20 p.

Rast, Everette D.; Sonderman, David L.; Gammon, Glenn L. **A guide to hardwood log grading.** Gen. Tech. Rep. NE-1. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1973. 32 p.

Shigo, Alex L.; Larson, Edwin vH. **A photo guide to the patterns of discoloration and decay in living northern hardwood trees.** Res. Pap. NE-127. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1969. 100 p.

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Rast, Everette D.; Beaton, John A. **Photographic guide to selected external defect indicators and associated internal defects in black cherry.** Res. Pap. NE-560. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1985. 22 p.

To properly classify or grade logs or trees, one must be able to correctly identify defect indicators and assess the effect of the underlying defect on possible end products. This guide aids the individual in identifying the surface defect indicator and also shows the progressive stages of the defect throughout its development for black cherry. It illustrates and describes seven types of external defect indicators and associated defects that are particularly difficult to evaluate.

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