

THE HARDWOOD LUMBER INDUSTRY OF THE EASTERN HIGHLAND RIM

GEORGE W. WEBB

Tennessee Polytechnic Institute

THE REGION

One of the major industries of Tennessee is the production of hardwood lumber and its derivatives, and Tennessee is one of the nation's important sources of these commodities. Among the hardwoods of Tennessee those of the Appalachian Highlands are considered by hardwood consumers to be superior. As a result of environmental factors in these highlands—climate, altitude, rock formations, slope, and soils—the forests of the Appalachian Highlands differ from place to place, particularly from one physiographic province to another. These forces have tended to set apart the forests of the Eastern Highland Rim of Middle Tennessee and south-central Kentucky from the rest of the Appalachian Highlands.

Only by the action of the Appalachian Hardwood Manufacturers Inc. is the Eastern Highland Rim a part of the Appalachian hardwood producing territory, the Highland Rim usually is considered geographically a part of the Interior Low Plateaus rather than the Appalachian Highlands. When the Appalachian hardwood producing territory was first defined, the western boundary in Tennessee coincided roughly with the western limit of the Cumberland Plateau. The OPA definition of the territory in 1942 moved the western boundary 40 to 50 miles to the east of that location and placed it in the center of Walden's Ridge, from whence it meandered northwestward to the Kentucky line. As a result, a large section of Tennessee where the altitude ranged from 1,000 to more than 2,000 feet was not regarded as Appalachian, and the lumber produced therein legally could not be sold as such. This was vital to the producers, for the OPA allowed higher ceiling prices on Appalachian than on lowland hardwoods, and consumers recognize the superiority of Appalachian hardwoods.

Even though consumers dealt directly with producers, for some years there was confusion due to the exclusion from the official territory of two highland divisions of Tennessee—the Eastern Highland Rim and the Cumberland Plateau. In an effort to remedy this state of affairs, the Appalachian Hardwood Manufacturers, Inc. appointed a special committee to make a study of the region, and to define an area on the basis of altitude and topography which would be recognized as "Appalachian."

In August, 1951, the manufacturers announced the adoption of a resolution which defined the area to be recognized as the Appalachian hardwood producing territory.¹ This territory was defined as shown in Figure I. County boundaries were employed, but the definition was written to place the western boundary, the one in which we are here particularly interested, in close proximity to the 1,000 feet altitude level.

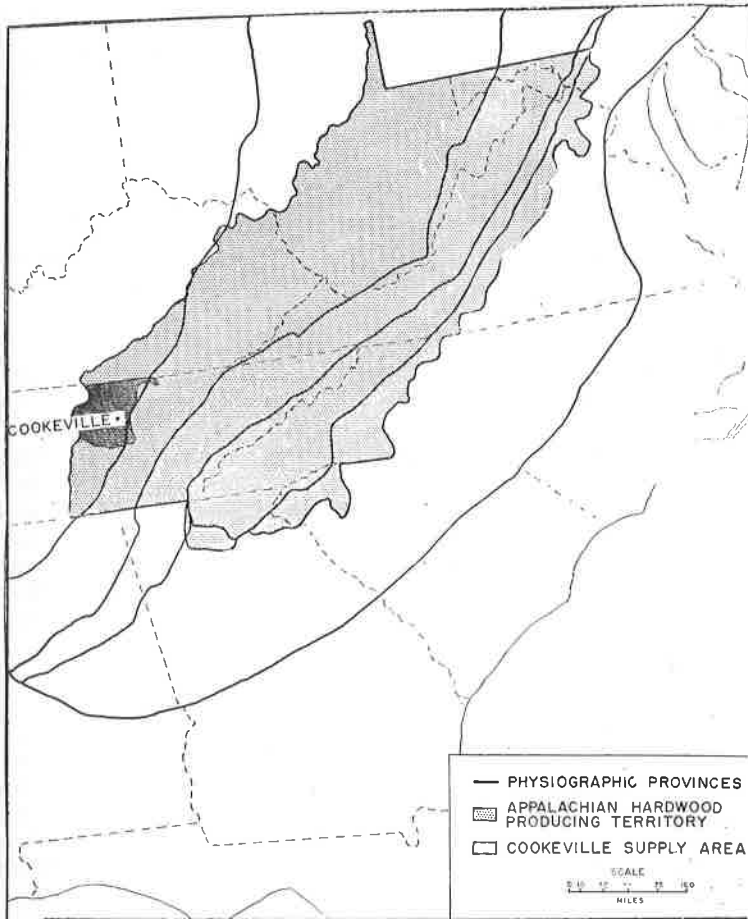


FIG. I. APPALACHIAN HARDWOOD PRODUCING TERRITORY RELATED TO THE PHYSIOGRAPHIC PROVINCES

¹ "Appalachian Area Officially Defined," *Southern Lumberman*, Sept. 1, 1951, p. 32.

In Tennessee, as can be observed in Figure I, the western limit of the Appalachian hardwood producing territory corresponds fairly well with the eastern edge of the Nashville Basin. From the Tennessee-Kentucky border, this western limit strikes northeast across Kentucky until it meets the western edge of the Cumberland Plateau.

Since industry has established a boundary on the west and northwest, and nature has provided a boundary on the southeast, a triangular area is enclosed which may properly be referred to as the Eastern Highland Rim hardwood lumber region. The boundary of this region on the west and northwest is the western extent of the Appalachian hardwood producing territory, while that on the southeast is the western escarpment of the Cumberland Plateau. The location of this region is shown on the accompanying maps. Infertile, sandy soils on the Plateau, resulting in poorer quality timber, are largely responsible for the location of the eastern limit. The map in Figure I was compiled especially to portray the position of the Eastern Highland Rim hardwood region relative to the whole Appalachian hardwood producing territory and to the physiographic provinces of the Appalachian Highlands.

THE PHYSICAL BASE

The Eastern Highland Rim, with an altitude of about 1,000 feet, has an undulating surface in the east adjacent to the Plateau. The western edge, along the Nashville Basin, is much dissected, so that there the topography is characteristically hilly and rough. In the south this province is drained by the Elk and Duck rivers, in the central section by the Stones and Caney Fork rivers, and in the north by the Obey and Cumberland rivers. Tributaries of these streams, especially the Caney Fork and the Cumberland, have cut their way back through the Rim and even into the Plateau producing deep valleys and a rugged terrain.

The Deatur and Cookeville soils in the areas nearest the Cumberland Plateau and in the northwestern areas adjacent to the Kentucky line are derived from the Warsaw-St. Louis group of limestones and are relatively fertile. The best timber is found in these areas and in the valleys. The inner parts of the Rim, the so-called "Barrens," are covered by soil derived from sherty or siliceous limestones and shales of the Fort Payne formation. In some of these areas, particularly to the south, the timber is of poorer quality, the oaks resembling those on the Plateau.

LAND USE AND OWNERSHIP

The importance of forests in the landscape of this region is indicated by the fact that, in 1950, 48 per cent of the land area of the Eastern Highland Rim was classified as commercial forest land. This is slightly higher than the state average of 46 per

cent.² Since only 47 per cent of the total land area of the state is in forest land, virtually all the forest land is commercial forest land.³

Of the commercial forest acreage of the state, 91 per cent is privately owned. In 1946, 42 per cent of the commercial forest land of Tennessee was on individual farm properties.⁴ These figures point out the significance of forests in the farm acreage of the region. The percentage for the Eastern Highland Rim must be much higher than the state average. On the Eastern Highland Rim, 78 per cent of the land area is in farms.⁵ The hardwood lumber producers of Putnam County, who turn out most of the product of that county, state that they draw the major portion of their supplies from farm woodlots. One of these producers owns about 800 acres of timber land. This is the only lumber company in the county which holds any land for commercial forest production.

PRESENT FOREST TYPES AND THEIR USES

Tennessee is a transition zone where southern timber species meet and intermingle with species whose greatest abundance is farther north; however, two-thirds of the commercial forest acreage is in upland hardwood types. It is in the Cumberland Plateau where the largest stands of southern shortleaf pine are found. The upland hardwoods are conspicuously predominant in the Highland Rim.⁶ The principal commercial timber species of the Eastern Highland Rim are: ash, basswood, beech, black gum, buckeye, hackberry, hickory, maple, oaks, and walnut.

The principal sources of supply of ash are Macon, Clay, Overton, Fentress, and Scott counties on the Eastern Highland Rim and the Cumberland Plateau.⁷ Ash is used for "interior trim," furniture, agricultural implement parts, and sporting goods. Baseball bats and boat oars are made almost exclusively of ash. Tennessee ash is of a superior grade and generally commands a higher market price than the national average.

² *Forest Statistics for Tennessee*, (Southern Forest Experiment Station, New Orleans, La.: Forest Service, U. S. Dept. of Agriculture, 1952), p. 5.

The Southern Forest Survey defined commercial forest land as land bearing, or capable of bearing, timber of commercial quantity and quality which has not been withdrawn from commercial timber use.

³ *Ibid.*, p. 1.

Forest land has in turn been defined as land which bears forest growth, or land from which the forest has been removed and which has not be put to other use, and whose area is a least one acre.

⁴ Computed from statistics given in *Industrial Resources of Tennessee*, Revised Edition—1949, (Nashville: Tenn. State Planning Commission), Vol. II, p. 1.

⁵ Computed from statistics given in the *United States Census of Agriculture*, U. S. Bureau of the Census, (Washington: Government Printing Office, 1950).

⁶ *Forest Statistics for Tennessee*, *op. cit.*, p. 3.

⁷ *Industrial Resources of Tennessee*, *op. cit.*, p. 19

Of the two varieties of basswood, American and white, only the latter is found in commercial quantities in Tennessee. Its habitat is 11 counties of the Eastern Highland Rim and Cumberland Plateau. Jackson and White counties have the largest stands.⁸

Even though the distribution of beech in Tennessee is essentially state-wide, the Highland Rim is the principal source, and Clay, DeKalb, Macon, Overton, and White are among the ten top producing counties.⁹ Beech lumber has extensive uses for the production of certain kinds of furniture and for flooring, woodenware novelties, toys, spools, boxes, and many other articles.

Black gum occurs in 81 of Tennessee's 95 counties, but Overton is among the four counties with the heaviest concentrations.¹⁰ Black gum finds usage in the manufacture of furniture, heavy duty flooring, and veneers.

The distribution of buckeye timber in Tennessee is limited to nine counties in the Eastern Highland Rim—Macon, Trousdale, Clay, Jackson, Overton, Smith, White, Van Buren, and Warren.¹¹ The largest stands occur in Clay, Jackson, and Overton counties. The wood is used in making furniture, boxes and crates, and some is used for pulpwood.

The commercially valuable maples of Tennessee include four species—black, sugar, silver, and red maples. Owing to their hardness and durability, black and sugar maples are the most valuable of these to the lumber trades. Maples are widely scattered, occurring in 80 counties of the state, but certain species are limited in their extent. Sugar maple is found principally in the Eastern Highland Rim, in Overton, DeKalb, White, and Warren counties.¹² Because of their resistance to wear, maple woods are especially valuable for flooring. They are also used in furniture.

Black walnut is the species designated by the trade term "walnut." This tree is widely scattered over the State, but few pure stands of commercial size remain. Of the seven counties having the largest stands, Clay, Jackson, and Van Buren are in the Eastern Highland Rim.¹³ The principal demands for walnut are for furniture manufacturing, including cabinets for radios, phonographs, and television sets.

In a survey of the locations of the more important commercial hardwoods of Tennessee, the superiority of the Highland Rim

⁸ *Ibid.*

⁹ *Ibid.*, p. 12.

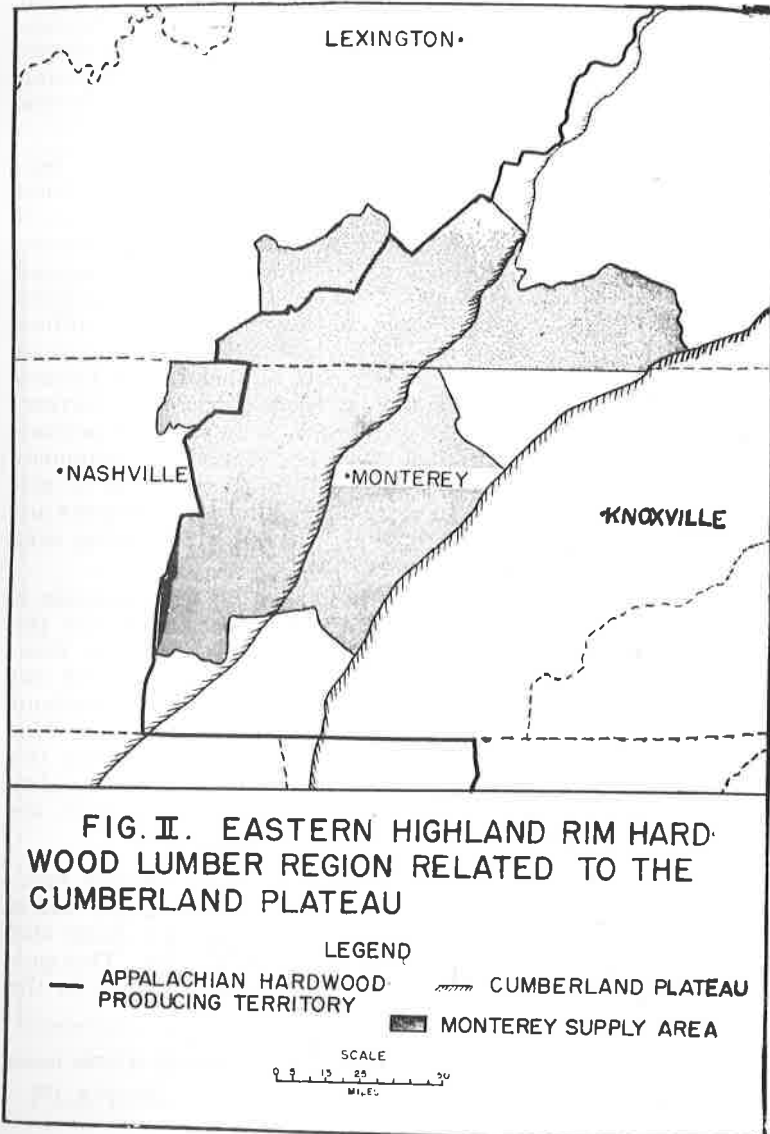
¹⁰ *Ibid.*, p. 14.

¹¹ *Ibid.*, p. 19.

¹² *Ibid.*, p. 15.

¹³ *Ibid.*, p. 20

over the Cumberland Plateau is conspicuous. This is due primarily to the infertile soils of the Plateau derived from the sandstone cap which covers most of the region. Only in red oak and hickory does the Plateau have stands ranking among the highest in quality. Most of the present stands of oak are inferior and at the best are useful only for making railroad ties. The



greater part of the lumber being sawed on the Plateau is made up of Virginia and shortleaf varieties of southern yellow pine.

DEPLETION AND DESTRUCTION

A brief examination of the conditions of the forests in the State as a whole will be of some value as an indication of how the hardwood forests are being maintained in the Eastern Highland Rim. The Southern Forest Survey, which collected data between July 1948 and September 1950, states that 25 percent of Tennessee's hardwood commercial forest acreage is still in saw-timber stands,¹⁴ and 60 per cent is in cordwood stands. The remaining 15 per cent is in small sizes, seedlings and saplings, or is not stocked.

The Southern Forest Survey also reports that, with an estimated annual total growth of 244 million cubic feet and a total drain in 1949 of 209 million cubic feet, there was a net growth for that year of 35 million cubic feet of timber, but the picture is different in the case of sawlogs. Here there was an estimated sawlog growth of 877 million board feet. The 1949 sawlog drain was one billion board feet resulting in a deficit of 23 million board feet.¹⁵ This conclusion is in keeping with statements of the big producers of finished hardwood lumber in the Eastern Highland Rim who maintain they must go farther and farther, and into more and more inaccessible places, in order to procure their supplies of logs or lumber. The use of modern equipment and the extension of rural roads have allowed timber to be utilized that could not be cut in years past. Thus the producers are maintaining their supplies in spite of the excess of cutting over growth.

The total picture of the hardwood supply maintenance is not obtained merely by comparing the annual growth with the drain by cutting, for much timber is being destroyed by fires. The extensive fires during the drought of the fall of 1952 did much damage in the Eastern Highland Rim and Cumberland Plateau regions as well as in the eastern part of the State. Not only is the hardwood timber supply getting shorter, but the quality is becoming poorer. Much of the reduction in quality is caused by fires. After being damaged by fire, the trees are more readily attacked by insects.

The only one major Cookeville producer of a finished hardwood product feels that his raw-material supply is ample and is being maintained at a long-term constant level. No doubt this is because the timber employed is limited to hickory. This producer stated that it was his opinion, after having been in the

¹⁴ *Forest Statistics for Tennessee*, op. cit., p. 6

A saw-timber stand was defined as one having a volume of 1,500 board feet per acre in merchantable sawlog-size trees.

¹⁵ *Ibid.*, p. 8

business since 1926, that hickory restocking is being sufficiently provided for by nature (each time a squirrel is killed his storehouse become a planting).

HARDWOOD LUMBER MANUFACTURING

Because of the number and diversity of the hardwood mills in the region, a description of lumber manufacturing there is complex. Plants vary in size from the small portable saw mills (called "peckerwood" mills by the big producers) which operate in the woods, to large stationary plants combining saw mills and planing mills. There are some plants whose raw material is either rough lumber or logs, or both, and whose product goes through a more advanced state of manufacturing than flooring or furniture dimension stock, but these plants are few and relatively small. The consumers of most of the rough hardwood lumber are plan-

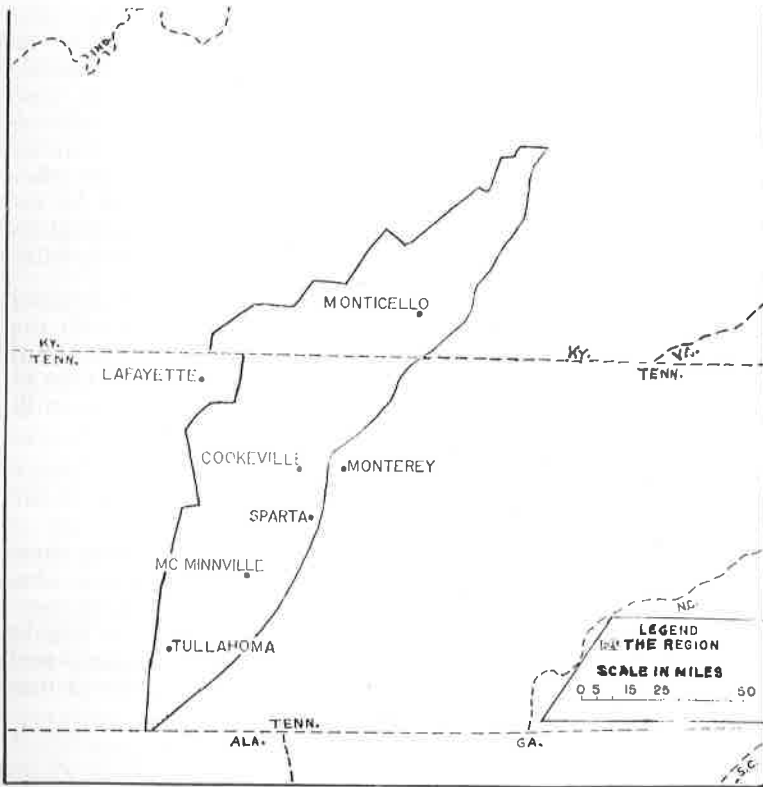


FIG. III EASTERN HIGHLAND RIM HARDWOOD PLANING MILL LOCATIONS

ing mills whose chief products are flooring, furniture dimension stock, and handles.

Although some lumber is sawed by small portable mills and trucked directly to consumers outside the region, especially to Louisville from the northern part of the region, the proportion of the rough lumber which goes through the planing mills located in the region is certainly high. Because rough lumber from the many sawmills is funneled through planing mills, a study of these plants provides the best picture of hardwood lumber manufacturing.

The form and manner in which planing mills procure the bulk of their raw materials may differ from mill to mill, but many of the mills employ all of the possible methods and forms. The planing mill operators of the region generally have their own stationary saw mills. Some have portable mills which they move into the woods when they buy a boundary of timber.

The planing mills buy timber, logs and lumber. They may buy tracts of timber and move their own portable mill in, or cut the logs and haul them to their stationary mill. A timber owner may contract with a sawmill operator to saw up his logs, the lumber from which he delivers to the planing mill. In some cases the portable mills may buy a tract of timber the lumber from which they in turn sell to the planing mill. In still other instances the timber owner will cut his own logs which he delivers to the planing mill. Almost any conceivable combination of operations may furnish the raw materials for the planing mills.

During World War II, when there was an excessive demand for lumber a federal agency working in collaboration with the mill operators estimated that 70 per cent of the rough lumber of the region was being produced by portable saw mills. One of the large Cookeville producers believes that in 1950 those mills turned out about 60 per cent of the rough lumber.

Even though the principal products of the mills of the Eastern Highland Rim putting out finished materials are flooring, furniture dimension stock, and handles, because of the purchase of boundaries of timber and because of saw mill operations, there is considerable by-product. Basswood, buckeye, blackgum, elm, and poplar are considered by-product species in the logging operations of flooring producers. A major use for the odd lengths from the mill operations is for "coarse stock" that is purchased by woodworking plants which, by glueing processes, turn it into furniture "dimension pieces" such as desk tops.

PLANT LOCATIONS

The planing mills of the region through which most of the hardwood lumber passes are located in Cookeville, Monterey, Sparta, McMinnville, and Tullahoma, Tennessee, and Monti-

cello, Kentucky. Cookeville has two plants whose products are primarily hardwood flooring and furniture dimension stock, and one whose product is limited to "striking tool" handles. Monterey's lone firm produces little other than flooring. Sparta has one mill producing flooring, interior trim, and sheeting; two plants whose output is divided between furniture dimension stock, spokes, staves, and plow handles. McMinnville has three firms with diversified products including furniture dimension stock, flooring, siding, interior trim, and one producer who manufactures only tool handles. Tullahoma has two plants producing hardwood specialties, and Monticello has only a flooring mill.

SUPPLY AREAS

Without regard to established boundaries, the supply area of the mills located on the Eastern Highland Rim attest the existence of an Eastern Highland Rim hardwood lumber region more than any other factor. Figure I shows that the area of supply of a Cookeville planing mill is located entirely within the Eastern Highland Rim, and is confined to the territory between the western boundary of the Appalachian hardwood producing territory and the western edge of the Cumberland Plateau. This area has a greater north-south than east-west dimension, reflecting the shape of the region.

The supply area for the one firm located in Monterey is presented in Figure II. There it can be seen that the part of the supply area on the Rim is larger than that on the Plateau. Only three Tennessee and four Kentucky counties located entirely on the Plateau are included. Here again is a supply area with its greater dimension stretching north and south. In this case the Highland Rim is much more important proportionally in the supply area than is indicated by the map. The owner of the Monterey firm stated that although he gets some lumber from these Plateau counties, in spite of the fact that his plant is located on the Plateau, most of his supply comes from the Rim. The supply areas of both the Sparta and McMinnville plants show the same pattern.

MARKET

The Eastern Highland Rim hardwood lumber region sends some of its products to every state in the Union, but because of the freight advantages held by Memphis in shipments to the West, and because of the location of the furniture industry, the market is mainly east of the Mississippi River. The locations of the big furniture manufacturers who provide the market for the furniture materials are well known. They are High Point, N. C., Chicago and Rockford, Ill., Grand Rapids, Mich., Jamestown, N. J., Evansville, Ind., and Toccoa, Ga. High Point is the largest customer.

The states to the east and north are the main markets for the Highland Rim's hardwood flooring as well as for the furni-

ture materials. The Monterey flooring plant sends 70 per cent of its product to New England; the remainder goes west of the Mississippi River or south. The customers are wholesale flooring dealers. One McMinnville firm sends 15 per cent of its product to the West Coast, and exports some flooring to European countries.

The products of the Sparta firms tend to differ from the bulk of the products from Cookeville, Monterey, and McMinnville, since there is a higher proportion of lighter products from the Sparta mills—spokes, plow handles, boat rims, barrel staves, and wagon wood stock. This results in different market locations, and we find the southeastern states taking a larger part of these products.

The handle mill in Cookeville exports about 20 per cent of its chief product, and, as a result of buying standing timber, it has some oak as a by-product about four carloads per year of which is exported to the West Indies and South American countries. Because of the uniqueness of its principal product, "striking tool" handles, this firm finds its markets in different locations from those producing flooring and furniture materials. The customers for about 60 per cent of the product are tool manufacturers, the major ones being located in Warren, Pa., Charleston, W. Va., Marion, Ind., and St. Louis, Mo. Twenty per cent of the product goes to hardware dealers for tool replacements.

TRANSPORTATION

The coming of the Tennessee Central Railroad, which in 1910 crossed the central part of the Eastern Highland Rim hardwood-lumber region from east to west, did much to open up this area to the lumber industry. Even though highways now allow some of the product to leave by motor truck, the bulk of the finished materials still moves to market by rail in carload lots. This is especially true of flooring. Because of the nature of their product, excepting for the exports, the manufacturers of tool handles ship their product mostly by truck lines.

The southern part of the Rim is served by a feeder line of the N. C. & S. L. Railroad which connects Sparta and McMinnville with Tullahoma, but this road hauls a smaller percentage of the output of the Sparta and McMinnville plants than the Tennessee Central does of the Cookeville and Monterey plants. This is due, at least in part, to the difference in the products, since flooring tends to move by rail while such products as handles and furniture dimension stock are more likely to move by truck.

While finished flooring leaves the area largely by rail, raw materials reach the mills by truck. The flooring firm in Monterey receives a small part of its rough lumber which originates in Kentucky over a spur line of the Tennessee Central that

comes in from Winder, a small town located to the northwest on the Plateau. In view of the fact that the planing mills are processing materials of the local region, while their markets are in distant regions, the types of transportation used are those that would be expected.

The railroads are so important in marketing the flooring that the Monterey firm reported that its disadvantage of being located on the Plateau, and having to haul its rough lumber up the 1000 feet escarpment, is offset by the switching facilities which would not be there were it not for the presence of the spur line terminal. When the Monterey plant was established in 1904, the Plateau oak timber was enough better that it furnished a much larger part of the lumber than at present. The present owner stated that, were he locating his plant now, he would place it in one of the cities having crossing truck line railroads.

FUTURE PROSPECTS

It was noted that in 1949 there was a net drain of 23 million board feet of cutting over growth of Tennessee hardwood sawlogs. Furthermore much timber is being destroyed by fire, but there is an increasing awareness of these facts on the part of producers and consumers of the timber and the general public. As a result, the state legislature has seen fit to enact laws to help assure a supply for posterity. Consequently, with these activities and the increase in fire protection and other conservation practices by governmental agencies and private individuals, the hardwood lumber industry of the Eastern Highland Rim has an encouraging future.

NEWS OF TENNESSEE SCIENCE

(Continued from Page 207)

course of less than 3%. "These statistics demonstrate an improvement both in the pre-medical and medical school grades throughout the last decade—an improvement which has been consistent and progressive," Dr. Nash asserted.

The Division of Preventive Medicine is the recipient of a \$2,300 Public Health Grant to conduct a pilot study on the epidemiology and immunology of adenovirus infections. Dr Henry Packer, chief of the division, and Dr. Robert C. Rendtorff, assistant professor, are principal investigators of this respiratory diseases study.

The National Science Foundation will send a University of Tennessee chemist and his family to England for a year so that he may do research to reveal the "human side" and outlook on life of some of history's great scientists. The chemist is U-T Professor Charles W. Keenan, who has been selected for NSF's Science Faculty Fellowship. He and his family will be supported and provided all travel expenses for the year abroad beginning in September. Co-author of a new chemistry textbook now being adopted by

(Continued on Page 239)