

50
YEARS
of SERVICE
through
WOOD
RESEARCH



**GOLDEN ANNIVERSARY
FOREST PRODUCTS LABORATORY**

U.S. Department of Agriculture • Forest Service

Miscellaneous Publication No. 820

The Forest Products Laboratory, Madison, Wisconsin, is a unit of the research organization of the Forest Service, U.S. Department of Agriculture. It is a scientific and technical research institution concerned wholly with the investigation of wood and wood products and their adaptation to diversified fields of use. It was the first and for several years the only institution in the world conducting general research on wood and its utilization; other nations have since followed the lead of the United States in developing laboratories along similar lines.

Issued April 1960



FROM GOLDEN DECADE TO GOLDEN ANNIVERSARY

A Momentous Step

This is the Golden Anniversary Year of the U.S. Forest Products Laboratory. Five decades ago a few men of uncommon vision saw their dreams grow to reality: the first wood research laboratory in the world formally opened on the campus of the University of Wisconsin. Today, in an age of research, such an event would not be unusual. But looking back with the perspective of a half century to a time when little thought was given research of any kind, that occasion looms a momentous step.

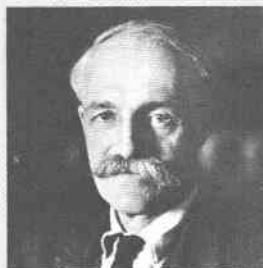
Those were pioneers of a different breed, men with ideas, explorers with crude testing equipment—watering trough, ruler, and simple scales—instead of undisciplined ax and saw. Ahead they set a goal. Though charting a new course, they knew where they were, where they wanted to go, and set a pattern to reach the goal. They shaped the tools to alter a people's way of thinking about forests and wood, from that of waste to wise use. It was an enormous task ahead, and dimly seen. The fruit from that beginning, though, nurtured through the years by other dedicated wood scientists, has grown to touch the life of each citizen in this country. It has changed the face and the fortune of a nation. Now, 50 years later, the Laboratory stands a living, serving tribute to those who led the way. Now, world known and the model for similar efforts in other lands, it stands, helping a fast-growing, ever-changing Nation meet and master its economic future.



Bernhard E. Fernow



Theodore Roosevelt



Gifford Pinchot

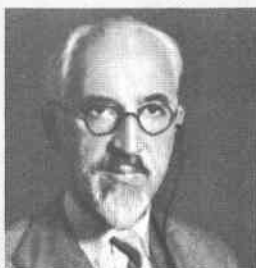
The Men of Uncommon Vision

Many coming later have followed the pattern, making and adding to a record of achievement. But the names of the founders deserve recording here. Included are Bernhard E. Fernow, President Theodore Roosevelt, Gifford Pinchot, McGarvey Cline, Harold S. Betts, William L. Hall, Lee F. Hawley, Arthur D. Little, Howard F. Weiss, and Charles R. Van Hise.

The goal they set: to find new ways of making products of the forest serve man better and in more different ways—wiser use of wood, man's oldest, most versatile raw material.



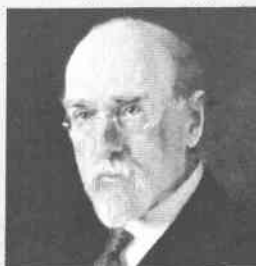
William L. Hall



Lee F. Hawley



Arthur D. Little



Charles Van Hise



McGarvey Cline



Howard F. Weiss



Harold S. Betts

Experiments With Timbers

The pattern began in the late 1800's when the first stirring of professional forestry began in the United States. In forest-starved Europe, forestry of a kind had been known for three centuries, but with little research and none of great value to American forests. A seemingly endless store of trees here were being harvested pellmell as if the supply would last forever.

In the Agriculture Department of the U.S. Government was a tiny Division of Forestry. Its chief was Bernhard Fernow, the country's first professional forester, who had been trained in Germany. Forestry's chronicle records that "In 1884 the duty of making experiments with timbers was added to the work of the Division." Three years later, Fernow wrote: "The properties upon which the use of wood, its technology, is based, should be well known to the forest manager if he wishes to produce a crop of given quality useful for definite purposes Crude experience has been our guide and crude has remained our knowledge"

As early as 1890 some little forest products research was being started in cooperation with universities: Purdue, California, Oregon, Washington, and Yale. And the young Forestry Division began research on naval stores in the South and a small experimental pulp-mill in Boston, where wood chemistry and preservatives were studied by Lee F. Hawley and Arthur D. Little. Yet in 1898 the Division had only "6 clerks and 6 scientific employees," and the "duty of making experiments with timbers" had not gone far.

A New Century, A New Concept



Then dawned the eventful 20th century. Gifford Pinchot, forestry evangelist and the true father of forestry in America, hiked and rode and boxed with outdoorsman Teddy Roosevelt—and talked a new concept, the conservation of forests and other natural resources. As President of the United States, “Rough Rider” Roosevelt grasped the idea and rode off with it to brand a nation with conservation.

Pinchot in 1898 had been named head of the Forestry Division, which later became a bureau, in the Department of Agriculture. Meanwhile, the forest reserves were still managed by the Department of the Interior. In 1905, the forest reserves were transferred to the Department of Agriculture, renamed the “National Forests,” and the Bureau of Forestry became the Forest Service with Pinchot its first chief.

“Forestry,” said Roosevelt, “is the preservation of forests by wise use.” But the words expressed only a hope, an ideal. For across the wide land the order of the day was anything but wise use. Already the East had been nearly stripped of its prime timber. The white pine wealth of the Lake States was melting fast to meet the lumber needs of a burgeoning Middle West. And whirring saws chewed hard at the southern pine stands from the Carolinas westward. By ship and train, Douglas-fir was trickling back East from the fabulous forests of Oregon and Washington. In the westward rush, the “cut out and get out” philosophy was everywhere rampant.

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The Golden Decade

Against this tide Roosevelt and Pinchot spoke out, shaping the tools that would one day halt and reverse that philosophy, and rebuild the forests. With T. R.'s backing, Pinchot was hammering out the pattern of the U.S. Forest Service. As part of it, a branch of Forest Products was set up.

Those were the basic tools, fashioned in the first years of the new century, years that were later called the Golden Decade of conservation. Tools to preserve the forests, rebuild them, and work toward their better use. And with those tools the Forest Service, before the Golden Decade ended, had taken up the challenge.

Through the port city of Charleston, S.C., in those early years of the century, funneled much of the lumber from the great southern pine forests. The sawmills ripped ceaselessly through the tide of logs flowing in from the back country. To one of these sawmills, about 1907, came two young men from the even younger Branch of Forest Products. These two, McGarvey Cline and Harold S. Betts, had come to run tests on the wood of southern pines. Almost nothing was known about these or any other wood that could be translated into figures needed by engineers. True, ignorance of the wood was not slowing the sawmills, but men who could see farther than the log before them felt that a start must be made somewhere.

A Time of Searching

For the whole Forest Service it was a time of probing and searching. The Branch of Products was forced to cast about for help wherever it could be found. It was found largely through cooperative agreements with universities. To the men heading this new venture it was soon obvious that research efforts were scattered, piecemeal. The left hand knew not what the right was doing. Could findings at Yale be related to those at Purdue, or other institutions? Could all of them to-

gether be applied to practical engineering problems of design with wood?

Wood research needed to be centralized—the conclusion was inescapable. Why not a central forest products laboratory where pine, oak, Douglas-fir, spruce, and all the rest could be tested on the same machines under the same conditions? Where engineers could exchange ideas and talk over problems with chemists, physicists, pathologists, foresters?

No such laboratory existed anywhere in the world, but these men welcomed new ideas. Pinchot and his chief of the Forest Products Branch, William L. Hall, went to Congress with the proposal in 1908. The House Agriculture Committee was skeptical; what, asked the members, would be done with such a laboratory after a few months' testing work was completed?

Less determined men would have quit; but foresters know more ways than one to fell a tree, or build a laboratory. McGarvey Cline conceived another idea: would one of the cooperating universities perhaps like to have this work centralized on its campus? He discussed this with coworker Howard F. Weiss. Their chiefs, Pinchot and Hall, quickly approved.

First Wood Laboratory Opens

Feelers sent out in 1909 brought in several generous offers. Finally, the proposal of the University of Wisconsin's president, Charles R. Van Hise, was accepted. Nationally known for his conservation leadership, Van Hise offered a new building complete with light, heat, and power. Late the same year a vanguard of research workers converged on Wisconsin's capital city.

The building was finished in 1910, and on June 4 of that year the world's first forest products laboratory, with a staff of 45, opened its doors. McGarvey Cline appropriately became its first Director, Howard F. Weiss the Assistant Director. Two years later, Weiss assumed the leadership and served until 1917. From then to

1946, Carlisle P. Winslow charted its course through two world wars and a depression. He was succeeded by George M. Hunt who held the reins until 1951. J. A. Hall served as Director until October 1959, at which time Edward G. Locke, the present Director, took office.

Like all growing institutions, this one outgrew its original building. Under a depression-born public works program, Congress in 1930 provided \$750,000 for a new five-story structure. The University of Wisconsin, true to its tradition of generous cooperation, again gave a choice 10-acre site. On a hill overlooking Lake Mendota, the present home of the Laboratory—a harmonious fusing of limestone and wood—was finished and occupied in 1932.



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McGarvey Cline



Howard F. Weiss



Carlisle P. Winslow



George M. Hunt



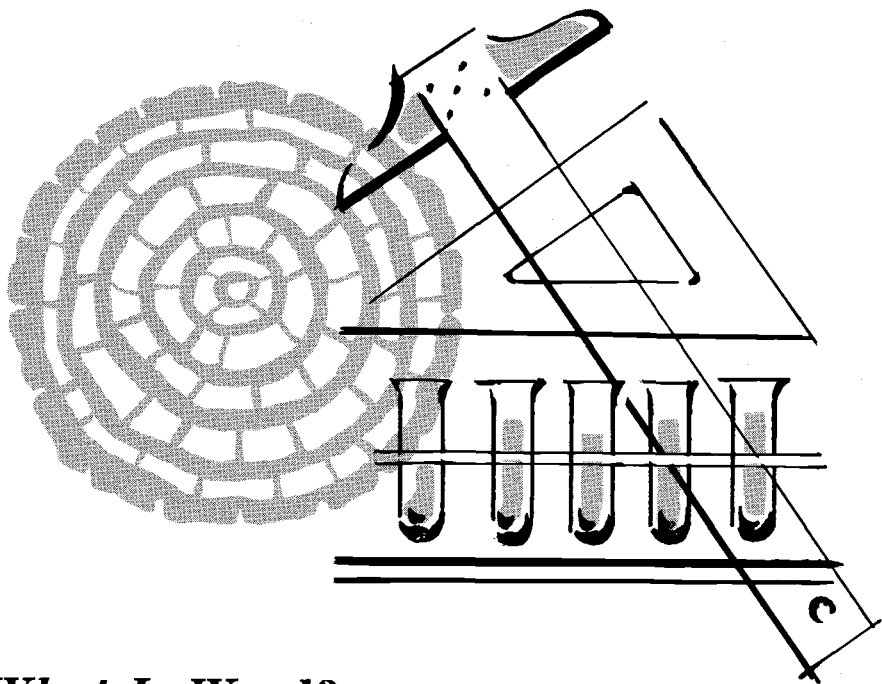
J. Alfred Hall



Edward G. Locke

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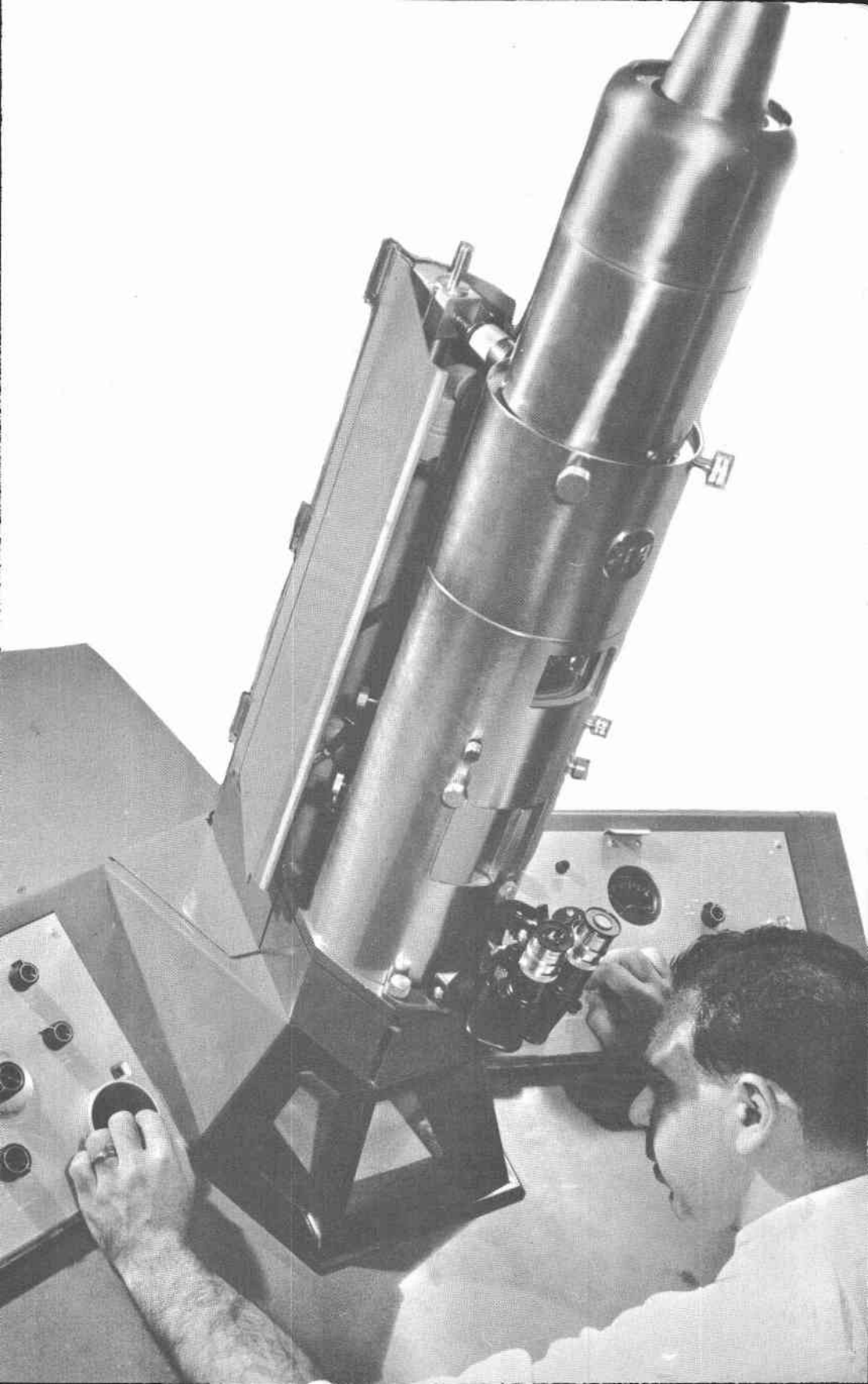




What Is Wood?

To comprehend the huge task, then only dimly seen, that was begun back there in 1910, one needs to look below the surface. What is wood? Everybody knows something about it, but nobody knows everything about it. It is at once more familiar than the proverbial old shoe, and still so mysterious that persistent chemists have not unlocked the secrets of some of its molecules.

Wood is woven into the fabric of our civilization. As man's life advanced on the earth, he learned to use this handy raw material in more and more ways—until today, through research, the variety of its uses approaches the infinite. Consider only one wood product—paper. Modern civilization practically lives and has its being on paper, the uses of which alone run into the thousands. Wood and its products are everywhere, and indispensable. There are the old familiar uses, plus new combinations, plus thousands no longer recognized as wood: Pastel-colored plastics, silky synthetic cloth, chemicals, flavoring extracts, and sausage casing. It is a prime material of world trade.



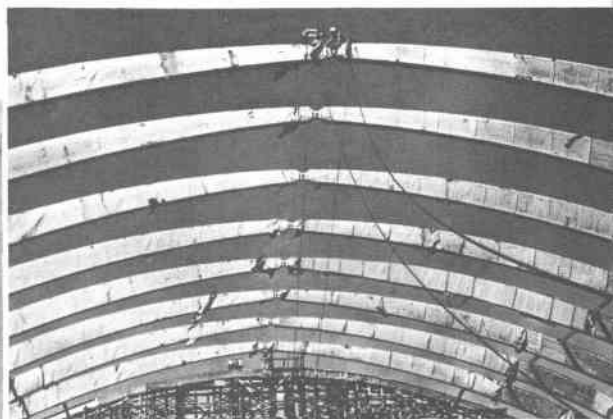


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Record of Achievement

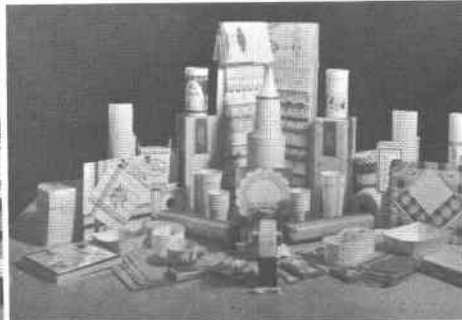
With firm support of succeeding Congresses that realized the great role forests and their products play in the life of the Nation, the diverse tasks at the Laboratory went on. The work has ranged across a vast complex of wood properties and wood use, from how to make a farmer's fenceposts last 10 times longer, to how wood-derived rocket fuels will react 10,000 miles out in space. And the results through this half century have proved how straight was the pattern set by the founders, how true the tools they fashioned and passed on to able successors.

The fruits of wood research touch the life of every American, improving the living standard, feeding the economy. Volumes have been written about small segments of the Laboratory's work. But the scope is apparent in a few major contributions such as the following:

Semichemical pulping process: Forty-seven pulp mills today use this method developed by the Laboratory. Annually more than 2.26 million tons of pulp are manufactured from 2.4 million cords of wood and converted into products worth an estimated \$300 million. The process has revolutionized the papermaking industry, opening the doors to the use of hardwoods and the resinous pines of the South. Through this industry, the face of that region has been changed, putting trees back on eroded hills and money back into the pockets of former cotton farmers.

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Cold soda process: Recently this simplified semichemical pulping method was developed, and in 1959 brought into use 200,000 cords of low-grade hardwoods for which there had been no market; it was converted into 208,000 tons of paper worth \$25 million. This has meant new industrial enterprises, jobs, groceries, automobiles, for people—wood reaching out in another form to improve the living standards of all.

Prefabricated houses: The Laboratory pioneered in prefabricated housing. More than three-fourths of the 100,000 such houses turned out each year use the basic, publicly patented stress-cover construction. Another \$500 million a year business.

Laminated wood: A young, thriving industry makes big timbers—strong, beautiful arches for churches, auditoriums, barns—from ordinary boards glued together by laminating techniques worked out by the Laboratory. Output is valued at \$10 million a year.

Dry kilns: Lumber manufacturers use some 5,000 dry kilns of a type on which basic patents were granted the Laboratory. Gross value of products seasoned is \$300 million a year.

Better packaging: Cost of packaging the Nation's industrial and agricultural products runs to about \$8 billion annually. Packaging research by scientists at the Laboratory has established the engineering principles of box and crate construction: blocking, bracing, carloading, cushioning, waterproofing materials, test and inspection procedures. These are widely used by industry, agriculture, and the Armed Forces. Value of this work cannot be calculated. However, since it involves 6 billion board-feet of lumber a year, a mere 1-percent saving here would total \$3 million—and savings often reach 30 to 50 percent on individual packaging-research jobs.

Other dividends: The unassessable dividends are far

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greater. Tests in wood strength have enabled the lumber industry to grade its products fairly and intelligently, giving customers products of consistent quality. By establishing the strength of all native commercial woods, the Laboratory has enabled engineers to design better bridges, factories, and homes with less lumber and lower cost.

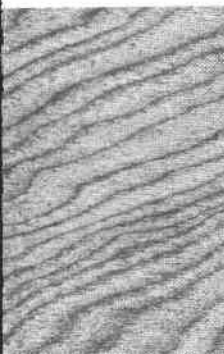
Forestry has been put on a dollars-and-cents basis by research that showed it pays to let trees grow to larger sizes and, in most regions, to harvest them selectively, rather than clear-cut the forests. Research, by finding uses for small and cull trees and unused species, has given timber owners markets for their thinnings and simplified forest management. Research at the Laboratory showed how to produce pure cellulose from wood, giving industry processes with which wood can be transformed into high-grade paper products, explosives, plastics, and synthetics.

Two-thirds of the Nation's lumber is produced by 50,000 small mills. They have been aided in practical everyday problems by research at the Laboratory. In addition, by a great and growing stream of letters, meetings, trade and technical conferences the Laboratory staff helps the public with its wood problems.

In sum, the story of the Laboratory can be read in the annual lumber production figures over the years compared with other forest products. Since 1910 lumber production has declined from 44 to 38 billion board feet per year. But other forest products have more than taken up the slack, to maintain and expand the market. Thus, total output of all industrial wood products has risen in the same period from 47 to 58 billion board feet annually. All of which is in line with the Laboratory's basic goal—to diversify forest industries so that wood may be used more completely with less waste.

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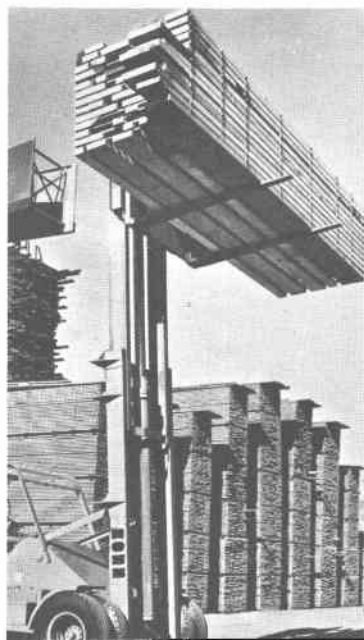
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Look Around You

To see how significant have been the advances toward that goal, look to the mills, factories, and homes of America. Look to the new and better and cheaper products from wood, all carrying dollar signs that aggregate many millions in sales, jobs, profits, and taxes. For yet more evidence: millions of acres of better managed forests, myriads of paper and paper-encased products on supermarket and drugstore shelves. Look anywhere, look everywhere: wood research has changed and is changing the face and fortune of a Nation.

To Those Who Helped

These achievements were possible because many groups and individuals through the years gave freely of their encouragement and help. A special salute goes to the leaders of industry, universities, and colleges. Many of these joined the effort with invaluable cooperation and support. And many, following the lead here, have developed their own research facilities, which continue to work hand in hand with the Laboratory.

Challenge of the Future

Now, with 50 years of experience, the Laboratory—its staff of men and women who are its real life force—faces a far more challenging future. The whole task and the opportunities are seen more clearly. Much has been learned about this renewable natural resource—how it grows, what can be done with it, how it can be preserved, modified, processed, converted to other substances. But much remains to be learned.

To cite three examples: (1) Uses need to be found for large quantities of small, low-grade, second-growth trees which would at once promote better forestry, create markets, and reduce the heavy drain on popular species; (2) how to utilize enormous amounts of wood, about half the tree, still wasted in limbs, tops, sawdust, slabs, and edgings; and (3) how to exploit another form of waste in lignin, that part of wood—nearly one-fourth—which remains a chemical enigma. Progress has been made on these problems. Basic research into the structure of lignin is going on, but the breakthrough which could open a rich vein of useful chemicals remains for the future. Likewise, other tantalizing prospects in other avenues lie just beyond the researcher's hand.

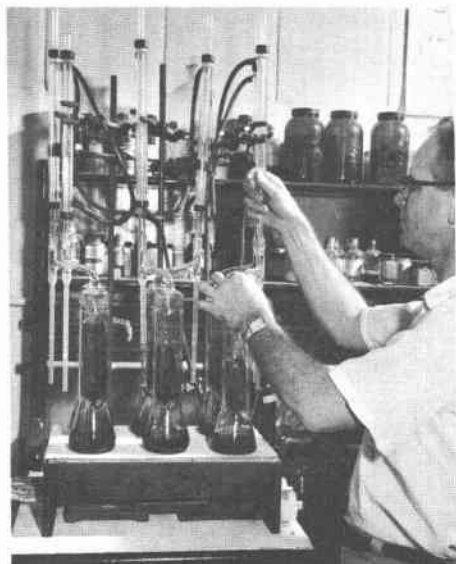
As the population of the United States approaches 200 million, as the slack forestry of yesterday gives way to a more intense forestry of tomorrow—demands for the unique services of this institution will grow as day succeeds day. Wood, that universal friend of man, must be further refined, analyzed, perfected, and used to the fullest, regardless of competing materials. It plays an indispensable role in the economy, strength, and prosperity of the free world. And at the very center of wood's stellar role is the Forest Products Laboratory—a living monument to farsighted men of the past, a resourceful citadel for a Nation's future.



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