

NEWS OF THE PROFESSION

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JAPANESE WOOD RESEARCH: FUNDAMENTAL OR PRACTICAL?

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Dr. Chow was assigned by the Canadian Forestry Service, Department of the Environment, to spend a month for research investigation in Japan during June and July of 1974. His visit included 12 major universities and governmental wood research institutes from the southernmost island of Kyushu to the northernmost island of Hokkaido. This editorial comment is limited to solid wood and composite products research and does not include wood chemistry or pulp and paper aspects.

According to a popular Japanese saying, "The islands, animals, and plants of Japan were born by the god and goddess of Ejanagi and Ejanami." Unique vegetation and beautiful forests covered the original ancient lands. It is not surprising that the Japanese used to call their islands the "forest county." Unfortunately, the Japanese god made a great mistake in creating a land that is too small. Through generations of use and the industrial revolution, Japan is no longer a forest country. It must import great quantities of wood to house its people.

JAPANESE FOREST RESOURCES

The recent white paper on the forest industry by Japan's Ministry of Agriculture pointed out that the 1973 consumption of wood in Japan was 100 million m³. Of this total, 46 million m³ was supplied by domestic forests. The wood consumption of Japan in the year 1984 is estimated to be about 135 million m³. At that time the domestic forest will be able to supply only about 50 million m³. Thus the contribution of domestic forests will decrease by 1984 from the present 46% to 37% and Japan will become more dependent on imported wood.

At present, 50 to 60% of imported wood is

hardwood from Southeast Asia and the other 40 to 50% (softwood) is from North America, New Zealand, and Russia. Japanese wood research is, therefore, of necessity focused on both hardwoods and softwoods. The Dipterocarpaceae from the Philippines were studied previously, but interest in these species has shifted to Indonesia because of changing trade patterns. Of the softwood species, Japanese research effort has been more on their own native species such as *Cryptomeria japonica* and *Chamaecyparis obtusa*. Since 1970, because of the increasing volume of imported logs from Russia, some research has been initiated to study the properties and uses of Siberian softwood species.

UNIVERSITY RESEARCH

Japanese wood research interests differ greatly from institute to institute. In general, wood research can be roughly classified into two categories: university research and government institutional research.

University research can be separated further into national university and prefectural university efforts. Wood research in the national universities, such as Tokyo, Kyoto, Kyushu and Hokkaido universities,

is for the most part highly fundamental in comparison to that of North American research. The subjects of wood research give the impression of being academic without much industrial relevance. Wood research in Japanese prefectural universities places more stress on industrially related subjects. This is partly due to the lack of financial support for acquiring research equipment in comparison to national universities. However, some outstanding achievements and contributions have resulted from research in the prefectural universities. For example, the adhesive and wood bonding research in Shimane University has no rival in the Japanese national universities.

Among the national universities, the Wood Research Institute (Uji) and Department of Forest Products (Kyoto) of Kyoto University are most impressive. The fundamental research in the Wood Research Institute is particularly outstanding. Wood physics research at the institute is under the direction of Professor Yamada. With sophisticated new equipment and a highly qualified research staff, the institute engages in advanced studies of dielectricity and rheological properties of wood at the molecular level. The electron microscopy facility of the Kyoto University Department of Forest Products is one of the valuable assets to Japanese wood research and contributes significantly to wood anatomical research literature. Professor Harada is the leader of this group, and his laboratory is well equipped with both transmission and scanning electron microscopes.

The Tokyo University Forestry Department is traditionally the leader in Japanese wood research. High-caliber research results have been published in the last two decades. However, with the current large turnover in staff, due mostly to retirement, this institute is under reorganization. Industrial backgrounds of the newly appointed professors may indicate that future research directions of this national university may lean towards more industrially oriented subjects.

GOVERNMENT RESEARCH INSTITUTES

The Japanese government research institutes, on the other hand, reflect another dimension of research activity that differs greatly from that of the universities. The Forest Experimental Station located in Meguro, a federal laboratory under the Ministry of Agriculture, engages heavily in current trade negotiations and standards formulation. This laboratory has contributed greatly to the recent revisions of Japanese standards to accommodate North American platform construction, 2- × 4-inch lumber and softwood plywood specifications. Restrictions on manpower and budget of this institute have limited its research potential.

Hokkaido Forest Products Research Institute is one of the most remarkable Japanese regional government laboratories. The institute is situated in the beautiful town of Asahigawa in the middle of Hokkaido Island, the northernmost territory of Japan, the latitude being somewhat similar to that of Oregon and southern Washington. Coniferous forests as well as hardwood forests grow well on this island. Because resource development took place later here than in other parts of Japan, the island has a more abundant forest resource. Hokkaido Forest Research Institute was established in 1950 to explore this natural resource.

The establishment of pilot-plant-scale work at the Hokkaido laboratory deserves great attention. The research institute is designed in such a way that it simulates an integrated forest products industrial complex, such as we have in North America. Within about 10 acres of land, it houses pilot-plant facilities in sawmilling, plywood and veneer processing, fiberboard, laminated wood, wood preservation, and fire-retardant treatment. The pilot-plant scale is of such a magnitude that the veneer and plywood mill is capable of producing 11,000 ft² of plywood a day from peeling to plywood pressing. The fiberboard plant is capable of producing 9 tons per day of boards, using both dry and wet processes. The sawmills, in conjunction with four dry kilns can process 15 m³ of softwood and

10 m³ of hardwood logs per 8-hour shift. The sawmills, in part, are designed to demonstrate effective methods of lumber processing and the profitable exercise of sawmill management. In addition, the laboratory has developed a process of combining lignin and phenol-formaldehyde resin for a plywood adhesive. A pilot plant for processing this lignin adhesive was established and is capable of producing one ton per day for the laboratory's own plywood mill use.

Mr. Abe, Director of the Hokkaido Forest Products Research Institute, indicated that the research work emphasizes the bridging of gaps between laboratory and industrial applications. From an observer's point of view, the academic achievement of this laboratory may not be as significant as that of Japanese universities. However, the contribution of the Hokkaido Forest Products Research Institute to the development of Japanese forest industries is admirable and we have much to learn from their example.

THE FUTURE: APPLICATIONS OF FUNDAMENTAL RESEARCH

In a world of increasing pressure for applied research, North American scientists would envy the academic freedom of Japanese universities in pursuing fundamental knowledge. One might wonder if the Japanese workers are able to justify their academic research. I have thought about this a great deal only to come to the conclusion that it is very difficult to decide.

Superficially, Japanese university and government institutional research seem to

be far apart in their purposes. In reality, they may complement each other to achieve a balance in development of the nation's needs. In an age of mounting nationalism in raw-material-supplying countries, it will be increasingly difficult for countries like Japan, where the natural resources are lacking, to rely on existing technology to maintain industrial production and to improve the living standard. Advances in the Japanese forest-products industry will rely more and more on technological input. In the North American research environment, where fundamental research is in danger of being overshadowed by short-term, practical industrial research, the source of fundamental information for future technological improvements will be gradually depleted. The time for the Japanese to imitate and take advantage of American technology may be over. A new era of self-sufficiency is beginning, in which the Japanese are generating fundamental data as a basis for developing the technology necessary to overcome the high cost and short supply of raw materials. Therefore, the parallelism in the separate development of fundamental and applied research in the Japanese universities and governmental institutions may be justified.

With diligent Japanese researchers and strong patriotic feelings of the Japanese public, I believe that Japan is capable of achieving technological self-sufficiency within a short period of time. Perhaps, at some point in the future, North Americans may have to borrow the results of fundamental Japanese research to fulfill the needs of our industrial development.

CHANGES IN SWST EXECUTIVE RANKS

At the Portland SWST board meeting, President-Elect Tom Maloney photographed Bill Lehmann, new Society Executive-Secretary, standing to the left of Eric Anderson, incoming president, with Al Foulger, Past President, on the right. Lehmann is a member of the Wood Products and Process Development section of

the Forest Products Laboratory in Madison. He replaces Von Byrd as Executive Secretary, who will be spending the following year on a scientist exchange program between the Madison Forest Products Laboratory and the Swedish Forest Products Research Laboratory in Stockholm, studying ways to measure effectiveness of fiber-