

THE NORTHWEST'S MARCH OF SCIENCE

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At the University of North Carolina last May was held a series of conferences in celebration of the 150th anniversary of the founding of the oldest of the American state universities. All the states of the South were represented. I was invited to make its opening address. The central theme of the conference was "Research and Southern Welfare." In opening its unique program, I made this statement:

"During the last half century in the United States, more than one-half of our new national wealth has come from new ideas which were not known fifty years ago or at least were not applied to the production of things. But for the South as a whole, like the Pacific Northwest, that proportion has been less than one-tenth. This contrast is something for the South to think about."

Also it is something for the Pacific Northwest to think about. Early this year, Fortune magazine gave almost an entire issue to the far West. Its leading editorial was entitled, "Why the Pacific Coast?" Here is a part of that editorial:

"Any time is a good time for talking or writing about the Pacific Coast. This is true partly because a profligate nature made the Pacific Coast a fabulous place; partly because life there is still *terra incognita* to most Americans. * * * For decades the West yearned for industrialization, and nursed the conviction that only a greedy colonial-minded East stood in the way. * * * Today the question whether the West should industrialize is academic. For better or worse it is industrialized,—primarily to ships and planes, to be sure, but industrialized nonetheless. Industrialization is not a reversible reaction; industrial communities cannot be scattered like flocks of pigeons,—certainly not in the West. * * * The West now has an industrial population that only industry can employ."

Thurman Arnold, a picturesque westerner, former mayor of Cheyenne, later Professor of Law at Yale University, then Assistant U. S. Attorney General, then a Federal Judge but always a valiant gladiator, orthodox of economics and picturesque of speech, speaking five or six years ago on "Monopoly and the South" carried the idea still farther in these words:

"The industrial East has been the Mother Country. The South and West have been the Colonies. The Colonies have furnished the Mother Country with raw material. The Mother Country has been exploiting the Colonies by selling them manufactured necessities. The industrial East has been the principal source of both capital and organization to develop the South and West. Under such conditions it has been natural enough that the South and West have been developed in the way which would contribute the most to the domination of the industrial East. This is the age-old principle of Colonial Empires."

This is a mild impeachment which neither the South nor the West may relish. But even more than its germ of truth is its challenge. Of Britain it has been said and is still said, "Export or die." Of the South and the West it may equally be said, "Utilize, conserve, and diversify, or be content with a second-rank position in the American economy."

Some people dislike the description of the West as "Colonial." But if it is a correct description, there is little gain in using different words which mean the same thing. There is nothing wrong with a Colonial status. Only it is not a very high ultimate objective for an ambitious people. It should rather be regarded as a way-station. If the principal financial, transportation, and industrial institutions in the Pacific Northwest are dominated as they are freely

said to be dominated by Eastern or Mid-western origins or ownership, and if they follow a course consistent with the interests of those origins and ownerships, they are doing exactly what should be expected of them and what they should do. In so doing, they will continue to build a stronger and gradually a more diversified economy in the Northwest.

But it will *continue* to be predominantly a raw materials economy and will be based more on development of resources in men's *hands* than on development of ideas in men's *minds*. This, although a high goal, is, I think, not the highest goal of which the Northwest and its progressive, industrious, and ambitious people are capable. The Pacific Northwest needs *ideas* of its own more than it needs *resources*. It has enough resources, if it uses them.

The Pacific Coast in the years ahead is confronted by much the same kind of opportunity looking across the *Pacific* as has confronted New England and the Atlantic states looking across the *Atlantic* for so long that it almost takes for granted that the focus of industry in this country is logically, permanently, and almost by constitutional ordination, located in the Northeast. That may be so. But I am not too sure. Time only will tell. It took hundreds of years to make New England. In an era of atomic energy with limitations of time and space almost annihilated, it will not take hundreds of years for a counterpart of New England in economy and culture to be developed in the Pacific Northwest if such a counterpart is, in fact, to be developed.

During the past century or more, our American foreign policy, if it may so be called, has been dominated by the "Monroe Doctrine." Behind this has been a purpose to preserve the security of the Americas, peace in the Western Hemisphere,—so that the American experiment in democracy might have a chance. We need no recital of the course of history which has brought this country to a position of general good will among the Americas and of recognized predominant economic strength, if not political prestige, throughout the world.

I am not a prophet. But my guess is that our trans-Pacific relations will become as dominating in the century ahead as have been our trans-Atlantic relations in the last century; and, whereas the Monroe Doctrine has heretofore been a dominant note, that in the course of time a "Strong China" will become equally dominant as a fundamental motive and objective of our trans-Pacific relations.

This may seem remote from the interests of science in the Northwest. I think it is not at all remote. If we have learned anything from history in our generation, it is that if trade and travel do not freely cross international boundaries, armies will. China ultimately is the key to peace in the Pacific; peace is the key to commerce in the Pacific, and commerce in the Pacific is the principal key to an economy and a culture of its own in the Pacific Northwest. China,—not Russia, not India, and not Japan,—is the key to the future in the Pacific. And when Chinese scientists and engineers visit Grand Coulee Dam and announce a project in China of a hydroelectric power and irrigation development several times the magnitude of Grand Coulee, let us not dismiss it as a hoax of Oriental imagination. I expect to live to see exactly that kind of development in China. It will be no more extraordinary than have been the giant achievements during the last quarter century in Russia which after the last war was so confidently described by so many willing commentators as being of a peasant people incapable of the arts of industry. If that had been so, Russia would not be where Russia is today. Neither would we.

Much has been written and more has been said about the wealth of the Pacific Northwest in natural resources, in forests, minerals, soils, waters, and electric power. The great extent of these resources is, of course, one of the finest promises of the West. But these resources are more of the nature of interesting statistics than of vital factors in American life until we learn to make more use and better use of them. The West is rich in natural resources. It is not yet comparably rich in ideas and in opportunities. That in my opinion, is the

challenge to the March of Science in the Pacific Northwest.

I am well aware of the West's so-called economic limitations,—familiar and even somewhat threadbare,—its small consuming population, great territorial expanse, distance from principal markets, lack of good roads, high transportation costs, lack of investment of capital, and comparatively high cost of venture money. All these are important, and for a long time, they will continue to be. But they are not decisive unless we think they are.

I was interested last spring in a striking pre-war comparison between the economy of the Old South and the economy of the newer West. Machinery is as good an example as any of a broad classification of fabricated industrial production. The South, for example, has about 30% of our national population. It uses nearly a fourth of our national product of machines of all kinds, but it produces less than 5%. The Western states have less than 15% of the population, use nearly 15% of the national product of machinery and produce less than 2%.

The war has brought into the Pacific Northwest great industries for the partial processing of the so-called light metals. But with the exception of a single rolling mill and of a great aircraft works, its participation in light metals has been practically confined to the production of pig or ingot metal, providing about three days' work for one man per ton. But the same metal, shipped to factories in the Middle West and the East for refinement, processing, and fabrication in forms, shapes, extrusions, tubing, forgings, and castings, has provided on a national average, nearly 45 days' work per ton; and in some limited areas in New England, nearly 100 days' of employment per ton. The Northwest would not have been able to do even this had it not been for the availability of abundant hydroelectric power at costs about 30% of the average costs of power available for the same purposes elsewhere. But with each pound of pig aluminum shipped elsewhere for fabrication and refinement went the equivalent of 3c

or perhaps 4c of the Northwest's power advantage.

Down in western Oregon near Eugene is nearing completion a war plant of the Willamette Valley Wood Chemical Company. It is located in the center of Oregon's principal sawdust piles. It is the first major effort in this country toward the chemical conversion of sawmill wastes, using a process of wood hydrolysis, originated on the continent of Europe which even before the war had transformed many of the wood industries of Germany and provided the German Reich with much of the backbone of its war industries, ranging from synthetic rubber for its motor cars to high protein content feeding yeasts for its impoverished cattle.

We are all aware of this Oregon adventure. But few of us perhaps are aware of its fundamental and potential *significance*, in the forest economy of this country. What do you see when you look at a pile of sawdust? Most people grown up in the shadow of sawdust piles, when asked that question, regard it as a bit silly. Not so scientists who see the future of forest industry as much in the chemist's test tube as in the sharp saw. From a ton of ordinary sawdust in our familiar Northwest woods may be recovered over 1,100 pounds of wood-sugar capable, in turn by simple process, of conversion into the myriad of products which may be derived from carbohydrates. Taking dry sawdust at \$4.00 a ton and dry wheat at \$1.00 a bushel, it would take nearly \$8.00 worth of wheat to provide the amount of carbohydrates which by this neo-Scholler process may readily be recovered from a dollar's worth of sawdust.

But this, too, may be merely an interesting statistic. Perhaps it is. A little more time and a further March of Science will tell. But if it is more than an interesting statistic, its significance for the United States is in this simple fact: Today the total annual wood waste in logging operations, in mills and in factories is sufficient to produce recoverable sugar equal in tonnage to the entire annual product of sugar of all kinds from

all sources; the world over, namely, 33 million tons.

Meantime the forest industries of the United States as a whole are utilizing on the average not more than 40% of the tree volume, compared with over 75% in the Scandinavian countries with conditions somewhat comparable to our own, and with nearly 85% in Central Europe before the war. Our American forest industries with the aid of better tax laws and with better public and private cooperation are in the early stages of what I hope and believe will be a great nationwide adventure in permanent forest production. Think of the impetus to forestry which would result if this Oregon adventure works out successfully. Potentially it may remake forestry in this country and particularly in the Pacific Northwest with its large percentage of lands useful for no other known purpose than forest growing.

A similar story might be told of the billions of tons of dolomite and magnesite and alumina-bearing clays under our feet and generally regarded as "dirt." Montana of the Pacific Northwest states is, I understand, regarded potentially as the richest in minerals. Idaho seems to lead in the extent of its irrigated lands. Oregon has the most extensive forest resources; Washington, certainly the most abundant power and perhaps the most convenient access to the Pacific and the Orient. But all these states have a wide common denominator or interest in terms of natural resources and in terms of intelligent, forward-looking, and ambitious people. These adventures toward the conversion of great resources into an economy and a culture of its own in the Pacific Northwest will not, I think, be accomplished without a March of Science.

I have been much interested in the scientific "tools" with which different regions of our country have to work. Among the most important tools are the industrial research laboratories. It is not known what the war has done to these. Undoubtedly there are more research laboratories than there were before the war, and many of them, on the fringes of adventure into atomic energy,

are engaged in vast new fields of exploration. In 1940, there were in the United States a few more than 2,600 industrial research laboratories. In the whole of the South, as I recall, there were fewer than 150. In the whole of the Pacific Northwest there were scarcely 50. In the single state of New Jersey there were over a hundred and in little Connecticut there were 92.

The National Research Council in the late thirties estimated that there were in the United States 44,000 of what it called "research" scientists and of these only 10% were on the Pacific Coast. Whatever be the significance of these comparisons and contrasts, it seems to me that it is at least fair to assume with respect to the Pacific Northwest that a "March of Science," if its tempo is to be increased, must be initiated, stimulated, and largely guided by the colleges and universities which have and no doubt will continue to have on their faculties, not only fine teachers, but ingenious research men who are not afraid of fantastic ideas. In many fields, such as the mineral industries, forestry and agriculture, the scientific agencies of the United States Government are making an invaluable contribution. The largest responsibility, will I think for a long time continue to fall on public scientific agencies, such as the institutions of the Federal Government and the State Colleges and Universities.

The facilities of most of these institutions individually on the whole are excellent and are constantly being extended. But the present facilities, for *coordination* of scientific research even on the bare level of convenient exchange of scientific ideas are pitifully deficient. I think it is little short of absurd for Washington and Oregon, for example, to be dealing as aggressively as they are now dealing with scientific approaches to such fundamental matters as forest products utilization with as little provision as now there is for exchanges of ideas, clues, and developments. I might say that even within the State of Washington there is a sufficient problem of such exchanges between the State University and the State College. Although I am a newcomer, I recognize

the practical necessities, if not the conveniences, of state lines of demarcation. But I frankly think, with respect to the great promise of economic development in the Northwest, that our several institutions would each make a much more useful contribution to that objective if we were less conscious of, and less scrupulous about state lines in our exchanges of science and research, and if we were to confine more of our interstate and inter-institutional rivalries to the 50-yard line in the fall.

Be that as it may be, we lack the mechanism of research coordination in the Northwest among states having similar and to a large extent comparable resources and opportunities for development. Possibly a voluntary agency like the Northwest Scientific Association might provide the necessary link for such coordination and exchange of ideas. Or perhaps it might be done through some form of voluntary unofficial interstate cooperation established for that purpose. Possibly it might be added to the functions of the Northwest Governors' Conference. If not, it should be undertaken by, and if need be imposed upon, some appropriate Federal agency with Pacific Northwest regional interests or upon some regional "authority" if one is established.

I am sure that Washington State College would gladly join with its sister institutions in the Pacific Northwest in any reasonable plan for the exchange of scientific ideas and coordination of scientific research. Such a coordination I am sure can be beneficial to all Northwest scientific institutions if, as is confidently expected, there is developed as a measure of national policy a program of Federal research funds to be administered by a competent representative Federal Board to institutions competent in the widely ramified fields of science. In any event, such a cooperation would enable the work of each institution to

count for more and that in itself is a sufficient justification. I hope this Association will interest itself in that objective.

Within its own field, the Board of Regents of Washington State College, as many of you know, has established what is known as the "Washington State Institute of Technology," together with a comparable "Institute of Agricultural Sciences," to coordinate, integrate and extend the functions of the institution in these fields of theoretical and applied sciences including alike teaching, engineering, research, and extension. The Washington State Institute of Technology includes the College of Engineering and its Engineering Experiment Station; the School of Mines, now called the School of Mineral Industries, and its Mining Experiment Station. Also it includes the newly established Division of Industrial Research and Extension which has an ambitious program of research, fortified by an extension service for the aid of industries, including potential small industries. This program in research and extension ultimately will be comparable in objectives if not in scope to the familiar combination of Experiment Stations and Extension Services in the field of the Agricultural Sciences.

Along with this the Institute of Technology, the Regents have announced, has been authorized to expand its undertakings to include the field of atomic power engineering. Washington State College is now engaged in an effort promptly to implement these authorizations with the best scientific directing talent available in or available to the Pacific Northwest. In so doing, in collaboration with other scientific institutions,—State, Federal and private,—it hopes that it may be able to do its fair share toward what I have called the "March of Science" in the Pacific Northwest.