2. THE PLACE OF FOREST GENETICS IN SILVICULTURE

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Several years ago a graduate student in silviculture whom I knew showed me a chart he had made. The exact title of the chart I cannot now remember, but it seems to me it was labeled "The Tools of the Silviculturist", or perhaps "The Factors Influencing Tree Growth and Development". The purpose of the chart was not simply to list the "silvicultural tools" or to enumerate the factors involved in the growth and development of a tree, but to show how they were interrelated and how they interacted. The chart was done, I might point out, on a rather grand scale--about 5 x 5 feet actually--and demonstrated that much thought and effort had been expended on it.

I remember that top center--the usual place of honor in such compositions--was given over to the photosynthetic reaction. Radiating downward were a series of principal arrows which established contact with the sun, carbon dioxide, and water. And these, in turn, were connected and interconnected with the soil, the atmosphere, the wild flora and fauna of the forest, man, and, indeed, almost everything. I remember I was particularly interested to note that the frass extruded from wood borers' or bark beetles' tunnels was connected, rather tenuously, to the soil; which, of course, indicated quite rightly that one should not neglect to recognize that even a lowly Dendroctonous may increase the organic increment of the soil, and thus possess some virtue as a silvicultural tool.

As a geneticist, I was naturally interested to know what role as silvicultural tools was given to the genes of the organisms involved in this scheme of things. I studied the chart in considerable detail--all 25 square feet of it--but I regret to say that tree genes (or even the genes of the bark beetles) had not, evidently, qualified for inclusion.

Such a concept of a geneless forest, as symbolized by this student of silviculture, was by no means unique or uncommon a few years ago. In fact, it has been only within very recent years that most forest biologists have come seriously to recognize that trees do, indeed, possess genes, and that they are, in consequence, subject to the same genetic laws that have been observed to govern heredity and variation in other organisms.

The situation that existed before what we might call "the rise of forest genetics" was not, in reality, quite as primitive as I have described. The fact is that foresters have always been keenly aware of genetic diversity at the species level., and were not unaware even that it existed in many species below this level. The important practical and theoretical contributions that forest genetics is capable of making in forestry are not, therefore, in a strict sense, particularly new or revolutionary. A recognition of genetics has tended simply to focus the attention of the forest biologist on the individual tree, rather than the species, and has made him more acutely aware of the basic biological concept that each tree in the woods is the end product of a continuous interaction between its genotype and the environment in which it has grown.

The committee responsible for organizing the program for this third Southern Forest Tree improvement Conference has, I presume, felt that it might be wise to define again the role or place of genetics in silviculture.

By now, I think, most forest biologists are in general agreement that forest genetics includes that field of inquiry concerned with the study of heredity and variation in forest trees. Like "corn genetics", or "wheat genetics", or "Drosophila genetics", forest genetics is concerned with a special group of organisms, and is thus merely a specific area of investigation in the broader field of the mother science, genetics.

In this connection I think it may be worth-while to reemphasize that forest genetics is strictly a fundamental, rather than an applied, science. It is thus exclusively a research field concerned with the elucidation of basic biological problems, and makes no effort to evaluate such facts in terms of their possible utilitarian value. Application of facts derived from forest genetic research is the concern of the silviculturist or the tree breeder.

I am not, of course, so naive as to believe that investigators in forest genetics must keep their minds and hearts unsullied by economic considerations. Indeed, most of the current research in forest genetics, here and abroad, is admittedly designed to produce data of practical usefulness. If the research. were not so designed, I am sure you would all agree that financial support, regardless of source, would be considerably curtailed.

If we must find a "place" for forest genetics, it seems to me quite clear that it is a part of silvics, i.e., that group of basic sciences upon which silviculture, theoretically, is based.

My impression is that the niche or place of forest genetics is now fairly well established, and that most forest biologists are pretty well reconciled to the fact. There are some environmentalist strongholds that still persist, of course; but these are few and unimportant. I am convinced that the pioneering work that has been done in the modernization of silvicultural thought by the Southern Forest Tree Improvement Committee and those committees in other regions will not soon fade away. Even those citadels of conservatism--our forestry schools--have, at long last, begun to realize that the concept of a geneless forest has, in the middle of the Twentieth Century, a dated look.

If graduate students in silviculture continue in the future to fashion charts depicting "the factors influencing tree growth and development", I have the feeling that in an important place on such charts, very likely near the top, will be found the word "genes".