INSIDE TREES. 100 MILLION YEARS OF WOOD STRUCTURE. A NATURAL HISTORY OF FOSSIL WOODS OF THE NORTHERN HEMISPHERE

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Fossil woods provide direct evidence of the stature of ancient plants and are a source of information about past biodiversity and ancient environments. There are spectacular assemblages of fossil trees conserved in National and State Parks, and National Monuments so that study of fossil woods is a public service providing information for interpretative programs. The oldest known fossil "dicot" woods are Albian, approximately 100 million years old. There are two distinct patterns represented: the phyllanthoid and platanoid/icacinoid type, and these wood patterns occur throughout the Cretaceous. The Albian-Cenomanian phyllanthoids of North America were trees. The bulk of Cretaceous woods described to date are Campanian–Maastrichtian in age, with about half of those being from a Californian assemblage, dominated by angiosperms, and studied by V.M. Page in 1970's and early 1980s. Questions for the Cretaceous woods are: How do their characteristics as a whole compare to extant woods? Do they have unique or unusual feature combinations? Which orders or families are represented? Answers include: Scalariform perforations plates are more common in Cretaceous woods, some Cretaceous trees have a high percentage of storage tissue, Magnoliaceae, Lauraceae, Celastraceae, and Malvaceae are among the families represented by Cretaceous wood. The InsideWood web site provides context for evaluating the incidence of wood anatomical features through time and the systematic affinities of ancient trees. This web site has coded wood anatomical descriptions of over 5,900 present-day plants and 1,600 fossil plants. There is a large body of work demonstrating general relationships between wood anatomical features and environment, including water availability and seasonality. Climate change is documented throughout the Tertiary of the Northern Hemisphere, with the Eocene-Oligocene transition being a time noted for significant cooling. Are there general changes in the incidences of wood anatomical features that reflect those changes? The incidence of ring porosity is one feature that does, this feature is common in present-day deciduous trees of the Northern Hemisphere. Also, study of other plant parts has shown that by the Late Tertiary almost all plant fossils are referable to extant genera, but before then fossil assemblages contain a mixture of extant and extinct genera. Fossil wood assemblages are similar, as shown by the early middle Eocene woods of Yellowstone National Park and the middle Eocene woods of the John Day Fossil Beds National Monument. Continued study of fossil woods, including estimating their wood density, will provide additional insight into how strategies for water conduction, support, and storage have evolved, and the internal structure of trees has changed.