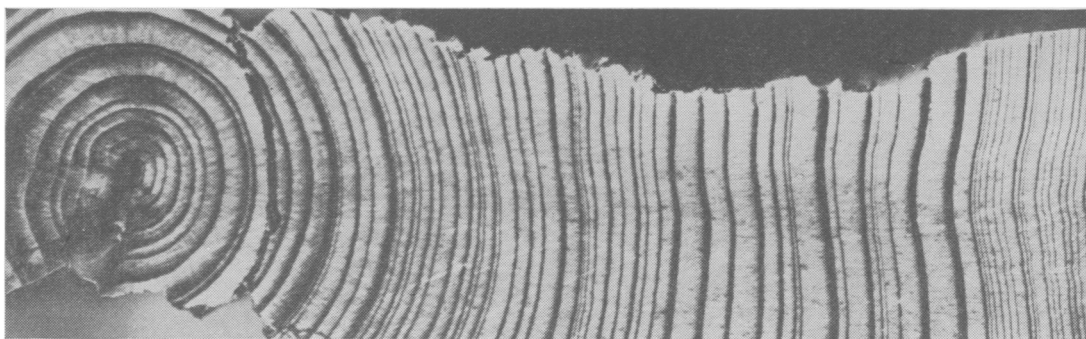


The fir log that was the missing link between Pueblo Bonito timbers and living trees. Born 1073; felled A. D. 1260.



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Tree Rings Date Ancient Ruins

Archæology

THE mysterious, abandoned settlements of the old Southwest have at last been dated by fragments of beam and timber that have survived in the ruins. Pueblo Bonito, apartment house metropolis in New Mexico, had building programs in the years 919, 1017, 1033-92, 1102, and 1130. The Cliff Palace of the Mesa Verde ruins, in Colorado, was constructed with wood cut in the year 1073. The White House Pueblo bears the date 1275. Some forty other ruins have similarly been dated.

Thus the efforts of Dr. A. E. Douglass, astronomer of the University of Arizona, and archæologists cooperating with the National Geographic Society, have led to a collection of more than 5,000 cross-sections of living trees and timbers from the prehistoric Indian ruins, and by reading the annual climatic record set by the trees in their rings, Dr. Douglass has finally succeeded in carrying his wooden calendar back to the Golden Age of the Pueblos.

"We have pushed back the horizons of history in the United States for nearly eight centuries before Columbus reached the shores of the New World," Dr. Douglass stated, "and we have established in our Southwest a chronology for that period more accurate than if human hands had written down the major events as they occurred."

Dr. Douglass pointed out that just as the Rosetta Stone provided the key to the written mysteries of ancient Egypt, so the collection of an unbroken series of tree rings has made clear the chronology of the Southwest.

"These researches have carried the calendar back to A. D. 700 in the Southwest, and they have provided the beginnings of a continuous weather chart for 1,200 years," he continued.

"Through this work we have learned of some outstanding events

in America which were contemporaneous with the conquest of Spain by the Moors, and we know that certain Pueblo Indian settlements were enjoying their golden ages when William the Conqueror faced Harold the Saxon at the Battle of Hastings.

"The earliest beam we recovered from Pueblo Bonito was cut A. D. 919 from a tree that was 219 years old when cut. Pueblo Bonito had reached its golden age in 1067 and was still occupied in 1127."

Explaining the procedure by which the tree-ring calendar was worked out, Dr. Douglass said:

"The method which we have used in extending the historical calendar of the Southwest is the outcome of a long attempt to read the diaries of trees. Every year the trees in our forests show the swing of Time's pendulum and put down a mark. They are chronographs, recording clocks, by which the succeeding seasons are set down through definite imprints. Every year each pine adds a layer of new wood over its entire living surface of trunk and branches.

"If every year were exactly the same, growth rings would tell the age of the tree and little more. Only in rare cases would they record exceptional events of any interest to us. But a tree is not a mechanical *robot*; it is a living thing, and its food supply and adventures through life all enter into its diary. A flash of lightning, a forest fire, insect pests or a falling neighbor may make strong impressions on its life and go into its diary.

"But in the arid regions of our Southwest, where trees are few and other vegetation scarce, the most important thing to man and trees is rainfall. This fact has helped vastly in our dating work, for certain sequences of years become easily recognized from tree to tree, county to county, even from state to state."

From sun spots to tree rings seems a long scientific jump. But it illustrates how one fact of science may have far-flung results in other fields.

"Originally my work was a study of sun spots," Dr. Douglass explained. "It is known that there is a periodicity in their occurrence; they are most numerous at intervals of eleven years. As an aid in that astronomical investigation, I studied trees, for solar changes affect our weather, and weather in turn affects the trees in Arizona's dry climate, as elsewhere.

"The first confirmation of our general interpretation of a relationship between tree rings and sun-spot periods came in a most dramatic way.

"Evidence of the eleven-year sun-spot cycle had been easily found in Arizona pine trees. The regularly recurring periods had been recorded for 500 years by tree rings, *except for the interval from 1650 to 1725*. During those 75 years the tree rings gave no evidence of periodical changes in the weather such as were to be expected."

Several years after Dr. Douglass encountered this puzzling fact the late Dr. E. Walter Maunder, an eminent English astronomer, unaware of his findings, wrote to him that he had found that there were no naked-eye sun spots between 1645 and 1715, and that if the tree rings did not indicate some effect of this absence of sun spots, the work was being conducted on an erroneous hypothesis.

The coincidence between the failure of Arizona trees to register any sun-spot effect upon the weather during those years, and establishment of the fact, by entirely independent study, that the customary sun-spot cycle did not occur during approximately the same period of years helped confirm the relationship between the growth of trees and solar changes.

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