

Potential Exhibits for the *Bryant Bannister Tree-Ring Building*



Image: Richärd and Bauer, 2010.

Prepared by the Laboratory of Tree-Ring Research

University of Arizona

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Compiled by:

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with the assistance of the faculty and staff of the Laboratory of Tree-Ring Research

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Description: The Laboratory of Tree-Ring Research (LTRR) has been housed in the West Stadium for more than 70 years, with minimal improvements to their facilities. This project will provide new laboratories and offices to house the LTRR's diverse array of research programs, as well as public outreach and support spaces. The project is the first phase of a long-term effort to relocate the entire LTRR into contemporary facilities.

These new contemporary facilities will include specifically designated exhibit space and provide many opportunities for display of LTRR related research and specimens throughout.

This document is intended to serve as a conceptual and practical guide, to aid in the planning of construction and design of future exhibits in the new building.

Our goals are to:

- provide a stimulating educational experience for the public -- including the University community and all of our visitors – informing them about the highest quality and most significant science conducted at LTRR, past and present;
- efficiently and effectively communicate our research findings and teaching endeavors to UA and LTRR visitors, while also maintaining and minimizing interference with our regular functions of laboratory research, classroom teaching, and curation of tree-ring collections;
- allow for substantial numbers of visitors to experience and learn from our exhibits, while achieving our other objectives listed above; visitors would likely range from single individuals, walking in at any time and self-guiding, to pre-arranged tours of groups of 30 to 50 or more; visitors will range in age from kindergartners to retirees;
- provide opportunities to inspire and engage new donors and supporters of our mission.

The exhibits should tell a story, be it about a significant person, site, event, or field of research.

Categories of possible exhibits include:

- Major/Permanent exhibits; General exhibits; Area-specific displays; Small stand-alone displays

Also included is a section titled “**A.E. Douglass Legacy Projects**,” which are intended to shed light on Douglass’ considerable contributions to the field. Many of these contributions go overlooked due to his primary acknowledgement as the found of the discipline.



Major/Permanent exhibits

1) **What:** Bristlecone pine snag (likely less than 30 ft. tall.)

Location in Building: centerpiece for lobby.

Other Notes: Tell story of the discovery of bristlecone pine, development of 8,000+ year chronologies, and applications in C14, treeline change, and climate studies.

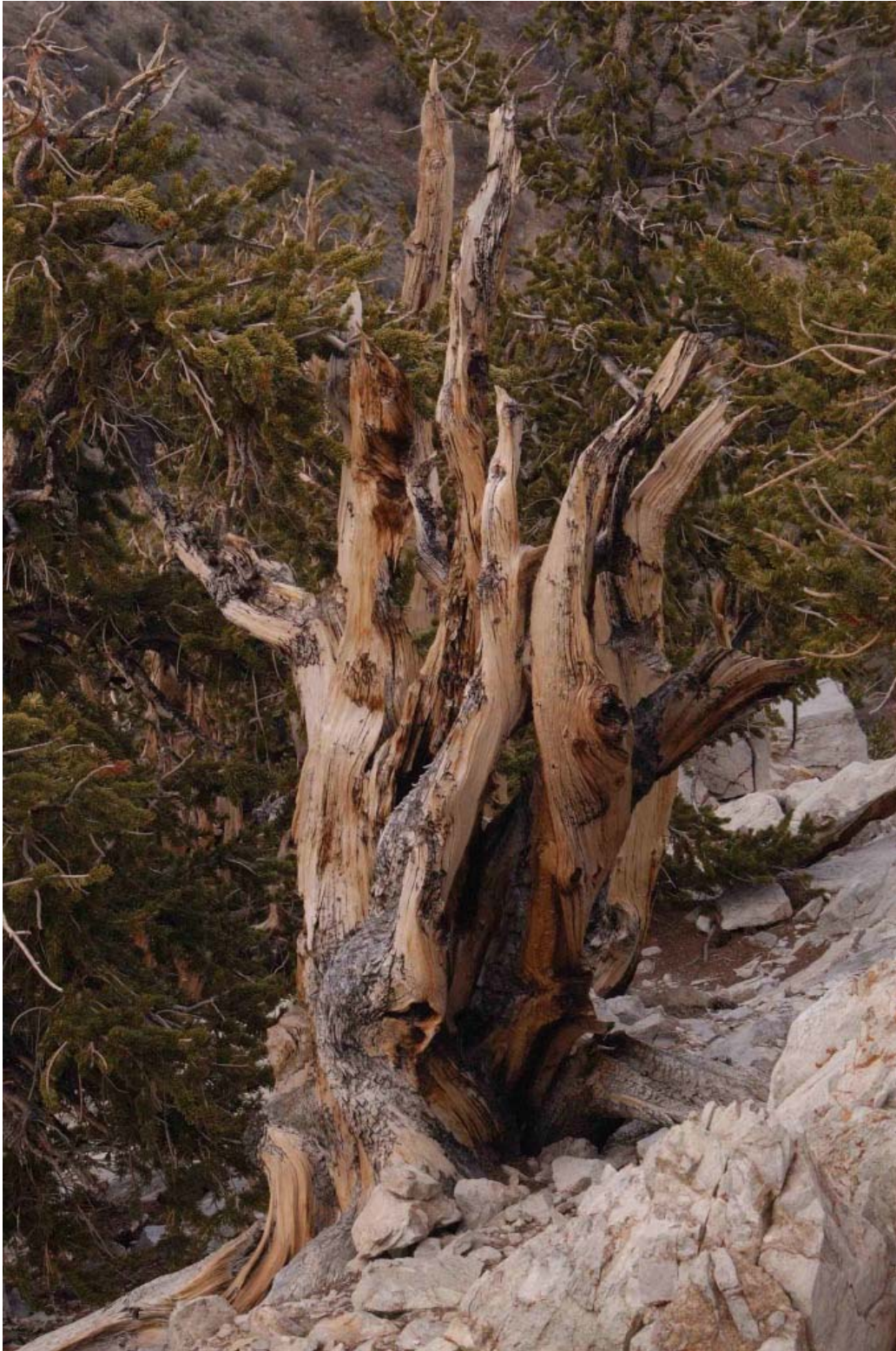
Alternatively, snag could be a ponderosa pine or Douglas-fir tree, possibly fire killed, from a local mountain range.

Notes: Obtaining a BCP snag from somewhere in the Great Basin may be a quite difficult and potentially expensive proposition. This will probably require a “special use permit” from the US Forest Service or Bureau of Land Management, and it will require considerable planning and discussion with federal managers. Also, there is the challenge and cost of transporting it. One idea is to see if a local firm with experience (and equipment) in moving saguaro cacti may be interested and may provide a cost estimate/donation of services in exchange for a small donor plaque on the exhibit.

If the BCP idea does not appear feasible, an interesting snag from a local mountain range (e.g., Santa Catalinas) would probably be relatively easy to get permission to obtain, and less expensive. For now, an aesthetically appealing, ancient BCP snag is the preferred item, if possible. Swetnam will investigate further.

If it is a BCP snag that fits the above description (or as shown in the photo below), an outdoor location for it would likely be unwise. Such a snag would likely have somewhat fragile branches and unique coloration and other aspects that demand protection from Tucson elements, vandals, etc. If it is a simple pole-like ponderosa pine or Douglas-fir snag, it might be just fine as an outdoor item.





Bristlecone pine, White Mts., California.
Image © Daniel Griffin, 2010.



- 2) **What:** Large sequoia section (currently in AZ State Museum storage)
Location: Lobby, on glass wall so can be viewed from interior and exterior.
Refinish both sides, if possible, and include major dates. Will require a new support structure.
Other notes: This is a Tucson classic, and must be prominent, stable and accessible. Some photos, such as below, could be placed around the top half on the interior face.

It would good to think about some kind of special display of chronological, time-line information along the tree-ring radius of this specimen (see image below where pins with a set of threads linking rings/years to notable events, historical, UA, LTRR, etc.).

This is the classic tree-ring display shown all over the world: e.g., Columbus “discovers” the Americas, American Revolution, etc. How about something dynamic? Maybe a movable strip of reflective material, upon which various types of events can be projected (or imaged somehow), so that different types of timelines might be examined, and changed interactively by the user/observer: e.g., human history events, natural history events (droughts, floods, volcanic eruptions, etc.)

*This exhibit, and its installation, is a very large opportunity for local and regional news coverage and a vehicle for raising awareness about the building and LTRR. This is an iconic Tucson and UA scientific object that has impressed Tucson school children and other visitors for generations ...but sadly, it has been unavailable for viewing for 10 years or so. We are bringing out for the next generation(s) to enjoy it and learn from it!



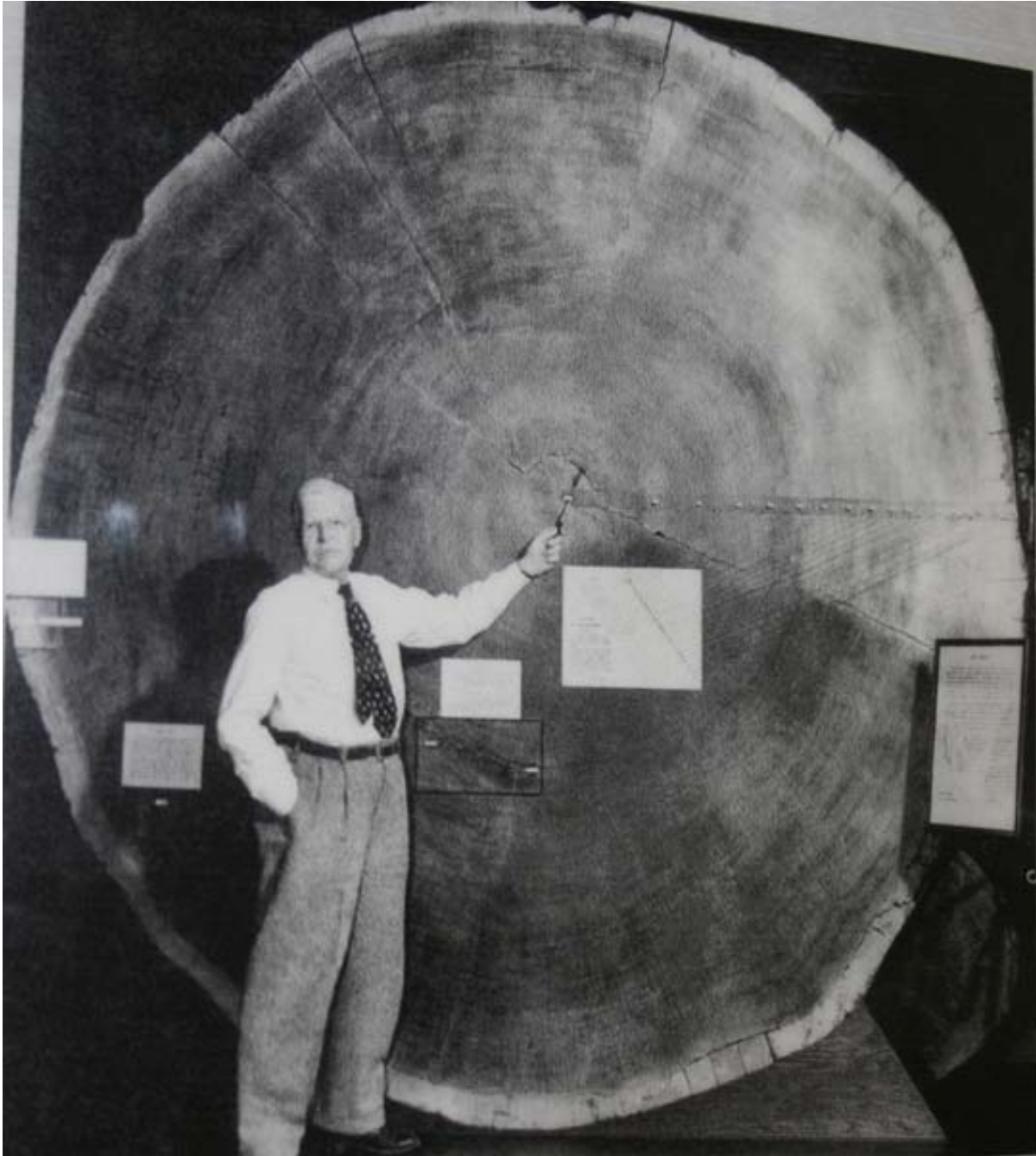


Image © Laboratory of Tree-Ring Research, University of Arizona.



- 3) **What:** “Prometheus” - Oldest known living tree sample, 4,900+ years, when cut in 1964. Accompanying story regarding creation of Great Basin National Park, Trexler photos, etc
Location: Lobby or a long wall
Other Notes: D. Currey’s specimen, via H. Arnott. Specimen originally from Wheeler Peak, White Pine County, NV. (formerly US Forest Service, now National Park Service)

This specimen has many ironies and stories to tell, both of scientific interest and about environmental ethics and science ethics (ethics is currently a major national initiative in the sciences and there may be some role for the UA Office for the Responsible Conduct of Research here). Telling these stories the right way will demand some sensitivity. In any case, this is one of the “must see - must display” pieces in our collections.

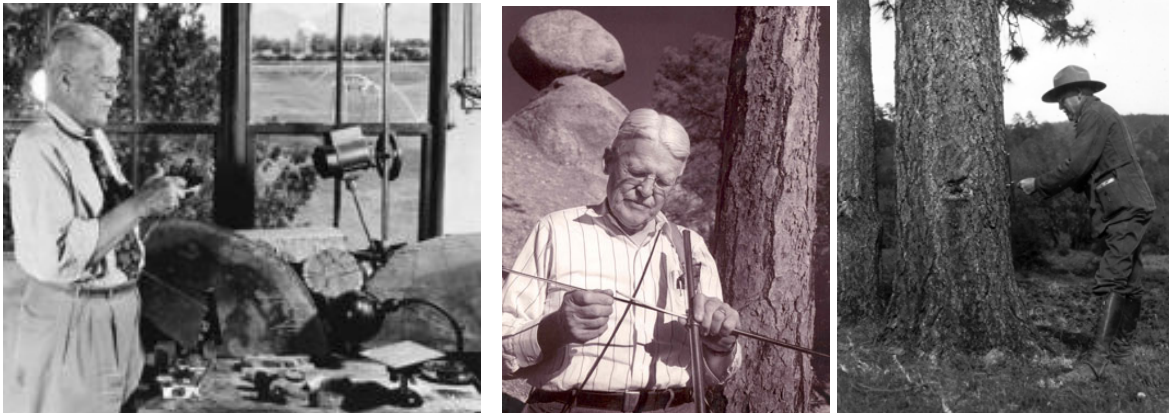


Specimen on arrival at LTRR in 2010.



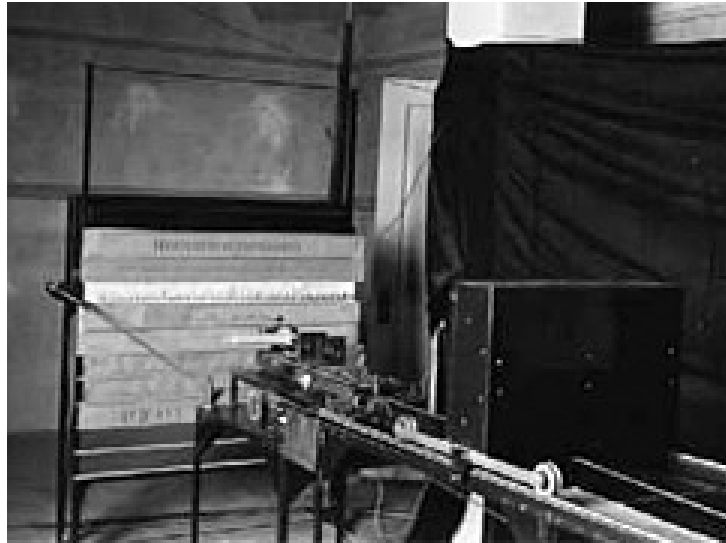
Prometheus’ stump and remnants. (Image: public domain).

- 4) **What:** A.E. Douglass display with re-created work space/office.
Location: corner of primary exhibition space
Other Notes: To include AED's Desk, bookshelves, tools, inventions, optical equipment, papers, photos and films
Tells the story of the birth of dendrochronology & dating the Southwest



Images © Laboratory of Tree-Ring Research, University of Arizona





AE Douglass' cycloscope - a tool invented and used by him in a long but ultimately unsuccessful quest to discover cycles of solar activity in tree rings.
(curated by ASM; see <http://uanews.org/node/8105>)



Sunlight microscope illuminator, invented by AE Douglass (ca. 12 inches tall).

Various other instruments are currently in storage at ASM, and available for display, but must be protected from theft, damage, etc.



5) **What:** History of the LTRR exhibit**Location:** lobby

Other Notes: We might think about a general part of our exhibit space that is devoted to LTRR history, and the prominent figures of our institutional past. As noted above, there are numerous artifacts/objects from the previous century of tree-ring studies used by these individuals that help tell the stories. Douglas and his founding works should, undoubtedly, be a major foci of this people/institutional historical part of our exhibits.

However, we should also include at minimum several others, i.e., Schulman (discoverer of ancient BCP, pioneering dendroclimatologist) and Emil Haury and Bryant Bannister (obviously because of the origins of the building, but equally because of historical importance to LTRR and dendrochronology). Space and sensitivities permitting, we should also think about something connecting these founders with other very important LTRR members, living and dead, that connect to the present.

We need to have sensitivity to the point that we DO NOT want our exhibits to be totally dominated by past accomplishments, especially long past ones. The vibrancy and currency of recent and ongoing work needs to have a front and center position as well (e.g., see “Now and the Future” below).

6) **What:** Recognition of Agnese N. Haury’s contributions**Location:** hanging over information kiosk or main entry.**Other Notes:** bronze plaque with photo (?)

From <http://uanews.org/node/17133>:

Agnese Nelms Lindley married Emil Haury in 1990. “The two had been friends since the mid-1960s, when she worked on Haury’s excavations at Snaketown, an extensive Hohokam archaeological site near Casa Grande, Ariz. Emil Haury died in 1992 at age 88.

Agnese Haury’s own remarkable career spans 60 years. She graduated with degrees from Bryn Mawr College and Wheaton College, and visited, worked and lived in more than 60 countries. She worked for, among others, the United Nations and the Woodrow Wilson Foundation.

During her five years with the Carnegie Endowment for International Peace, she traveled to Bolivia, Peru, Ecuador, Libya and Burma on special assignment to survey international assistance programs and wrote extensively about her work.

She established the Agnese N. Lindley Foundation in 1981 to benefit dozens of projects in education, science, arts, civil and human rights and the environment, and has been exceptionally generous to the UA.



Her gifts have supported the Agnese Haury Institute for Court Interpretation, the Agnese and Emil Haury Southwest Native Nations Pottery Vault, located in the Arizona State Museum, the Agnese and Emil W. Haury Endowed Chair in Archaeological Dendrochronology and the Agnese Nelms Haury Graduate Fellowship in Archaeological Dendrochronology, to name only a few.”

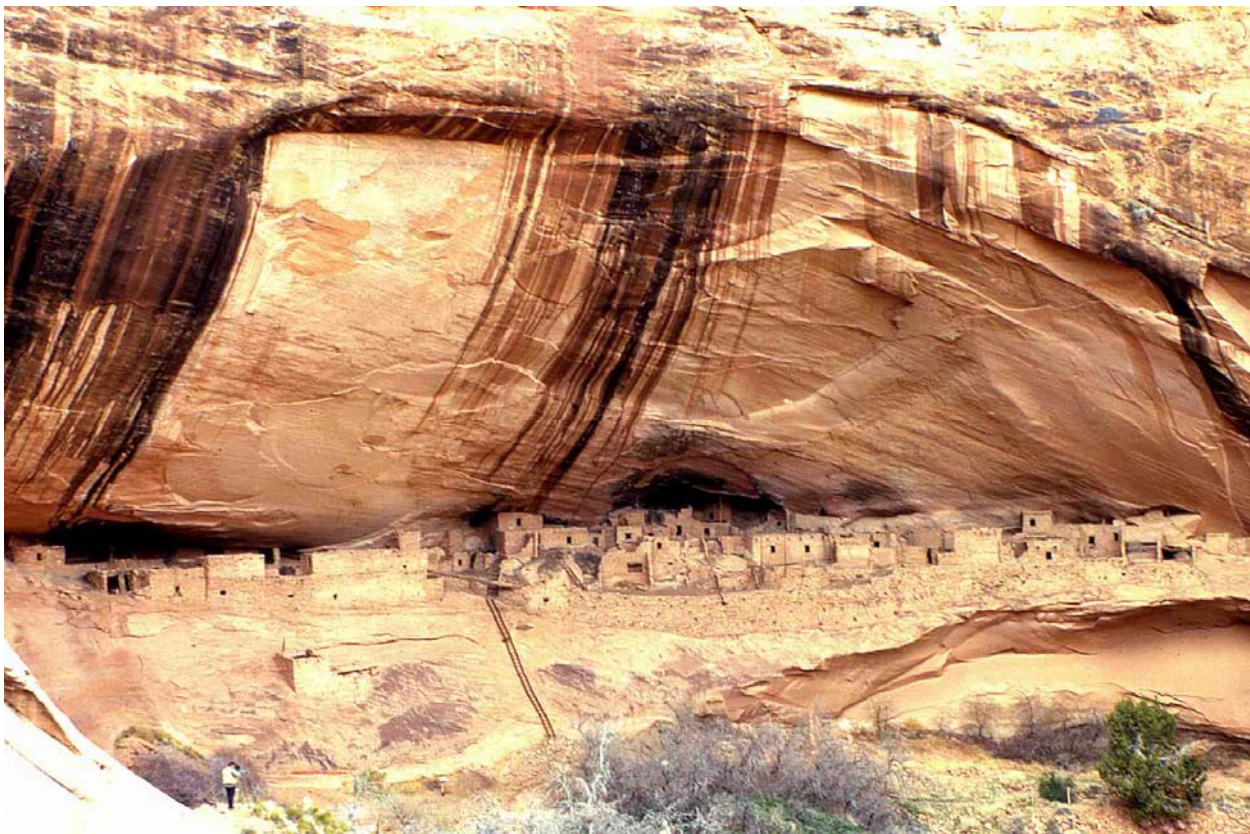


- 7) **What:** “Now and The Future” – to be constantly modified
Location: primary exhibition space
Other Notes: Heavy metals, Sub-Saharan Africa, Ships, etc.



General exhibits

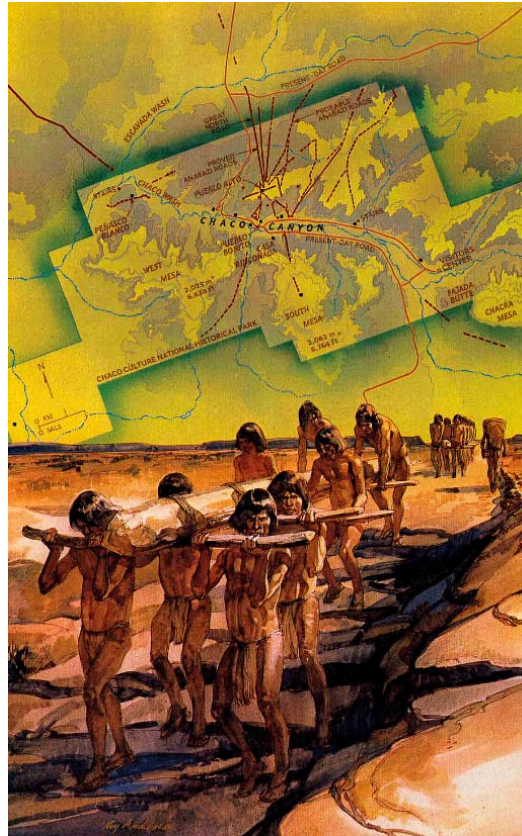
- 1) **What:** Brief biographies of five or six central LTRR figures, with video/photos playing on a loop on a monitor, including: Bannister, Schulman, Fritts ...
Location: primary exhibition space
- 2) **What:** Hands-on box of specimens (BCP, archaeological, fire scar, etc...)
Location: middle of exhibition space
Other Notes: Lucite/plastic box with holes cut out so people can handle the specimens, but not remove them (?)
- 3) **What:** Original dating of SW archeological tree rings and sites
Location: primary exhibition space
Other Notes: Chaco, Mesa Verde, HH-39....Match specimens with photographs



Keet Seel, Navajo National Monument, AZ, tree-ring dated at 1250-1300 CE. (Photo: J.S. Dean)

Archaeological tree-ring dating was the original dendrochronology application that established the science and began the reputation of LTRR. There are several exciting stories about this history, as well as modern applications, like the use of strontium isotopes to determine the origin of the beams that were hauled into Chaco Canyon (see image below).





- 4) **What:** Colorado River flow reconstructions, history of early Stockton, Jacoby work, and update with latest findings, extension, and water management implications

Location: primary exhibition space

Other Notes:

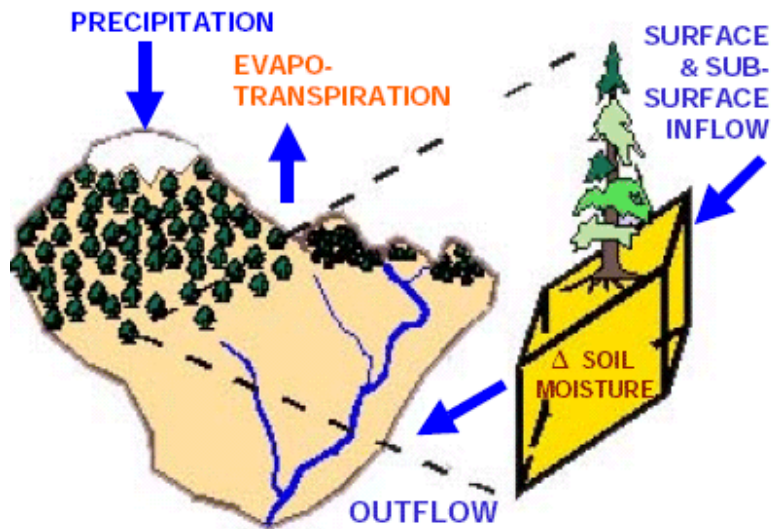
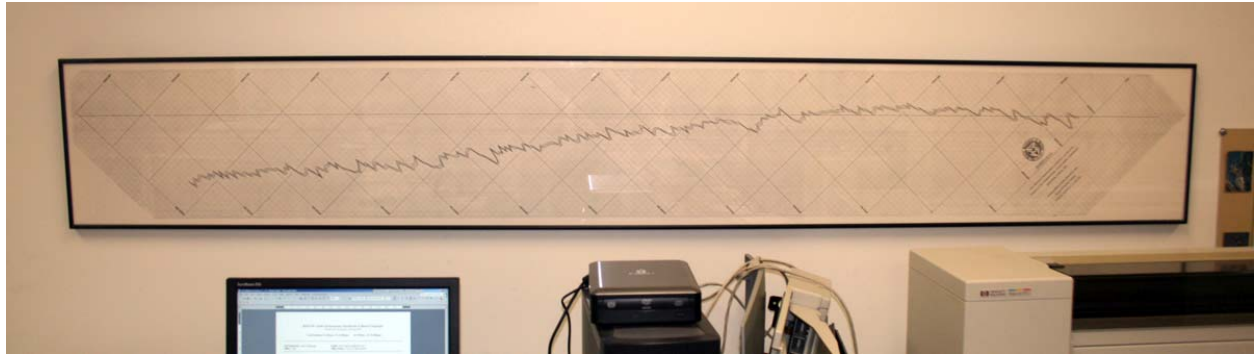


Image © Dave Meko.

- 5) **What:** ^{14}C and Dendrochronology
Location: primary exhibition space
Other Notes: Calibration voucher specimens, Bivariate plot (^{14}C vs tree rings from Irish oaks); see Leavitt, S.W. and Bannister, B., 2009. Dendrochronology and radiocarbon dating: The Laboratory of Tree-Ring Research connection. Radiocarbon 51:373-384.



- 6) **What:** “Climate from tree rings”
Location: primary exhibition space
Other Notes: broad outline of history and applications past and present, including, and other specialized measurements; Hockey stick.
- 7) **What:** “Tools of the Trade,” including: Douglass’ tools (cycloscope, telescopes, microscopes...); Increment borer (regular, old 48 inch), Archaeological drills/ bits, Straws, tubes, etc.; Fritts dendrograph and traces; Joyce Loebel optical densitometer; 084 Stihl chainsaw with 7 foot bar attached (hang from ceiling above or near the sequoia section?) and photo of Chris Baisan running it; Addo-X; old Apple and or IBMs...
Location: various



Increment borer.

- 8) D-23 (Centennial) radial (ca. 10 ft) and photo of stump (ca. 2 ft wide)



- 9) Photo-mosaic of BCP sequence (to be assembled, see P. Sheppard) – will be 8 meters in length and not more than 1 meter high.

Area-specific displays

Archaeology

- 1) HH-39 and related story
“the missing link that connected the two chronologies – a piece of burned timber excavated from a pueblo near Show Low, Ariz. The result gave archaeologists the critical tool they needed to pinpoint the occupation dates for nearly all of the prehistoric pueblos in the region, including Chaco Canyon and Mesa Verde.” (<http://uanews.org/node/17133>)
- 2) Archaeological display pieces: Stone axe cut beam ends, metal axe cut beam ends, etc.

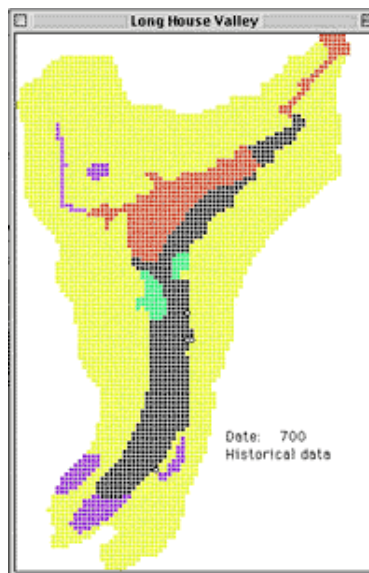


3) Chaco beams with National Geographic photos of the 1920s Beam Expeditions



(Beams available in various sizes.)

4) Artificial Anasazi – digital reconstructions – something to play on a monitor.



- 5) Photographs of historic structures – Savage Homestead, etc.
- 6) Ship timbers and interpretation (numerous beam ends; up to 2 ft wide)



Chemistry/Densitometry

- 1) “Inside the Rings,” scanning electron microscope images (from H. Arnott, below); Frost rings; LaMarche & Hirschboeck *Nature* article; Volcanic eruptions; Heavy metals (P. Sheppard)



- 2) Stable isotope uses for climate

Climatology

- 1) Harold “Hal” C. Fritts exhibit – Book *Tree Rings and Climate*
Historic dendrograph – tool to measure circumferential tree growth, seen below.



2) Edmund Schulman exhibit

Something with Bristlecone pines, story of their “discovery” (for scientific purposes by Schulman) and map/images of “Schulman Grove”, White Mountains, California



Image © NASA – “Ancient Bristlecones in Schulman Grove” (from <http://earthobservatory.nasa.gov/IOTD/view.php?id=6172>)

Ecology/Fire History

- 1) Marv Stokes exhibit
- 2) Fire history specimens

Conference Room

- 1) One or two superlative photos and several photographs (Ansel Adams print from UA?)
- 2) Considerations: Backdrop for interviews/web communications



Classroom

- 1) Photo-mosaic of Pueblo tree-ring chronology assembled by Douglass (ca. 30 ft. long, 1 ft high)



- 2) Plaques of LTRR student awards



- 3) Framed image of “Sensitive” and “complacent” growth patterns (ca. 2 ft wide)



- 4) Framed image of chronology building/crossdating (ca. 2 ft wide)



Administration Office

- 1) Framed portraits of LTRR Directors (ca. 2 ft wide)



- 2) Photographs and wall-mounted specimens
- 3) Plaque of LTRR Service awards
- 4) Various other professional recognitions of the LTRR
- 5) Maps of:
 - Sites where LTRR affiliates have worked
 - Home countries of LTRR visitors



Small, stand-alone displays

Prints:

Prints of superlative trees, landscapes, specimens, etc. provided by current and former LTRR students, staff, faculty and visitors.

Images could be for sale at lobby kiosk.

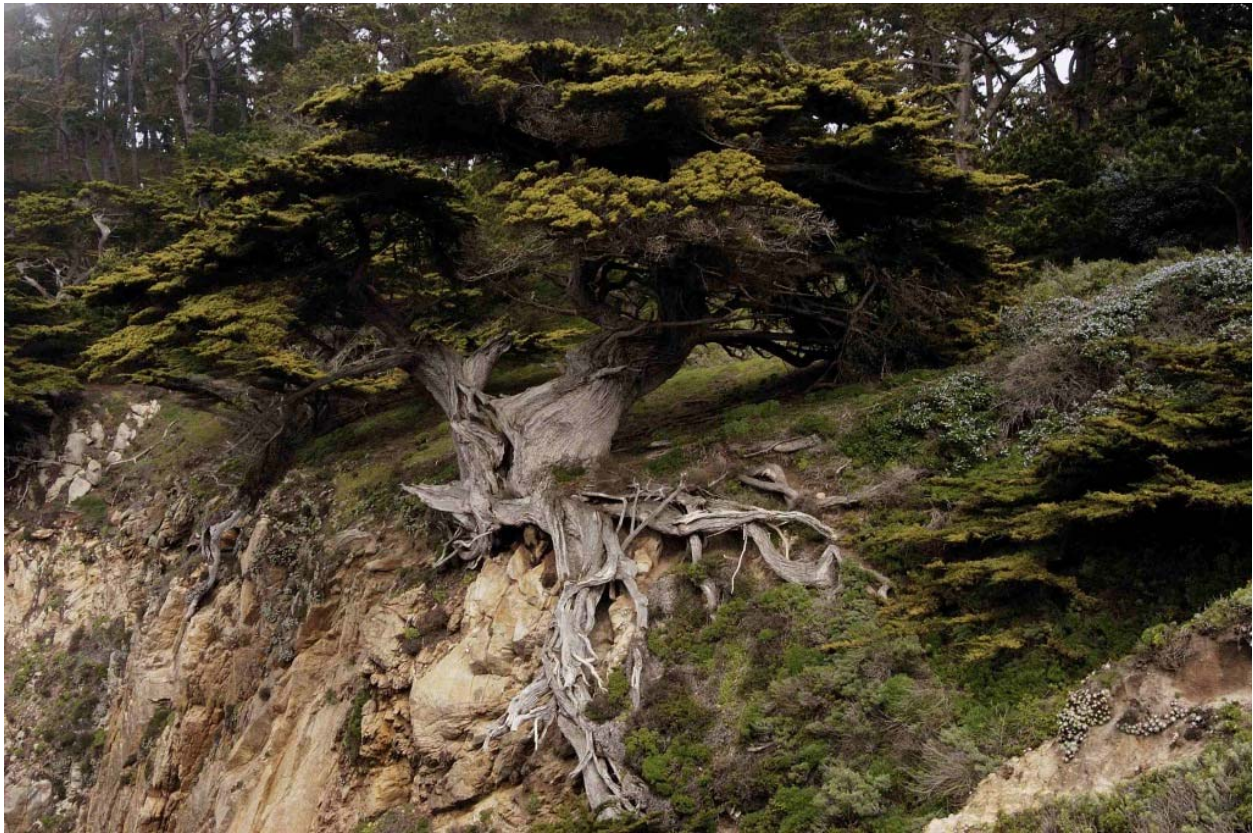
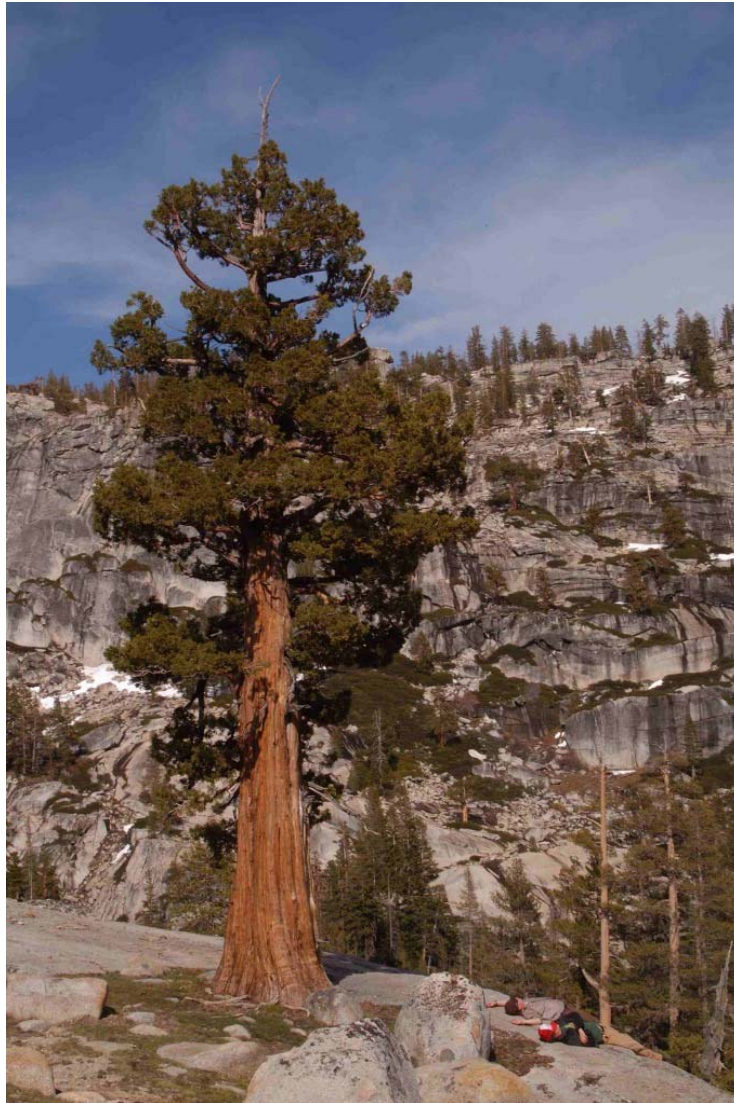


Image © Daniel Griffin, 2010.



Yosemite National Park. Image © Daniel Griffin, 2010.



A monsoon thunderstorm rolls in over the Santa Catalina Mts near Tucson, AZ. 17 July 2009.
Image © Daniel Griffin, 2009.



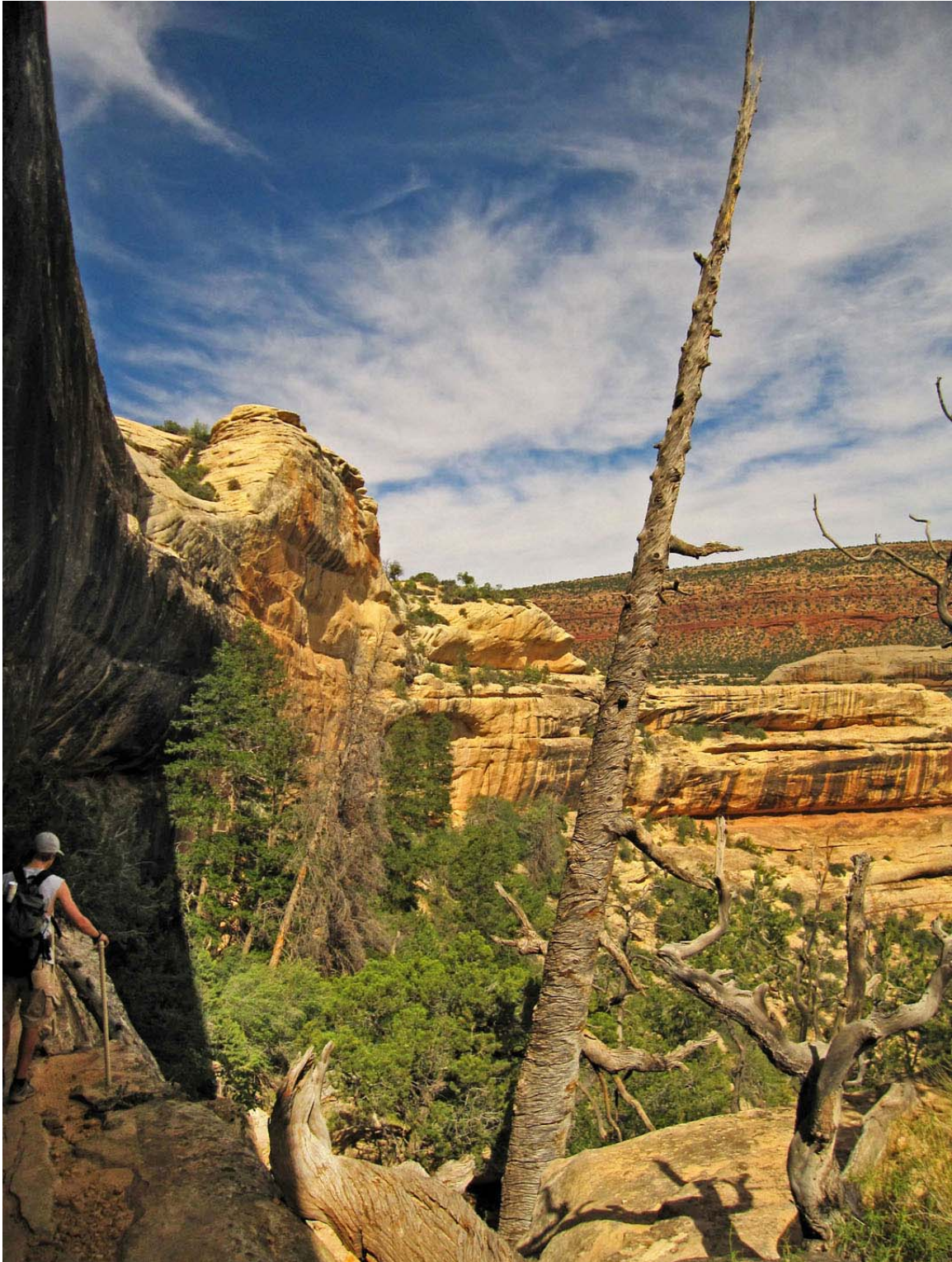


Old-growth mixed conifer forest in the Guadalupe Mountains National Park, TX, May 2009.
Image © Daniel Griffin, 2009.



Connie Woodhouse and Mark Losleben examine a tree-ring core from a drought-stressed Douglas-fir tree
in the Santa Rita Mountains south of Tucson, AZ, February 2009.
Image © Daniel Griffin, 2009.





LTRR intern & old-growth and remnant Douglas-fir, White Canyon National Monument, UT, July 2009.
Image © Daniel Griffin, 2009.



Specimens:

“Fish piece”



Giant sequoia fire scar section with date labels from GFV1 (at airport; ca. 4 ft. tall)



Bikkai cedar from Lebanon (ca. 3 ft diameter)



Fire scarred ponderosa pine from New Mexico (ca. 2 ft diameter)



Long series Bristlecone pine with bore hole (ca. 4 ft long) [Additionally, we have a large, 4,000+ year old bristlecone specimen, which is currently on loan. This particular specimen has a duplicate cross section (the same stump) hanging in the American Museum of Natural History in New York City]



Fire scarred Sequoia with ca. 40 fire events (ca. 3 ft. wide)



Unfinished redwood sections collected by Douglass (about 18 to choose from, ca. 4 ft. diameter)



Framed Images and Other Items:

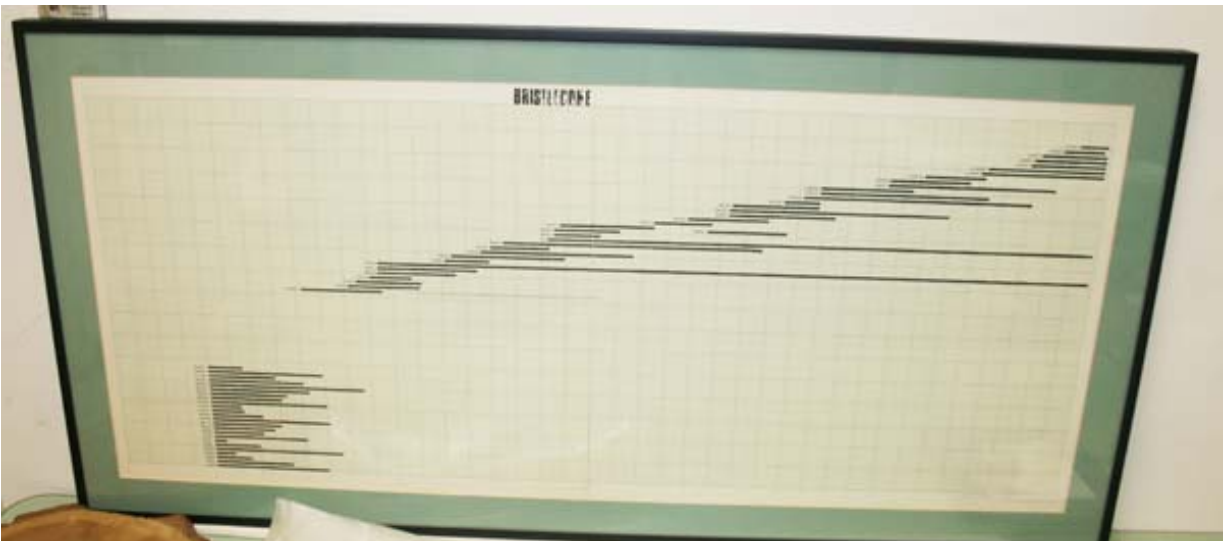
Cells (ca. 2 ft wide)



Five framed series (ca. 1.5 x 2 ft) showing early spatial climate reconstructions by Harold C. Fritts



Bristlecone pine chronology (ca. 3 ft wide)



A.E. Douglass Legacy Projects

- 1) Refinish large sequoia section and prepare for display in new Tree-Ring Building.
Demonstrates his work in building long chronologies and recognition of climate signals

Estimate: \$12,500
- 2) Convert and digitize approximately fifty 16 mm film reels captured by AE Douglass circa 1930's & 1940's. This will provide a vivid, lasting and living reminder of the many places, people and projects which Douglass encountered.

Estimate: \$3,000
- 3) Convert and digitize approximately ten 35 mm film reels captured by AE Douglass, et al. pre 1950's. This project will provide a vivid, lasting and living reminder of the many places, people and projects which Douglass encountered.

Estimate: \$2500
- 4) Design and prepare traveling exhibit regarding the National Geographic Beam Expeditions. This will be demonstrative of the vast support network which Douglass and company were able to amass to support a burgeoning science. Additionally, this could focus on the realities of conducting fieldwork in the Southwest in the early 20th century.

Estimate: \$1,000
- 5) Design and prepare an interpretive "HH-39/Bridging the Gap" exhibit.
This should be used to dispel commonly held myths related to the excavation, recognition and bridging of the prehistoric gap by HH-39. The emphasis should be on an accurate depiction of the events surrounding this event.

Estimate: \$ 750



Existing Exhibits



Large exhibit at Tucson airport.



Interpretive display, with dated wood and major events indicated. Compared to ancient coin



Miscellaneous images (various credits)



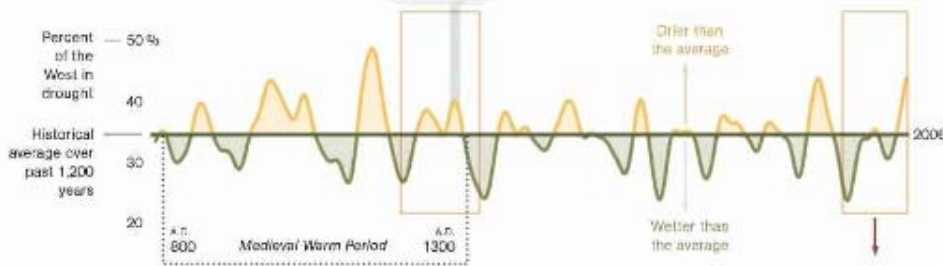
Reading the Rings

Climate patterns of centuries past can be tracked in a tree's annual growth rings: Dry years produce thinner bands than wet years. A wedge from a Douglas fir log (above), collected in Utah's Harmon Canyon, holds the precipitation record of the upper Colorado River Basin from the 10th to 17th centuries A.D. The enlarged section below highlights a decade-long drought in the late 1200s that likely drove the Anasazi from Mesa Verde.

PHOTO: LABORATORY OF TREE-RING RESEARCH, UNIVERSITY OF ARIZONA. LENGTH OF WEDGE SHOWN IS 12 INCHES.



Using tree-ring data from a variety of wood samples from across the West, scientists have graphed the region's climate fluctuations (below), finding the most prolonged droughts during the medieval period, when parts of the world experienced warmer temperatures.



Population Rise in a Wet 20th Century

The unusually wet past century amply met the water needs of a flood of newcomers to the West. But the 21st dawns drier, as population continues to rise.

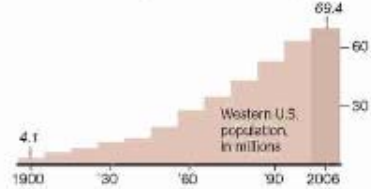


CHART ABOVE IS SMOOTHED USING A 50-YEAR MOVING AVERAGE. DATA: EDWARD COOK, TREE-RING LABORATORY, LAMONT-DOHERTY EARTH OBSERVATORY, COLUMBIA UNIVERSITY; U.S. CENSUS BUREAU.1. REPORTING AND GRAPHICS: SYDNEY ZELLER, JR., NGA ART





1692 Twenty people die in Salem, Massachusetts, witch trials. Tree survives another 200 years; this cross section came from its weathered stump.

1616 Roman Catholic Church prohibits Galileo from continuing controversial scientific work.

1589 Galileo becomes professor of mathematics at University of Pisa.

1565 St. Augustine, Florida, founded, first permanent European colony in the present-day U. S.

1543 Copernicus dies.

Rings of time

A natural calendar, this ponderosa pine chronicles its 400-year existence with bands of annual growth. An accurate means of dating forest fires (here indicated by dates), droughts, and floods, tree-ring analysis now reaches back 8,600 years—an aid to climatologists, archaeologists, and others.

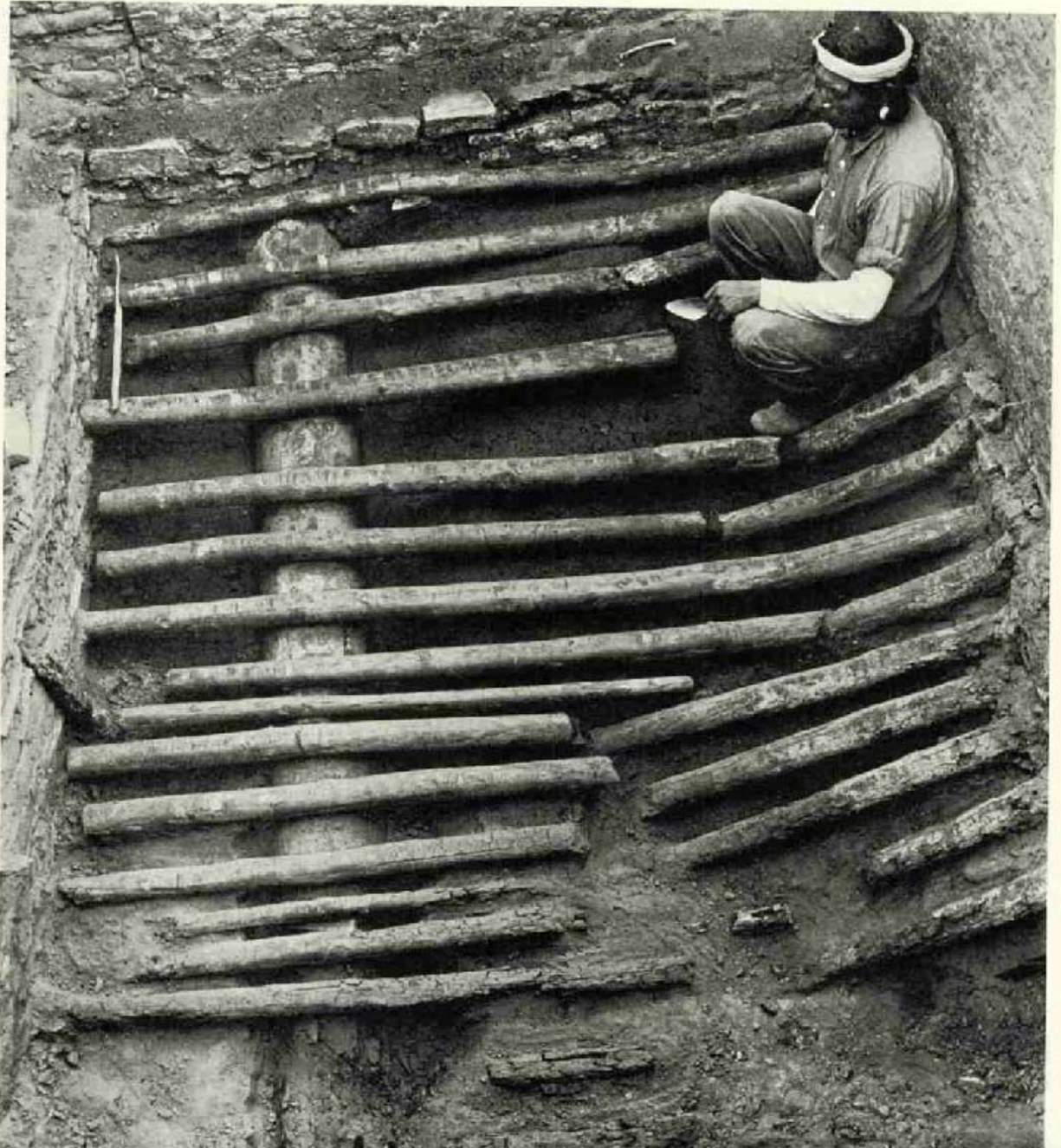
1519 Magellan begins to circumnavigate the globe.

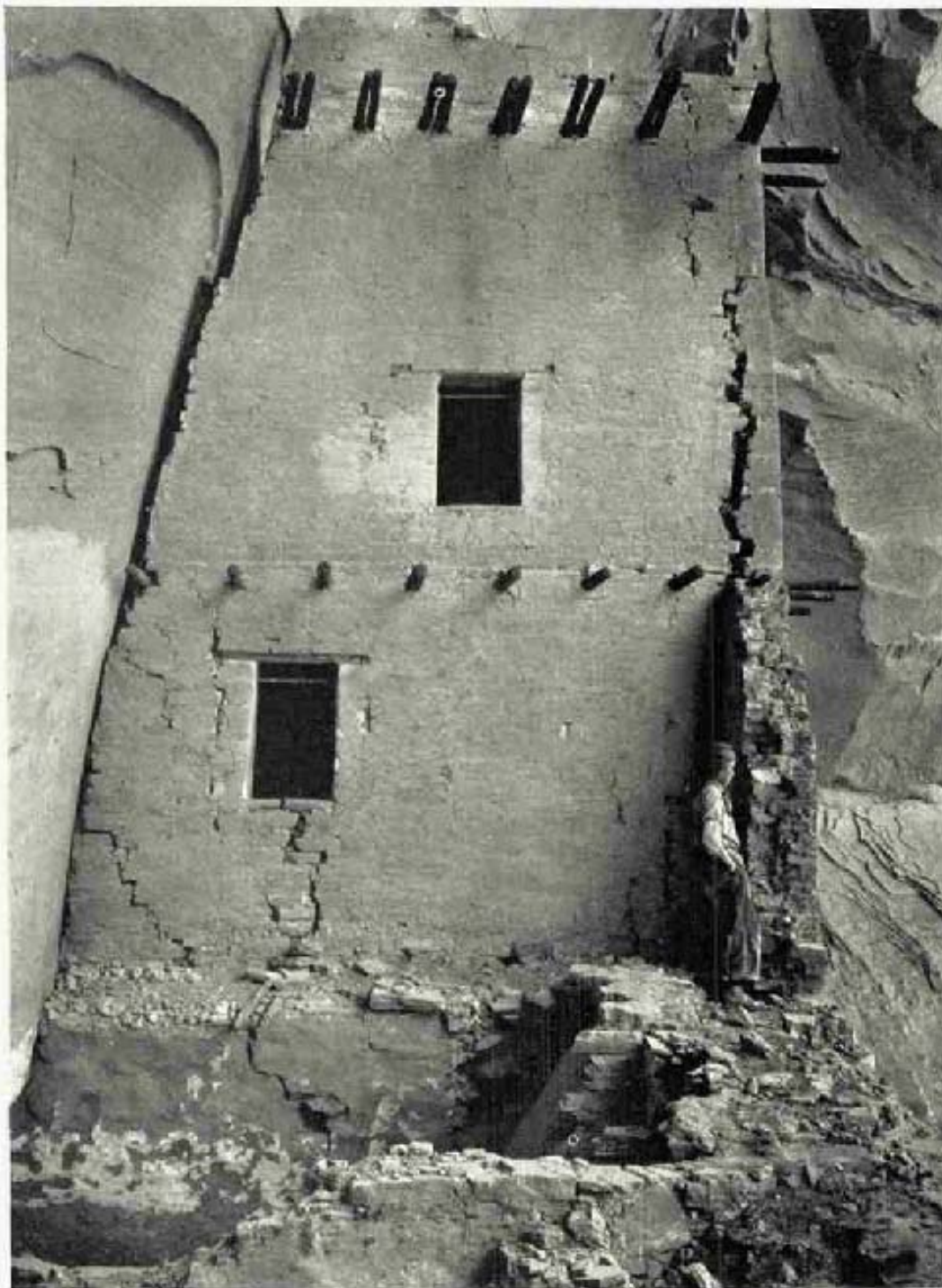
1484 First fire scars the tree, which had already taken root when the world's first book printed with moveable metal type appeared around 1450. Drying caused cracks.



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THE NATIONAL GEOGRAPHIC MAGAZINE

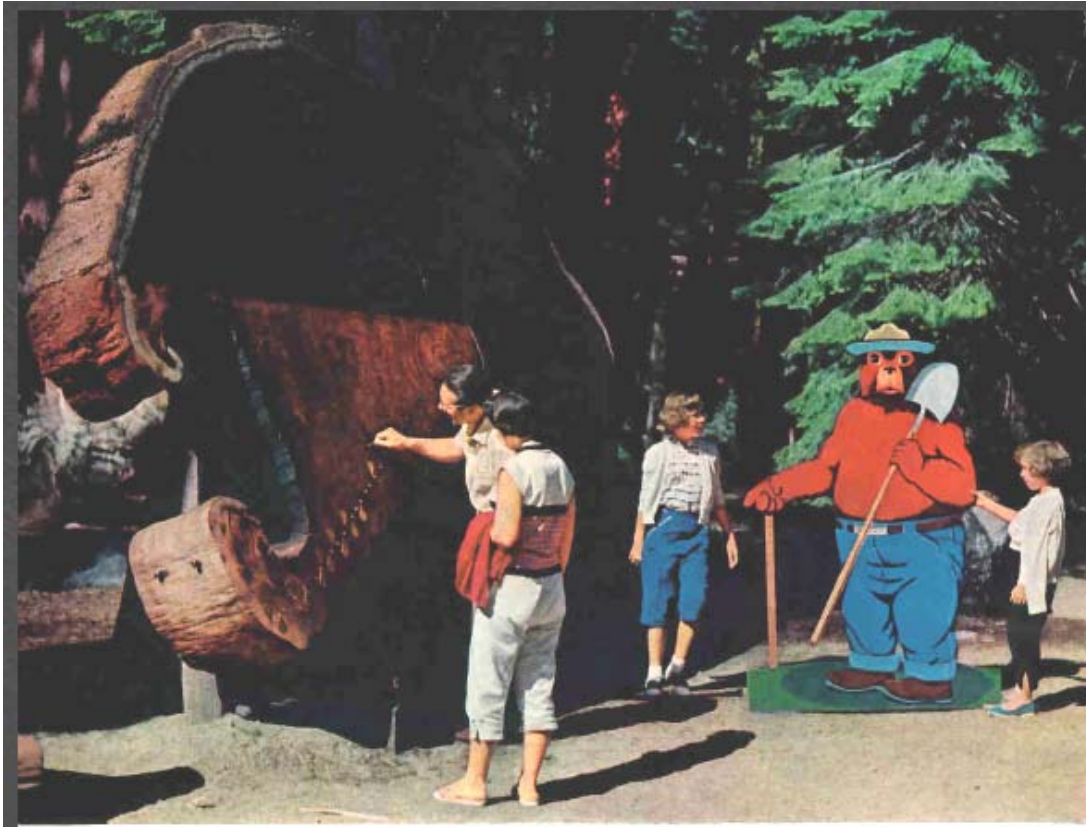




Photograph by Edwin L. Wislerd

A THREE-STORY CLIFF DWELLING IN MUMMY CAVE
(SEE TEXT, PAGE 264)





ANCESTRORNE (ABOVE) AND KIDSCORNER BY B. ANTHONY STEWART © A. D. S.



Civilian Conservation Core, ca. 1930s, outdoor Redwood exhibit.





Researchers Peter Brown and Tom Swetnam dating the tree-rings and fire scars on a cross-section of a giant sequoia tree displayed near the General Sherman Tree, Sequoia National Park. [Tony Caprio (<http://blogs.nationalgeographic.com/blogs/news/chiefeditor/geography/2010/03/>)]



Exhibit idea (image from <http://conwaynhmotel.com/mt-washington-valley-history-week/>)