

OLDLIST: A DATABASE OF MAXIMUM TREE AGES

PETER M. BROWN

Rocky Mountain Station Tree-Ring Laboratory, 240 W. Prospect Road, Fort Collins
Colorado 80526 USA

ABSTRACT. OLDLIST is a computer database containing maximum ages of trees by species. The purpose of the database is to serve as a baseline for the maximum known ages of different species, in order that individual trees of exceptional ages may be recognized. A portion of the database listing the oldest trees of 30 different species is given here. The oldest species in the database is *Pinus longaeva*, with the oldest individual tree at 4844 yr old. The oldest angiosperm tree in the database is *Quercus alba* at 407 yr old. Interested scientists are invited to contribute to the database.

INTRODUCTION

There is ever-increasing awareness among the general public and managers of both public and private lands of the ecological, scientific and esthetic values of old-growth forest ecosystems (Whitney 1987; Juday 1988; Kaufmann, Moir, and Bassett 1992). Dendrochronologists especially can appreciate the invaluable scientific resources contained in old-age forests (Sheppard and Cook 1988; Van Pelt and Swetnam 1990). The discovery and analysis of long tree-ring records often provides new insights into dynamical systems such as climate or forest disturbance processes. Paleoclimatic and paleoecological data are crucial to providing longer-term records of environmental variability against which to assess potential human-induced environmental changes. Often older-aged stands or trees are located in marginal sites that are more sensitive to climate variations and are protected from harvesting or other human disturbance. Furthermore, old-age stands are often remnant examples of relatively pristine forest conditions contained within a more widespread matrix of second-growth forest. These stands act as natural laboratories for understanding ecological processes in the absence of human disturbances (Stahle and Chaney 1994).

However, an essential question involves the definition of "old-growth" for a given forest type or species: exactly how old is "old"? This question increases in importance when one attempts to identify exceptionally ancient stands or individual trees that arguably should have special protection from harvesting or other human activities (Van Pelt and Swetnam 1990; Swetnam and Brown 1992; Stahle and Chaney 1994). An example is the designation of Research Natural Areas on U.S. Forest Service lands, where old age is a primary criterium for inclusion. Even if many of the oldest stands or trees have no commercial value, they may be under threat of destruction from other development activities. One example is a stand in New Mexico, USA, that contains the oldest known limber pine (*Pinus flexilis*) and is only a few kilometers from a large and growing molybdenum mine (Swetnam and Brown 1992).

I have compiled a computer database, OLDLIST, of the maximum known ages that trees from different species may attain. The database contains ages from individual trees of over 30 species. Several of these species are represented by different trees from more than one geographic location. The principal idea behind the OLDLIST database is to serve as a baseline of the maximum known ages of a species, in order that exceptionally old-age trees or stands of a species may be recognized. Researchers with exceptionally ancient trees may then have some greater justification to argue for special protection or status for their study area.

THE OLDLIST DATABASE

OLDLIST is a Paradox® database consisting of 14 fields (Table 1). I recognize four types of age determinations in the database (field 7). Crossdated ages are derived through recognized dendro-chronological procedures (e.g., Stokes and Smiley 1968; Swetnam, Thompson, and Sutherland 1985; Schweingruber 1987). For a crossdated age, there should be no question of the age of the portion of the tree sampled, except in any portion of the ring series not confidently crossdated with either other trees at the same site or other sites in the area (see field 10). Crossdated ages also include the beginning and ending calendrical dates for the sampled portion of the tree (fields 8 and 9). Ring-counted ages are derived by simple ring counts and may contain errors in age due to missing or false rings, suppressed areas, or other tree ring anomalies. The "age" of these first two types will invariably be a minimum age rather than true chronological age, owing to the difficulty of sampling a tree exactly at the point of germination. Extrapolations are ages derived by regression from age/size relationships (e.g., Stephenson and Demetry 1995) or other mathematical or graphical methods. Ranges of ages derived by extrapolations are welcome and can be accommodated in the database. Historical ages are based upon historical reference to the tree. At present, OLDLIST contains only one historical age, that for *Ficus religiosa* at a Buddhist temple in Anuradhapura, Sri Lanka. A continuous historical account of four trees planted there in the 3rd century BC has been kept (letter to R. J. Hartesveldt from the Ambassador of Sri Lanka to the United States, December 15, 1972). An individual tree may have up to two entries in the database. For example, a tree may have one entry for the age of a crossdated radial increment core and a second for an extrapolation age to a possible pith or germination date.

The database at present contains ages on over 60 trees representing over 30 species (Table 2). The oldest trees are of the species *Pinus longaeva*, the bristlecone pine of the White Mountains and Great Basin in the western United States. The oldest tree known is the "Currey Tree" of eastern Nevada at

TABLE 1. Fields in the OLDLIST Database

No.	Name	Explanation
1	Species	Latin name and authority, if known
2	Age	
3	Sample ID	Collector's identification number
4	Site Name	Collector's name for the site where the tree was sampled
5	Geographic location	State, province, mountain range, etc. Also latitude/longitude if known
6	Country	
7	Type of age	4 types recognized: crossdated (XD), ring-counted (RC), extrapolations (EX), historical record (HI)
8*	Beginning year	
9*	Ending year	
10*	Period of record not crossdated	Any portion of the ring series that is not crossdated absolutely against either other trees at the same site or other sites in the region. This field may be 0 in the case of living trees if remnant (dead) material was also sampled at the site and provides dating control for the earliest portion of the sample.
11	Collector(s)	
12	Dater(s)	Or counter(s) in the case of a ring-counted age
13	References	Any publications or other reports that mention or use the sample
14	Submitter's name/address	

*For crossdated ages only

close to 4900 yr old (Currey 1965). (The bristlecone pine is the only species known to live over 4000 yr.) The second oldest tree is from the South American species *Fitzroya cupressoides*. The great age potential of this species was recently discovered (Lara and Villalba 1993) and it supplanted the *Sequoiadendron giganteum* or giant sequoia from California's Sierra Nevada Mountains as the second oldest known species. At least 13 other species are known or suspected to live over 1000 yr. The

TABLE 2. A Representative Portion of OLDLIST

Species	Age	Type	Sample ID	Location	Collector(s), Dater(s), or Reference
<i>Pinus longaeva</i>	4844	XD	WPN-114	Wheeler Pk., Nevada	Currey 1965
<i>Pinus longaeva</i>	4789	XD	Methusela	Methusela Walk, Calif.	E. Schulman, T.P. Harlan
<i>Fitzroya cupressoides</i>	3620	XD		Chile	Lara and Villalba 1993
<i>Sequoiadendron giganteum</i>	3220	XD	D-21	Sierra Nevada, Calif.	Huntington 1914, Douglass 1919
<i>S. giganteum</i>	3075	XD	D-23	Sierra Nevada	Huntington 1914, Douglass 1919
<i>S. giganteum</i>	3033	XD	CMC 3	Sierra Nevada	T.W. Swetnam, C.H. Baisan
<i>Pinus aristata</i>	2435	XD	CB-90-11	Central Colorado	Brunstein and Yamaguchi 1992
<i>Ficus religiosa</i>	2217	HI		Sri Lanka	Sri Lankan Ambassador
<i>Sequoia sempervirens</i>	2200	RC		N. Calif.	E. Fritz
<i>Juniperus occidentalis</i>	2200	EX	BNJ 1	Sierra Nevada, Calif.	P.M. Brown
<i>Pinus balfouriana</i>	2110	XD	SHP 7	Sierra Nevada, Calif.	A.C. Caprio
<i>Larix lyalli</i>	1917	EX		Kananaskis, Alberta	Worrall 1990
<i>Juniperus scopulorum</i>	1889	XD	CRE 17	N. New Mexico	H. Grissino-Mayer, R. Warren
<i>Pinus flexilis</i>	1670	XD	ERE	N. New Mexico	T.W. Swetnam, T.P. Harlan
<i>Pinus balfouriana</i>	1666	XD	RCR 1	Sierra Nevada, Calif.	A.C. Caprio
<i>Pinus flexilis</i>	1659	XD	KET 3996	Ketchum, Idaho	Schulman 1956
<i>Pinus balfouriana</i>	1649	XD	BBL 2	Sierra Nevada, Calif.	A.C. Caprio
<i>Chamaecyparis nootkatensis</i>	1636	RC?		Vancouver Island	L. Jozsa
<i>Taxodium distichum</i>	1622	XD	BCK 69	Bladen Co., N. Caro.	Stahle, Cleaveland, Hehr 1988
<i>Pinus flexilis</i>	1542	XD		Central Colorado	D.K. Yamaguchi
<i>Pinus aristata</i>	1438	XD		S. Fran. Peaks, Ariz.	D.A. Graybill
<i>Pseudotsuga menziesii</i>	1350	RC?		Vancouver Island	M. Parker and L. Jozsa (?)
<i>Juniperus occidentalis</i>	1288	XD	HL 47	Sierra Nevada, Calif.	L.J. Graumlich, MB Keifer
<i>Pseudotsuga menziesii</i>	1275	XD	BIC 63	N. New Mexico	H.D. Grissino-Mayer
<i>Juniperus occidentalis</i>	1220	XD	BNJ 1	Sierra Nevada, Calif.	P.M. Brown
<i>Lagarostrobos franklinii</i>	1089	XD		Tasmania	Cook <i>et al.</i> 1991
<i>Thuja occidentalis</i>	1032	XD		Ontario	Larson and Kelly 1991
<i>Pinus edulis</i>	973	XD	SUN 2522	NE Utah	Schulman 1956
<i>Pinus albicaulis</i>	882	XD		Western Alberta	B.H. Luckman
<i>Picea engelmannii</i>	852	XD	FCC 19	Central Colorado	Brown <i>et al.</i> 1995
<i>Pinus ponderosa</i>	843	XD	BRY 4002	Central Utah	Schulman 1956
<i>Pinus ponderosa</i>	742	XD		NW Arizona	T.P. Harlan
<i>Picea engelmannii</i>	780	XD		Western Alberta	B.H. Luckman
<i>Larix lyalli</i>	728	XD		Western Alberta	Colenutt and Luckman 1995
<i>Pinus strobiformis</i>	538	XD		Graham Mtns., Ariz.	H.D. Grissino-Mayer
<i>Picea glauca</i>	522	XD		Norton Bay, Alaska	Giddings 1951
<i>Picea rubens</i>	405	XD		Nancy Brk., N. Hamp.	P.J. Krusic
<i>Quercus alba</i>	407	XD		Warren Co. Iowa	Duwick and Blasing 1983
<i>Quercus gambelli</i>	401	XD		N. Central Arizona	F. Biondi
<i>Quercus stellata</i>	373	XD	KEY 13	Osage Co., Oklahoma	D.W. Stahle
<i>Pinus echinata</i>	315	XD	LAW 38	Saline Co., Arkansas	D.W. Stahle
<i>Quercus muehlenbergii</i>	278	XD		Iowa	Duwick and Blasing 1983
<i>Quercus lyrata</i>	218	XD	SNA 7	Desha Co. Arkansas	D.W. Stahle

oldest known crossdated angiosperm species are those of *Quercus*, but these only live to be just over 400 yr old at most, an order of magnitude less than the oldest gymnosperms.

CONCLUSION

OLDLIST is in its infancy. I have not made a great effort to contact researchers with old trees and have very few entries in the database outside of western North American species. I am therefore calling upon all interested dendrochronologists and others working with tree ages to send me their oldest ages for all species and locales. If you have what you believe is an ancient tree or know of a reference to one and would like to contribute to this database, please use Table 1 as a template for your entry and send it to me.¹

The interests and objectives of dendrochronologists often lead us to look for sites that contain old-age trees to obtain a maximum length of time series for climate reconstruction or other tree-ring studies. I envision the OLDLIST database as a well-documented repository of ages of old trees that a researcher may consult to determine whether she or he has a tree or stand of extraordinary antiquity. Such information may support appeals to funding or management agencies for special protection of a study site. In addition, we now have a place to turn for answers to such inevitable questions from the interested public or other scientists as, "What is the oldest tree?" or "How old can this species get?"

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¹Postal address as above, or (preferably) via e-mail to: peterb@meecker.cnr.colostate.edu

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