TREE-RING BULLETIN

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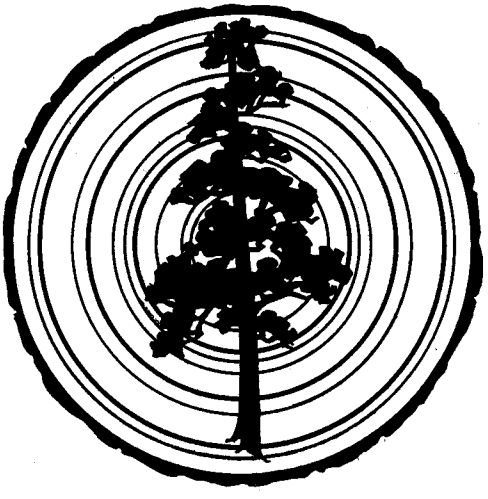

CONTENTS

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Tucson, Arizona

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THE TREE-RING BULLETIN

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The Tree-Ring Bulletin will publish papers resulting from original research in tree-rings in relation to climatology, archaeology, and other fields. For reports of projects in tree-ring dating, a tabular form as in Vol. 1, No. 1 is suggested. Until funds are available authors will be requested to pay the cost of illustrations. Each contributor will be given twenty-five copies of the Bulletin in which his article appears.

SUBSCRIBERS

All correspondence regarding subscriptions should be addressed to Mr. Edmund Schulman, Tree-Ring Laboratory, University of Arizona, Tucson, Arizona.

EDITORIAL

For the present year it is planned to devote each issue of the Bulletin mainly to one general subject. Thus, the first number is largely along archaeological lines, the second will contain material relating to the climatic phase of tree-ring analysis, and another will contain a bibliography. It is hoped that this arrangement will make for greater ease of reference.

FIFTH ANNUAL TREE-RING CONFERENCE

ROY LASSETTER

The Fifth Annual Tree-Ring Conference met at the summer field camp of the Arizona State Museum at Forestdale, Arizona, near Showlow, on July 22nd and 23rd, 1939. Dr. A. E. Douglass presided at the meetings.

Those attending the conference were: Mr. Gordon C. Baldwin, Dr. A. E. Douglass, Mr. Paul Ezell, Mr. I. F. Flora, Mr. H. T. Getty, Mr. Thomas Hale, Mr. Edward T. Hall, Mr. Lyndon L. Hargrave, Dr. Emil W. Haury, Mr. Roy Lassetter, Mr. Albert Schroeder, Mr. Edmund Schulman, Mr. Donovan Senter, Dr. Florence Hawley Senter, Mr. W. S. Stallings, Jr., and the students of the field camp. It was learned with regret that both Dr. H. S. Colton and Mr. John C. McGregor were unable to attend because of illness.

The qualifications for election to Fellow were changed to read: investigators who have contributed outstanding work in dendrochronology and have been approved by the Fellows of the Society.

Some topics reported on and discussed: Dr. A. E. Douglass, exact method of identifying Douglas fir, by the spiral thickening of the cell walls seen under a power of 60X or more; I. F. Flora, compression wood and its possible dependence on reduction of pressure under the bark, on the under side of a bent trunk; Edward T. Hall, handling of charcoal in the field recommending reduction in the use of paraffine or even its elimination because it clouds the charcoal surface under preparation for microscope or photograph (a saturated solution of paraffine in gasoline is usually too strong—A.E.D.); Dr. Florence Hawley Senter, treatment of rotten wood and wet charcoal with a solution of acetone and bakelite; Mr. W. S. Stallings, Jr., publication of tree-ring work; Dr. Emil W. Haury, professional work on tree-ring material.

A resolution was adopted to the effect that it was the sense of the conference that a published technical report of the tree-ring material include descriptions, photographic if possible, of the ring sequences and the basic

evidence underlying the dating. These should accompany the final report of the associated archaeological work as an appendix or appear in other recognized channels of publication. In contracts or agreements for the study and dating of such material it should be stipulated that the agent contracting for such study assume responsibility for this needed publication unless the same can be done by the dendrochronologist.

ELECTIONS

Tree-Ring Society:	President	Dr. A. E. Douglass
	Secretary	Mr. Roy Lassetter
	Treasurer	Mr. Edmund Schulman
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	Botany	Dr. Charles J. Lyon
Fellows:	Mr. I. F. Flora	Mr. Edward T. Hall
	Mr. J. L. Giddings, Jr.	Dr. Charles J. Lyon

A vote of thanks to the hosts, Dr. E. W. Haury and the Field Camp, ended the business sessions. The society was fortunate in being able to hold the conference near Showlow, where ten years ago the famed "gap" was closed.

NOTES ON BEAM DATING BY SAP-HEART CONTACT

A. E. DOUGLASS

A large proportion of the specimens collected by the National Geographic Society Beam Expeditions in the Hopi villages came from logs that had been in use for hundreds of years and were badly worn in the outer rings. In many cases the entire sapwood was gone. The main purpose of this paper is to call attention to the estimated losses of important rings on the outside of specimens whose remaining rings are perfectly dated and to lay a foundation for more accurate estimates in the future. These specimens were collected by Mr. Lyndon L. Hargrave, then connected with the Museum of Northern Arizona. He made very full notes of the locations of these beams and together he and I made memoranda of the buildings then standing in Old Oraibi on the mesa top and at other villages.*

A publication of resulting dates was made in "Dating Pueblo Bonito and Other Ruins of the Southwest", National Geographic Society Contributed Technical Papers, No. 1 in the Pueblo Bonito Series, 1935. These dates were given in considerable numbers without stating the specimen identity, an omission which the current and two previous lists by Mr. Peterson are intended to supply.

The Hopi ring chronology was solved in April, 1928. In August of that year specimens were found giving actual dates of some of the Jeddito prehistoric ruins. Therefore tables were made of the outer dated rings and it was at once evident that there were heavy losses of outside rings. Then "sap-heart" dating was introduced to get nearer the actual cutting date. At that time the "Gap" in the late 1200's had not been closed and for the first approximation of cutting dates a rough average of sapwood duration was taken as about 50 years. This was added to the date of sap-heart contact and gave the first estimates that were published as above stated.

*These records are in our files.

On recent review of this problem of sap-heart dating of beams, the first improvement is the distinction between pine and Douglas fir (often called spruce) in which the pine sapwood often contains 60 to 75 rings and the fir 30 to 35. It is recognized that this again is not the final solution but a satisfactory solution will require the examination and measurement of great numbers of specimens which cannot be completed without long delay.

With this difference in the duration of sapwood in pine and fir, it becomes important to be sure of the species, and because it is not always easy to distinguish the species of wood or charcoal the dated specimens in the accompanying lists have all been checked by microscopic tests. This is not difficult since it is only necessary to obtain some minute radial slices parallel to the grain (tangential slices are a little less certain to give results) by shaving the specimen with a sharp razor; the shavings are caught on a piece of glass and surveyed with a power of X90 or so, using transmitted light or sometimes even reflected light. It can often be done with X60. What we call "fur", the spiral thickening of the cell walls, can easily be seen in the Douglas firs but is absent in the pines. This test can be used on charcoal as on wood and the entire process usually takes only two or three minutes.

There are two species of pines in the area used in our studies, the ponderosa or western yellow pine and the edulis or pinyon. These are readily distinguished by odor, the latter having a very strong pitchy smell. Resin ducts offer another method of identification. They may be seen with a small glass on a radial surface cut forty-five degrees to the grain and illuminated so as to cause reflection on the cell walls. Pinyon has many ducts and very thin latewood in nearly all but the first thirty rings; pine has a few irregularly distributed ducts with much wider latewood in normal years; Douglas fir usually has no ducts or may have a very few often stringing along the circuit of the tree parallel to the red latewood. Douglas fir rings under strong compression as on steep hillsides have been found to be immensely dense and heavy in favorable years.

The outline of the heartwood is usually a little irregular, reaching out sometimes through many rings in some limited direction. At one point in OL-12, a pine* in the Flagstaff Cinder area, a band of heartwood extends out into the sapwood two inches, covering rings 1829-1902 to a pocket of resin which may be a lightning scar. The heartwood also has certain irregularities in connection with large living branches.

In the giant sequoias lightning scars and burnt areas that injure the cambium present "shadows" composed of sapwood on the inner side of the injury, all surrounded by heartwood.

In spite of these occasional lapses, there is a traceable outline of the heartwood around the circuit so that in most cases its date has a real relation to the outside of the sapwood which is the bark date.

The sapwood is narrow in the Douglas fir (spruce) being usually about one inch thick. In the pine it is often three inches thick but may be as little as one inch in rare cases.

In the tables of this issue the species has been checked microscopically by Mr. Edmund Schulman or the writer. For these lists the average sapwood duration in years has been taken as about 30 or 35 years in the Douglas fir and 60 to 75 in the pine, as above noted. These values are provisional and will sometime be discussed again. Absence of sap-heart contact occurs in almost half of the specimens in this list. This may be caused by special growing conditions without loss of the outside rings (which is probably rare) or by actual loss at the outside. Some reference as to which of these alternatives occurred may be obtained in many cases by the color of the

*Discussed in W. S. Glock, *Principles and Methods of Tree-Ring Analysis,* Carnegie Inst. Wash. Pub. 486, 31-62, 1937.

remaining wood and occasionally by the changing size of the outer rings and more often by the continuity of rings around the outside.

The assignment of ring types in table 1 was made by the writer. In the ring types, A stands for very high crossdating quality while D indicates that the ring series is too complacent to date. Microscopic examination has shown that in some cases earlier identification of species for some BE's was incorrect; the revised list is published herewith in table 1a. The photo reproductions noted in table 1 refer to Series A of the micro-film copies of some 800 photographs of ring series. These form a small part of those used in producing the southwestern ring chronology. Copies of this film may be obtained through the Bibliofilm Service, Department of Agriculture, Washington, D. C.

It may be very difficult to duplicate these Hopi collections and so a real value is thought to reside in this more detailed description. Estimated outside dates, which we call "bark dates", as given in Mr. Peterson's list are necessarily provisional and subject to further revision when the correction described above is better known.

TABLE 1a. RING TYPE AND SPECIES OF DATED SPECIMENS NUMBERED BE 1 TO 168.

BE Number	Species	Quality	MFA[1]	BE Number	Species	Quality	MFA[1]
4	DF	BC	*	104	DF	B	
5	P	BC		106	DF	BC	
7	P	A		107	P	BC	
8	DF	B		108	DF	B	
9	DF	B		109	DF	AB	*
10	P	AB	*	112	DF	AB	*
11	DF	AB	*	113	DF	B	
14	P	BC		114	DF	BC	
15	DF	AB	*	115	DF	AB	
17	P	BC		118	DF	B	
18	P	BC		119	DF	B	
19	DF	B		120	DF	AB	
21	P	B	*	121	DF	B	
22	P	B		122	DF	B	*
32	DF	A	*	125	DF	AB	*
33	DF	AB		126	DF	B	
34	DF	A	*	127	DF	B	
35	DF	AB	*	128	DF	AB	*
36	DF	AB	*	129	DF	B	
37	P	BC		133	DF	D	
38	P	B	*	134	DF	AB	
39	DF	B	*	135	DF	A	*
43	P	B	*	136	DF	BC	
49	DF	B		138	DF	B	*
50	DF	A	*	139	DF	B	
63	DF	AB		146	DF	BC	
65	DF	BC		147	DF	A	
66	DF	C		148	DF	AB	
67	DF	A	*	151	DF	B	
73	JUN	AB	*	159	DF	A	
74	P	B		160	DF	B	
90	P	BC		161	DF	AB	
94	P	C		162	DF	B	
96	P	BC		163	DF	AB	
98	P	B					

[1]Micro-film, Series A, 1939; starred numbers indicate that the ring series has been photographed and included in the micro-film.

TABLE 1b. RING TYPE OF DATED SPECIMENS NUMBERED BE 169 TO 309.

BE Number	Quality	MFA	BE Number	Quality	MFA	BE Number	Quality	MFA
169	A		220	AA		268	B	
170	A		220x	A		269	A	*
171	A		221	BC		271	A	
171A	A		222	BC		272	A	
174	AB		223	A	*	273	A	*
177	A	*	224	AB		274	A	
178	A		226	A?		275	A	
180	A		228	A		276	A	*
183	A	*	231	A		277	A	
184	A		232	AB		278	AB	
185	A		233	A		279	AB	*
187	A		234	A	*	280	AA	*
189	AB		236	B		281	BC	
190	A		238	A	*	284	AB	
192	A	*	239	A		285	AB	
194	B		240	A		286	B	
200	A		241	A		287	A	*
201	A		242	AB		288	A	
202	A		244	A		289	A	
203	B		245	AB		290	A	
204	A		249	A		291	A	
205	AB		250	A	*	293	B	
206	B		251	AA	*	294	A	*
207	B		252	A		295	A	*
208	AB		253	A	*	296	BC	*
210	AB		254	BC		297	A	
211	AB		255	B		298	A	
213	AB		256	AB		299	A	*
214	AB		257	A		300	AB	
215	A	*	261	A		301	A	*
216	AA		262	A	*	304	A	*
217	B		264	A	*	307	B	
218	AA		265	A	*	308	AB	
219	A		267	A		309	A	

THIRD REPORT[1] ON HOPI SPECIMENS: COLLECTIONS OF SECOND BEAM EXPEDITION, 1928.

ALFRED PETERSON

Site: All from Oraibi.

BE Spec. Number	Outside Dated Ring	Inside Dated Ring	Radius, mm.	Species by Microsc. Test	Form of Specimen	Date of Sap-Heart Contact	Estimated Rings Lost at Outside	Number Absent in Series	Estimated Bark Date[2]
169	1572	1536	34	DF	½ Sec.	1551	10±5	0	1582±5
170	1754	1649	56	DF	Sq. Cut	1718	0	0	1754
171	1464	1337	66	DF	Core	1420	0	3-4	1464±2
171A	1515	1466	33	DF	Core	1513	30±10	1	1545±10
174	1712	1651	48	DF	Core	1681	3±2	0	1715±2
177	1635	1537	63	DF	¼ Sec.	1592	2±2	0	1637±2
178	1380	1320	89	DF	V-Cut	All Heart	30±10	0	1410±10
180	1691	1648	30	DF	⅔ Sec.	1667	1±1	0	1692±1
183	1564	1324	177	DF	Core	No[5]	15±15	7	1579±15
184	1621	1419	153	Pine	Core	No ?	30±30	5	1651±30
185	1730	1621	99	DF	Core	1682	0	0	1730
187	1723	1609	94	DF	Core	No ?	15±15	0	1738±15
189	1630	1479	140	Pine	Core	No ?	30±30	15[3]	1660±30

BE Spec. Number	Outside Dated Ring	Inside Dated Ring	Radius, mm.	Species by Microsc. Test	Form of Specimen	Date of Sap-Heart Contact	Estimated Rings Lost at Outside	Number Absent in Series	Estimated Bark Date[2]
190	1378	1285	105	DF	Core	All Heart	30±5	1	1408±5
192	1610±5	1418	64	DF	Core	1555	10±10	10±	1620±15
194	1689	1645	84	DF	Core	1681	25±5	0	1714±5
200	1475	1344	67	DF	¼ Sec.	All Heart	30±20	4	1505±20
201	1710	1578	122	DF	Core	1692	15±5	4	1725±5
202	1566	1465	85	DF	Core	All Heart	30±5	0 or 1	1596±5
203	1520	1405	105	Pine	Core	No	30±30	2	1550±30
204	1547	1312	145	Pine	Core	No	30±30	4	1577±30
205	1619	1462	143	Pine	Core	No	30±30	3	1649±30
206	1601—2	1462	145	Pine	Core	1535?	30±30	3	1631±30
207	1556	1479	117	Pine	Core	1507	15±15	4	1571±15
208	1562	1499	112	Pine	Core	No	30±30	0	1592±30
210	1621	1505	70	Pine	1/5 Sec.	All Heart	60±20	2	1681±20
211	1702	1648	39	DF	¾ Sec.	No	3±3	0	1705±3
213	1532	1469	98	Pine	Core	All Heart	60±10	1	1592±10
214	1550	1488	113	Pine	Core	1534?	44±20	0	1594±20
215	1629	1485	155	DF	Core	1577	0	0	1629
216	1619	1495	99	DF	Sec.	1581	8±8	6	1627±8
217	1424	1358	67	DF	Core	All Heart	30±10	0	1454±10
218	1543	1511	48	DF	½ Sec.	1527	14±5	0	1557±5
219	1710	1660	85	DF	Core	1684	5	0	1715±5
220	1562	1517	41	DF	V-Cut	1538	4±4	0	1566±4
220A	1633	1543	68	DF	Core	1595	0?	2	1633
221	1491	1298	85	DF	Sec.	1476?	15±15	3	1506±15
222	1682	1641	80	DF	Core	1660	10±5	0	1692±5
223	1675	1618	85	DF	Core	1656±2	10±5	0	1685±5
224	1491	1320	116	DF	V-Cut	All Heart	30±20	3	1521±20
226	1562	1516		DF?	Sec.	1542	20±20		1582±20
228	1539	1513	34	DF	Sec.	1531	22±5	0	1561±5
231	1528	1462	85	DF	Core	All Heart	30±10	0	1558±10
232	1678	1618	99	DF	Core	1664	16±10	0	1694±10
233	1678±2	1604	32	DF	Sec.	1653	10±10	0?	1688±10
234	1621	1524	84	DF	V-Cut	1583	10±10	1	1631±10
236[4]	1323	1300	66	DF	Core	All Heart	35±10	0	1358±10
238	1424	1363	52	DF	Core	All Heart	30±10	0	1454±10
239	1628	1479	75	DF	Core	1580	0?	2	1628
240	1455	1363	50	DF	Core	All Heart	30±10	0	1485±10
241	1563	1530	44	DF	Sec.	1552	20±10	0	1583±10
242	1634	1547	64	DF	Core	1598	5±5	2	1639±5
244	1468	1393	111	DF	Core	All Heart	30±10	0	1498±10
245	1724	1689	40	DF	½ Sec.	1704	2±2	0	1726±2
246	1619	1580	37	DF	V-Cut	1597	5±5	0	1624±5
249	1730	1689	44	DF	Sec.	1705	5±5	0	1735±5
250	1482	1392	75	DF	Core	All Heart	30±10	3	1512±10
251	1531	1485	41	DF	V-Cut	1528	27±10	0	1558±10
252	1598	1574	67	DF	Core	All Heart	30±10	1	1628±10
253	1461	1400	73	DF	Core	All Heart	30±10	0	1491±10
254	1631	1527	93	Pine	Core	1546	0	0	1631
255	1712	1651	74	DF	Sec.	1678	2±2	0	1714±2

BE Spec. Number	Outside Dated Ring	Inside Dated Ring	Radius, mm.	Species by Microsc. Test	Form of Specimen	Date of Sap-Heart Contact	Estimated Rings Lost at Outside	Number Absent in Series	Estimated Bark Date[2]
256	1429	1344	65	DF	Core	1425 All	25±5	0	1454±5
257	1490	1439	76	DF	⅛ Sec.	Heart	30±5	0	1520±5
261	1548	1463	135	DF	V-Cut	1532 All	14±5	0	1562±5
262	1550	1508	60	DF	¼ Sec.	Heart	35±10	0	1585±10
264	1633	1556	75	DF	Core	1597	5±5	0	1638±5
265	1552	1486	38	DF	Sec.	1534	12±5	0	1564±5
267	1513	1419	94	DF	Core	No All	15±15	2	1528±15
268	1365	1320	65	DF	Core	Heart All	30±10	0	1395±10
269	1345	1260	89	DF	Core	Heart All	30±10	0	1375±10
271	1494	1430	63	DF	Core	Heart	30±10	0	1524±10
272	1488	1322	85	DF	Sq. Cut	1478 All	20±10	4	1508±10
273	1490	1424	56	DF	Core	Heart All	30±10	0	1520±10
274	1467	1322	85	DF	⅛ Sec.	Heart	30±10	3	1497±10
275	1579	1535	45	DF	V-Cut	1578	30±10	0	1609±10
276	1756	1614	79	DF	Sec.	1690	5±5	3	1761±5
277	1546	1414	78	DF	Sec.	1530	18±10	5	1564±10
278	1749	1614	51	DF	Core	1700	2±2	0	1751±2
279	1749	1719	39	DF	Core	1742	25±5	0	1774±5
280	1552	1515	31	DF	¼ Sec.	1542	20±5	0	1572±5
281	1518	1363	92	Pine	Core	1431 All	1±1	4	1519±1
284	1366	1309	76	DF	Core	Heart All	30±10	0	1396±10
285	1557	1494	83	DF	Core	Heart All	30±10	0	1587±10
286	1464	1375	57	DF	Core	Heart	15±15	0	1479±15
287	1686	1612	50	DF	V-Cut	1675	20±10	0	1706±10
288	1706	1665	45	DF	V-Cut	1678 All	3±3	0	1709±3
289	1368	1325	72	DF	Core	Heart	30±10	0	1398±10
290	1564	1525	35	DF	V-Cut	1556 All	20±10	0	1584±10
291	1575	1526	66	DF	Core	Heart	30±10	0	1605±10
293	1392	1330	75	DF	Core	1390	30±10	0	1422±10
294	1674	1603	77	DF	Core	1666	26±10	0	1700±10
295	1690	1620	62	DF	Core	1671	15±10	0	1705±10
296	1625	1416	109	DF	Core	1556 All	3±3	2	1628±3
297	1428	1321	87	DF	Core	Heart All	35±10	0	1463±10
298	1559	1468	85	DF	Core	Heart	30±10	2	1589±10
299	1759	1651	49	DF	V-Cut	1725	1±1	0	1760±1
300	1430	1358	77	DF	Sq. Cut	1420 All	25±10	0	1455±10
301	1400	1305	90	DF	Core	Heart	30±10	0	1430±10
304	1707	1615	90	DF	V-Cut	1694	20±5	0	1727±5
307	1527	1491	64	DF	Core	1516	20±10	0	1547±10
308	1711	1589	132	Pine	Core	1624	2±2	0	1713±2
309	1708	1596	110	DF	Core	1663	12?	0	1720

[1]Previous reports in vol. 1, 23-24, Jan. 1935, and vol. 3, 23-24, Jan. 1937. Oraibi specimens include nos. BE 1 to 10, and BE 101 to 310.
[2]For discussion of Bark Date see separate paper in this issue.
[3]BE 189 has a break in the middle of the core with about 15 rings lost. This does not affect the dating of the two parts of the core.
[4]BE 236 is the earliest dated beam in Oraibi.
[5]Sap-heart contact indeterminate and probably absent.
Note: The designations "P" and "Pine" for species refer to P. *ponderosa*.