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PURCOMBE FARMHOUSE, BATTS LANE, MARSHWOOD, DORSET
TREE-RING ANALYSIS OF TIMBERS

SCIENTIFIC DATING REPORT

Martin Bridge

INTERVENTION
AND ANALYSIS

ENGLISH HERITAGE

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SUMMARY

Samples were taken from 15 oak timbers, representing various elements and potential phases within Purcombe Farmhouse. Three samples were unsuitable for analysis. The remaining 12 series were successfully cross-matched, producing a site chronology of 126 years dated as spanning the period AD 1379–1504. All 12 timbers, incorporating elements of the main frame, the roof, a floor joist, and partitions, appear to be coeval. Only one timber retained complete sapwood, this being a cross-beam associated with the stack, giving an actual felling date of winter AD 1504/05. The felling date ranges of the other dated samples suggest a similar likely felling date for the timbers represented.

CONTRIBUTORS
Dr M C Bridge

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ARCHIVE LOCATION
Dorset Historic Environment Record
Environment
Dorset County Council
County Hall
Colliton Park
Dorchester
Dorset
DT1 1XJ

DATE OF INVESTIGATION
2013

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INTRODUCTION

This Grade II listed farmhouse is relatively isolated, being along a minor road about 7km west of Beaminster (Figs 1and 2). It is currently recorded as of sixteenth century and later origin, although a recent survey by Peter Child has suggested a development scheme for the property that includes much earlier work, possibly *c* AD 1450. His survey (Child 2013) suggests that this is a rare survival of a medieval farmhouse that shows clear evidence of having been originally open from end to end without any full height divisions. The post-medieval conversion to form a two-storey house was carried out as a single work, and remains very complete, including a timber-framed stack that backs onto the cross passage. During recent redecoration a wall painting was exposed on a plaster panel, extending over on to the timber frame around it (Fig 3). This painting is in a pre-Reformation style, and suggests that the partition wall of which it is part is therefore of this age too.

Four potential phases were identified as of interest to be dated by dendrochronology. The first was the primary construction, represented by three jointed cruck trusses and smoke-blackened roof timbers. The next phase consisted of any timbers that could be associated with the building's secondary conversion from an open plan to a multiple-roomed, two-storeyed structure. The third area of interest was the stud-and-rail partition that incorporates the wall painting, and a fourth possible phase relates to the replacement of an earlier timber-framed stack with a new one in the same position, at the time of the insertion of the stairs. Tree-ring dating was requested by Jill Guthrie, English Heritage Senior Designation Adviser, to ascertain the date of the wall painting and provide information about the dating of the developmental phases of the building.

Figure 1: Map showing the location of Purcombe Farmhouse (outlined in black) in relation to Beaminster (right margin). © Crown Copyright and database right 2014. All rights reserved. Ordnance Survey Licence number 100024900

Figure 2: Map showing the location of Purcombe Farmhouse within its immediate environs. © Crown Copyright and database right 2014. All rights reserved. Ordnance Survey Licence number 100024900

Figure 3: Painting of a saint extending onto the timber framework (Martin Bridge)

METHODOLOGY

Fieldwork for the present study was carried out in March 2013, following an initial assessment of the potential for dating some weeks beforehand. In the initial assessment, accessible oak timbers with more than 50 rings and where possible traces of sapwood were sought, although slightly shorter sequences are sometimes sampled if little other material is available. Those timbers judged to be potentially useful were cored using a 15mm auger attached to an electric drill. The cores were glued to wooden laths, labelled, and stored for subsequent analysis.

The cores were polished on a belt sander using 80 to 400 grit abrasive paper to allow the ring boundaries to be clearly distinguished. The samples had their tree-ring sequences measured to an accuracy of 0.01mm, using a specially constructed system utilising a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC, which recorded the ring widths into a dataset. The software used in measuring and subsequent analysis was written by Ian Tyers (2004a). Cross-matching was attempted by a combination of visual matching and a process of qualified statistical comparison by computer. The ring-width series were compared for statistical cross-matching, using a variant of the Belfast CROS program (Baillie and Pilcher 1973). Ring sequences were plotted on the computer monitor to allow visual comparisons to be

made between sequences. This method provides a measure of quality control in identifying any potential errors in the measurements when the samples cross-match.

In comparing one sample or site master against other samples or chronologies, *t*-values over 3.5 are considered significant, although in reality it is common to find demonstrably spurious *t*-values of 4 and 5 because more than one matching position is indicated. For this reason, dendrochronologists prefer to see some *t*-value ranges of 5, 6, and higher, and for these to be well replicated from different, independent chronologies with both local and regional chronologies well represented, except where imported timbers are identified. Where two individual samples match together with a *t*-value of 10 or above, and visually exhibit exceptionally similar ring patterns, they may have originated from the same parent tree. Same-tree matches can also be identified through the external characteristics of the timber itself, such as knots and shake patterns. Lower *t*-values however do not preclude same-tree derivation.

Ascribing felling dates and date ranges

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. With samples which have sapwood complete to the underside of, or including bark, this process is relatively straightforward. Depending on the completeness of the final ring (ie if it has only the spring vessels or early wood formed, or the latewood or summer growth) a precise felling date and season can be given. If the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then an estimated felling date range can be given for each sample. The number of sapwood rings can be estimated by using an empirically derived sapwood estimate with a given confidence limit. If no sapwood or heartwood/sapwood boundary survives then the minimum number of sapwood rings from the appropriate sapwood estimate is added to the last measured ring to give a *terminus post quem* (*tpq*) or felled-after date.

A review of the geographical distribution of dated sapwood data from historic timbers has shown that a sapwood estimate relevant to the region of origin should be used in interpretation, which in this area is 9–41 rings (Miles 1997a). It must be emphasised that dendrochronology can only date when a tree has been felled, not when the timber was used to construct the structure or object under study.

RESULTS AND DISCUSSION

Details of the samples taken are given in Table 1 and the positions of all except the ceiling joist are shown in Figure 4. The initial brief requested sampling of the suspected primary timbers, those associated with the secondary conversion into a multi-roomed, two-storey structure, the stud-and-rail partition on which the painting is found, and a potentially eighteenth-century modification at one end. On-site discussion and consultation following the initial assessment combined the secondary conversion and partition to a single phase, which raised the possibility that the first three groups were in fact all one phase, and

rejected the potentially eighteenth-century modification from further consideration as it was all softwood.

Two samples (pur04, pur11) were found to contain too few rings to be worthy of further study and a further sample was rejected as it had broken during coring with neither section having sufficient rings for analysis. The remaining samples all match each other (Table 2) and were combined into a 126-year site chronology, PURCOMBE1. This was subsequently dated to the period AD 1379–1504, the strongest matches being shown in Table 3. The relative cross-matching of the individual timbers is shown in Figure 5 and the data are presented in the Appendix.

The 12 dated timbers represent all three phases/areas of interest. One timber, pur03, from the beam thought to relate to the insertion of the chimney stack, retained complete sapwood, and was found to have come from a tree felled in winter AD 1504/05. All the other dated timbers have likely felling date ranges that incorporate this date, or are not at odds with it, and it would seem therefore that the timbers represent a single group, probably all felled at the same time. This is made clear in Figure 5, which separates the timbers into the previously assumed groups. This was unexpected as it was thought the smoke-blackened roof timbers probably pre-dated the internal divisions. The exact nature of the beam sampled that was thought to represent a beam inserted when the chimney stack was inserted needs careful reconsideration since, as it is the same date as the other timbers, it cannot easily explain the smoke-blackening on the roof timbers.

Although compared with reference data for all parts of England, and indeed matching well with chronologies from many areas, there is a clear tendency for the dated material from Purcombe Farmhouse to have the highest levels of similarity with chronologies made from data from other sites in the South-West and West Midlands regions. This suggests that the timbers used in the farmhouse are likely to be of local origin.

Another interesting outcome of the dating is being able to narrow down the date of the wall painting. This painting was probably done at the time of construction, although it could of course have been added later, but all the expert opinion suggests that it must be pre-Reformation. This narrows its date range to AD 1505–38.

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Table 1: Details of samples taken from Purcombe Farmhouse, Marshwood, Dorset

Sample number	Timber and position	No of rings	Mean HW ring width (mm)	Dates spanning (AD)	h/s boundary (AD)	Sapwood rings	Mean sensitivity	Felling date ranges (AD)
pur01	West cruck base, truss 2	104	1.70	1379–1482	1482	h/s	0.19	1491–1523
pur02	West cruck blade, truss 2	67	2.90	1432–98	1491	7	0.19	1500–32
pur03	Cross-beam associated with stack	68	2.33	1437–1504	1482	22C	0.21	Winter 1504/05
pur04	East cruck blade, truss 1	32	NM	-	-	-	-	-
pur05	East cruck base, truss 1	74	1.71	1410–83	1483	h/s	0.22	1492–1524
pur06	East upper purlin, bay 2-3	57	2.01	1433–89	-	-	0.27	after 1498
pur07	West upper purlin, bay 2-3	51	2.54	1420–70	-	-	0.22	after 1479
pur08	Wall plate at south end of building	43	1.43	1447–89	1488	1	0.28	1497–1529
pur09	Lower purlin, bay 3-4	47	2.15	1442–88	1487	1	0.26	1496–1528
pur10	East upper purlin, bay 3-4	41	2.81	1439–79	-	-	0.20	after 1488
pur11	Stud on east side of painting, partition truss 3	39	NM	-	-	-	-	-
pur12	Top-rail to partition on line of truss 3	63	3.12	1429–91	1488	3	0.18	1497–1529
pur13i	East-most stud of partition on line of truss 3	20	NM	-	-	-	-	-
pur13ii	*ditto*	28	NM	-	-	-	-	-
pur14	Ceiling joist, 7th from west, bay 2-3 south	58	2.02	1440–97	1489	8	0.20	1498–1530
pur15	Top-plate to partition on north side of passage	62	2.78	1424–85	1485	h/s	0.16	1494–1526

Key: NM = not measured; HW = heartwood; h/s = heartwood-sapwood boundary; C = complete sapwood, tree felled in the following winter

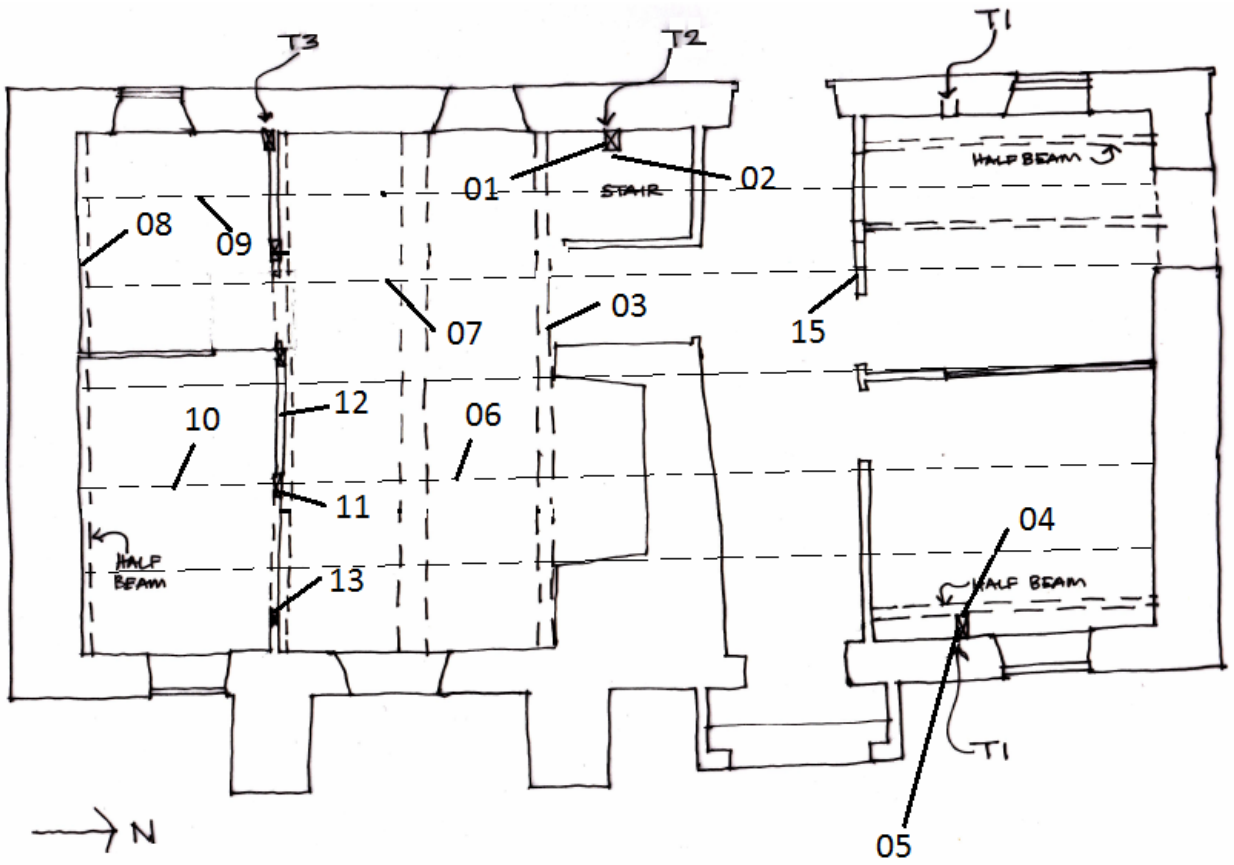

Figure 4: Plan of the farmhouse showing the approximate locations of samples taken for dendrochronology (except sample 14 from a ceiling joist)

Table 2: Cross-matching between the dated series from Purcombe Farmhouse; t*-values above 3.5 are statistically significant*

t-values											
Sample	pur02	pur03	pur05	pur06	pur07	pur08	pur09	pur10	pur12	pur14	pur15
pur01	2.4	2.8	8.3	1.3	3.1	3.0	3.3	4.2	4.2	1.9	5.4
pur02		2.4	2.1	3.5	2.2	5.7	3.5	2.4	4.4	2.0	3.2
pur03			2.0	0.1	2.0	2.5	3.9	4.2	1.5	4.2	2.8
pur05				2.8	3.3	3.3	3.0	2.1	5.9	2.9	4.7
pur06					1.5	1.4	1.3	0	4.9	2.0	2.8
pur07						*	2.7	2.8	3.8	2.8	4.4
pur08							3.2	3.8	4.5	1.3	2.8
pur09								4.1	2.8	4.6	1.9
pur10									2.5	2.5	1.7
pur12										2.1	5.3
pur14											1.8

* = overlap less than 25 years

Table 3: Dating evidence for the site chronology PURCOMBE1 AD 1379–1504

Source region:	Chronology name:	Publication reference:	File name:	Span of chronology (AD)	Overlap (years)	*t*-value
Regional reference chronologies						
Somerset	Somerset Master Chronology	(Miles 2004)	SOMRST04	770–1979	126	9.2
Hampshire	Hampshire Master Chronology	(Miles 2003)	HANTS02	443–1972	126	8.9
Wales/English borders	Hillside oaks	(Siebenlist-Kerner 1978)	GIERTZ	1341–1636	126	8.4
Southern England	Southern England Master	(Bridge 1998)	SENG98	944–1790	126	8.4
Southern England	South Master Chronology	(Hillam and Groves 1994)	SOUTH	406–1594	126	8.2
Wales	Welsh Master Chronology	(Miles 1997b)	WALES97	404–1981	126	8.1
Individual site chronologies						
Gloucestershire	Mercer's Hall, Gloucester	(Howard *et al* 1996)	GLOUCMH	1289–1541	126	9.0
Cornwall	St Ildierna's Church, Lansallos	(Arnold and Howard 2006)	LANASQ03	1355–1514	126	8.5
Herefordshire	White House, Vowchurch	(Nayling 2000)	WVT9	1364–1602	126	8.4
Wiltshire	Salisbury Cathedral	(Miles *et al* 2005)	SARUM11	1409–1541	126	8.3
Devon	Wareleigh House, Tamerton Foliot	(Howard *et al* 2006)	TMFASQ01	1367–1539	126	8.3
Cornwall	Pendennis Castle	(Tyers 2004b)	PEN_t17	1358–1541	126	8.2
Wales	Branas-Uchaf, Llandrillo	(Miles *et al* 2010)	DENBY6	1388–1763	117	8.2
London	Westminster School	(Miles *et al* 2008)	LIDDELLS	1346–1540	126	7.9
Herefordshire	Cradley Village Hall	(Miles and Worthington 2004)	CRADLEY	1347–1530	126	7.8

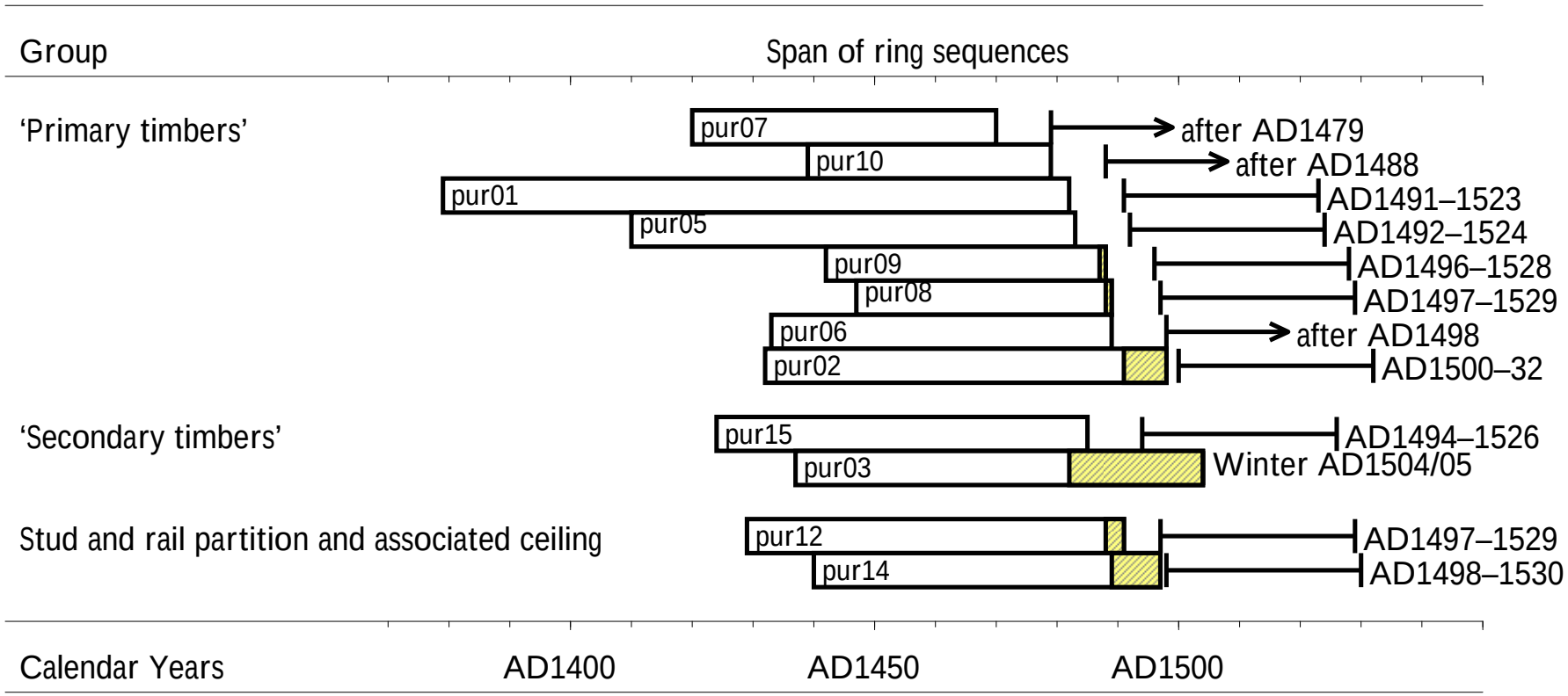

Figure 5: Bar diagram showing the relative positions of overlap and likely felling date ranges for the dated samples from Purcombe Farmhouse, Marshwood, Dorset. White bar – heartwood; yellow hatched bar – sapwood

APPENDIX

Ring width values (0.01mm) for the sequences measured

pur01

289	204	183	191	138	224	159	167	158	148
141	106	151	142	139	127	160	172	136	206
219	195	224	112	138	137	136	200	167	174
215	136	89	131	127	113	126	89	117	127
119	128	135	93	133	117	100	92	87	114
60	82	76	100	87	76	109	124	132	120
78	98	96	115	108	145	137	124	127	114
153	152	238	152	163	212	163	166	167	254
253	337	241	219	277	173	200	303	307	286
305	353	262	200	213	216	309	300	295	289
225	223	360	197						

pur02

399	294	312	383	432	330	374	381	387	423
365	454	448	291	255	340	283	338	249	336
407	353	408	270	288	258	252	228	169	93
162	225	168	233	302	316	293	215	232	204
219	164	189	265	209	216	235	175	277	228
304	318	375	306	268	268	313	304	328	290
261	343	362	290	397	314	214			

pur03

595	463	368	456	331	361	462	423	289	201
242	254	278	262	347	296	337	520	332	343
262	276	300	219	167	95	142	123	176	180
131	138	130	119	94	80	131	103	132	110
58	79	65	88	86	73	85	98	137	155
137	129	96	114	91	90	97	104	98	170
93	124	112	99	66	74	94	102		

pur05

160	117	136	117	136	106	82	137	129	104
115	131	79	114	104	74	79	76	68	50
60	50	89	61	45	102	86	130	126	44
59	61	69	80	68	72	68	85	79	100
93	139	144	139	196	153	188	134	259	230
255	264	294	369	250	298	436	419	333	316
365	278	236	270	219	344	293	348	278	238
258	365	363	274						

pur06

166	168	181	140	97	111	59	92	156	98
140	158	136	118	147	135	139	104	173	233
180	158	170	124	90	125	129	120	147	185
266	127	101	90	140	97	99	140	261	293
212	268	495	325	228	296	439	382	400	230
235	472	255	231	383	403	395			

pur07

246	245	221	254	266	227	175	214	212	192
246	256	300	168	192	229	122	154	223	137
147	170	166	189	163	122	131	176	262	380
466	392	257	312	443	351	348	284	386	300
349	185	282	408	257	213	225	260	350	333
365									

pur08

139	93	135	46	92	120	120	225	94	134
157	174	181	128	78	72	143	87	106	196
202	171	144	133	129	119	127	116	182	108
127	149	141	177	184	247	179	202	218	191
114	115	201							

pur09

98	223	202	133	121	222	345	279	169	230
117	186	246	167	231	213	240	204	266	183
238	288	158	295	287	316	308	277	250	147
150	131	154	251	255	170	167	146	172	279
220	214	269	213	240	205	173			

pur10

237	254	370	290	345	379	373	255	279	264
359	242	220	177	203	320	184	247	233	256
271	319	197	156	256	153	275	292	271	292
277	278	209	186	269	356	406	389	379	390
401									

pur12

270	304	308	499	306	363	599	420	516	471
263	387	372	318	357	348	330	321	309	336
321	262	350	330	292	349	289	378	278	330
311	337	238	233	311	174	223	297	314	345
269	254	256	260	197	187	271	157	214	271
256	277	288	332	308	398	290	310	290	300
255	326	276							

pur13i

377	507	385	497	730	698	629	519	513	455
456	396	590	413	353	417	325	354	274	282

pur13ii

190	236	210	270	224	158	281	307	289	173
196	237	215	145	163	265	240	245	277	205
284	271	333	244	315	258	245	269		

pur14

91	75	57	99	80	76	76	117	171	207
186	178	197	181	301	287	293	224	288	189
310	179	195	195	208	228	237	289	246	226
248	207	199	207	194	338	230	193	173	194
236	384	196	201	178	203	228	232	209	158

197 180 196 243 236 256 480 278

pur15

270 297 315 304 394 286 365 462 546 343
331 404 385 413 383 313 364 361 406 402
362 259 319 331 286 264 271 281 221 200
275 236 285 247 283 291 285 234 230 333
230 206 305 328 283 221 233 175 194 217
167 220 158 161 186 170 168 133 115 138
219 176

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