

Tree-Rings, Kings, and Old World Archaeology and Environment:

*Papers Presented in Honor of
Peter Ian Kuniholm*

Edited by

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Contents

FOREWORD	
<i>A. Colin Renfrew</i>	vii
PREFACE AND ACKNOWLEDGMENTS	ix
CONTRIBUTORS TO THE VOLUME	xi
BIBLIOGRAPHY OF PETER IAN KUNIHOLM	xv
<hr/>	
PETER KUNIHOLM'S DENDRO TIME	
<i>Fritz H. Schweingruber</i>	1
PERSPECTIVE: ARCHAEOLOGY, HISTORY, AND CHRONOLOGY FROM PENN TO THE PRESENT AND BEYOND	
<i>James Muhly</i>	3
EXCURSIONS INTO ABSOLUTE CHRONOLOGY	
<i>M. G. L. Baillie</i>	13
ONE HUNDRED YEARS OF DENDROARCHAEOLOGY: DATING, HUMAN BEHAVIOR, AND PAST CLIMATE	
<i>Jeffrey S. Dean</i>	25
THE ABSOLUTE DATING OF WASSERBURG BUCHAU: A LONG STORY OF TREE-RING RESEARCH	
<i>A. Billamboz</i>	33
IS THERE A SEPARATE TREE-RING PATTERN FOR MEDITERRANEAN OAK?	
<i>Tomasz Wazny</i>	41
DENDROCHRONOLOGICAL RESEARCH AT ROSSLAUF (BRESSANONE, ITALY)	
<i>Maria Ivana Pezzo</i>	51
THE DEVELOPMENT OF THE REGIONAL OAK TREE-RING CHRONOLOGY FROM THE ROMAN SITES IN CELJE (SLOVENIA) AND SISAK (CROATIA)	
<i>Aleksandar Durman, Andrej Gaspari, Tom Levanič, Matjaz Novšak</i>	57
DENDROCLIMATOLOGY IN THE NEAR EAST AND EASTERN MEDITERRANEAN REGION	
<i>Ramzi Touchan and Malcolm K. Hughes</i>	65
A 924-YEAR REGIONAL OAK TREE-RING CHRONOLOGY FOR NORTH CENTRAL TURKEY	
<i>Carol B. Griggs, Peter I. Kuniholm, Maryanne W. Newton, Jennifer D. Watkins, and Sturt W. Manning</i>	71

DENDROCHRONOLOGY ON <i>PINUS NIGRA</i> IN THE TAYGETOS MOUNTAINS, SOUTHERN PELOPONNISOS <i>Robert Brandes</i>	81
COULD ABSOLUTELY DATED TREE-RING CHEMISTRY PROVIDE A MEANS TO DATING THE MAJOR VOLCANIC ERUPTIONS OF THE HOLOCENE? <i>Charlotte L. Pearson and Sturt W. Manning</i>	97
DENDROCHEMISTRY OF <i>PINUS SYLVESTRIS</i> TREES FROM A TURKISH FOREST <i>D. K. Hauck and K. Ünlü</i>	111
NEUTRON ACTIVATION ANALYSIS OF DENDROCHRONOLOGICALLY DATED TREES <i>K. Ünlü, P. I. Kuniholm, D. K. Hauck, N. Ö. Cetiner, and J. J. Chiment</i>	119
THIRD MILLENNIUM BC AEGEAN CHRONOLOGY: OLD AND NEW DATA FROM THE PERSPECTIVE OF THE THIRD MILLENNIUM AD <i>Ourania Kouka</i>	133
MIDDLE HELLADIC LERNA: RELATIVE AND ABSOLUTE CHRONOLOGIES <i>Sofia Voutsaki, Albert J. Nijboer, and Carol Zerner</i>	151
ABSOLUTE AGE OF THE ULUBURUN SHIPWRECK: A KEY LATE BRONZE AGE TIME-CAPSULE FOR THE EAST MEDITERRANEAN <i>Sturt W. Manning, Cemal Pulak, Bernd Kromer, Sahra Talamo, Christopher Bronk Ramsey, and Michael Dee</i>	163
HOW ABOUT THE PACE OF CHANGE FOR A CHANGE OF PACE? <i>Jeremy B. Rutter</i>	189
ARCHAEOLOGISTS AND SCIENTISTS: BRIDGING THE CREDIBILITY GAP <i>Elizabeth French and Kim Shelton</i>	195
CENTRAL LYDIA ARCHAEOLOGICAL SURVEY: DOCUMENTING THE PREHISTORIC THROUGH IRON AGE PERIODS <i>Christina Luke and Christopher H. Roosevelt</i>	199
THE CHRONOLOGY OF PHRYGIAN GORDION <i>Mary M. Voigt</i>	219
THE END OF CHRONOLOGY: NEW DIRECTIONS IN THE ARCHAEOLOGY OF THE CENTRAL ANATOLIAN IRON AGE <i>Geoffrey D. Summers</i>	239
THE RISE AND FALL OF THE HITTITE EMPIRE IN THE LIGHT OF DENDROARCHAEOLOGICAL RESEARCH <i>Andreas Müller-Karpe</i>	253
AEGEAN ABSOLUTE CHRONOLOGY: WHERE DID IT GO WRONG? <i>Christos Doumas</i>	263
<hr/>	
THE THERA DEBATE	275
COLD FUSION: THE UNEASY ALLIANCE OF HISTORY AND SCIENCE <i>Malcolm H. Wiener</i>	277

SANTORINI ERUPTION RADIOCARBON DATED TO 1627–1600 BC: FURTHER DISCUSSION <i>Walter L. Friedrich, Bernd Kromer, Michael Friedrich, Jan Heinemeier, Tom Pfeiffer, and Sahra Talamo</i>	293
DATING THE SANTORINI/THERA ERUPTION BY RADIOCARBON: FURTHER DISCUSSION (AD 2006–2007) <i>Sturt W. Manning, Christopher Bronk Ramsey, Walter Kutschera, Thomas Higham, Bernd Kromer, Peter Steier, and Eva M. Wild</i>	299
THERA DISCUSSION <i>Malcolm H. Wiener, Walter L. Friedrich, and Sturt W. Manning</i>	317

Dendrochronological Research at Rosslauf (Bressanone, Italy)

Maria Ivana Pezzo

Abstract: *The Sovrintendenza ai Beni Culturali of the Province of Bolzano carried out excavations which revealed in Rosslauf the presence of dwellings constructed by the autochthonous Rhaetian population. The building was destroyed by fire and, as a consequence of slow combustion, the wooden material was preserved. The excavations uncovered a number of barrel staves stacked at one side of a room of the basement, and pieces from a large vat. The particular type of combustion that occurred within the basement of the dwelling preserved the carbonized remains of the wooden objects in a manner such that it was possible to conduct dendrochronological analysis, determine the ligneous species, and construct a 117-year chronology.*

The town of Bressanone is situated in the center of the Isarco Valley, where the valley bottom broadens at the confluence of the Isarco and Rienza watercourses. The area's climate is particularly clement because the morenic plateau to the north protects it against cold northerly winds, while eastwardly sloping uplands give constant exposure to the sun, even during the winter months. These features combine with stable hydrological conditions to create an optimal location for human settlement. Indeed, there are traces evident of practically uninterrupted human habitation in Bressanone from the Neolithic Age (Relazioni-Beni archeologici 1997) until the present day.¹ Rosslauf extends along the right bank of the River Isarco, behind the historic center of Bressanone and between the present-day Via Brennero and Via Dante.

From April to June 2002, on commission by Dr. Umberto Tecchiati of the Sovrintendenza ai Beni Culturali of the Province of Bolzano, the Società Ricerche Archeologiche directed by Gianni Rizzi carried out excavations which revealed the presence beneath the medieval and Roman layers of dwellings constructed by the autochthonous Rhaetian population. The main building consisted of two storeys, with a basement created by a stone perimeter wall clad with timber and insulated with sandy gravel which functioned as an interspace. The floors of the structure were supported by cross-beams resting on alignments embedded in the walls. The technique used for the construction

was that known as "Blochbau," or the log-cabin system with interlocking timbers—which demonstrates the considerable construction skill possessed the inhabitants at the time. The building was destroyed by fire, but the ceiling supported by wooden beams and composed of gravel material collapsed onto the objects in the basement, so that combustion was slow and took place in an anaerobic (i.e. oxygen-free) environment. As a consequence of this slow combustion, the wooden material was carbonized and perfectly preserved. The excavations uncovered a number of barrel staves stacked at one side of the room, and pieces of a large vat (Figure 1). Of outstanding interest was part of a six-spoke wheel. Pottery finds of note included two ribbed earthenware jars with curled brims, and pottery shards ascribable to Fritzens-Sanzeno culture (Perini's Rhaetian A), steep-sided cups decorated with pine-needle motifs, small ansated jugs decorated with "metopes" containing imprints delimited by vertical bands of three parallel lines. The pottery finds probably date to the first half of the 5th century BC.²

The dendrochronological analysis

The particular type of combustion that occurred within the basement of the dwelling preserved the carbonized remains of the wooden objects in a manner

¹For a description of pre-Roman finds in the Bressanone area, see L. Allavena Silverio 2002: 444–451.

² This description of the excavation and the finds (still unpublished) has been made possible by information kindly provided by Gianni Rizzi and Alessandro Manincor of the Società Ricerche Archeologiche.



Figure 1: The reconstruction (by Gianni Rizzi) of the room interior shows the barrels, wheels and large containers along the wall, with the vat in the background. To be noted is the complete absence of nails and metal elements in the barrels and the vat, with wooden hoops instead being used to bind the staves together. The room was completely lined with planks and beams.

such that it was possible to conduct dendrochronological analysis, determine the ligneous species, and construct a 117-year chronology. Dendrochronology is the study of the annual growth of trees or timber sensitive to climate changes, and it enables the dating of wooden objects or their carbonized remains. Used as the reference curve for the Rosslauf material was the curve plotted for southern Bavaria by B. Becker,³ which spans from AD 1985 to 546 BC. The arboreal species for the Becker curve is oak. Recent studies (Pindur 2001: 62–75) have successfully compared trees of different species which have grown in similar climatic conditions and in locations at a more than 250-kilometre distance from each other. Comparisons between the Rosslauf curve and Becker's curve yielded particularly significant and noteworthy data.

The charcoal analysed for the present study originated from the beams of the building, and from the barrels and the vat. Fifty samples were taken, and 30 were analysed. The samples' species were determined and, when possible, also the year of the last ring present. The species (Schweingruber 1990) were identified by Stefano Marconi and Maurizio Battisti of the Museo Civico of Rovereto. In some instances the species could be narrowed to two choices at best, due to small sample size.

³The curve has not yet been published. See Kuniholm 2002: 66.

Samples measured

ROSS-1 Sample from post 54, south-west corner (C3 502/6). Measurements: max. length 8cm; width 3.5cm; thickness 4.5cm. Rings: 15. Species: larch (*Larix decidua* Mill.). The sample exhibited an annular sequence with only a few measurable rings; it was consequently not included in the chronology.

ROSS-2 Sample from beam 5 (portion of post), ancient hut, north-east interior. Measurements: max. diam. 10cm; max. thickness 5cm. Rings: 30. Species: larch (*Larix decidua* Mill.) cf. spruce (*Picea abies* (L.) Karst.). The sample exhibited an annular sequence with regular growth and quite thick measurable rings; because this was a roundel, the pith was present but not the bark.

ROSS-3 Sample from beam 11 (portion), ancient hut, centre-south interior. Measurements: max. diam. 14cm; max. thickness 8cm. Rings: 12. Species: larch (*Larix decidua* Mill.) cf. spruce (*Picea abies* (L.) Karst.). The sample exhibited an annular sequence with few measurable rings but of notable thickness.

Barrels and vat

The samples below were used to construct a curve for each individual barrel; the year of the last ring present is given for the dated samples.

ROSS-20 Sample from barrel N. Measurements: max. length 3cm; max. width 3cm; max. thickness 5.6cm. Rings: 32. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the staves of barrel N and exhibited an annular sequence of very thin measurable rings. The last ring present was dated to 505 BC.

ROSS-21 Sample from barrel N. Measurements: max. length 3.5cm; max. width 2cm; max. thickness 3.5cm. Rings: 38. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the staves of barrel N and exhibited an annular sequence of rather thin measurable rings. The last ring present was dated to 485 BC.

ROSS-22 Sample from barrel N. Measurements: max. length 3cm; max. width 4cm; max. thickness 3.5cm. Rings: 22. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the staves of barrel N and exhibited an annular sequence of rather thin measurable rings. The last ring present was dated to 490 BC.

- ROSS-23** Sample from barrel N. Measurements: max. length 3cm; max. width 4cm; max. thickness 5cm. Rings: 21. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the staves of barrel N and exhibited a perfectly preserved annular sequence of rather thin measurable rings. The last ring present was dated to 498 BC.
- ROSS-24** Sample from barrel N. Measurements: max. length 1.6cm; max. width 1.6cm; max. thickness 3cm. Rings: 23. Species: larch (*Larix decidua* Mill.). The small sample was taken from one of the staves of barrel N and exhibited an annular sequence of very thin measurable rings. The last ring present was dated to 500 BC.
- ROSS-25** Sample from barrel N. Measurements: max. length 2cm; max. width 1.2cm; max. thickness 1.7cm. Rings: 25. Species: larch (*Larix decidua* Mill.). The small sample was taken from one of the staves of barrel N and exhibited an annular sequence of very thin measurable rings. The last ring present was dated to 489 BC.
- ROSS-26** Sample from barrel N. Measurements: max. length 2.3cm; max. width 1.1cm; max. thickness 2.6cm. Rings: 24. Species: larch (*Larix decidua* Mill.). The small sample was taken from one of the staves of barrel N and exhibited an annular sequence of very thin measurable rings. The last ring present was dated to 515 BC.
- ROSS-27** Sample from ligneous fragments found on barrel N, north side. Measurements: max. length 1.6cm; max. width 1.6cm; max. thickness 3cm. Rings: 33. Species: spruce (*Picea abies* (L.) Karst.). The very small sample was taken from stave fragments on the exterior of barrel N, north side. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 492 BC.
- ROSS-28** Sample from ligneous fragments found on barrel N, north side. Measurements: max. length 2.2cm; max. width 0.8cm; max. thickness 2.8cm. Rings: 32. Species: larch (*Larix decidua* Mill.). The very small sample was taken from stave fragments on the exterior of barrel N, north side. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 496 BC.
- ROSS-29** Sample from ligneous fragments found on barrel N, north side. Measurements: max. length 2.6cm; max. width 0.8cm; max. thickness 2.5cm. Rings: 33. Species: larch (*Larix decidua* Mill.).
- The very small sample was taken from stave fragments on the exterior of barrel N, north side. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 519 BC.
- ROSS-30** Sample from staves of barrel B 1. Measurements: max. length 4.2cm; max. width 2cm; max. thickness 4.3cm. Rings: 31. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the staves of barrel B 1. The annular sequence was characterized by rather thin measurable rings.
- ROSS-31** Sample from the inside bottom of barrel C. Measurements: max. length 3.9cm; max. width 2.2cm; max. thickness 4.3cm. Rings: 84. Species: larch (*Larix decidua* Mill.). The sample was taken from a stave bearing evident traces of working. To be noted are three parallel grooves cut at a distance of 0.7cm from each other on the outer surface. The stave was part of the outer cladding but was found inside the barrel at the bottom. The annular sequence was characterized by extremely thin measurable rings. The last ring was dated to 494 BC.
- ROSS-37** Sample from ligneous fragments found at barrel N, north side. Measurements: max. length 6cm; max. width 1.6cm; max. thickness 3.5cm. Rings: 67. Species: larch (*Larix decidua* Mill.). The sample was taken from a stave of barrel N, north side. The annular sequence was characterized by extremely thin measurable rings. The last ring was dated to 539 BC.
- ROSS-41** Sample from barrel B 1. Measurements: max. length 2.3cm; max. width 1.5cm; max. thickness 3.2cm. Rings: 50. Species: larch (*Larix decidua* Mill.). The small sample was taken from staves of barrel B 1. The annular sequence was characterized by extremely thin measurable rings.
- ROSS-42** Sample from barrel B 1. Measurements: max. length 3.5cm; max. width 1.4cm; max. thickness 4cm. Rings: 33. Species: larch (*Larix decidua* Mill.). The small sample was taken from staves of barrel B 1. The annular sequence was characterized by extremely thin measurable rings.
- ROSS-43** Sample from barrel B 1. Measurements: max. length 2cm; max. width 0.9cm; max. thickness 1.3cm. Rings: 56. Species: larch (*Larix decidua* Mill.). The small sample was taken from staves of barrel B 1. The annular sequence was characterized by extremely thin measurable rings.

ROSS-44 Sample from vat D. Measurements: max. length 3.1cm; max. width 1.3cm; max. thickness 3cm. Rings: 59. Species: larch (*Larix decidua* Mill.). The small sample was taken from one of the staves of vat D. The annular sequence was characterized by extremely thin measurable rings.

ROSS-45 Sample from barrel L. Measurements: max. length 2.2cm; max. width 2.3cm; max. thickness 2.1cm. Rings: 58. Species: larch (*Larix decidua* Mill.). The small sample was taken from one of the staves of barrel L. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 485 BC.

ROSS-46 Sample from barrel L. Measurements: max. length 2.3cm; max. width 1.1cm; max. thickness 2.6cm. Rings: 37. Species: larch (*Larix decidua* Mill.). The very small sample was taken from one of the staves of barrel L. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 496 BC.

ROSS-49 Sample from barrel C. Measurements: max. length 4.4cm; max. width 1.3cm; max. thickness 5.6cm. Rings: 59. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the staves of barrel C. The annular sequence was characterized by rather thin measurable rings. The last ring present was dated to 543 BC.

ROSS-50 Sample from barrel U. Measurements: max. length 4.7cm; max. width 1.5cm; max. thickness 2.8cm. Rings: 47. Species: larch (*Larix decidua* Mill.). The sample bore evident signs of working on the external surface and was taken from a stave of barrel U. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 490 BC.

ROSS-51 Sample from barrel U. Measurements: max. length 3.5cm; max. width 1.5cm; max. thickness 2.1cm. Rings: 43. Species: larch (*Larix decidua* Mill.). The sample bore evident signs of working on the external surface and was taken from a stave of barrel U. The annular sequence was characterized by extremely thin measurable rings.

ROSS-52 Sample from barrel U. Measurements: max. length 2cm; max. width 1.4cm; max. thickness 1.8cm. Rings: 33. Species: larch (*Larix decidua* Mill.). The small sample was taken from a stave of barrel U. The annular sequence was characterized by extremely thin measurable rings.

ROSS-53 Sample from barrel U. Measurements: max. length 2.3cm; max. width 1.2cm; max. thickness 2cm. Rings: 28. Species: larch (*Larix decidua* Mill.). The small sample was taken from a stave of barrel U. The annular sequence was characterized by extremely thin measurable rings.

ROSS-54 Sample from barrel U. Measurements: max. length 1.5cm; max. width 1.5cm; max. thickness 1.2cm. Rings: 38. Species: larch (*Larix decidua* Mill.). The very small sample and was taken from a stave of barrel U. The annular sequence was characterized by extremely thin measurable rings.

ROSS-55 Sample from barrel U. Measurements: max. length 3cm; max. width 3.4cm; max. thickness 2.8cm. Rings: 33. Species: larch (*Larix decidua* Mill.). The sample was taken from a stave of barrel U. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 508 BC.

ROSS-56 Sample from barrel U. Measurements: max. length 2.5cm; max. width 4cm; max. thickness 4cm. Rings: 34. Species: larch (*Larix decidua* Mill.). The sample was taken from one of the collapsed staves on the bottom of barrel U. The annular sequence was characterized by extremely thin measurable rings.

ROSS-57 Sample from barrel L. Measurements: max. length 5cm; max. width 1.7cm; max. thickness 5.5cm. Rings: 42. Species: larch (*Larix decidua* Mill.). The sample had a smooth surface and was taken from a thin stave of barrel L. The annular sequence was characterized by extremely thin measurable rings. The last ring present was dated to 509 BC.

Conclusions

Larch (*Larix decidua* Mill.) was the most frequently identified arboreal species, in the cases of both the barrel and vat staves, and the beams. Other samples proved to be spruce (*Picea abies* (L.) Karst.). Although the beam samples were larger in size than the fragments from the barrel staves, they yielded scant data because the rings, of considerable width, were of insufficient number for the last ring present to be determined. Planks from the outer part of the log were used to make the staves; this interpretation was confirmed by the fact that the rings were extremely narrow, almost parallel and without curvature, which indicates a position close to the exterior of the log.

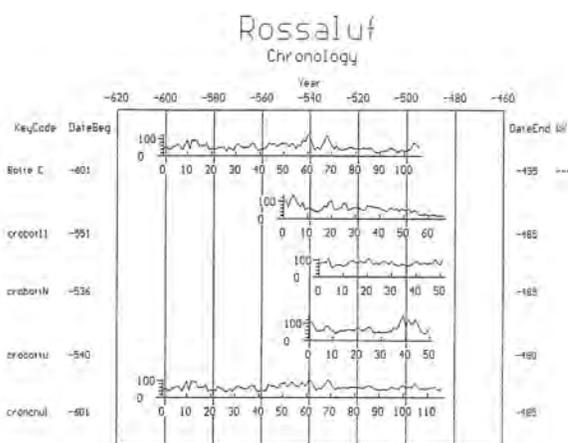


Figure 2: Graphs of the barrel chronologies with the final Rossaluf master chronology.

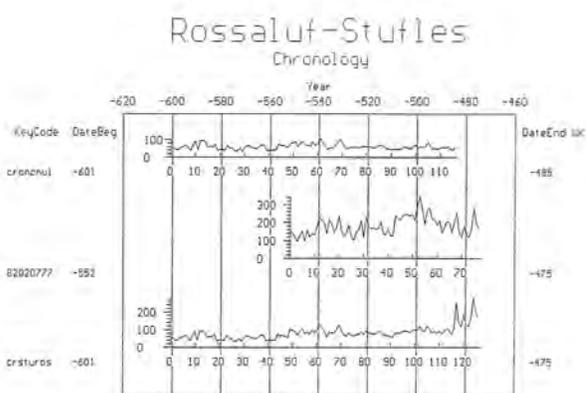


Figure 3: Graphs of the chronologies for Rossaluf and Stufles.

Analysis of the samples determined the *terminus post quem* of barrels C, L, N, and U. Barrel C, with only two samples (ROSS-31 and ROSS-49), furnished the longest chronology: 601–494 BC. Comparison of this chronology with Becker's chronology yielded good results which were subsequently confirmed by the data obtained by analysis of the other samples.

Barrel L, for which three samples were dated (ROSS-45, ROSS-46, ROSS-57), had a chronology covering the time span 551–485 BC. Barrel N had nine dated samples (ROSS-20, ROSS-21, ROSS-22, ROSS-23, ROSS-24, ROSS-25, ROSS-26, ROSS-27, ROSS-28), and the chronology obtained ranged from 536 to 485 BC.

Two samples from barrel U were dated (ROSS-50 and ROSS-55), and its chronology was from 540 to 490 BC.

The Rossaluf charcoal yielded a 117-year chronology (601–485 BC). Combination of this chronology with that for Stufles (STU-777) recently constructed at the Laboratorio di Dendrocronologia of Rovereto produced a 127-year chronology (601–475 BC).

Acknowledgments

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