

SOUTHERN RHODESIAN RADIOCARBON MEASUREMENTS I

P. A. ROBINS and E. R. SWART

Department of Chemistry, University College of Rhodesia and Nyasaland
Salisbury, Southern Rhodesia

The first series of C^{14} dating measurements made in the Gulbenkian Radiocarbon Dating Laboratory, which came into operation in October 1962, are reported in the following list.

INTRODUCTION

All measurements are made in a stainless steel counter of the Houtermans-Oeschger type, manufactured by Manufacture Belge de Lampes et de Matériel Electronique, using acetylene as the counting gas. The counter is operated at 760 mm Hg pressure with appropriate corrections for ambient temperature. The counter is shielded by 1 in. of steel, 3 in. of lead, large paraffin wax blocks containing 15% by weight of boric acid, and finally 8 in. of mild steel. Under these conditions the counter has a background of 1.4 counts/min and an NBS oxalic count of 15.5 counts/min.

Acetylene is prepared either by the method of Barker (1953) or by the more direct conversion of wood charcoal to lithium carbide as described by Swart (1963). In both cases yields of 95% or better are obtained.

NBS oxalic acid is used as a standard and has been checked and found to agree within less than 0.5% with a sample of 1890 wood from a section of *Pinus pinea* of known planting date and known felling date which was grown in Tokai Plantation, South Africa (18° 25' S Lat, 34° 03' E Long).

No correction for isotopic fractionation is made because of the lack of mass spectroscopic facilities. Samples are normally counted at two weekly intervals, the count being repeated whenever the two counts do not agree within the statistical error.

The errors reported include the statistical counting error, an estimate of the error due to possible fractionation (± 30 yr for wood or charcoal) and an estimate of the error due to the fluctuation of the C^{14} content of the atmosphere (± 80 yr). The error in the half-life of C^{14} is not included.

Pretreatment of samples: All organic samples are treated with hot 1% hydrochloric acid, followed by 1% sodium hydroxide, followed by 1% hydrochloric acid once again and finally a thorough washing with distilled water. In some few cases treatment with sodium hydroxide had to be dispensed with as it removed too much of the organic material. Any rootlets present are handpicked from the sample.

ACKNOWLEDGMENTS

We gratefully acknowledge a generous grant from the Calouste Gulbenkian Foundation which enabled us to purchase all the necessary equipment including a liquid-air plant. We are also pleased to acknowledge the help of Miss E. A. Heggarty who has carried out the work of preparing and counting the samples.

SAMPLE DESCRIPTIONS

All results are expressed in years before 1950, based on a C^{14} half-life of 5570 yr.

I. TREE SAMPLES

Baobab Tree series

SR-1. Baobab Tree, Lake Kariba **740 ± 100**
A.D. 1210

Wood sample of *Adonsonia digitata* L from bush-clearing operations at Lake Kariba (16° 55' S Lat, 28° 05' E Long), in Southern Rhodesia. Sample was taken from midway between the center and the outside of a 15 ft in diam baobab tree (Swart, 1963). Coll. and subm. by E. Swart.

SR-2. Baobab Tree, Heartwood **1010 ± 100**
A.D. 940

Wood from the heart of the same tree as SR-1. *Comment*: since many Baobab trees grow to a diam greater than 20 ft the indications are that many of them are more than 1000-yr old.

SR-3. Estoril Beach Camp, Beira, Mozambique **560 ± 100**
A.D. 1390

Wood of *Avicennia marina* found 2 mi N of the Estoril Beach Camp, Beira, Mozambique (19° 45' S Lat, 35° 0' E Long). Wood was embedded in lagoon mud and had been exposed by coastal erosion. Coll. by A. D. Boughey, Dept. of Botany, Univ. College of Rhodesia and Nyasaland, Salisbury, Southern Rhodesia. *Comment* (A.D.B.): by analogy with the relationship between the existing coastline and the present lagoon, date gives an estimate of the time taken by this stretch of coast to over-run the lagoon in which this tree once grew.

SR-4. Wonderboom, Pretoria **350 ± 100**
A.D. 1600

Wood sample taken 6 ft from the heart of the tree known as the Wonderboom (*Ficus pretoriae* Burt-Davey) (25° 36' S Lat, 28° 12' E Long). Coll. by J. E. Repton; subm. by H. Bruins-Lich, Parks and Recreation Dept., Pretoria.

SR-5. Wonderboom **750 ± 100**
AD. 1200

Wood sample taken 5 ft from the heart of the same tree as SR-4. *Comment*: because of the enormous size of the Wonderboom its age has long been a source of considerable interest (Swart, 1963). In the absence of any extant heartwood, the age of the tree is estimated, on the basis of the above dates and the existing size of the tree, to be about 1000 yr.

II. ARCHAEOLOGIC SAMPLES

*A. Africa***Pomongwe Cave series, Southern Rhodesia**

Pomongwe Cave, Matopo Hills was excavated by C. K. Cooke, Director of the Comm. for the preservation of Nat. and Hist. Monuments and Relics,

Bulawayo, Southern Rhodesia. Cave is situated in the Matopo Hills (20° 32' S Lat, 28° 30' E Long) near Bulawayo and was excavated during 1959-62 (Bull. South African Archaeol. Soc., in press).

SR-7. Pomongwe Cave, Matopo Hills **>42,000**

Charcoal sample, exceptionally small for dating purposes, had to be counted at reduced pressure. Resulting statistical error was too large to distinguish it from the background count. Coll. by C. K. Cooke, P. O. Box 3248, Bulawayo, Southern Rhodesia. *Comments:* a further sample of bone from the same layer has been supplied by C. K. Cooke and this will be dated in due course. The cultural affinities of SR-7 are probably Sangoan Industry of the 1st Intermediate Stone Age.

SR-8. Pomongwe Cave, Matopo Hills **42,200 ± 2300**
40,300 B.C.

Combination of two charcoal samples. *Comment:* mixing was necessary because of the small amount of charcoal in the deposit. Stratigraphically the samples were one below the other but culturally the same, being the nexus between the Sangoan of the 1st intermediate Stone Age and the still Bay of the Middle Stone Age.

SR-9. Pomongwe Cave, Matopo Hills **42,200 ± 2300**
40,300 B.C.

Charcoal from small logs from hearths in the cave. *Comment:* associated with the earliest levels of Still Bay Industry of Middle Stone Age.

SR-39. Pomongwe Cave, Matopo Hills **35,530 ± 780**
33,580 B.C.

Charcoal from Pomongwe Cave. *Comment:* associated with the Still Bay Industry of the Middle Stone Age.

SR-10. Pomongwe Cave, Matopo Hills **21,700 ± 400**
19,750 B.C.

Charcoal from Pomongwe Cave. Error is larger than usual because sample was small and was counted at reduced pressure. *Comment:* associated with the developing middle Stone Age and Still Bay Industry.

SR-11. Pomongwe Cave, Matopo Hills **15,800 ± 200**
13,850 B.C.

Charcoal sample. *Comment:* associated with the 1st Intermediate Stone Age Material of the Magosian Industry.

SR-12. Pomongwe Cave, Matopo Hills **9400 ± 100**
7450 B.C.

Small twig charcoal. *Comment:* associated with very early Wilton material of the Later Stone Age.

SR-13. Pomongwe Cave, Matopo Hills **7690 ± 140**
5740 B.C.

White ash sample, consisting largely of inorganic carbonates; appears to be younger than SR-12 from the same layer, probably as a result of exchange with atmospheric CO₂. *Comment:* associated with Stone Age material of unknown affinities, possibly very early Wilton.

SR-14. Pomongwe Cave, Matopo Hills **7610 ± 110**
5660 B.C.

Sample coll. from deposit of ash consisting of burnt nut from the *Scelerocayre caffra* tree. *Comment*: associated with lower levels of the Wilton Culture of the Later Stone Age.

SR-15. Rock Shelter, Dombozanga, Southern Rhodesia **1220 ± 100**
A.D. 730

Charcoal coll. throughout the Wilton deposit from 8 to 10 in. below surface. Coll. by K. R. Robinson; subm. by R. Summers, Natl. Mus., P. O. Box 240, Bulawayo, Southern Rhodesia. *Comment*: total depth excavated 24 in. Above the 8 in. level Wilton deposit was mixed with Iron Age potsherds.

Ziwa Farm series, Inyanga, Southern Rhodesia

SR-17. Grave Site, Ziwa Farm **1650 ± 100**
A.D. 300

Charcoal sample from grave site, depth 2 ft 4 in. (18° 12' S Lat, 32° 40' E Long). Coll. and subm. by F. Bernhard, 127 Third Street, Umtali, Southern Rhodesia. *Comment*: skeleton found in grave was that of young female (± 14 yr old) of Negroid race.

SR-32. Ritual Pit, Ziwa Farm **1100 ± 100**
A.D. 850

Charcoal from ritual pit (18° 12' S Lat, 32° 40' E Long).

SR-38. Ziwa Farm **1050 ± 100**
A.D. 900

Charcoal found attached to a skull from a grave found on Ziwa Farm (18° 12' S Lat, 32° 40' E Long). *Comment*: skeleton found in this grave was that of a young male (± 16 yr old) of Negroid race.

General comment: samples SR-17, SR-32, and SR-38 are all related to Ziwa culture, which can now be dated from at least 4th century A.D. to the first half of the 11th century A.D.

Harleigh Farm series, Rusape, Southern Rhodesia

SR-25. Harleigh Farm, Rusape **650 ± 120**
A.D. 1300

Charcoal sample (18° 32' S Lat, 32° 05' E Long). Coll. and subm. by P. A. Robins, Univ. College of Rhodesia and Nyasaland, Salisbury, Southern Rhodesia. *Comment*: carbonised posts overlaid by an early floor of the Zimbabwe Culture settlement. This represents a *post quem* date for the settlement.

SR-35. Harleigh Farm, Rusape **280 ± 90**
A.D. 1670

Charcoal sample. Coll. by J. R. Crawford; subm. by P. A. Robins. *Comment*: sample was obtained from a pit sealed by deposits of an early occupation of the site and comes from a midden containing pottery of the earliest type found on the site which is the ancestral home of the Chipunza Chieftancy.

SR-26. Tunnel Site, Gokomere, Southern Rhodesia **1420 ± 120**
A.D. 530

Midden deposit from 60 to 66 in. level (19° 55' S Lat, 30° 45' E Long). Coll. by K. R. Robinson; subm. by R. Summers. *Comment*: charcoal recovered from base of iron age midden averaging 36 in. thick and sealed by approx. 18 in. of the 19th century deposit. Below the layer of midden there was natural earth containing Wilton Culture material.

SR-28. Kamusongolo Kopje Cave, Kasempa Northern Rhodesia **800 ± 100**
A.D. 1150

Charcoal sample from North Western Province of Northern Rhodesia (13° 27' S Lat, 25° 51' E Long). Subm. by S. G. Daniels, Nat. Monuments Comm., P. O. Box 124, Livingstone, Northern Rhodesia. *Comment*: dating of this sample will be useful in the dating of comb-stamped pottery from N of the Kafue River and W of the eastern Lunga.

SR-33. Malapati, Southern Rhodesia **1110 ± 100**
A.D. 840

Midden deposit 8 in. level (base) (22° 03' S Lat, 31° 25' E Long). Subm. by K. R. Robinson. *Comment*: charcoal from this Iron Age site was coll. throughout midden deposit averaging 8 in. thick and resting on natural earth. The midden was overlain by 3 to 4 in. of sandy soil.

SR-34. Zoo Park Gardens, Kaisertrasse, Windhoek **5200 ± 140**
3250 B.C.

Large piece of elephant tusk (22° 55' S Lat, 17° 05' E Long). Subm. by H. R. Maccalman, Archaeologist, State Mus., P. O. Box 1203, Windhoek, South West Africa. *Comment*: date of elephant butchery site and quartz stone industry found with the tusk. Important for the analysis of a stone industry relating to a specific industrial activity.

Mutema's Sacred Grove series, Southern Rhodesia

SR-36. Mutema's sacred grove, Melsetter **720 ± 120**
A.D. 1230

Sample from a wood post found on the surface before the excavation had started (19° 59' S Lat, 32° 33' E Long). Subm. by A. Whitty, Monuments Comm., Mashonaland Office, Box 66, Borrowdale, Salisbury, Southern Rhodesia. *Comment*: sample comes from an Iron Age site.

SR-37. Mutema's sacred grove **800 ± 90**
A.D. 1150

Wood post from below surface.

III. GEOLOGIC SAMPLES

SR-24. Situmpa Forest Station **1930 ± 100**
A.D. 20

Charcoal sample (16° 50' S Lat, 25° 07' E Long) from charcoal levels in the Kalahari sand (Fergusson and Libby, 1963); depth 42 in. Subm. by B. Fagan, Keeper of Prehistory, Rhodes-Livingstone Mus., P. O. Box 214, Livingstone, Northern Rhodesia. *Comment*: sample is of stratigraphical im-

portance over some distance and ties in with sample C-829 (Libby, 1955).
Comm. Mashonaland Office, Box 66, Borrowdale, Salisbury, Southern Rhodesia.

IV. ATMOSPHERIC SAMPLES

SR-6. Atmosphere—Salisbury, Southern Rhodesia Δ 260

Carbon dioxide coll. during January 1963 from atmosphere over Salisbury, by exposure of a solution of sodium hydroxide for four days. An estimated value of δC^{13} of 21 per mil, following Godwin and Willis (1961), was used in obtaining the per mil deviation Δ . This value of Δ appears to be in accord with the data of McMurray and Stander (1963) on atmospheric samples collected over Pretoria which vary between 200 and 300 per mil.

REFERENCES

Date lists:

- | | |
|---------------|---------------------------|
| Cambridge III | Godwin and Willis, 1961 |
| UCLA II | Fergusson and Libby, 1963 |
- Barker, J., 1953, Large scale preparation of acetylene from organic material: *Nature*, v. 172, p. 631.
- Fergusson, G. J., and Libby, W. F., 1963, UCLA radiocarbon dates II: *Radiocarbon*, v. 5, p. 18.
- Godwin, H., and Willis, E. H., 1961, Cambridge University natural radiocarbon measurements IV: *Radiocarbon*, v. 3, p. 78-79.
- Libby, W. F., 1955, *Radiocarbon dating*, 2nd Ed.: Chicago, Univ. of Chicago Press, p. 138.
- McMurray, W. R., and Stander, L. O., 1963, Radioactive fall-out, its dispersion, deposition over South Africa, and biological significance: *South African Jour. of Sci.*, v. 59, p. 19.
- Swart, E. R., 1963a, The direct conversion of wood charcoal to lithium carbide in the production of acetylene for radiocarbon dating: *Experientia*, v. 20, p. 47.
- 1963b, Age of the baobab tree: *Nature*, v. 198, p. 708-709.
- 1963c, The Age of the Pretoria Wonderboom: *South African Jour. of Sci.*, v. 60, no. 1, p. 27.