

RADIOCARBON DATES OF SOME NEOLITHIC AND EARLY HISTORIC SAMPLES

D. P. AGRAWAL AND S. KUSUMGAR

Tata Institute of Fundamental Research, Bombay-5

WE present here radiocarbon dates of samples obtained from the neolithic site of Burzahom, Kashmir, and from Hetimpur and Kausambi, both early historic sites in Uttar Pradesh.

As pretreatment of the sample differs from laboratory to laboratory, our procedures are given briefly. All samples were first manually cleaned to remove soil, rootlets, etc., and then digested with 1% HCl to remove carbonates. NaOH pretreatment was given only when the charcoal was sufficiently hard to stand it; wherever this treatment has been given it has been mentioned in the attached list. The techniques adopted have been described in detail by Kusumgar *et al.* (1963).

For the modern carbon value we have taken 95% of the value C^{14}/C^{12} in the N.B.S. oxalic acid which had been calibrated against pre-1900 wood. For each sample two dates, in years B.P. (before present), are given. The first date is based on a value of 5568 ± 30 yrs. for the half-life of radiocarbon; the second date, given within brackets, is based on half-life of 5730 ± 40 yrs., which is "regarded as the best value now obtainable" (Deevey *et al.*, 1964). For all intercomparisons dates based on the same half-life value should be used. To convert dates to the A.D./B.C. scale, 1950 A.D. should be used as the reference year (Deevey *et al.*, 1964.)

ACKNOWLEDGEMENTS

The authors are indebted to Prof. D. Lal for his constant guidance and to Prof. M. G. K. Menon for active interest in our work. Thanks are due to Prof. James R. Arnold for collecting some of the samples. We also acknowledge thankfully the work carried out by Shri K. B. Nambiar in changing the glass system.

 C^{14} DATES WITH SAMPLE DESCRIPTIONS**Burzahom, Kashmir, India**

Burzahom (Lat. $34^{\circ} 10' N$, Long. $74^{\circ} 54' E$), District Srinagar, is the northernmost excavated neolithic site of India. This Neolithic Culture has no parallel in the country; some Chinese affinities have, however, been pointed out (Gupta, 1964). The site is being excavated by Shri T. N. Khazanchi since 1960-61 (Ghosh, 1960-61). Samples submitted by Shri A. Ghosh. Comment: The antiquity of the site seems to

extend up to the last quarter of the third millennium B.C.

TF-14, Neolithic Period, 3860 ± 340 (3975 ± 350)

Charcoal with mud from Trench SE, Locus A1, Depth 2.1-3 m. Wet combustion of sample carried out. (A few rootlets were visible in the sample.) As the sample was small it was counted by mixing with anthracite C_2H_2 .

TF-127, Neolithic Period, 3935 ± 110 (4050 ± 115)

Charcoal from Trench BZH-1/62, North Extension, Locus XIX_a-XXII_a, Layer 13, Depth 2.9 m. NaOH pretreatment was also given.

TF-123, Neolithic Period, 4055 ± 110 (4175 ± 115)

Charcoal from Trench BZH-3/61, Locus B2(NE), Layer Pit C, Depth 2.8-3.5 m. NaOH pretreatment was also given.

TF-128, Neolithic Period, 4205 ± 115 (4325 ± 120)

Charcoal from Trench BZH-1/62, North Extension, Locus XXII_a-XXIII_a, Layer 13, Depth 3.9 m. NaOH pretreatment was also given.

Hetimpur, Uttar Pradesh, India

This site is located in District Varanasi. The site seems to have been vacated by the megalithic (pre-Iron) folk because of the impact of the historical people represented by the occurrence of N.B.P. Ware. Hetimpur excavations are being conducted by a group from the Allahabad University under the direction of Prof. G. R. Sharma, who submitted the samples.

TF-177, N.B.P. Ware Period, 1820 ± 100 (1870 ± 105)

Charcoal from Trench HPR-I(V), Locus A2, XII-XIII, Pit B sealed by Layer 4, Depth 1.2 m., Field No. HPR-I(V)63/2003.

TF-176, N.B.P. Ware Period, 2000 ± 100 (2055 ± 105)

Charcoal from Trench HPR-I, Locus A2, IX-XIV, Layer 4, Depth .46 m., Field No. HPR-I(V)-63/2002.

Kakoria, Uttar Pradesh, India

TF-183, Megalithic Habitation, 200 ± 95 (205 ± 100)

Charcoal from Kakoria (Lat. $25^{\circ} 3' N$, Long. $83^{\circ} 11' E$), District Varanasi, Trench KKR-II, Locus SAI, 0-14, Layer 4, Depth .76 m., Field No. KKR-II(V)63/1507. (Few rootlets were visible in the sample.) Submitted by Prof. G. R. Sharma. Comment: The excavator had indicated the possibility of having mistaken old black

roots for charcoal while collecting samples at the site. More samples from the site are being measured to ascertain the true age.

Kausambi, Uttar Pradesh, India

Kausambi (Lat. 81° 23' N, Long. 25° 20' E.), now known as Kosam, District Allahabad, is located on the northern bank of Yamuna. According to the Puranic tradition the capital of the Pandavas was shifted from Hastinapur to Kausambi at the time of Nichaksu, fifth in descent from Parikshit, the grandson of Arjuna. The site is being excavated (Sharma, 1960) since a decade by a group from the Allahabad University under the direction of Prof. G. R. Sharma, who submitted these samples.

TF-103, Period III, 2295 ± 105 (2360 ± 110)

Charcoal from the Ghositaram area of Kausambi, Trench KSB-GR, Locus YZ2, 2-3, Pit C sealed by Layer 18ABK, Depth 3 m., Field No. KSB/63/GR-106. (A few rootlets were visible in the sample.) Comment: The sample has been attributed to the last phase of N.B.P. Ware.

TF-104, Period III, 2150 ± 105 (2220 ± 110)

Charcoal from Trench KSB/GR, Locus YZ2, 2-3, Layer 22BK, Depth 2.4 m., Field No. KSB/63/GR-107. (A few rootlets were visible in the sample.) Comment: The sample has been attributed to the middle phase of N.B.P. Ware.

TF-105, Period III, 2220 ± 110 (2285 ± 115)

Charcoal from Trench KSB/GR, Locus YZ2, 1-2, Pit A sealed by Layer 21 BK, Depth 2.4 m., Field No. KSB/63/GR-108. (A few rootlets were present in the sample.) NaOH pretreatment was also given. Comment: The sample has been attributed to the middle phase of N.B.P. Ware.

1. Deevey, E. S., Flint, R. F. and Rouse, Irving, *Radiocarbon* (Editorial Statement), 1964.
2. Ghosh, A., *Indian Archaeology—A Review*, 1960-61, p. 11.
3. Gupta, S. P., *Proceedings of the Seminar in Prehistory and Protohistory*, Poona, 25-30 May, 1964 (Unpublished).
4. Kusumgar, S., Lal, D. and Sharma, V. K., *Proc. Ind. Acad. Sci.*, 1963, 58 (3), 125.
5. Sharma, G. R., *The Excavation at Kausambi* (1957-59), Allahabad University Publication No. 1, Allahabad, 1960.

INDIAN ACADEMY OF SCIENCES : 30TH ANNUAL MEETING

THE Thirtieth Annual Meeting of the Indian Academy of Sciences was held on 25, 26 and 27 December 1964 in Poona under the auspices of the Poona University. The three-day session started with the inaugural function held in the N. M. Wadia Amphitheatre of the Fergusson College at which Dr. N. V. Gadgil, Vice-Chancellor of the Poona University, welcomed the Fellows and Delegates to the meeting. Sir C. V. Raman, in his Presidential Address on "Vision and the Nature of Light", dealt with his most recent investigations on the relation between the physical nature of light and the physiological sensations excited by its incidence on the retinae of our eyes. (A summary of the address appears below.)

The scientific meeting in Section A was held in two sessions on the 26th. The first session began with a paper by Dr. S. Bhagavantam on "Crystal Symmetry and Magnetic Properties". There was a symposium on meteorology over which Mr. P. R. Krishna Rao, Director-General of Observatories, presided. The symposium was opened by Dr. K. R. Ramanathan with his talk on "Stratosphere and Mesospheric Meteorology".

Section B met in two sessions on the 27th and Dr. N. K. Panikkar, Director, Indian Programme of the International Indian Ocean Expedition, presided. The meeting was initiated by Dr. M. S.

Swaminathan, Head of the Division of Botany, Indian Agricultural Research Institute, New Delhi, with his lecture on "Experimental Manipulation of Genes", in which he explained the latest researches in this field of study with special reference to the work in progress on mutations and plant breeding at the Co⁶⁰ gamma garden in the Agricultural Research Institute. This was followed by a talk by Dr. E. S. Narayanan on "Genetical Behaviours of the Mulberry Silkworm".

There were two public lectures during the Academy session. The first was by Dr. S. Bhagavantam on "Lasers and the Raman Effect" on the 26th evening, and the second by Dr. N. K. Panikkar on "The Indian Ocean" on the 27th evening.

The following papers were presented and discussed at the symposium on meteorology: "Jet Streams in Relation to Aviation over India" by Mr. P. R. Krishna Rao; "A Preliminary Study of the Indian SW Monsoon in Relation to the Dynamics of Jet Streams over the World" by Mr. C. Ramaswamy; "Meteors and the Upper Atmosphere" and "Seasonal Variations in Zonal and Meridional Circulations over India and Neighbourhood" by Dr. R. Ananthakrishnan; "A Numerical Prediction Model for the Indian Region" by Dr. P. R. Piharety and Mr. G. C.