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TATA INSTITUTE RADIOCARBON DATE LIST VII

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We continue to give dates based on the half-life of 5568 years according to the decision of the Sixth Pullman Conference (Internatl. Conf., Pullman, 1965). The year 1950 has been used as a reference year for converting the dates to A.D./B.C. scale. A value corresponding to 95% net counting rate of the NBS oxalic acid has been used as the modern reference standard.

To obtain more dates for the Late Quaternary, we have dated samples from Kakathope (TF-695, -696), Malia (TF-807(a), -807(b)), and Sambhar Lake (TF-698, -738, -739), using C^{14} dates based on $\tau_{1/2} = 5730$ yr. With the help of the pollen sequence, worked out by the Sahni Institute of Palaeobotany, Lucknow, and C^{14} dates for the different pollen zones, an absolute chronology for the Late Quaternary of India is being built up.

A few of the C^{14} dates from the earlier Kayatha excavations had shown some scatter. Therefore more samples were collected from fresh excavations conducted by the Deccan College, Poona. Dates obtained are consistent and place the beginning of the Kayatha culture (TF-776 to TF-781) to ca. 1900 B.C.

The date (TF-748) for Kodekal again shows that the southern neolithic cultures show increasingly younger dates to the south (Radiocarbon, 1968, v. 10, p. 13).

The enigmatic Pirak ware was assigned a very high antiquity by Raikes (1963), but TF-861 places it at ca. 800 B.C. in agreement with Casal's estimates (pers. commun.).

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SAMPLE DESCRIPTIONS

ARCHAEOLOGIC SAMPLES

A. India

3280 ± 105

TF-576. Hallur, India, Neolithic culture **1330 B.C.**

Charcoal from Hallur (14° 20′ N Lat, 75° 37′ E Long), Dist. Dharwar, Trench 1, Layer 8, depth 3.6 m, Field No. HLR 1965. Subm. by M. S. Nagaraja Rao, Kannada Research Inst., Karnatak Univ., Dharwar.

Kayatha series, Madhya Pradesh

Kayatha (23° 14′ N Lat, 76° 02′ E Long), Dist. Ujjain is Chalcolithic site. Samples subm. by H. D. Sankalia, Deccan College, Poona-6. Except for TF-780, all samples were given NaOH pretreatment.

3455 ± 110

TF-776. Chalcolithic culture **1505 B.C.**

Charcoal, Trench KTH-A, Layer 4, Field No. 111.

3625 ± 95

TF-777. Chalcolithic culture **1675 B.C.**

Charcoal, Trench KTH-A, Layer 5, Field No. 361.

3550 ± 95

TF-778. Chalcolithic culture **1600 B.C.**

Charcoal, Trench KTH-A, Layer 6, Field No. 599.

3685 ± 105

TF-779. Chalcolithic culture **1735 B.C.**

Charcoal, Trench KTH-A, Layer 7, Field No. 693.

3680 ± 95

TF-780. Chalcolithic culture **1730 B.C.**

Charcoal, Trench KTH-A, Layer 8, Field No. 697.

3720 ± 105

TF-781. Chalcolithic culture **1770 B.C.**

Charcoal, Trench KTH-A, Layer 9, Field No. 976.

4285 ± 105

TF-748. Kodekal, India, Neolithic culture **2335 B.C.**

Charcoal from Kodekal (16° 21′ N Lat, 76° 24′ E Long), Dist. Gulbarga, Trench 2, Layer 4, depth 2 to 3 m, Field No. 948. Subm. by H. D. Sankalia.

Moosakhand Dam series, Uttar Pradesh

Iron tools and pottery from Moosakhand Dam (24° 59′ N Lat, 83° 18′ E Long), Dist. Varanasi, from pits left exposed 2 to 3 months before. Subm. by V. S. Krishnaswamy, Geol. Survey, India, E. G. Div., N Region, Lucknow. All samples given NaOH pretreatment.

340 ± 95

TF-819(c). River bank deposits **A.D. 1610**

Carbonized wood, depth 15.22 m. Field No. MKD/1c.

TF-820. River bank deposits **Modern**

Wood with leaves and twigs in sand silt, depth 15.22 m, Field No. MKD/2.

TF-821. River bank deposits **Modern**

Wood, depth 3 m, Field No. MKD/3.

3805 ± 100

TF-701. Palvoy, India, Neolithic culture **1855 B.C.**

Charcoal from Palvoy (14° 31′ N Lat, 77° 09′ E Long), Dist. Ananthpur, Layer 9, depth 3.5 m. Subm. by H. D. Sankalia. *Comment*: NaOH pretreatment.

1665 ± 95

TF-636. Rajbadidanga, India, historical **A.D. 285**

Charcoal from Rajbadidanga (24° 1′ 44″ N Lat, 88° 11′ 04″ E Long), Dist. Murshidabad, Trench B-5, Layer 8, depth 3.3 m. Subm. by S. R. Das, Dept. Archaeol., Univ. Calcutta.

Takalghat series, Maharashtra

Takalghat, Dist. Nagpur, excavated by S. B. Deo, Nagpur Univ., Nagpur, who subm. samples. Similar painted pottery was also found at Paunar where it could be assigned to earliest pre-iron occupation ca. 600 to 800 B.C.

2495 ± 100

TF-783. Paunar I complex **545 B.C.**

Charcoal, Trench TKG-I, 1.95 × 1.60 m, Layer 9(A), depth 4.78 m, Field No. TKG-215.

2435 ± 95

TF-784. Paunar I complex **485 B.C.**

Charcoal, Trench TKG-I, Locus III′ × IV′ .75 × 125 m, Layer 7(A), depth 3.03 m. Field No. TKG-216.

Ter series, Maharashtra

Ter, Dist. Osmanabad, excavated by M. G. Dikshit, Dir. Archaeol., Maharashtra, Bombay, who subm. samples. NaOH pretreatment given all samples.

1645 ± 100

TF-746. Historical **A.D. 305**

Charcoal from Layer 3, Reg. No. 5/619.

2045 ± 100

TF-747. Historical **95 B.C.**

Charcoal from Layer 22, Reg. No. 5/573.

TF-749. Wood figure **Modern**

Wooden Ganesa figure dated to determine authenticity as antique object. Subm. by M. G. Dikshit.

B. Poland

Nieborowa series, Poland

Nieborawa, Dist. Chelm Lubelski, Poland, excavated by Chmielenski, Warsaw 22, St. Niemcewicza 24-45. NaOH pretreatment given both samples.

2680 ± 100

TF-754. Neolithic culture **730 B.C.**

Charcoal from fireplace, Locus CCXL-CCXLI-023, Layer 3, depth 0.55 m. Field No. NBI/5/C-67-1. *Comment*: sample expected to date end of Neolithic period.

1555 ± 100

TF-755. Unknown culture **A.D. 395**

Charcoal from fireplace, Locus CCXXXIV-014 and 015, Layers 3 and 4, depth 0.48 m, Field No. NBI/5/C-67-2.

C. Pakistan

2660 ± 100

TF-861. Pirak, W Pakistan **710 B.C.**

Charcoal from Pirak (29° 30′ N Lat, 67° 54′ E Long), Dist. Kachi, Layer W 12, depth 1 m, Field No. Pk. A. Coll. and subm. by J. M. Casal, Mus. Guimet, Paris.

D. Nepal

2235 ± 95

TF-737. Tilaurakot, Nepal, P.G. ware deposits **285 B.C.**

Charcoal from Tilaurakot (27° 34′ 30″ N Lat, 83° 30′ 3″ E Long) Dist. Taulihawa, Locus A2-A3, 4.9 × 1 m, Layer 10, depth 2.58 m, Field No. TLK-6. Subm. by N. R. Banerjee, Dept. Archaeol. Govt. of Nepal, Kathmandu.

E. Thailand

8505 ± 135

TF-802. Spirit Cave, Thailand, Mesolithic **6555 B.C.**

Wood from Spirit Cave (20° N Lat, 98° E Long), Mae Hongson Prov. Locus B2-B3, Layer 2A, depth 0.22 m, Field No. B2-B3 (2A). Subm. by C. F. Gorman, Archaeol. Lab., Univ. of Hawaii, Honolulu.

II. LATE QUATERNARY SAMPLES

Kakathope series, Madras

Kakathope (11° 35′ N Lat, 70° 52′ E Long), Dist. Nilgiris. Samples recovered by boring for dating pollen zones. Subm. by Vishnu-Mittre, Birbal Sahni Inst. of Paleobotany, Lucknow. NaOH pretreatment was given to all samples.

14,980 + 355
− 340

TF-695. Late Pleistocene **13,030 B.C.**

Organic mud, depth 2.0 to 2.30 m, Field No. 4789/3.

23,590 + 740
− 675

TF-696. Late Pleistocene **21,640 B.C.**

Organic mud, depth 3.20 to 3.50 m, Field No. 4789/3.

Malia series, Gujarat

Malia (23° 05′ 30″ N Lat, 70° 45′ 30″ E Long) in Little Rann of Kutch excavated by Indian Railways. Samples obtained from boreholes drilled for construction of railway embankment. Subm. by Y. G. K. Murty, Dir., Gujarat Circle, Geol. Survey India, Ahmedabad.

TF-807(a). Late Pleistocene **13,640 ± 200**
11,690 B.C.

Shells from Borehole 6, at depth −19 m. Top of bed which was 0.85 m thick. Field No. 7.

TF-807(b). Late Pleistocene **15,995 ± 250**
14,045 B.C.

Shells from Borehole 6, depth 19.85 m, bottom of bed. Field No. 7.

TF-808. Holocene **575 ± 105**
A.D. 1375

Shells from creek cutting between Boreholes 9 and 10. Shells from depth 1.0 m and 1.3 m were mixed. Field Nos. 10A and 10B.

TF-837(b). Pleistocene **>36,000**

Oyster shells from Khadir I. (23° 52′ 30″ N Lat, 70° 27′ 30″ E Long) in Great Rann of Kutch. Oyster debris represent raised beaches of sub-recent times. Ca. + 3 m. Subm. by S. K. Biswas, Oil and Natural Gas Commission, Baroda-4.

Mangalore series, Mysore

Mangalore (12° 56′ N Lat, 74° 50′ E Long), Dist. S Kanara. Samples from boreholes on sea bottom. Subm. by H. N. Siddiqui, Marine Geol. Unit, Geol. Survey India, Calcutta.

TF-740(b). Holocene **1985 ± 90**
35 B.C.

Shells from Borehole 59, depths 11.89 to 13.47 m.

TF-740(d). Holocene **1975 ± 100**
25 B.C.

Carbonaceous clay from Borehole 59, depth 58.75 to 60.42 m.

TF-741. Holocene **1980 ± 100**
30 B.C.

Shells from Borehole 64, depth 12.77 to 17.25 m.

TF-742. Holocene **1390 ± 115**
A.D. 560

Shells from Borehole 69, depth 25.70 to 30.58 m.

Sambhar Lake series, Rajasthan

Sambhar salt lake (26° 54′ N Lat, 75° 13′ E Long), Dist. Jaipur, excavated by G. Singh, Birbal Sahni Inst. of Paleobotany for pollen analysis and C^{14} dating. All samples given NaOH pretreatment.

TF-698. Late Quaternary **8585 ± 140**
6635 B.C.

Organic debris, depth 3.12 to 3.20 m, Field No. S-2/312-320, Sample No. RC-2.

8065 ± 135

TF-738. Late Quaternary **6115 B.C.**

Organic debris, depth 2.70 to 2.85 m, Field No. S-2/270-285, Sample No. RC-3.

4535 ± 110

TF-739. Late Quaternary **2585 B.C.**

Organic debris, depth 1.50 to 1.60 m, Field No. S-2/150-160, Sample No. RC-4.

III. GEOCHEMICAL SAMPLES

The following samples were collected by members of our Geophysics Group in connection with the study of problems relating to ground water dating. Interpretation of the data will be published elsewhere. Results are given as "real" ages.

4845 ± 110

TF-609. Palana, Rajasthan, open well **2895 B.C.**

Dissolved carbonates, picked up in IR-45 and IRA-400 anion exchange resins from open well at Palana (28° N Lat, 72° 45′ E Long), Dist. Bikaner. Sample coll. and subm. by V. N. Nizampurkar.

2215 ± 120

TF-456. Vijapur, Gujarat, tube well **265 B.C.**

Dissolved carbonates, picked up in IR-45 and IRA-400 anion exchange resins from tube well at Vijapur (23° 33′ N Lat, 72° 50′ 38″ E Long), Dist. Mehsana. Sample coll. by V. N. Nizampurkar.

2710 ± 100

TF-686. Amritsar, Panjab, tube well **760 B.C.**

Dissolved carbonates, picked up in ASR-76 and IRA-400 anion exchange resins, from tube well at Amritsar (29° 45′ N Lat, 73° 30′ E Long), Dist. Amritsar. Sample coll. and subm. by V. N. Nizampurkar.

295 ± 90

TF-687. Rupar, Panjab, tube well **A.D. 1655**

Dissolved carbonates, picked up in IR-45 and IRA-400 anion exchange resins, from tube well at Rupar (31° N Lat, 76° 40′ E Long), Dist. Rupar. Sample coll. and subm. by V. N. Nizampurkar.

525 ± 100

TF-688. Neyveli, Madras, tube well **A.D. 1425**

Dissolved carbonates picked up in IR-45 and IRA-400 anion exchange resin from tube well at Neyveli (11° 32′ N Lat, 79° 28′ E Long), Dist. S Arcot. Sample coll. and subm. by V. N. Nizampurkar.

TF-762. Laboratory tap

Free and fixed CO_2 from Lab. Tap water. Coll. 1967 and subm. by S. K. Gupta.

(a) Free CO_2	150.34 ± 1.07%	Modern
(b) Fixed CO_2	154.66 ± 1.06%	Modern

TF-763. Mulund, Maharashtra, tube well

Free and fixed CO_2 from tube well at Mulund (19° 05′ N Lat, 72° 50′ E Long), Bombay. Coll. 1967 and subm. by S. K. Gupta.

(a) Free CO_2 110.57 ± 1.12% Modern
(b) Fixed CO_2 112.78 ± 1.18% Modern

Neyveli series, Madras

Neyveli lignite field is in coastal plain of SE India. Study area is almost wholly overlain by sandstones, grits, clay beds, assoc. lignite beds, and water bearing sands of Neyveli artesian aquifer.

Samples were coll. from lignite mine area to study flow of ground water. Although Samples TF-811, -813, -815, -817 were roughly equidistant from recharge area, TF-811 and -815, which were closer to mine, gave high delta values as compared to the other 2 samples. TF-813 coll. 4 mi S and TF-817 6 mi N, whereas other samples of series were 25 mi NE of mine.

Free CO_2 from tube well water. Coll. 1967 and subm. by S. K. Gupta.

Lab. no.	Field no.	Well no. or location	Uncorrected C^{14} age	% of Modern
TF-810	NV/SKG-11/9	Nellikuppam	1020 ± 100 A.D. 930	88.18 ± 1.22%
TF-811	NV/SKG-4/2	NP-8	370 ± 95 A.D. 1580	95.58 ± 1.2%
TF-813	NV/SKG-8/6	J.E. Qts.	3775 ± 100 1825 B.C.	62.50 ± 1.2%
TF-815	NV/SKG-3/1	SP-18	65 ± 95 A.D. 1885	99.21 ± 1.2%
TF-816	NV/SKG-6/4	Cuddalore	1790 ± 95 A.D. 160	80.03 ± 1.17%
TF-817	NV/SKG-5/3	4th BL	2895 ± 95 945 B.C.	69.77 ± 1.2%
TF-818	NV/SKG-7/5	Pondichery	4945 ± 115 2995 B.C.	54.05 ± 1.41%

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