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 C14 dates based on T1/2 = 5730 yr. With the help of the pollen sequence, worked out by the Sahni Institute of Palaeobotany, Lucknow, and C14 dates for the different pollen zones, an absolute chronology for the Late Quaternary of India is being built up.

A few of the C14 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.).

ACKNOWLEDGMENT

We thank Prof. D. Lal for his guidance. Mr. S. V. Kerkar helped us in laboratory work. We are also thankful to Drs. H. D. Sankalia, Vishnu Mittre, and Gurdip Singh for cooperation in our Late Quaternary dating program.

SAMPLE DESCRIPTIONS

ARCHAEOLOGIC SAMPLES

A. India

TF-576. Hallur, India, Neolithic culture

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., Karnataka 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.
TF-776. Chalcolithic culture  
Charcoal, Trench KTH-A, Layer 4, Field No. 111.  
3455 ± 110  
1505 B.C.

TF-777. Chalcolithic culture  
Charcoal, Trench KTH-A, Layer 5, Field No. 361.  
3625 ± 95  
1675 B.C.

TF-778. Chalcolithic culture  
Charcoal, Trench KTH-A, Layer 6, Field No. 599.  
3550 ± 95  
1600 B.C.

TF-779. Chalcolithic culture  
Charcoal, Trench KTH-A, Layer 7, Field No. 693.  
3685 ± 105  
1735 B.C.

TF-780. Chalcolithic culture  
Charcoal, Trench KTH-A, Layer 8, Field No. 697.  
3680 ± 95  
1730 B.C.

TF-781. Chalcolithic culture  
Charcoal, Trench KTH-A, Layer 9, Field No. 976.  
3720 ± 105  
1770 B.C.

TF-748. Kodekal, India, Neolithic culture  
Charcoal from Kodekal (16° 21' N Lat, 76° 24' E Long), Dist. Gubarga, Trench 2, Layer 4, depth 2 to 3 m, Field No. 948. Subm. by H. D. Sankalia.  
4285 ± 105  
2335 B.C.

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.

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.

TF-701. Palvoy, India, Neolithic culture  
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.
TF-636. Rajbadidanga, India, historical
A.D. 285

TF-783. Paunar I complex
545 b.c.
Charcoal, Trench TKG-I, 1.95 x 1.60 m, Layer 9(A), depth 4.78 m, Field No. TKG-215.

TF-784. Paunar I complex
485 b.c.
Charcoal, Trench TKG-I, Locus III’ x IV’ .75 x 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.

TF-746. Historical
A.D. 305
Charcoal from Layer 3, Reg. No. 5/619.

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 Chmielen- ski, Warsaw 22, St. Niemcewicza 24-15. NaOH pretreatment given both samples.

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.
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

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

D. Nepal

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

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

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-Mitre, Birbal Sahni Inst. of Paleobotany, Lucknow. NaOH pretreatment was given to all samples.

TF-695. Late Pleistocene
14,980 ± 355
– 340
13,030 B.C.
Organic mud, depth 2.0 to 2.30 m, Field No. 4789/3.

TF-696. Late Pleistocene
23,590 ± 740
– 675
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 subrecent 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 C14 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.
TF-738. Late Quaternary
Organic debris, depth 2.70 to 2.85 m, Field No. S-2/270-285, Sample No. RC-3.

TF-739. Late Quaternary
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.

TF-609. Palana, Rajasthan, open well
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.

TF-456. Vijapur, Gujarat, tube well
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.

TF-686. Amritsar, Panjab, tube well
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.

TF-687. Rupar, Panjab, tube well
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.

TF-688. Neyveli, Madras, tube well
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
(a) Free CO₂ 150.34 ± 1.07% Modern
(b) Fixed CO₂ 154.66 ± 1.06% Modern
**TF-763. Mulund, Maharashtra, tube well**

Free and fixed CO₂ from tube well at Mulund (19° 05' N Lat, 72° 50' E Long), Bombay. Coll. 1967 and subm. by S. K. Gupta.

(a) Free CO₂ 110.57 ± 1.12% Modern  
(b) Fixed CO₂ 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 CO₂ from tube well water. Coll. 1967 and subm. by S. K. Gupta.

<table>
<thead>
<tr>
<th>Lab. no.</th>
<th>Field no.</th>
<th>Well no. or location</th>
<th>Uncorrected C¹⁴ age</th>
<th>% of Modern</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF-810</td>
<td>NV/SKG-11/9</td>
<td>Nellikuppam</td>
<td>1020 ± 100 A.D. 930</td>
<td>88.18 ± 1.22%</td>
</tr>
<tr>
<td>TF-811</td>
<td>NV/SKG-4/2</td>
<td>NP-8</td>
<td>370 ± 95 A.D. 1580</td>
<td>95.58 ± 1.2%</td>
</tr>
<tr>
<td>TF-813</td>
<td>NV/SKG-8/6</td>
<td>J.E. Qts.</td>
<td>3775 ± 100 1825 B.C.</td>
<td>62.50 ± 1.2%</td>
</tr>
<tr>
<td>TF-815</td>
<td>NV/SKG-3/1</td>
<td>SP-18</td>
<td>65 ± 95 A.D. 1885</td>
<td>99.21 ± 1.2%</td>
</tr>
<tr>
<td>TF-816</td>
<td>NV/SKG-6/4</td>
<td>Cuddalore</td>
<td>1790 ± 95 A.D. 160</td>
<td>80.03 ± 1.17%</td>
</tr>
<tr>
<td>TF-817</td>
<td>NV/SKG-5/3</td>
<td>4th BL</td>
<td>2895 ± 95 945 B.C.</td>
<td>69.77 ± 1.2%</td>
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<tr>
<td>TF-818</td>
<td>NV/SKG-7/5</td>
<td>Pondichery</td>
<td>4945 ± 115 2995 B.C.</td>
<td>54.05 ± 1.41%</td>
</tr>
</tbody>
</table>

**References**

Date list:  
Tata Institute V  
Agrawal and Kusumgar, 1968

