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BIRBAL SAHNI INSTITUTE RADIOCARBON MEASUREMENTS II

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The radiocarbon dates covered in this list were measured during 1978. Chemical and counting procedures are as reported previously (R, 1978, v 20, p 398-404). Age calculations are based on the conventional ^{14}C half-life (5570 yr) and on the contemporary value of 95% of the activity of NBS oxalic acid. Errors quoted correspond to 1σ value which takes into account the counting statistics, the uncertainty in the half-life, and the instability of the counting system. The ages are not corrected for isotopic fractionation in nature.

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A new set of electronics constructed by O Fernandes of Hydrology group, Tata Institute of Fundamental Research, Bombay were used for about 50% of the measurements reported in this list. We are indebted to Rama, Head of the Hydrology group, for making the facilities available and to O Fernandes for the construction and testing of these units.

SAMPLE DESCRIPTIONS

QUATERNARY SAMPLES

Himachal Pradesh series

Varved clay samples from Leedong (32° 28′ N, 77° 54′ E), Dist Lahul and Spiti. Samples coll from natural exposure and subm by A Bhattacharya, Birbal Sahni Inst Palaeobotany (BSIP), Lucknow to date late Quaternary vegetational changes.

BS-73. Varved clay **28,310 ± 3070**

Depth 43 to 77cm.

BS-74. Varved clay **24,030 ± 580**

Depth 179 to 220cm. *Comment*: BS-73 most likely contaminated with coal particles. Samples found devoid of pollen.

Three profiles of black silt samples from Mari (32° 15′ N, 77° 15′ E), Dist Kulu. Samples coll from trial trenches and subm by A Bhattacharya to date past vegetational changes of the region.

Profile 1

BS-85. Black silt **Modern**

Depth 5 to 7cm.

BS-86. Black silt **1975 ± 110**

Depth 17cm.

Profile 2

BS-87. Black-brown clay **7985 ± 110**

Depth 40 to 44cm.

Profile 3

Black brown humus, depth 65cm.

BS-71a. Lumps of organic matter **870 ± 110**

BS-71b. Clay fraction **1345 ± 110**

Comment: BS-71a indicates incorporation of humus of later origin. Pollen analysis of profiles is in progress.

Clay samples from Chottodara (32° 18′ N, 77° 33′ E), Dist Lahul and Spiti. Sample coll and subm by A Bhattacharya to date past vegetational changes.

BS-89. Carbonaceous clay **Modern**

Depth 5 to 8cm.

BS-99a. Carbonaceous clay **Modern**

Depth 38cm.

Comment: carbon content found insufficient in 5 deeper samples of 2.35m profile. Pollen analysis of profile in progress.

BS-82. Monali **Modern**

Clay sample from Monali (32° 15′ N, 77° 10′ E), Dist Kulu. Depth 15cm. Coll and subm by A Bhattacharya to date vegetational sequence.

BS-84. Chandratal Lake **1220 ± 350**

Carbonaceous sediments, depth 127 to 132cm from Chandratal lake (32° 28′ N, 77° 40′ E), Dist Lahul and Spiti. Coll and subm by A Bhattacharya to date vegetational changes. Uppermost two samples of the profile had insufficient carbon.

BS-55. Batal **Modern**

Varved silty clay, depth 26 to 43cm from Batal (32° 14′ 30″ N, 77° 33′ 40″ E), Dist Lahul and Spiti. Coll and subm by A Bhattacharya. *Comment*: top and bottom samples of the profile, BS-54 and BS-60, are dated at 495 ± 90 and 1370 ± 135 (R, 1978, v 20, p 398-404). Pollen analysis of the profile is in progress.

Nilgiris series

Samples from bore hole in peat deposits from Upper Bhawani (11° 21′ N, 76° 45′ E), Dist Nilgiris, Tamil Nadu. Coll and subm by H P Gupta and K Prasad, BSIP. Samples date pollen diagram.

BS-76. Peaty clay **280 ± 100**

Depth 0 to 5cm.

BS-75. Peaty clay **1920 ± 100**

Depth 30cm. *Comment*: two deeper samples of the profile, BS-52 and BS-53, have been dated at 5690 ± 110 and 18,540 ± 290 (R, 1978, v 20, p 398-404). Pollen analysis of the profile indicates the occurrence of grasslands with scanty tree elements about 5690 ± 110 yrs BP and the subsequent re-immigration of the shola forest at the site during the last 2000 yrs BP.

Peat from Nanjanad (11° 22′ 52″ N, 76° 38′ 10″ E), Dist Nilgiris. Coll and subm by K Prasad. Samples to date pollen diagram.

BS-106. Peat **4005 ± 90**

Depth 20 to 50cm.

BS-120. Peat **10,620 ± 160**

Depth 70 to 100cm.

BS-122. Peat **19,310 ± 360**

Depth 120 to 150cm.

Rajasthan series

Samples from trial trenches from Rajasthan. Coll and subm by A K Saxena, BSIP to date pollen diagram.

BS-99b. Didwana **7210 ± 160**

Dark clay, depth 260 to 267cm from Didwana (27° 20′ N, 74° 35′ E), Dist Nagaur. *Comment*: date consistent with earlier measurements from the profile (R, 1978, v 20, p 398-404).

BS-81. Kanod **7840 ± 300**

Dark clay, depth 2.3 to 2.4m from Kanod (27° 9′ N, 71° 10′ E), Dist Jaisalmer. *Comment*: sample belongs to a profile different from the one reported earlier (R, 1978, v 20, p 398-404).

Oxidized layer from base of sand dune, depth 76cm, from Budha Pushkár lake (26° 31′ N, 74° 35′ E), Dist Ajmer. Coll from natural exposure and subm by A Prakash, BSIP.

BS-77a. Lumps of organic matter **425 ± 90**

BS-77b. Clay fraction **825 ± 120**

Comment: botanical analysis of oxidized layer reveals presence of *Chara nucules* suggesting its deposition under fresh water conditions. A nearly similar deposit in this basin has been dated on typologic evidence to upper Palaeolithic (Allchin, Hegde & Goudie, 1972).

Gujarat series

Samples from natural exposure from Rajpipla (21° 0′ 45″ N, 73° 0′ 50″ E), Dist Broach. Coll and subm by R K Kar, BSIP, to date top fluvial deposit in Pleistocene sections.

BS-95. Charcoal **160 ± 95**
Depth 0.9m.

BS-102. Charcoal **245 ± 90**
Depth 1.2m.

BS-96. Charcoal **330 ± 140**
Depth 3.15m.

BS-100. Charcoal **330 ± 70**
Depth 3.3m.

BS-101. Shells **Modern**
Depth 3.0m.

GEOLOGIC SAMPLES

BS-88. Chengalpattu, Tamil Nadu **5210 ± 145**

Peat, depth 3.4m, from Chengalpattu (13° 14′ 10″ N, 80° 16′ 30″ E), Dist Chengalpattu. Coll and subm by S Subramanian, Geol Survey of India, to date alterations in shore line.

BS-83. Ambou, Himachal Pradesh **38,270 ± 2480**

Carbonaceous clay, depth 0.3m, from Ambou (30° 32′ 30″ N, 77° 42′ E), Dist Nahan. Subm by Engg Geol Div, Geol Survey of India, to date the neotectonic event.

ARCHAEOLOGIC SAMPLES

Ayodhya series

Charcoal samples from Ayodhya (26° 45′ N, 82° 10′ E), Dist Faizabad. Coll and subm by B B Lal, Indian Inst of Advanced Study, Simla, to date the late phase of Northern Black Polished (NBP) Ware period.

BS-66. Charcoal **2065 ± 120**
Depth 3.12m.

BS-69. Charcoal **1975 ± 100**
Depth 4.05m.

BS-70. Charcoal **2130 ± 105**

Depth 4.31m. *Comment*: dates confirm archaeol estimate (Agrawal *et al*, 1978).

Peddabankur series

Peddabankur (18° 35′ N, 79° 25′ E), Dist Karim Nagar, is an historic site. Subm by S Ramesan, Dir Archaeol and Museums, Andhra Pradesh.

BS-67. Historic levels **1920 ± 110**
Wood charcoal from Sec II, Div 81, Layer 2, depth 0.65m.

BS-68. Historic levels **1940 ± 110**

Wood charcoal from Sec I, Div 74, Layer 2, depth 0.75m. *Comment*: dates agree with earlier known dates from the site (Agrawal & Kusumgar, 1973).

Polakonda series

Polakonda (17° 42′ N, 79° 26′ E), Dist Warangal. Subm by Dir Archaeol and Museums, Andhra Pradesh.

BS-97. Megalithic culture **2045 ± 90**

Wood charcoal, depth 0.87m, submitter's sample no. PKD/2/77. *Comment*: date agrees with archaeol estimate.

BS-98. Neolithic culture **3255 ± 120**

Wood charcoal, depth 1.15m, submitter's sample no. PKD/1/77. *Comment*: date, close to archaeol estimate, indicates late arrival of a Neolithic people from S Andhra Pradesh or from SW Karnataka.

Dhulikatta series

Dhulikatta (18° 35′ N, 79° 16′ E), Dist Karim Nagar, is an historic site. Subm by Dir Archaeol and Museums, Andhra Pradesh.

BS-117. Historic levels **1965 ± 90**

Wood charcoal, depth 0.15m. Submitter's sample no. DKT/3/76.

BS-118. Historic levels **1910 ± 95**

Wood charcoal, depth 0.55m. Submitter's sample no. DKT/1/76.

BS-119. Historic levels **2210 ± 100**

Wood charcoal, depth 2.25m. Submitter's sample no. DKT/2/76. *Comment*: dates establish inception of early historic phase and chronology of Satvahanas.

Naikund series

Naikund (21° N, 79° 6′ 7″ E), Dist Nagpur. Megalithic habitation site at Naikund assoc with Megalithic stone circles. Subm by S B Deo, Deccan Coll, Pune.

BS-92. Megalithic culture **2455 ± 100**

Wood charcoal from NKD-Md I, Trench C 1, Layer (3), depth 45 to 50cm.

BS-94. Megalithic culture **2495 ± 105**

Wood charcoal from NKD-Md I, Trench C 2, Layer (2), depth 30 cm. *Comment*: dates agree with archaeol estimate.

BS-78. Sangamner, Maharashtra **24,670 ± 710**

Freshwater shells from Sangamner (19° 24′ 48″ N, 74° 10′ 12″ E), Dist Ahmed Nagar. Shells were found on surface along with Late Stone age (Upper Palaeolithic) artifacts during excavation. Subm by S N

Rajguru, Deccan College, Pune. *Comment* (SNR): date confirms archaeol estimate for Upper Palaeolithic period obtained from Tapti and Belan Valleys.

BS-103. Inamgaon, Maharashtra **3355 ± 105**

Charcoal from Trench D_1 & D_2, Sq E 6 sealed by layer (8), House no. 70, horizontal excavation. Assoc with early Jorwe culture (Period II of Inamgaon). Coll and subm by Z D Ansari, Deccan College, Pune. *Comment*: date agrees with archaeol estimate (Agrawal & Kusumgar, 1972).

BS-79. Chennur, Karnataka **>40,000**

Freshwater shells from Chennur (16° 29′ N, 76° 33′ E), Dist Gulburga, probably representing food debris found scattered on surface along with Mesolithic artifacts during excavation. Coll and subm by K Paddayya, Deccan Coll, Pune. *Comment*: date much older than archaeol estimate.

BS-113. Agroha, Haryana **1350 ± 95**

Charred rice grains from Agroha (29° 20′ N, 75° 38′ E), Dist Hissar. From archaeol excavation, sample assoc with Indo-Greek coins. Coll and subm by P N Kaushik, Hisar. *Comment*: date much younger than archaeol estimate.

OCEANOGRAPHIC SAMPLES

Dredge core samples of coral algal limestone from continental shelf between Vengurla and Ratnagiri along W coast of India. Coll and subm by P C Srivastava, Geol Survey of India, and H N Siddique, Natl Inst of Oceanog, Goa, to date climatic and environmental changes on the basis of sedimentologic and microfaunal studies.

General Comment: dates suggest early Holocene period.

Lab no.	Location	Age
BS-107.	**16° 40′ N, 72° 48′ E**	**8395 ± 145**
BS-108.	**16° 18′ N, 73° 2′ E**	**7845 ± 130**
BS-109.	**16° 9′ 39″ N, 72° 50′ E**	**9435 ± 145**
BS-110.	**16° 0′ 20″ N, 73° 51′ E**	**8380 ± 140**
BS-111.	**15° 50′ N, 73° 12′ E**	**8300 ± 135**
BS-112.	**15° 15′ N, 73° 0′ 36″ E**	**7470 ± 135**

GEOPHYSICAL SAMPLES

Minicoy series

Dead corals from natural exposure near light house, Minicoy I. (8° 0′ 18″ N, 73° E). Coll and subm by H N Siddique, Natl Inst Oceanog, Goa, to date storm beaches and formation of islands.

BS-58. Surface **475 ± 75**

BS-59. 2.5m below cutting **2875 ± 100**

BS-61. Top of cutting **2755 ± 105**

BS-62. Surface, on shore **595 ± 105**

BS-63.	**Surface**	**2215 ± 100**
BS-64.	**Surface**	**2455 ± 100**
BS-65.	**Surface**	**180 ± 95**

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GLIWICE RADIOCARBON DATES VI

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Results presented in this date list have been obtained from Jan 1977 to Dec 1977, but some earlier measurements are also included. All calculations are based on a contemporary value equal to 0.95 of the activity of NBS oxalic acid standard and on the Libby value for the half-life of radiocarbon. Ages are reported as conventional radiocarbon dates in years before AD 1950. No corrections for $^{13}C/^{12}C$ ratio were made for measurements reported in this list. Errors quoted ($\pm 1\sigma$) included estimated overall standard deviations of count rates of the unknown sample, contemporary standard and background (Pazdur & Walanus, 1979). Counting equipment and experimental procedures have been described earlier (Mościcki & Zastawny, 1976, 1977; Pazdur *et al*, 1978; Pazdur & Pazdur, 1979a). Sample descriptions are based on information provided by the submitters.

SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Lake sediments

Samples of calcareous gyttja from several profiles of lake sediments from N Poland were dated for paleomagnetic studies made jointly by Dept of Geophysics, Edinburgh Univ, UK, and Inst of Geophys, Pol Acad of Sci, Warsaw. All samples coll in 1976 with Mackereth corer (Mackereth, 1969) by J E Mojski, Piotr Tuchołka and Eric Hogg, subm 1977 by Zdzisław Małkowski, Inst of Geophys, Pol Acad of Sci, Warsaw.

Raduńskie Lake series

Core 2 from Raduńskie Górne Lake (54° 14′ N, 17° 59′ E).

Gd-442A. RADG 2/I-1-5 ORG **6620 ± 180**
Depth from 135 to 165cm, organic fraction.

Gd-442B. RADG 2/I-1-5 ORG **6600 ± 250**
Duplicate run on 2nd counter.

Gd-454. RADG 2/I-1 CARB **7430 ± 190**
Depth from 145 to 155cm, carbonate fraction.

Gd-446. RADG 2/II-1-5 ORG **9360 ± 300**
Depth from 325 to 355cm, organic fraction.

Gd-439. RADG 2/II-1 CARB **9470 ± 270**
Depth from 335 to 355cm, carbonate fraction.

Gd-438. RADG 2/II-2-3 CARB **9740 ± 300**
Depth from 330 to 350cm, carbonate fraction.

Gd-449. RADG 2/III-1-3 ORG **9940 ± 210**
Depth from 440 to 460cm, organic fraction.

Gd-445. RADG 2/III-1 CARB **9610 ± 210**
Depth from 445 to 455cm, carbonate fraction.

Charzykowskie Lake series

Calcareous gyttja sediments, Core 6, from Charzykowskie Lake (53° 47′ N, 17° 28′ E).

Gd-451. CHAR 6/I-1-3 ORG **2850 ± 170**
Depth from 140 to 160cm, organic fraction.

Gd-475. CHAR 6/I-1-3 CARB **3270 ± 160**
Depth from 140 to 160cm, carbonate fraction.

Gd-452. CHAR 6/II-1-3 ORG **4870 ± 150**
Depth from 340 to 360cm, organic fraction.

Gd-476. CHAR 6/II-1 CARB **6220 ± 120**
Depth from 345 to 355cm, carbonate fraction.

Gd-460. CHAR 6/III-1 CARB **7770 ± 220**
Depth from 495 to 505cm, carbonate fraction.

Gd-458. CHAR 6/IV-1 CARB **8670 ± 220**
Depth from 555 to 565cm, carbonate fraction.

Mikołajskie Lake series

Calcareous gyttja, Core 2, from Mikołajskie Lake (53° 46′ N, 21° 35′ E).

Gd-461. MIK 2/I-1-3 ORG **1640 ± 140**
Depth from 215 to 235cm, organic fraction.

Gd-471. MIK 2/I-1-3 CARB **1850 ± 120**
Depth from 215 to 235cm, carbonate fraction.

Gd-472. MIK 2/II-1-5 ORG **3150 ± 130**
Depth from 435 to 465cm, organic fraction.

Gd-464. MIK 2/II-1-3 CARB **2740 ± 150**
Depth from 440 to 460cm, carbonate fraction.

Gd-470. MIK 2/II-4-5 CARB **2700 ± 130**
Depth from 435 to 440cm and from 460 to 465cm, carbonate fraction.