

CARBON-14 DATING IN PISA—II

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Almost all radiocarbon measurements reported in the following list have been made with the same equipment and method used for the measurements reported in our previous work (Pisa-I). The sample used as contemporary standard for these samples is also charcoal obtained from *Arbutus unedo* wood grown near Pisa between 1948 and 1956. The value obtained from this standard has also been used for shell samples.

An Oeschger-Houtermans counter, manufactured in the Institute of Physics University of Bern, is now operating; this counter, shielded with 1.5 cm of lead and 30 cm of iron, has, with acetylene at a pressure of 530 mm, a background of 1.59 counts/min. With such conditions oak wood grown near Pisa between 1890 and 1900 has an activity of 13.49 counts/min. This wood is now used as standard. Samples Pi-119, Pi-153 and Pi-150 have been measured with the new counter; their ages have been calculated by comparison with the oak-wood standard and referred to 1950.

For evaluation of the magnitude of the Suess effect we are now measuring the two contemporary standards with the two counters.

SAMPLE DESCRIPTIONS

I. ARCHAEOLOGIC SAMPLES

Italy

Pi-119. Levanzo 9694 ± 110

Shells (*Patella ferruginea*) from lower part of the deposit in the Cala Genovesi Cave, at Levanzo Island (38° 00' N Lat, 12° 20' E Long). Sample was taken by P. Graziosi during the 1953 excavation, at a depth of about 2 m. The age determined corresponds to the age of the first human habitation in this cave. It probably took place soon after a coastal economy developed. This economy was based on marine and terrestrial shell harvest. Later this food became of increasing importance and continued to be so until the beginning of the Neolithic. A stone engraved with a figure of a wild ox was found at the same depth where the sample was found. This stone appears to have been engraved in the same manner as human and animal figures engraved on the walls of the cave (Graziosi, 1950). Hence it is possible to correlate this prehistoric art with the age of the sample. Subm. by P. Graziosi, Istituto di Paleontologia dell'Università di Firenze.

La Punta series

The deposit in the La Punta Cave, 20 km SE of Avezzano (41° 57' N Lat, 13° 39' E Long), was excavated by Radmilli and Tongiorgi in 1959. Below

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the Neolithic layers no cultural remains were found in a section of the deposit 2 m thick. The next 2 m below contained stone implements and a large number of bones of birds and small mammals which can be supposed to have been captured with traps.

Pi-153. Grotta La Punta 1 10,581 \pm 100

Charcoal from the lower part of the above described section. Underneath this section, a deposit of 1.50 m thickness was formed during a period in which cave was not inhabited. This period is represented in the nearby Ortucchio Cave by sample Pi-23, 12,619 \pm 410 (Pisa I).

Pi-152. Grotta La Punta 2 14,488 \pm 800

Charcoal from the lower part of a still deeper layer, also 1.50 m thick. A few bones found with this sample seem to indicate an economy different from that of the layer of Pi-153. This economy belonging to an Upper Paleolithic culture and based on the hunting of large mammals, is well represented by remains found in many nearby caves. A 10-cm bed of volcanic ash has been found in upper part of this layer. The ash is believed not to have been re-deposited after the eruption and provides a good base of correlation for this whole region.

Pi-101. Penne Di Pescara 6578 \pm 135

Charcoal from the central open hearth in a house-site of a prehistoric village 3 km from Penne di Pescara (42° 28' N Lat, 13° 56' E Long). Sample was collected by G. Leopardi during the 1958 excavation, one m below the surface. Two different kinds of pottery were found in association. One of these is the "impressed" pottery, persisting from a lower Neolithic culture; the other is a yellowish, unpainted and untempered ware indicating the beginning of middle Neolithic (Radmilli, 1959a). Subm. by G. Leopardi, Comitato per le Ricerche Preistoriche in Abruzzo, Soprintendenza alle Antichità di Chieti.

Grotta Piccioni series

Samples were taken from a cave (Grotta dei Piccioni) located on the rocky side of the valley of Orte River, 500 m ENE of Bolognano (42° 13' N Lat, 13° 58' E Long). Remains ranging from middle Neolithic to Iron Age have been found in the deposit excavated (1957-1960) by A. M. Radmilli, Istituto di Antropologia e Paleontologia Umana dell'Università di Pisa, who supplied the samples.

Pi-46. Grotta Piccioni 1 6247 \pm 130

Charcoal from an horizon where pottery belonging to an early phase of a middle Neolithic culture was found. At the same horizon both impressed and yellowish pottery were found. The latter was made from untempered clay and its surface was either unpainted or decorated with a red design, without a black outline.

Pi-49. Grotta Piccioni 3 4770 \pm 110

Charcoal from an upper horizon in the part of the deposit containing remains of an upper Neolithic culture. Some types of pottery are known only in

this cave; others are similar to those of the Ripoli culture; still others were evidently influenced by the Lagozza culture dated at 4794 ± 90 (Pi-34, this date list).

Pi-50. Grotta Piccioni 4

4306 ± 105

Charcoal from a layer containing, in this thicker part, remains of an Eneolithic culture clearly influenced by the Remedello culture.

Pi-47. Grotta Piccioni 2

9465

Earth, rich in carbonaceous matter, but without pieces of charcoal, from a lower horizon in the same upper Neolithic layer from which sample Pi-49 (4770 ± 110 , this date list) was obtained. The C^{14} age, clearly too old, was inexplicable until bitumen pieces (Fig. 1) were found in the same layer. Ex-



Fig. 1.

Piccioni Cave—Abruzzo—Italy
Upper Neolithic

Fig. 1. Bitumen piece found at the same level of sample Pi-47 (nat. size).

Fig. 2. Yellowish untempered ware repaired with bitumen (1/2).

Fig. 2.

traction of bitumen from limestones in this region was practiced also during the Roman period. Upper Neolithic inhabitants of Piccioni Cave used the bitumen to repair broken vessels, one of which (of the yellowish untempered ware) is shown in Fig. 2.

Pi-34. Lagozza

4794 \pm 90

Part of a wooden piling driven deep into the lacustrine deposit during the lake-dwelling phase represented by the archaeologic zone 15 to 30 cm thick at Lagozza di Besnate, 6 km NNW of Busto Arsizio (45° 42' N Lat, 80° 46' E Long). This locality, typical of the upper Neolithic Lagozza culture, was excavated by O. Cornaggia-Castiglioni in 1953 and 1954 (Cornaggia-Castiglioni, 1955), Soprintendenza alle Antichità-Milano, who submitted the samples.

Pi-100. Asciano

4248 \pm 115

Charcoal found by R. Peroni during the 1955 and 1956 excavation of the deposit under a rock ledge in the locality named "La Romita", near Asciano, 7 km NE of Pisa (43° 44' N Lat, 10° 29' E Long). Sample was collected at the horizon containing some of the cultural remains, which in central Italy are frequently found in burials of the Rinaldone type (related to the Remedello culture). Subm. by R. Peroni, Istituto di Antropologia e Paleontologia Umana dell'Università di Pisa.

Pi-87. Barche di Solferino

3341 \pm 115

Wood from lake dwelling of Barche di Solferino (Zorzi, 1940) 27 km NW of Mantova (45° 32' N Lat, 10° 34' E Long). Archaeologic findings belong to the Polada culture. Subm. by F. Zorzi, Museo Civico di Verona.

Pi-88. Ledro

3137 \pm 105

Part of wooden piling collected by R. Battaglia during the 1937 excavation of lake dwelling found in the Ledro lake, 7 km SE of Riva del Garda (45° 51' N Lat, 10° 43' E Long) (Battaglia, 1953). Sample is probably contemporaneous with Polada type of pottery, but, owing to the long occupation of the Ledro lake dwellings, this association is not entirely certain. Subm. by Cleto Corrain, Istituto di Antropologia dell'Università di Padova.

Pi-81. Lavagnone

3099 \pm 120

Wood from the inner part of piling underneath lake dwelling found during the extraction of peat in the Lavagnone marsh, 1 km SE of Desenzano del Garda (43° 28' N Lat, 10° 34' E Long). The abundant prehistoric pottery found by F. Fussi, belongs to the same culture as the Late Bronze Age finds in Isolone del Mincio (Pi-25, 3333 \pm 115; Pi-26, 3100 \pm 113; Pisa I). Subm. by F. Fussi, Museo Civico di Verona.

Pi-91. Castione Marchesi

2944 \pm 105

Wood from the Terramare of Castione dei Marchesi near Fidenza, 26 km from Parma (44° 54' N Lat, 10° 03' E Long). Subm. by Museo Nazionale di Antichità di Parma.

Pi-80. Fucino

3366 \pm 130

Charcoal coll. during S.M. Puglisi's 1958 excavation in a prehistoric vil-

lage in the Fucino plain near Ortucchio, 19 km SE of Avezzano (41° 57' N Lat, 13° 39' E Long). This village, on basis of shape and decoration of vessels, is considered to belong to the sub-Appennine culture (Late Bronze Age) (Radmilli, 1959a). The remains of this village were found 50 cm below the surface and were superimposed upon a habitation layer with remains of an older (Eneolithic) village (Radmilli, 1959b). Subm. by S. M. Puglisi, Museo Preistorico L. Pigorini di Roma.

Pi-53. Grotta del Farneto **3240 ± 110**

Charcoal from refuse deposit outside the Farneto Cave, 10 km SE of Bologna (44° 26' N Lat, 11° 23' E Long). Sample was coll. during the 1951 excavation (Bermond-Montanari and Radmilli, 1954 and 1955) in an horizon very rich in pottery and implements. In spite of some archaic types, these materials have been classified as belonging to the sub-Appennine culture (Late Bronze Age). Subm. by A. M. Radmilli, Istituto di Antropologia e Paleontologia Umana dell'Università di Pisa.

Pi-54. Grotta Misa **3030 ± 75**

Charcoal found during the 1947 excavation of Cardini, Rittatore and Tongiorgi in the Misa Cave, 16 km N of Montalto di Castro (42° 30' N Lat, 11° 38' E Long) (Rittatore, 1949). Sample was taken from a circle of charcoal within which wheat, beans, millet and flour were burned, probably ritually (Tongiorgi, 1947). Bronze objects and pottery found in the cave are representative of the sub-Appennine culture (Late Bronze Age). Subm. by E. Tongiorgi.

Pi-94. Ancona **2780 ± 95**

Charcoal from lower part of archaeological sequence found by D. Lollini (1956) in the "Colle dei Cappuccini" within the town of Ancona (43° 37' N Lat, 13° 31' E Long). First period of habitation, represented by this sample, occurred during the time of the proto-Villanovan culture. Subm. by D. Lollini, Soprintendenza alle Antichità di Ancona.

Pi-1. Grotta del Fauno **2318 ± 105**

Charcoal found in 1955 by A. M. Radmilli during an excavation under a rock ledge, 13 km SE of Pescasseroli (41° 44' N Lat, 13° 50' E Long). The deposit, 2.5 m thick, consists of rubble with beds of charcoal and ashes, which in the upper part are of the Roman period, and in the lower part contain pre-Roman pottery showing a local persistence of some Iron Age types. Sample was taken from upper part of pre-Roman deposit (Radmilli, 1956). Subm. by A. M. Radmilli, Istituto di Antropologia e Paleontologia Umana dell'Università di Pisa.

Pi-84. Canoe del Trasimeno **744 ± 100**

Wood from one of the dugouts found on shore of Trasimeno lake (43° 11' N Lat, 12° 8' E Long) during drainage operations in 1958. Sample was submitted by the Soprintendenza alle Antichità di Etruria di Firenze, because in the absence of any other kind of remains, it was impossible to confirm the supposed prehistoric age of the dugouts.

II. GEOLOGIC SAMPLES

*Italy***Pi-116. Lago di Massaciuccoli** **5646 \pm 220**

Shell (*Purpura haemastoma* Consul) found in silica-sands, extracted for industrial purposes between -12 and -26 m below sealevel, near Torre del Lago (Lago di Massaciuccoli), 15 km NNW of Pisa (45° 50' N Lat, 10° 19' E Long). Subm. by E. Tongiorgi.

Pi-150. Stagno **2991 \pm 115**

Posidonia fibres in a near-shore sediment found near Stagno, 16 km SSW of Pisa (43° 36' N Lat, 10° 24' E Long) 2 m below sealevel, during the excavation of a channel. The sediment was deposited at the end of the last period of open sea at this locality. Subm. by E. Tongiorgi.

Pi-75. Campi Flegrei **10,090 \pm 215**

Calcareous petrified wood found during drilling of tunnel through Vomero hill (40° 51' N Lat, 14° 21' E Long). The fossil wood was in a greenish-gray tufa, belonging to the yellow tufa formation at Naples. Subm. by P. Lucini, Istituto di Geologia Applicata di Napoli.

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