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INSTITUTO VENEZOLANO DE INVESTIGACIONES CIENTIFICAS NATURAL RADIOCARBON MEASUREMENTS III

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The dates reported here represent a portion of those determined in 1966. The Radiocarbon Dating Laboratory of the Instituto Venezolano de Investigaciones Científicas carries out a synthesis of benzene for each sample and detects the activity with a liquid scintillation spectrometer. For routine measurements, 3 cc synthesized benzene and 1 cc commercial toluene, with PPO and dimethyl-POPOP scintillators, are used in a special small counting vial. The modern standard is 95% of the NBS oxalic acid, which gives a net modern count rate of 23.9 cpm. The background is now 8.5 cpm.

In agreement with international conventions, all calculations of dates are made with the radiocarbon half-life taken as 5568 yr. The errors quoted are the standard deviations originating in the random nature of the radioactive disintegration process.

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SAMPLE DESCRIPTIONS

I. GROUND WATER SAMPLES

Study of recharge rates and movement of ground waters from various aquifers of Venezuela continues as main research work of Radiocarbon Dating Lab. Methods described for investigation of water of Maracaibo (Tamers, 1967) have been applied, with minor changes, to ground water deposits of Coro, Peninsula of Paraguaná, and basin of Lake of Valencia. Some dates for Coro and Paraguaná were reported in IVIC II. Study of these two aquifers is now complete and is published elsewhere (Tamers, 1966b). Investigation of the Lake of Valencia is being continued; however, a preliminary article discussing the radiocarbon results has appeared (Tamers and Thielen, 1966).

Radiocarbon contents are reported as % of modern without correction for limestone dilution. The δC^{13} values are based on Craig PDB limestone standard being equal to 0.00‰ and were done by Isotopes, Inc. Samples coll. 1965 and 1966 by members of Dept. of Chemistry of I.V.I.C.; subm. by Murry Tamers.

Coro Aquifer Wells and Spring

		δC^{13} (‰)	C^{14} (% of modern)
IVIC-226	Siburúa 2 (11° 19′ N Lat, 69° 35′ W Long)	−11.2 ± 0.1	51.6 ± 0.4
IVIC-227	Siburúa 9 (11° 19′ N Lat, 69° 35′ W Long)	−21.2 ± 0.1	81.9 ± 0.5
IVIC-228	San Antonio 1 (11° 20′ N Lat, 69° 32′ W Long)	−13.1 ± 0.1	54.1 ± 0.4
IVIC-229	San Antonio Spring (11° 20′ N Lat, 69° 32′ W Long)	−11.0 ± 0.1	48.0 ± 0.4
IVIC-230	Rio Coro Pozo No. 1 (11° 26′ N Lat, 69° 38′ W Long)	−13.7 ± 0.1	38.3 ± 0.4
IVIC-251	El Buco (11° 23′ N Lat, 69° 39′ W Long)	−15.8 ± 0.1	82.6 ± 0.4
IVIC-252	Fuguet (11° 23′ N Lat, 69° 45′ W Long)	−10.5 ± 0.1	17.7 ± 0.3
IVIC-253	Rio Coro Pozo No. 7 (11° 25′ N Lat, 69° 38′ W Long)	−14.1 ± 0.1	61.4 ± 0.4
IVIC-254	Antonini (11° 26′ N Lat, 69° 38′ W Long)	−17.8 ± 0.1	78.8 ± 0.5
IVIC-255	El Patillal (11° 21′ N Lat, 69° 49′ W Long)	−14.0 ± 0.1	36.3 ± 0.4
IVIC-256	Granja del Estado (11° 25½′ N Lat, 69° 38½′ W Long)	−14.8 ± 0.1	60.5 ± 0.4
IVIC-257	Manaure (11° 23′ N Lat, 69° 39½′ W Long)	−14.3 ± 0.1	84.0 ± 0.5
IVIC-258	Trapichito (11°23′ N Lat, 69° 39′ W Long)	−16.0 ± 0.1	52.5 ± 0.4
IVIC-259	Barigua (11° 25′ N Lat, 69° 30′ W Long)	−14.1 ± 0.1	41.9 ± 0.4
IVIC-261	Arreta (11°24′ N Lat, 69° 36′ W Long)	−13.2 ± 0.1	15.0 ± 0.3
IVIC-262	Roosevelt (11° 23′ N Lat, 69° 42′ W Long)	−11.5 ± 0.1	9.3 ± 0.3
IVIC-263	Granja I.A.N. (11° 23′ N Lat, 69° 44′ W Long)	−11.5 ± 0.1	50.4 ± 0.5
IVIC-264	Rio Coro Pozo No. 9 (11° 25′ N Lat, 69° 38′ W Long)	−14.6 ± 0.1	58.7 ± 0.6
IVIC-271	El Recreo (11° 21′ N Lat, 69° 49′ W Long)	−13.3 ± 0.1	26.2 ± 0.4
IVIC-272	Las Delicias (11° 23′ N Lat, 69° 45′ W Long)	−17.3 ± 0.1	60.8 ± 0.6

		δC^{13} (‰)	C^{14} (% of modern
IVIC-273	Conejal (11° 25′ N Lat, 69° 43′ W Long)	−11.6 ± 0.1	13.9 ± 0.3
IVIC-274	El Jebe (11° 23′ N Lat, 69° 45′ W Long)	−12.0 ± 0.1	36.6 ± 0.4
IVIC-275	San Rafael (11° 23′ N Lat, 69° 46′ W Long)	−22.9 ± 0.1	37.2 ± 0.4
Peninsula of Paraguana Wells			
IVIC-231	Pueblo Nuevo (11° 55′ N Lat, 69° 53′ W Long)	−10.8 ± 0.1	38.8 ± 0.4
IVIC-232	Guacurebo (11° 51′ N Lat, 69° 57′ W Long)	− 6.7 ± 0.1	4.9 ± 0.3
IVIC-265	La Vaca (11° 47′ N Lat, 69° 54° W Long)	−14.3 ± 0.1	92.7 ± 0.6
Wells of the Basin of the Lake of Valencia			
IVIC-294	La Palomera (10° 10′ N Lat, 67° 35′ W Long)	−15.2 ± 0.1	45.5 ± 0.4
IVIC-295	Eugenio Mendoza 5 (10° 06′ N Lat, 67° 37′ W Long)	−20.9 ± 0.1	82.4 ± 0.7
IVIC-296	Eugenio Mendoza 3 (10° 06′ N Lat, 67° 37′ W Long)	−21.7 ± 0.1	80.1 ± 0.6
IVIC-298	Güigüe 2 (10° 05′ N Lat, 67° 47′ W Long)	−14.0 ± 0.1	90.1 ± 0.7
IVIC-299	Güigüe 3 (10° 05′ N Lat, 67° 47′ W Long)	−15.7 ± 0.1	88.7 ± 0.7
IVIC-300	El Trompillo (10° 04′ N Lat, 67° 46′ W Long)	−21.6 ± 0.1	91.2 ± 1.6
IVIC-301	Mariara-INOS 1 (10° 13′ N Lat, 67° 43′ W Long)	−15.6 ± 0.1	88.4 ± 0.6
IVIC-304	Yuma (10° 06′ N Lat, 67° 42′ W Long)	−23.5 ± 0.1	88.9 ± 1.1
IVIC-305	Tocoron (10° 06′ N Lat, 67° 35′ W Long)	−20.5 ± 0.1	93.0 ± 0.6
IVIC-306	San Francisco de Asis (10° 05′ N Lat, 67° 33′ W Long)	—————	88.8 ± 0.6
IVIC-307	Palo Negro (10° 10′ N Lat, 67° 32′ W Long)	—————	62.5 ± 0.5
IVIC-308	Santa Cruz (10° 11′ N Lat, 67° 31′ W Long)	−13.0 ± 0.1	81.3 ± 0.6

		δC^{13} (‰)	C^{14} (% of modern
IVIC-309	Fundación Shell-Pozo Grande (10° 11′ N Lat, 67° 28′ W Long)	12.7 ± 0.1	75.9 ± 0.6
IVIC-310	Fundación Shell-Pozo Pequeño (10° 11′ N Lat, 67° 28′ W Long)	———	78.3 ± 0.6
IVIC-312	Peaje Palo Negro (10° 13′ N Lat, 67° 34′ W Long)	−20.1 ± 0.1	59.8 ± 0.5
IVIC-313	19 de Abril (10° 13′ N Lat, 67° 31′ W Long)	−22.9 ± 0.1	85.9 ± 0.6
IVIC-315	La Laguna (10° 11′ N Lat, 67° 35′ W Long)	−15.7 ± 0.1	48.2 ± 0.5
IVIC-316	Alfredo Pérez (10° 11′ N Lat, 67° 34′ W Long)	−11.1 ± 0.1	45.8 ± 0.5
IVIC-317	C.V.A. (10° 08′ N Lat, 67° 35′ W Long)	−18.7 ± 0.1	60.7 ± 0.6
IVIC-325	Bucaral (10° 10′ N Lat, 67° 58′ W Long)	———	39.3 ± 0.5
IVIC-326	Agua Dulce (10° 07′ N Lat, 67° 55′ W Long)	−14.1 ± 0.1	53.9 ± 0.5
IVIC-328	Fabrica Papco (10° 11′ N Lat, 67° 56′ W Long)	−12.6 ± 0.1	39.1 ± 0.5
IVIC-329	Flor Amarilla (10° 09′ N Lat, 67° 56′ W Long)	−14.6 ± 0.1	18.8 ± 0.3
IVIC-330	El Roble (10° 10′ N Lat, 67° 55′ W Long)	−21.3 ± 0.1	7.8 ± 0.3
IVIC-334	U.C.V. (10° 07′ N Lat, 67° 53′ W Long)	−11.2 ± 0.1	11.7 ± 0.3
IVIC-336	Glorieta (10° 08′ N Lat, 67° 54′ W Long)	−14.9 ± 0.1	14.3 ± 0.3

II. ARCHAEOLOGIC SAMPLES

A. Venezuela

1950 ± 70

IVIC-192. El Guacucal **A.D. 1**

Small charcoal sample from Trench 1, 0.00 to 0.25 m below surface of site 12 km W of Puerto Piritu, Venezuela (10° 10′ N Lat, 65° 10′ W Long). Coll. 1965 and subm. by Jose Cruxent, I.V.I.C. Associated with stone chips and pottery belonging to style not previously known. *Comment* (J.C.): date older than expected, but entirely reasonable.

450 ± 60

IVIC-282. Araya, Pozo del Rey 9 **A.D. 1500**

Charcoal from pit No. 9, 0.00 to 0.25 m below surface on Peninsula of Araya, state of Sucre, Venezuela (10° 35′ N Lat, 64° 15′ W Long). Site located SE of Castillo de Araya on small plateau with cliff facing the

sea. Analysis controls age of European majolica. Estimated date A.D. 1580 to 1640. Coll. 1966 and subm. by José Cruxent. *Comment* (J.C.): considering quoted error, date agrees with our expectation.

230 ± 60

IVIC-283. Araya, Pozo del Rey 7 **A.D. 1720**

Charcoal from pit No. 7, 0.25 to 0.50 m below surface on Peninsula of Araya, state of Sucre, Venezuela (10° 35′ N Lat, 64° 15′ W Long). Dates Dutch and Spanish majolica. Coll. 1966 and subm. by José Cruxent. Estimated date approx. A.D. 1650. *Comment* (J.C.): measured age is correct.

490 ± 50

IVIC-285. Maurica 7 **A.D. 1460**

Charcoal from pit No.7, 0.00 to 0.25 m below surface, of site 2 km E of Barcelona, state of Anzoátegui, Venezuela (10° 10′ N Lat, 64° 45′ W Long). Controls historical date for city of San Cristobal de los Cumanagotos. Estimated date A.D. 1580-1640. Coll. 1966 and subm. by José Cruxent. *Comment:* see IVIC-289.

530 ± 60

IVIC-289. Maurica 8 **A.D. 1420**

Charcoal from pit No. 8, 0.00 to 0.25 m below surface, 2 km E of Barcelona, state of Anzoátegui, Venezuela (10° 10′ N Lat, 64° 45′ W Long). Associated with ceramic and glass artifacts of city of San Cristobal de los Cumanagotos. Coll. 1966 and subm. by José Cruxent. *Comment* (J.C.): Maurica is older than Araya. Dates reasonable.

290 ± 60

IVIC-332. Quíbor **A.D. 1660**

Charcoal recovered from Indian cemetery in Bolivar Plaza, town of Quíbor, state of Lara, Venezuela (9° 55′ N Lat, 69° 38′ W Long). Associated with a type of ceramics at least 1000 yr old. Site is of great importance since it could represent a link in isthmic movement toward Venezuelan Andes. Coll. 1966 by Adrián Lucena, Univ. Central de Venezuela, Caracas; subm. by José Cruxent. *Comment* (J.C.): date much too young. Charcoal must be intrusive.

B. Argentina

790 ± 270

IVIC-185. Barranca Larga Huesos **A.D. 1160**

Two fragments of lower mandible of trepanned skull found in funeral urn of Valley of Abaucán, 7 km NE of town of Tinogasta, Province of Catamarca, Argentina (28°02′ S Lat, 67° 32′ W Long). Cloth sample associated with bones previously dated at 1460 ± 90 B.P. (IVIC-184, IVIC II). Coll. 1963 and subm. by Eduardo Cigliano, Museo de La Plata, La Plata, Argentina. Carbonate portion of bones completely removed by acid-dissolving pretreatment. Bones were 2.1% organic carbon. Large error in date is caused by small size of sample. *Comment:* pre-

vious study on validity of bone dates (Tamers and Pearson, 1965) showed that despite complete removal of carbonates bones usually result in dates too recent. Sample had known age (from IVIC-184) and gives date 650 yr in error.

3990 ± 70

IVIC-268. María Andrea 1 **2040 B.C.**

Mollusk shells, 1.50 m below surface of a natural formation of Calle Montevideo, Los Talas, Partido de Berisso, Province of Buenos Aires, Argentina (34° 53′ S Lat, 57° 50′ W Long). Sample corresponds to same formation as that dated at 4760 ± 120 B.P. (IVIC-188, IVIC II). Associated with rough type of ceramics. Coll. 1965 and subm. by Eduardo Cigliano. *Comment:* see IVIC-269.

4250 ± 70

IVIC-269. María Andrea 2 **2300 B.C.**

Mollusk shells from same site as IVIC-268 (34° 53′ S Lat, 57° 50′ W Long), but found 1.80 m below surface. Coll. 1965 and subm. by Eduardo Cigliano. *Comment:* (E.C.): these new dates confirm our ideas concerning antiquity of associated ceramics.

C. Chile

1640 ± 90

IVIC-162. El Durazno **A.D. 310**

Wood 1.80 m below surface of structure Túmulo 1 of Quebrada de El Durazno, approx. 25 km from Vallenar, Huasco, Prov. of Atacama, Chile (28° 45′ S Lat, 70° 25′ W Long). Sample associated with two skeletons and crude pottery. Artifacts can be included in Molle Negro Pulido culture. Site has been described in detail by Jorge Iribarren (1957). Coll. 1955 and subm. by Jorge Iribarren, Museo de La Serena, Chile.

D. Curaçao

These are first dates for island of Curaçao in Caribbean Sea. Excavations carried out 1965 by José Cruxent of I.V.I.C. to compare artifacts with those found on nearby Venezuelan coast. Monograph is now in preparation concerning archaeology of island by Cruxent and Cris Engels of Het Curacaosch Mus. All samples are charcoal and were subm. by Cruxent.

910 ± 50

IVIC-233. Knip 9, 0.00-0.25 m **A.D. 1040**

830 ± 60

IVIC-244. Knip 9, 0.25-0.50 m **A.D. 1120**

Charcoal from 2 m x 2 m pit No. 9 on Plaja Arao, N coast of Curaçao (12° 21′ N Lat, 69° 08′ W Long). Associated with shells, stones, and ceramics belonging to Dabajuroid series. A previous date for Dabajuroid pottery in Venezuelan Andes was 1300 ± 170 B.P. (IVIC-179, IVIC II). Inhabitants of site are classified as Neo-Indian. *Comment* (J.C.): results are logical.

1230 ± 60

IVIC-250. Knip 26, 0.00-0.25 m **A.D. 720**

630 ± 50

IVIC-248. Knip 26, 0.25-0.50 m **A.D. 1320**

From pit No. 26, E of Westpoint, Curaçao (12° 21′ N Lat, 69° 08′ W Long). Associated with stone objects, shells, and Dabajuroid ceramics. Artifacts classified as Neo-Indian. *Comment* (J.C.): no explanation for reverse order of ages of these two samples.

630 ± 60

IVIC-249. Knip 27, 0.00-0.25 m **A.D. 1320**

From pit No. 27, E of Westpoint, Curaçao (12° 21′ N Lat, 69° 08′ W Long). Associated materials similar to those of other Knip pits and are considered Neo-Indian. *Comment* (J.C.): date is reasonable.

70 ± 60

IVIC-236. De Savaan **A.D. 1880**

Sample 156 excavated from Pit 4, 0.00 to 0.25 m below surface in court yard of occupied house on Bay of Piscadera in N Curaçao (12° 60′ N Lat, 68° 57′ W Long). Also found were stone hatchet and Dabajuroid ceramics that should belong to Periods IV or III of Venezuelan chronology (Cruxent and Rouse, 1961). C^{14} activity is statistically indistinguishable from that modern standard, but does not show excess due to nuclear weapon contamination, typical of contemporary materials. *Comment* (J.C.): recent date suggests contamination from surface.

1440 ± 60

IVIC-237. San Juan **A.D. 510**

Material found 0.25 to 0.50 m below surface on slope of Barike Ceru in E Curaçao (12° 15′ N Lat, 69° 05′ W Long). Associated artifacts included Dabajuroid ceramics, shells, stones, and bones. Site had been excavated by Dutch archaeologists. Indians could have had contact with Spanish conquistadores. *Comment* (J.C.): date seems old, but is still acceptable since style of artifacts could have lasted long time. Dabajuroid has one of the longest time spans of Venezuelan series (Rouse and Cruxent, 1963).

340 ± 50

IVIC-241. Gaito **A.D. 1610**

Sample 8 Bis-1 taken 0.00 to 0.25 m below surface on SW coast of Curaçao (12° 07′ N Lat, 68° 54′ W Long). Associated with ceramics, majolica, iron objects, and bones. Charcoal subm. for its interest in identification of port of Santa Ana. Expected date, 17th century. *Comment:* result agrees with submitter's estimate.

4110 ± 65

IVIC-234. Rooi Rincon, Pozo Holandés, 0.20 m **2160 B.C.**

4070 ± 65

IVIC-242. Rooi Rincon, Pozo Holandés, 0.20-0.30 m **2120 B.C.**

Samples from location previously investigated by Dutch archaeolo-

gists. In rock shelter near Hato, Curaçao (12° 11′ N Lat, 68° 57′ W Long). Preceramic site is of a meso-Indian complex of collectors with industry of stone chips. Classified as a marginal development of El Jobo. No archaeologic station of this type presently known in Venezuela. Estimated age between 3000 and 5000 yr. *Comment:* agrees with submitter's estimate.

IVIC-240. Rooi Rincon 5, 0.25-0.50 m **3990 ± 50** **2040 B.C.**

Charcoal, associated with shells and stone objects, from pit No. 5 near Hato, Curaçao (12° 11′ N Lat, 68° 57′ W Long). Meso-Indian preceramic complex. *Comment* (J.C.): date is reasonable.

IVIC-247. Rooi Rincon 28, 0.00-0.25 m **4490 ± 60** **2540 B.C.**

IVIC-246. Rooi Rincon 28, 0.25-0.50 m **4160 ± 80** **2210 B.C.**

Samples excavated from pit No. 28 near Hato, Curaçao (12° 11′ N Lat, 68° 57′ W Long). Meso-Indian, preceramic complex, *Comment:* agrees with submitter's estimate.

II. GEOLOGIC SAMPLES

A. Finland

IVIC-291. Varrassuo 14-15 **6140 ± 90** **4190 B.C.**

Sphagnum peat taken with piston sampler from middle of domed Varrassuo bog near Lahti, S Finland (61° 00′ N Lat, 25° 29′ E Long). Pollen investigated previously. Depth 280 to 290 cm. Sample important for study of postglacial vegetational history of Finland. Coll. 1965 and subm. by J. J. Donner, Univ. of Helsinki. Estimated age ca. 6000 yr. *Comment:* see IVIC-292.

IVIC-292. Varrassuo 20-21 and 29-30 **7780 ± 110** **5830 B.C.**

Two small samples of peat from depths 310 to 320 cm and 360 to 370 cm from same core as IVIC-291 (61° 00 N Lat, 25° 29′ E Long). Estimated ages for two levels 7000 and 8300 yr, respectively. *Comment* (J.D.): results in good agreement with earlier postglacial dates from bogs in southern Finland.

III. MISCELLANEOUS SAMPLES

IVIC-278. Lago de Maracaibo Sediments **1470 ± 150** **A.D. 480**

Sediments from top 25 cm of positions B-62 and B-64 (10° 44′ 40″ N Lat, 71° 34′ 36″ W Long) from bottom of Lake of Maracaibo in Venezuela, water depth 12 m. Sample is part of preliminary study of drifting of sediments into central canal. Sediments were relieved of carbonates by

acid washing pre-treatment. Coll. 1966 and subm. by Cesare Ronzani, I.V.I.C. $\delta C^{13} = -25.6‰$, which shows that material dated was plant products. *Comment:* sedimentation in section is apparently slow and, therefore, not being affected by mechanisms rapidly filling up canal, which requires continuous dredging operations.

IVIC-345. Hojas de Guama 1966 **156.7 ± 0.5 % modern**

Growing leaves from Guama tree (Inga Fastuosa), 14 km from Caracas in Altos de Pipe (10° 23′ N Lat, 66° 58′ W Long). Same tree used for IVIC-147 (IVIC II) which showed 171 % modern, one year earlier. These measurements were made to monitor nuclear weapon contamination in Venezuela. Coll. May 26, 1966. *Comment:* C^{14} contamination has decreased considerably because of limited test ban treaty.

1150 ± 60

IVIC-181. Mitchell Site **A.D. 800**

Wood from outer rings of bald-cypress log (260-280 annual rings) in Feature 50 of Mitchell site, 3 mi N of Granite City, Illinois (38° 46′ N Lat, 90° 05′ W Long). Coll. 1961 by J. W. Porter, Illinois Archaeol. Survey; subm. by E. M. Davis, Univ. of Texas, as interlaboratory check sample. Previous published dates from same log are 990 ± 90 (Tx-198, Texas III) and 1000 ± 75 (M-1305, Michigan VIII) from inner rings. *Comment:* I.V.I.C. date in good agreement with previous two.

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