

**MOSCOW MV LOMONOSOV STATE UNIVERSITY
RADIOCARBON DATES I**

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INTRODUCTION

The following list sums up the results of radiocarbon age determinations obtained at the Laboratory in 1974-1975. The list is prefaced with a brief description of the measurement procedure and discussion of some methodological aspects of the investigation that result in a higher accuracy of dating.

The radiocarbon dating was performed by the liquid-scintillation method. Benzene synthesized from the samples was used as a measuring preparation. The standard was provided by the Geological Institute of the Academy of Sciences of the USSR of which the conversion factor is 1.1922 relative to 95% of the activity of NBS oxalic acid.

The age measurements cited below were calculated using the ^{14}C carbon half-life obtained by Libby, 5570 ± 30 years. The sample age was measured in radiocarbon years prior to 1950. Correction for isotopic fractionation was not made. Radiocarbon ages are given with an error of 1σ , including the instrumental error. Evaluation of the error is based on the scattering of separate measurements of the count rate of the sample, standard, and background. This method modifies that suggested by Grevecoeur *et al* (1959).

The mineral composition of shells and corals was determined with the aid of a DRON-1 X-ray diffractometer. The standard used for calcite was Icelandic spar and for aragonite modern coral. To make qualitative determination of mineral composition each sample was analyzed in the range of $14-40^\circ 2\theta$. Quantitative determination of calcite and aragonite in the sample was carried out by the internal standard procedure (Gorbunova, 1969).

When the sample is originally composed of aragonite, X-ray diffractometric analysis determines the degree of recrystallization to calcite. For such samples, ages are quoted with the results of the X-ray analysis, as $\text{recryst} = \text{---}\%$.

Although the dates were not corrected for recrystallization, we can identify four age groups according to the effect of recrystallization upon radiocarbon age: Group 1 — samples 500 to 5000 years — the error at maximum recrystallization, 90%, does not exceed 1000 years; Group 2 — samples 5 to 20,000 years — the error amounts to several thousands years; Group 3 — samples 20 to 35,000 years — the error averages 5 to 20,000 years; Group 4 — samples $>35,000$ years — in this group, even an insignificant degree of recrystallization can cause an error of 20,000 years or more which means that these ancient samples are not suitable for age determination.

In addition to the conventional instruments, an amplitude-differential discriminator (ADD) designed at the Laboratory was used in the electronics. Up to five radiocarbon counters can be connected to this discriminator allowing simultaneous measurement of several samples (Khait & Shlukov, 1973). This was achieved by employing the principle of signal compression applied in communication.

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Pacific Islands I

Samples coll from Pacific Is during 6th cruise of *R/V Dmitry Mendeleev* and subm by P A Kaplin, MGU.

Efate Island series

MGU-174. Efate I. 2890 ± 500
recryst = 10%

Coral limestone from Efate I., New Hebrides, S coast of island, W coast of Eracor bay (17° 46' 24" S, 166° 16' 39" E). Scarp of 1st terrace, alt 1.5m.

MGU-175. Efate I. 22,400 ± 100

Coral limestone, S coast of island, Pango peninsula, Etumoo plateau (17° 46' 00" S, 168° 16' 47" E). Scarp of Pleistocene upper terrace, alt 20m, with well expressed wave-cut recess at foot. Absolute elev of sampling, 70m.

MGU-170-1. Efate I. 3960 ± 150

NW coast of island, Samoa cape (17° 34' 12" S, 168° 14' 59" E). Scarp of 1st terrace, alt 2m. Terrace, elev Holocene coastal accumulative form composed of coral fragments, shell detritus, and pieces of coral limestone. This and 2 subsequent samples date ancient accumulative form. Present elev reaches +8m.

MGU-170-2. Efate I. 3740 ± 250
recryst = 5%

Sample from same scarp of ancient accumulative form as MGU-170-1 (17° 34' 12" S, 168° 14' 59" E). Material of filler, *ie*, calcareous sand, silt, and ooze.

MGU-170-3. Efate I. 3780 ± 150

Fragment of *Tridacna* shell from same scarp as MGU-170-1 (17° 34' 12" S, 168° 14' 59" E).

MGU-171. Efate I. 2385 ± 120

Coral limestone from NE coast of island (17° 34' 36" S, 168° 28' 58" E). Reef terraces, +1.5, +15 and +29m, composed of coral limestone, well-exposed on coast. Barometric profile was run through terraces. Dates 1st terrace, +1.5m.

MGU-172. Efate I. 15,220 ± 300
recryst = 90%

Coral limestone from NE coast of island (17° 34' 42" S, 168° 28' 49" E). Scarp of 2nd terrace, +15m. Same barometric profile as MGU-171. Dates 2nd terrace.

MGU-173. Efate I. 29,880 ± 300
recryst = 90%

Coral limestone from NE coast of island (17° 34' 48" S, 168° 28' 37" E). Same barometric profile as MGU-171 and -172. Dates 3d terrace, +29m.

MGU-176. Efate I. 21,400 ± 270

Coral limestone from S coast of island (17° 48' 36" S, 168° 22' 42" E), de la Taome bay. Foot of ancient cliff and adjacent elev Holocene accumulative coastal form, +14m, 130m from shore line.

MGU-177. Efate I. 2500 ± 190
recryst = 10%

Coral limestone, S coast of island, Traqoi bay (17° 49' 24" S, 168° 24' 45" E). Reef flat, tide level.

MGU-178. Efate I. 1666 ± 70

Coral limestone, S coast of island (17° 49' 24" S, 168° 24' 45" E). Surface of 1st terrace, +1.5m, *ie*, tide level.

New Guinea series**MGU-162. New Guinea I. 21,920 ± 360**

Coral limestone, NE coast, SW of Madang, middle course of Gogol R (5° 17' 00" S, 145° 38' 00" E). Hillside, left-hand bank of river. Height of sampling +80m.

MGU-163. New Guinea I. 29,780 ± 1000

Coral limestone, NE coast of island, SW of Madang, middle course of Gogol R (5° 17' 00" S, 145° 38' 00" E). Same hillside as MGU-162 but 20m higher. Absolute elev, +100m.

MGU-164. New Guinea I. ≥41,000

Coral fragment, NE coast of island, S of Madang, middle course of Gogol R (5° 17' 30" S, 145° 40' 00" E). Sample taken from road quarry of dark-blue clay enclosing debris of shells and corals. Alt, ca +50m.

MGU-165. New Guinea I. 31,600 ± 500

Fossil wood, NE coast of island, S of Madang (5° 17' 00" S, 145° 41' 00" E). Road quarry, dark-blue clay base containing calcite concretions, shell fragments, and fossil wood. Alt, ca +60m.

MGU-181. New Guinea I. 25,100 ± 780
recryst = 80%

Coral fragments, NE coast of island, SW of Madang (5° 17' 00" S, 145° 42' 00"E). Same road quarry as MGU-165, bed of coral fragments and filler overlying dark-blue clay. Coral fragments are angular with well-preserved structure.

Funafuti Atoll series

MGU-185. Funafuti Atoll 1435 ± 80

Lithified coral, N part of atoll rim, Amatuku I. (8° 26' 12" S, 179° 11' 07" E). Surface of reef flat, oceanward side, tide flooded.

MGU-186. Funafuti Atoll 1725 ± 120

Coral fragment, N part of atoll rim, Amatuku I. (8° 26' 18" S, 179° 11' 12" E). Lagoon side, washout scarp revealing accumulative body of island. Elev, +0.5m.

MGU-190. Funafuti Atoll 830 ± 50

Coral, SE part of atoll rim, Funafara I. (8° 31' 57" S, 179° 06' 10" E). Reef flat, lagoon side, 5 to 10m above tide level. Coral *Porites* in growth position.

MGU-191. Funafuti Atoll 1823 ± 100

Coral, SW part of atoll rim, Funafara I. (8° 30' 33" S, 179° 02' 15" E). Rim flooded by tide, coral *Porites* in growth position.

MGU-235. Funafuti Atoll Recent

Sediments of *Halimeda* calcareous algae, base of atoll lagoon (8° 31' 57" S, 179° 08' 12" E). Water depth, 40m. Piston core, 0 to 10cm sub-base.

MGU-236. Funafuti Atoll 440 ± 90

Sediments of *Halimeda* calcareous algae, bottom of atoll's lagoon (8° 31' 57" S, 179° 08' 12" E). Sample from same piston core as MGU-235, interval 196 to 202cm sub-base.

MGU-237. Funafuti Atoll 530 ± 60

Sediments of *Halimeda* calcareous algae, base of atoll lagoon (8° 31' 57" S, 179° 08' 12" E). Sample from same piston core as MGU-235, interval 340 to 350cm sub-base.

Butaritari Atoll series

MGU-238. Butaritari Atoll Recent

Coral sand, base of atoll lagoon (3° 09' 00" S, 172° 51' 36" E). Water depth, 33m. Piston core, interval 0 to 10cm sub-base.

MGU-239. Butaritari Atoll 2230 ± 150

Coral sand with coral and shell detritus, base of atoll lagoon (3° 09' 00" S, 172° 51' 36" E). Sample taken from same piston core as MGU-238, interval 98 to 104cm sub-base.

Lord-How Island series**MGU-180. Lord-How I. 725 ± 180**

Shell fragments, W coast of island (31° 32' 20" S, 159° 04' 50" E). Beach.

MGU-179. Lord-How I. 20,000 ± 220

Calcarenite (lithified eolian coral sand), W coast of island, between Signal cape and Lover bay (31° 32' 00" S, 159° 04' 30" E). Outlies ancient dune over coastal aggradation terrace. Elev, 2m above mean water level.

MGU-187. Lord-How I. 25,160 ± 500

recryst = 60%

Slightly lithified carbonate sand (eolian horizon), NE coast of island, Ned's Beach bay (31° 31' 03" S, 159° 04' 36" E). Cliff in ancient dune, 2nd layer from top. Elev, +24m.

MGU-184-1. Lord-How I. 26,290 ± 450

recryst = 5%

Coral fragments, NE coast of island, Ned's Beach bay (31° 31' 03" S, 159° 04' 36" E). Sample taken from foot of same cliff as MGU-187. Elev, +3.5m. Sand with shell detritus, coral fragments, and gravels of volcanic rocks (coastal-marine deposits). Dates period of high sea level.

MGU-184-2. Lord-How I. 29,590 ± 600

Coral sand and detritus, NE coast, Ned's Beach bay (31° 31' 03" S, 159° 04' 36" E). Sample taken from same cliff as MGU-184-1.

Pacific Islands II

Samples coll from Pacific Is during 6th Cruise of *R/V Kallisto*.

MGU-629. Bagaman I. 3190 ± 170

recryst = 5%

Beach-rock (cemented *Tridacna* shell) from Bagaman I., Calvados Is, S coast, Lalagela bay (11° 08' 35" S, 152° 40' 51" E). Rear part of beach, ancient storm accumulation bar. Elev, 20cm above tide level.

MGU-593. Misima I. 22,500 ± 180

recryst = 70%

Coral fragments from Misima I, Luisiade archipelago, Bvaga bay (10° 41' 12" S, 152° 50' 47" E). Surface of terrace, 5m alt.

MGU-633. Misima I. 12,316 ± 210

recryst = 100%

Lithified coral fragments, Bvaga bay (10° 41' 12" S, 152° 50' 47" E). Scarp of terrace, 5m alt. Elev, +1.5m.

Bio Island series

MGU-634. Bio I. 31,930 ± 1300
recryst = 95%

Reef limestone from Bio I, Solomon Is (10° 10' 06" S, 161° 41' 00" E). Surface of 3d terrace (highest elev on island). Elev, +34m. Limestone overlain by 50cm soil.

MGU-627. Bio I. 2615 ± 84
recryst = 90%

Reef limestone from NNW side of island (10° 10' 03" S, 161° 41' 30" E). Reef flat, high tide level.

MGU-624. Bio I. 2467 ± 84
recryst = 70%

Reef limestone, SE part of island (10° 10' 52" S, 161° 41' 15" E). Scarp of 1st terrace, +2.5m alt. Elev, 0.8m above high tide level.

MGU-591. Bio I. 3180 ± 170

Reef limestone, SE part of island (10° 10' 52" S, 161° 41' 15" E). Scarp of 1st terrace same as MGU-624. Elev, 0.3m above high tide level.

MGU-631. Bio I. 23,894 ± 430
recryst = 100%

Reef limestone, SW part of island (10° 10' 17" S, 161° 40' 40" E). Scarp of 2nd terrace, 3.5m alt, with wave-cut recess at foot, very steep, descending to 1st terrace, 2.5m alt. Elev, 1.3m above 1st terrace.

MGU-592. Bio I. 26,870 ± 350
recryst = 80%

Reef limestone, SW part of island (10° 10' 17" S, 161° 40' 40" E). Scarp of 2nd terrace same as MGU-631. Elev, 166cm above 1st terrace.

MGU-618. Bio I. 4100 ± 84
recryst = 45%

Reef limestone, SW part of island (10° 10' 17" S, 161° 40' 40" E). Surface of 1st terrace, rear part. Depth, 55cm under soil.

MGU-630. Norfolk I. 6478 ± 116
recryst = 60%

Lithified sand (calcarene), SE part of island (29° 03' 30" S, 167° 57' 50" E). Contact between Hunter cape accumulative terrace and shore. Sample taken from base of layer 185cm thick.

MGU-628. Norfolk I. 22,897 ± 352
recryst = 95%

Lithified sand (calcarene), S part of island, Hunter cape (29° 03' 45" S, 167° 57' 30" E). Ancient dune, 16m alt. Sample taken in cliff at 1m above high tide level.

Niuye Island series

MGU-589. Niuye I. **2954 ± 170**
recryst = 90%

Reef limestone, SE coast (19° 06' 43" S, 169° 48' 54" E). Reef flat, exposed only at low tide.

MGU-590. Niuye I. **19,580 ± 460**
recryst = 10%

Reef limestone, SE coast (19° 06' 43" S, 169° 48' 54" E). Surface of terrane 3m above low tide level.

MGU-622. Niuye I. **27,480 ± 330**

Reef limestone, SE coast (19° 06' 43" S, 169° 48' 54" E). Scarp of terrace near brow. Elev, 20m.

MGU-625. Niuye I. **28,968 ± 1020**
recryst = 75%

Reef limestone, SE coast (19° 06' 43" S, 169° 48' 54" E). Top of ancient rim of elev atoll. Elev, 65m.

MGU-632. Suvorov Atoll **3623 ± 116**
recryst = 30%

Coral fragments, W part of atoll, High I. (13° 16' 10" S, 163° 11' 42" E). Reef flat, oceanward side, flooded by tide in middle.

MGU-626. Suvorov Atoll **1197 ± 170**

Lithified coral (reef-rock), W part of atoll, High I. (13° 16' 10" S, 163° 11' 35" E). Central part covered by soil, 15cm thick. Elev, 2.5m.

MGU-623. Puka-Puka Atoll **Recent**

Cemented beach sand (beach-rock), SE part of atoll, Motu Ko I., oceanward side (10° 57' 00" S, 165° 47' 35" E). Contact between reef flat and foot of pebble bar. Elev, 0.5m above low tide level.

Cuba

Samples subm by Yu A Pavlidis, Inst Oceanol, Acad Sci USSR.

Island of Pines series

MGU-363. I. of Pines **27,160 ± 150**

Mollusk shells, S coast of island (21° 32' 56" N, 82° 45' 24" W). 2nd terrace, quarry. Depth, 3 to 4m from ground surface.

MGU-465. I. of Pines **29,780 ± 500**

Roots of mangrove trees, SW coast of island, Colony region (21° 38' 54" N, 82° 58' 18" W). Base of ancient accumulative form. Depth, 1.4m from ground surface.

MGU-367. I. of Pines **5480 ± 140**
Organic ooze, Siguanca bay (24° 43' 00" N, 83° 05' 00" W). Water depth of 10m. Depth, 340 to 380cm sub-base.

MGU-368. I. of Pines **7360 ± 290**
Sapropel, water depth, 10m (21° 43' 00" N, 83° 05' 00" W). Depth 380 to 435cm sub-base.

MGU-369. I. of Pines **4055 ± 120**
Peat, Siguanca bay (21° 43' 48" N, 83° 03' 12" W). Water depth, 3m. Depth, 10 to 45cm sub-base.

MGU-414. I. of Pines **1610 ± 130**
Organic limestone, S coast of island, Playa Larga (21° 28' 45" N, 82° 44' 45" W). 2nd marine terrace.

MGU-415. I. of Pines **16,430 ± 200**
recryst = 70%
Oolitic sandstone, S coast of island (21° 28' 45" N, 82° 44' 45" W). 2nd marine terrace. Depth, 6 to 7m below ground surface.

MGU-416. I. of Pines **20,000 ± 260**
recryst = 10%
Coral, S coast of island (21° 28' 45" W, 82° 44' 45" W). 2nd marine terrace.

Island of Cuba series

MGU-371. I. of Cuba **1310 ± 80**
Peat, Inacos bar, Molase cape (23° 12' 28" N, 81° 07' 30" W). Water depth, 2m. Depth, 20 to 30cm sub-base.

MGU-417. I. of Cuba **2150 ± 90**
Coral, N coast of island, Guanicos cape (23° 09' 12" N, 81° 39' 15" W). 1st marine terrace. Depth of sampling, 1m below ground surface.

MGU-418. I. of Cuba **1170 ± 130**
Coral, N coast of island, Guanicos cape (23° 09' 12" N, 81° 39' 15" W). 1st marine terrace. Depth of sampling, 1m below ground surface.

MGU-419. I. of Cuba **1900 ± 120**
Shell, N coast of island, Guanicos cape (23° 09' 12" N, 81° 39' 15" W). 1st marine terrace. Depth, 1m below ground surface.

MGU-547. I. of Cuba **15,020 ± 300**
Shell detritus, Guacanayabo bay (20° 08' 01" N, 77° 59' 00" W). Shelf, water depth, 26m. Depth, 310 to 330cm sub-base.

MGU-548. I. of Cuba **7480 ± 800**
recryst = 10%
Shell, Guacanayabo bay (20° 21' 30" N, 77° 24' 30" W). Shelf, water depth, 9m. Depth, 420 to 440cm sub-base.

MGU-550. I. of Cuba **7590 ± 250**
recryst = 10%

Shell detritus, NE coast of island, Nine bay (20° 48' 00" N, 75° 37' 30" W). Water depth, 24m. Depth, 340 to 360cm sub-base.

MGU-551. I. of Cuba **7680 ± 150**
recryst = 10%

Shell detritus, Guacanayabo bay (20° 21' 30" N, 77° 24' 30" W). Shelf, water depth, 22m. Depth, 275 to 295cm sub-base.

MGU-552. I. of Cuba **3370 ± 80**

Shell detritus, Onda bay (22° 56' 11" N, 83° 10' 50" W). Water depth, 4m. Depth, 400 to 455cm sub-base.

Canada

Samples subm by M G Groswald, Inst Geog, Acad Sci USSR.

Queen Elizabeth Islands series

MGU-331. Queen Elizabeth Is **8570 ± 120**

Mollusk shell, Devon I., Greenell peninsula (76° 23' 00" N, 95° 31' 00" W). Ancient shore line. Alt, +98m.

MGU-330. Queen Elizabeth Is **11,280 ± 160**

Mollusk shell, Devon I., Greenell peninsula (76° 15' 00" N, 95° 16' 00" W). Ancient shore line. Alt, +84 m.

MGU-332. Queen Elizabeth Is **6336 ± 160**

Mollusk shell, Devon I., SW coast of Greenell peninsula (76° 23' 00" N, 95° 37' 00" W). Ancient shore line. Alt, +44.5m.

MGU-333. Queen Elizabeth Is **7590 ± 100**

Mollusk shell, Devon I., SW coast of Greenell peninsula (76° 23' 00" N, 95° 37' 00" W). Ancient shore line. Alt, +62m.

MGU-334. Queen Elizabeth Is **14,540 ± 300**

Mollusk shell, Devon I., SW coast of Greenell peninsula (76° 23' 00" N, 95° 37' 00" W). Ancient shore line. Alt, +150m.

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TALLINN RADIOCARBON DATES VI

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The following list includes samples dated at the Institute of Geology, Academy of Sciences of the Estonian SSR in 1978. The measurement of natural ^{14}C activity is performed by 1-channel and 2-channel scintillation devices (Punning & Rajamäe, 1977). Ages are calculated using the half-life of 5568 ± 30 years and 0.95 NBS oxalic acid modern standard with AD 1950 as reference year.

*Estonian SSR***Tln-253. Reo** **7165 \pm 70**

Sapropel with reed remains under Littorina Sea sands from Reo profile, 12km from v Orissaare, Saaremaa I. Sample in upper layer of organic deposits at depth 200 to 220cm. Pollen analyses by H Kessel refer accumulation of deposits to Pollen Zone AT 1. Coll 1976 by H Kessel, Inst Geol, Acad Sci Estonian SSR (now Inst Geol).

Tln-254. Reo **7350 \pm 70**

Phragmites peat from same profile as Tln-253. Sample at depth 220 to 230cm.

Tln-261. Niitvälja **7580 \pm 70**

Lagoonal sapropel overlying sands in Niitvälja mire near settlement Niitvälja, Harju Dist. Sample at depth 280 to 290cm. Coll 1976 by H Kessel, Inst Geol. Pollen analyses by H Kessel refer accumulation of lagoonal deposits to Pollen Zone AT 1.

Akali mire series

Akali mire is situated near estuary of Emajõgi R. Deposits comprised of *Carex* peat overlying fine sands. Samples coll from 2 boreholes: Tln-281, -282 from deposits 185cm thick; Tln-347, -348 from deposits 350cm thick. Coll 1977 by M Ilomets, Inst Geol and T Moora, Inst Hist, Acad Sci ESSR.

Tln-281. Akali **3480 \pm 60**

Sample at depth 190 to 200cm.

Tln-282. Akali **6390 \pm 90**

Sample at depth 340 to 350cm.

Tln-347. Akali **3340 \pm 60**

Sample from depth 165 to 173cm.

Tln-348. Akali **3610 \pm 70**

Sample at depth 175 to 185cm.

Tln-328. Korveküla **41,000**
+ 700
– 2100

Wood remains from borehole, 10km N of town Tartu. Sample embedded in sands at depth 350cm below surface. Sands with organic remains are covered by sandy loam and gravel and overlie sapropel. Coll 1978 by J M Punning and R Rajamäe, Inst Geol.

Tln-340. Kuigli **6620 ± 80**

Phragmites peat from borehole within Karula Heights, South Estonia. Bog deposits 265cm thick in closed depression. Sample at depth 155 to 165cm. Coll 1977 by M Ilomets, Inst Geol.

Tln-342. Parmu **9190 ± 80**

Sapropel from Parmu raised bog within Otepää Heights. Sample coll at depth 468 to 475cm from contact zone of underlying silts. Coll 1975 by M Ilomets and A Sarv, Inst Geol.

Tln-343. Parmu **6510 ± 70**

Sphagnum peat from same complex as Tln-342. Sample at depth 215 to 225cm.

Tln-345. Rebase **3190 ± 60**

Sapropel from Rebase profile, 20km S of town Tartu. Sample depth 125 to 135cm. Coll 1975 by M Ilomets and A Sarv, Inst Geol.

Tln-346. Palamumäe **6910 ± 100**

Wood peat from lake and bog deposits on bank of Palamumäe Lake within Haanja Heights. Sample coll at depth 565 to 575cm from contact zone of underlying silts and till. Coll 1976 by M Ilomets.

Byelorussian SSR

Tln-308. Galinovo **5050 ± 70**

Loamy light sand and silts with plant remains overlie till in exposure on right bank of Zapadnaya Dvina R, 4km upstream of town Surazh, Vitebsk Dist. Sample at depth 670cm below terrace surface. Coll 1977 by L Voznyachuk, Inst Geochem and Geophys, Acad Sci, Byelorussian SSR.

Tln-310. Galinovo **5300 ± 80**

Plant detritus with wood remains from same complex as Tln-308. Sample at depth 720cm.

Tln-309. Galinovo **17,470 ± 210**

Plant detritus at depth 375cm below base of Valdai till from same complex as Tln-308.