Lamont Natural Radiocarbon Measurements, II[1]

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THE INTEREST IN NATURAL RADIOCARBON MEASUREMENTS has been constantly increasing, particularly among those formally concerned with historical science. This is evidenced in part by the growing number of significant samples that are being submitted for analysis. As each paper containing radiocarbon measurements (*1–3*) is published, new fields of application have been demonstrated and confirmatory evidence for the validity of the age method has been amassed. Although a few anomalous results remain unresolved, the agreement among the different laboratories, the self-consistency of the data, and the correlation of the ages measured with external checks provided by geology and archaeology assure the general applicability of the method. The measurements that do not seem in accord with other information are the most interesting to the experimentalist in this field and are the subject of intensive study.

The measurements presented below were made between November 1, 1951, and August 1, 1952. The techniques used are described elsewhere (*4, 5*). An advance in technique (*5*) permits dating back to 30,000 years—an extension of 5000 years over the period determinable with the techniques available when the first list of dates from this laboratory (*3*) was published. The dates given are based on the half-life of carbon 14 of 5568 ± 30 years (*6*). The error listed in years is calculated from the standard deviation of the counting data. Actually this error is not symmetrical, but since it is only used as an index of precision the procedure is adequate.

Table 1 shows the results of some samples of archaeological interest. The 122 Series from Peru was chosen to compare the age of shell and organic material. Although at a few other localities (e.g., Libby's Annis Mound samples 116 and 251 [*1*]) there is substantial agreement in the ages derived from these two types of material, at this locality the shells give ages that are too old. The shell sample from the 123 Series shows the same anomaly. Several possible explanations come to mind. If shells were used as ornaments, they could be older shells that had been reworked on local

TABLE 1

ARCHAEOLOGICAL AND PALEONTOLOGICAL SAMPLES

Sample No.	Description	Age (yr)
L-126F*	Charcoal from hearth in Piney Creek alluvium NW¼NW¼ sec 25, T 25, R 68 W, Denver area, Colo. Estimated age, 500–1000 yr. Submitted by C. B. Hunt.	1150 ± 150
L-133A	Charcoal from prehistoric site at Oued Djebbana, south of Tebessa, Algeria. This locality is near the Aterian site of Bu-el-ater. The sample was believed to be of Aterian (i.e., pre-Capsian) age. Comment: evidently not pre-Capsian.	3700 ± 200
L-133B	Charcoal from the basal portion of the deposits at Dra-Mta-el Ma el-Abiod, which on typological grounds is assigned to the Upper Çapsian culture. 133A and 133B submitted by L. Balout, University of Algiers.	7000 ± 200
L-134	Charcoal from large shell heap of El Mekta, near Gafsa in Southern Tunisia. This is a site of the Upper Capsian culture. The Capsian is estimated to be not older than 10,000 ± 1000 yr. Submitted by E. Gobert, Department of Antiquities of Tunisia.	8400 ± 400
L-135	Charcoal from the site of Metlaoui in Southern Tunisia. Locality also known as the Gisement or Abri des Jaatcha. Metlaoui is a very typical site of the so-called Neolithic of Capsian tradition, a widespread post-mesolithic development in North Africa. Estimated age: probably not older than 4500 ± 500 yr. Submitted by R. Vaufrey, Institut de Paleontologie Humaine.	5000 ± 150

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TABLE 1—(*Continued*)

Sample No.	Description	Age (yr)
L-126C	Wood from fallen roof of cist inside early Pueblo rock shelter. The locality is on the W side of the Colorado River, about 2 mi above the Moab Bridge. The cist is about 50′ above the river and 150′ S of the witness corner for the quarter corner between sec 25 and 26, T 25 S, R 21 E. Dated with pottery as Pueblo II–III, i.e., 1050–650 yr ago. Submitted by C. B. Hunt.	950 ± 150
L-129	Stomach contents of large moa (*Dinornis*), Pyramid Valley Swamp, North Canterbury, New Zealand. Approx 5′ below present surface. Submitted by H. Shapiro.	1800 ± 150
L-130A	Pine cones from a thermal spring at Ciego Montero, Cuba, associated with extinct mammal forms including Edentes turtles, sloths, and rodents. Pine trees now unknown in this part of Cuba but may have been present at last Wisconsin maximum. Submitted by Ernest Williams via E. H. Colbert.	Older than 30,000
L-130B	Wood from same spring as 130A but suspected younger.	25,000 ± 2000
122 Series	Guañape Culture materials from Strata Cut 1 at Site V-71, Huaca Negra, Virú Valley, Peru. In the cultural stratigraphy of Strata Cut 1, the levels from the surface of the site to a depth of 1.75 m have been shown to be Middle Guañape, more commonly known as the Cupisnique or Coastal Chavin culture; those from 1.75 to 4.0 m, Early Guañape, the first period in which ceramics were utilized in this section of Peru. As the arbitrary excavation levels did not coincide with the strata, some preceramic debris was included with the material removed above the 4-m level; hence, the age of 122G may apply to the upper portion of the preceramic horizon. Because of the thickness of the Early Guañape deposit and the sufficiency of materials therefrom, an arbitrary split, roughly in the middle, has been made in the Early Guañape materials at 2.75 m below the surface. In the Middle Guañape samples, no materials from the surface to a depth of 0.25 m have been included in order to prevent possible surface contamination. Collected and submitted by W. D. Strong.	

TABLE 1—(*Continued*)

Sample No.	Description	Age (yr)
L-122A	Charcoal from 0.25–1.75 m (Middle Guañape).	3050 ± 200 3200 ± 100 Av 3150 ± 90
L-122B	Shell from 0.25–1.75 m (Middle Guañape).	5650 ± 200 6000 ± 400 Av 5750 ± 180
L-122C	Charcoal from 1.75–225 m (Upper Early Guañape).	3100 ± 200
L-122D	Shell from 1.75–2.25 m (Upper Early Guañape).	4300 ± 200
L-122F	Charcoal from 2.75–4.0 m (Lower Early Guañape).	3800 ± 150
L-122G	Shell from 2.75–4.0 m.	5300 ± 200
	Comment: The charcoal dates fit the calendar for the region established by other C^{14} dates (*1, 2*) and are self-consistent.	
123 Series	Samples taken from midden formed against Temple of the Sun, Pachacamac, Peru, excavated by W. D. Strong in 1941. The material is associated solely with Inca and Inca-contemporary pottery types, and must date from the period of Inca control. Known age, 444 ± 25 yr. (Personal communication from John Rowe via J. B. Bird.)	
L-123A	Marine shells, mainly *Concholepa*, with some *Mytilus*.	3800 ± 200
L-123B	Rope and matting, largely sedge and cattail.	800 ± 100 900 ± 150
L-123C	Mammalian remains. Fur and llama skin.	450 ± 150 500 ± 120

* In order to avoid future ambiguity in cross references, it has been agreed among the carbon 14 laboratories to prefix their sample numbers with a letter indicating which institution is involved. Thus C = Chicago, L = Lamont, M = Michigan, Y = Yale, etc.

beaches. That this hypothesis is unsatisfactory in the Virú Valley and at Pachacamac was pointed out by J. B. Bird, because it seems certain that the animals in these shells were used for food. In fact, some shells were stained with an organic dye secreted by the living organism when dislodged from its habitat. Another explanation might be that ancient carbon from a fresh or brackish water environment was utilized by the organism, but this does not apply here because the shells selected were all marine species. Carbonate exchange with ancient carbon in ground water derived from limestone strata is also a possibility, but can be ruled out in this case because the samples were found in dry deposits.

Several other factors must be considered before a satisfactory hypothesis can be constructed: (1) The same anomaly occurs off the Aleutian coast (Table 2-C, Samples L-112 D, E, and F), the California coast (Table 2-C, Sample L-144 D), and from one deposit in Japan (E. S. Deevey, personal communication). (2) Modern shells on the Atlantic and Gulf coasts seem to give proper values, although there are only a few measurements. (3) Deep ocean water seems to circulate very slowly (Table 3) and may have the radiocarbon content reduced by an age equivalent of several thousand years.

TABLE 2

GEOLOGICAL SAMPLES

Sample No.	Description	Age (yr)
A. Bermuda		
(The samples in this set are listed in stratigraphic order)		
L-120G	Sample of Southampton eolianite from Sayles (7) locality 4, taken 3′–4′ from top of 12′ thickness of formation.	17,600 ± 800
L-120F	Sample of top of Somerset from Sayles (7) locality 6.	21,000 ± 1600 21,300 ± 1600
L-120C	Sample near base of Somerset from Sayles (7) locality 2.	Older than 25,000
L-120B	Signal Hill soil sample from Sayles (7) locality 1. Comment: Unconsolidated and near surface, yet no contamination by meteoric CO_2.	Older than 25,000
L-120A	Pembroke eolianite from Sayles (7) locality 1. Same comment as for L-120B.	Older than 25,000
B. Mississippi Delta		
(These three 125 Series samples were taken from cores obtained by the Mississippi River Commission along a line between Donaldsville and Franklin, La. Submitted by H. N. Fisk)		
L-125A	Wood from depth of 25′.	2900 ± 300
L-125G	Shell from depth of 73′.	8700 ± 200 9000 ± 200
L-125I	Wood from 273′ on weathered surface, presumably produced during last great sea level lowering of the Wisconsin.	Older than 30,000
C. General Geology		
L-140A	Fossil *Aeropora omisornis* from small patch reef near Fresh Creek village (on shore east of Commissioner's residence), Andros Island, Bahamas. This rock outcrops 4′ above high tide. Collected by J. K. Rigby; submitted by N. D. Newell.	Older than 25,000
L-140B	Loose drifting oolites 25° 15′ N, 79° 0′ W Great Bahama Bank. Depth, 3 fathoms. Collected by H. S. Smith; submitted by N. D. Newell.	2750 ± 150
L-144A	Shell (*Schizothaerus nuttallii*), W side of Mesa St., 100′ S of 3rd St., San Pedro, Calif., alt, about 75′. Palos Verdes sand (marine deposits on lowest terrace) assigned to late Pleistocene. Collected by W. P. Woodring.	Older than 30,000
L-144D	Recent shells, low tide, June 28, 1952, from Portuguese Bend on S (open sea) side of Palos Verdes Hills, Los Angeles Co., Calif. Collected by M. N. Bramlette.	1500 ± 200

TABLE 2—(*Continued*)

Sample No.	Description	Age (yr)
L-141A	Black mucky peat containing some *Helisoma* sp., a freshwater gastropod, from 0.0′–0.5′ above bedrock, 5.5′–6.0′ below land surface. Everglades Experiment Station, 2½ mi SE of Belle Glade on South (pasture) line, Station 8 + 00.	4900 ± 200
L-141B	Dark-brown fibrous peat (same description as for 141A except North [crop] line, Station 8 + 00). 141A and 141B, collected by J. C. Stephens; submitted by N. D. Hoy.	3800 ± 200
L-141C	Peat taken 0.0′–0.5′ above Fort Thompson marl, 5.0′–5.5′ below surface in 5.5′ peat section. Collected 10 mi S of Lake Okeechobee, 100′ W of U. S. Highway 27, located in NE¼SW¼ sec 25, T 45 S, R 36 E, Palm Beach Co., Fla. Submitted by N. D. Hoy.	5050 ± 200
L-138	Charcoal from Fall River formation (Dakota) in road cut just north of Bear Butte Lake, about 1½ mi SW of Bear Butte, 5 mi NE of Sturgis, S. D. Submitted by P. M. Wright, Wheaton College Science Station.	Older than 30,000
L-109	Fossil wood from laminated band of clay and organic matter about 125′ below surface of a canyon in valley fill in western Canadian Co., Okla., in sec 5, T 11 N, R 10 W. Submitted by R. Dreyer.	9000 ± 300
L-126A	Aragonite from West Reno well, Steamboat Springs, Nev. Comment: Carbon apparently derived from limestone, as expected. Less than 2% recent meteoric carbon. Submitted by D. E. White.	Older than 30,000
L-118	Fresh wood from tree stump 3′–4′ below mean high tide level, near Sagadahoc Bay, Maine. Represents epoch of lowered sea level. Submitted by W. H. Bradley.	4150 ± 200
L-150C	Lignite from Rapa Island, Austral group, Polynesia, Central South Pacific. Sample taken from lump of lignite coal 4″ thick. Collected by 1934 Mangareva Expedition, Bishop Museum No. 1409. Submitted by J. M. Schopf and H. Ladd. Comment: Geologists suspected it would be older than 30,000 years.	Older than 30,000
D. Alaska		
L-127	Fragments of skin and dried tissue of extinct superbison collected from frozen muck on Dome Creek near Fairbanks. Comment: Suggests	Older than 28,000

TABLE 2—(*Continued*)

Sample No.	Description	Age (yr)
	permafrost continuous from beginning of second (last) major phase of Wisconsin in this region. Submitted by O. W. Geist, University of Alaska.	
L-117B*	Spruce root 4.5′ below surface of alluvial fan exposed in section 18.5′ long above mean high water on N side of Kachemak Bay, 50 yards W of Miller's Landing, Homer. The spruce root was deposited toward the end of the depositing phase of one of the numerous extensive alluvial fans that spread over Homer Bench from the 1000′ high Homer Bluff. Collected by W. S. Benninghoff, 1950.	3200 ± 150
L-117C	Wood 10′ beneath the surface in interbedded peat and muck at Coffee Creek, a tributary of Kougarok River, Seward Peninsula. The deposit was formed at a time when the climate was warmer than at present and is underlain by undated silt deposited at a time when the climate probably was colder than at present. Collected by R. S. Sigafoos.	8350 ± 200
L-117D	Wood and peat 3′ beneath surface in a peat layer interbedded with muck at head of Coffee Creek. Deposit indicates that accumulation of mucklike material has taken place during last few hundred years. The peat layer was formed at a time when the climate was not perceptibly different from the present. Collected by R. S. Sigafoos.	450 ± 100
L-117G	Wood 6′ beneath the surface in muck at Wilbur Creek near Livengood. The deposit was formed at a time when the climate was slightly warmer than at present. (Geologic estimate of age was 3000–6000 yr for 117G and 117H.) Collected by T. L. Péwé, 1951.	4200 ± 200
L-117H	Wood 6′ beneath the surface in an organic layer at Eva Creek, 10 mi W of Fairbanks. The deposit was formed at a time when the climate was slightly warmer than at present. Collected by T. L. Péwé, 1951.	3750 ± 200
L-117I	Wood from fossil beaver dam in muck at Fairbanks Creek, 20 miles NE of Fairbanks. Deposit formed when climate was slightly warmer than at present. (Libby reported 12,600 ± 750 yr for his Sample 301 from similar locality.) Collected by T. L. Péwé, 1951.	13,600 ± 600

TABLE 2—(*Continued*)

Sample No.	Description	Age (yr)
L-117K	Wood from end moraine within 1000′ of the present front of Tustumena Glacier, Kenai Peninsula. Deposit represents one of the most recent glacial advances in the Cook Inlet area, following a warmer period during which Tustumena Glacier was much less extensive than at present. Collected by T. N. V. Karlstrom, 1951.	400 ± 150
L-117L	Lignitized log from basal part of 8′ thick lake silt section overlying outwash, near East Foreland, Kenai Peninsula. Lake deposition began before the latest major glaciation in the Cook Inlet area. Assuming that the log analyzed was not derived from a previous deposit, the outwash underlying the lake silts is correlative with a pre-Mankato glaciation of more than 18,000 years ago. Collected by T. N. V. Karlstrom, 1951.	19,200 ± 1000
L-117N	Spruce log near base of 5′ peat section overlying lake silts deposited on till, near Boulder Point, Kenai Peninsula. Dating of the basal peat permits evaluation of rate of accumulation during the past 4000 yr in the Cook Inlet area. Collected by T. N. V. Karlstrom, 1951.	3800 ± 400
L-106B	Wood from bottom of muskeg in outwash, or possibly lateral moraine, of nearby Lemon Glacier. Submitted by Maynard Miller.	3500 ± 250
L-112D	Modern shells to be used as a control on 112E.	1950 ± 250 1650 ± 400 Av 1900 ± 300
L-112E	Clamshells from Aleut midden on north part of sand pit enclosing Clam Lagoon. (Note: If this is corrected by using the result of 112D, the apparent age is 2700 ± 150 yr.)	4620 ± 100 4610 ± 160 4530 ± 150 Av 4580 ± 90
L-112F	Buried peat horizon in section of north spit on east shore of Clam Lagoon. Oldest Aleut artifacts found on surface equivalent to, or perhaps slightly younger than, peat accumulation. This is stratigraphically older than 112E.	3300 ± 200
L-112H	Drift wood embedded in storm beach at Earle Cave. Latest shift of base level here must be younger than age of driftwood log.	650 ± 150
L-117A	Wood from buried peat overlying glacial outwash deposits	19,100 ± 900

TABLE 2—(*Continued*)

Sample No.	Description	Age (yr)
	and underlying till, near Goose Bay, north shore, Knik Arm.	
	E. Miscellaneous Samples	
L-126E	Uranium ore (carbonized wood) from the Triassic Shinarump formation at the Oyler Mine, Fruita, Utah. Comment: Chemical purification procedure is apparently adequate. Submitted by C. B. Hunt.	Older than 30,000
L-45	Country air, Lamont Observatory, July 18–25, 1951.	(Net cpm) 6.32 ± 0.20
L-46	City air, Amsterdam Ave. and 117th St., New York, Aug. 10–20, 1951.	5.92 ± 0.15
L-48	Laboratory air, Lamont Observatory, May 9–11, 1951.	4.67 ± 0.10
Standard	Modern wood.	6.07 ± 0.05

* Descriptions of 117 Series supplied by T. L. Péwé, U. S. Geological Survey.

An attractive hypothesis, therefore, might be that, in areas where the deep water moves up along a coast, the surface water would have a lower radiocarbon content. Despite the paucity of data, it appears that the lower radiocarbon content of the shells on some coastlines can be correlated with abrupt, deep troughs offshore—e.g., Japan, California, Aleutian arc, and Peru. Direct measurements on the radiocarbon content of the ocean carbonate taken from many locations and depths are being made.

Another problem arises in connection with the 123 Series. It is noted that only the mammalian remains give the correct age. Although wood appears generally above suspicion, it has been suggested by E. S. Deevey that plants which derive their carbon in part from fresh-water lakes rather than directly from the air may show erroneously old ages. It is at least interesting that sedge and cattail are botanical types that presumably fall into this suspect group. Studies on the radiocarbon content of such plants, as well as of fresh lake water, are being undertaken by the Yale laboratory.

A list of the results on samples of geological interest is given in Table 2. The Bermuda samples show that (*a*) the ages are in correct sequence, (*b*) meteoric water does not contaminate loose limestone even when it occurs at the surface, and (*c*) the upper layers are sufficiently young so that a detailed analysis with more samples might shed considerable light on the worldwide climatic fluctuations during the last half of the Wisconsin glacial period. The samples from the Mississippi Delta show the progressive rise in sea level after the Wisconsin maximum. It is particularly significant that L-125G gives approximately the same age as the drowned forest on Greater Bermuda (*3*), which is now 60′–90′ below sea level. Any exchange with meteoric water prior to burial would have increased rather than decreased the age.

Florida peat samples in the General Geology section demonstrate that peat formation began over this wide area about 6000 years ago.

The anomalous values for some modern shells have been referred to above. In the samples from Clam Lagoon (112D, E, and F), however, both modern and ancient shells are available. If 112E is corrected by using the modern shell count *on the same coast*, the age is then consistent with the stratigraphic relationships. It appears that more study will be required before the exact conditions are known under which quantitative ages from shell may be ascertained. The present data suggest that exchange is relatively unimportant; therefore, if the original radiocarbon content for a given location is known, a reliable age determination may be made.

L-126E was run to give the chemical purification system the most severe test. It is evident that contamination of the sample by uranium-thorium series elements is negligible.

TABLE 3

Sample No.	Description	Age (yr)
	A. Ocean Samples	
L-121A	Core C-10-5, 22–32 cm, 33° 37.4′N 62°29.6′W. Depth of water, 2670 m.	20,600 ± 900 20,400 ± 900
L-121B	Core C-10-5, 70–80 cm.	28,000 ± 2000
L-121C	Core A-152-118, 0–5 cm. North Atlantic W of Mid-Atlantic Ridge, 35°07′N 44°40′W. Depth 4334 m.	5,000 ± 200
L-131A	Core A-172-2, 29–35 cm. Water depth, 3070 m. Caribbean, on E flank of Beata Ridge, 16°12′N 72°19′W. Sample taken at base of *Globorotalia menardii* zone.	14,250 ± 500
L-131B	Core A-172-2, 220–227 cm. Caribbean, top of *Globorotalia menardii* var. *flexuosa* zone.	Older than 30,000
L-153	Core A-164-14, 75–88 ½ cm, 36°06′30″N 67°19′W. Depth, 4810 m.	Older than 27,000

*B. Deep Ocean Water**

54°35′N 41°W	Surface	(1) 6.82 ± 0.09 (2) 7.74 ± 0.07 Av 6.77 ± 0.06	Recent
	Av, modern shells	6.72 ± 0.10	
58°19′N 32°56.8′W	1829 m	5.38 ± 0.07 5.60 ± 0.11 Av 5.45 ± 0.06	1600 ± 130
53°52.6′N 21°06′W	2743 m	5.31 ± 0.12 5.36 ± 0.12 Av 5.34 ± 0.10	1750 ± 150

* Direct comparison: Difference in cpm of surface sample *vs* 58° 19′ N was, from averages, 1.32 ± 0.10; from direct measurement, 1.15 ± 0.12.

Table 3 gives additional measurements of some deep-sea core samples and ocean carbonate. Samples from Cores C-10-5 and A-152-118 were previously measured (*3*). Core A-172-2 shows the normal, slow depositional rate. From lithologic evidence, it was suspected that this depth may have been quite recent. The fact that it is not emphasizes the complex character of these sediments. Not only are they frequently redistributed, but lithologically and paleontologically similar sections may be unrelated on the short time span over which radiocarbon dating can be applied.

TABLE 4

COUNT RATE AS A FUNCTION OF SAMPLE SIZE FOR MODERN WOOD

Wt of carbon (g)	Net cpm	No. of samples
10.00	6.10 ± 0.08	1
8.00	6.07 ± 0.05	7
6.00	5.88 ± 0.09	2
4.00	5.71 ± 0.08	1
1.85	4.10 ± 0.10	2
0.95	3.07 ± 0.07	2
0.79	2.80 ± 0.09	1
0.63	2.40 ± 0.06	1

The deep-ocean-water results will be described in more detail elsewhere (*8*). It seems from the meager data that deep water has measurably less radiocarbon than surface water and that the rate of turnover of the ocean must take place on a scale of thousands of years.

Table 4 shows the count rate as related to carbon sample weight. It is now possible to measure as little as 0.5 g of carbon instead of the usual 8.0 g. The precision is lower, however, and considerably more effort is required.

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News and Notes

Scientists in the News

Norman H. Beamer, of the USGS, has been designated district chemist in charge of quality-of-water investigations in Pennsylvania, with headquarters at Philadelphia. He has been acting district chemist since July 1951, when he replaced **Walter F. White, Jr.** Mr. Beamer has been assigned to the Pennsylvania investigations since 1946.

Herbert Blumer is now chairman of the Department of Sociology and Social Institutions on the Berkeley campus of the University of California. He had been a member of the University of Chicago faculty since 1928. He is the first vice president-elect of the American Sociological Society. For 11 years, from 1941 to 1952, he was editor of the *American Journal of Sociology.*

Henry B. Bull, formerly professor of chemistry in the Medical School at Northwestern University, is now professor and head of the Department of Biochemistry at the State University of Iowa.

Homer D. Chapman, chairman of the Department of Soils and Plant Nutrition at the University of California Citrus Experiment Station, will address horticultural scientists at the 13th International Horticultural Congress in London. After the conferences in London, Dr. Chapman will visit all the important citrus-producing areas of the Mediterranean region to study soils and plant nutritional relationships. He will return to California by way of the citrus-growing areas of Pakistan, India, and Japan. During his leave of absence, extending until Jan. 15, **Daniel G. Aldrich, Jr.,** will serve as acting chairman of the department.

John Chipman, head, MIT Department of Metallurgy, is the 1952 recipient of Sauveur Achievement Award, presented by the American Society for Metals. The award was established by ASM in 1934 in honor of Albert Sauveur, late Harvard University professor, to recognize pioneering metallurgical achievements. Dr. Chipman has also been chosen by the Italian Metallurgical Society as the winner of the 1952 Losana Gold Medal for making the greatest contribution to international research and cooperation in the field of metallurgical engineering.

Alfred L. Copley, formerly of New York Medical College and New York University, has been appointed chargé de recherches de laboratoire at the new research laboratories of the Centre International de l'Enfance, Paris, a United Nations organization. Dr. Copley recently completed, at Woods Hole Marine Biological Laboratory, projects on bleeding and clotting, which he directed for the Atomic Energy Commission and the Office of Naval Research. He will continue his researches on blood and blood vessels in Paris.

Walton H. Durum has been transferred from Lin-