

PRNC056

PRNC 88

PUERTO RICO NUCLEAR CENTER

PROGRAM AND ABSTRACTS

U.S. ATOMIC ENERGY COMMISSION ~ DIVISION OF BIOLOGY AND MEDICINE

BIO-MEDICAL PROGRAM DIRECTORS MEETING

SAN JUAN, PUERTO RICO

FEBRUARY 8-9, 1965

?OPERATED BY UNIVERSITY OF PUERTO RICO UNDER CONTRACT

NO. AT (40sl-1893 FOR U. §, ATOMIC ENERGY COMMISSION.

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PROGRAM AND ABSTRACTS

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?IO-MEDICAL PROGRAM DIRECTORS MEBTTG

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FEBRUARY 2.9, 1955

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Resonance tn Fadiation Effects Progren

Radiotherszy ané Cancer Diviston

Nuclear Power Program of Puerto Rico

(Chemical Defense in Puerto Rico)

Clinical applications Division

Agricultural Bio-Sciences Division

Radiotopes Division

Organic Chemistry Project

Radiation Chemistry and Photochemistry

Marine Biology Program

Sugar Cane Borer Project

BIOGRAPHICAL SKETCHES OF PRNC PARTICIPANTS

Bugher, John C.

Cobas, Anador

Daniels, Nelson

Goaberg, Henry J.

Inuiarry, Sergio

Towman, Frank O.

Suse, Robert A.

Marcial, Victor A.

Odum, Hovara 7.

Roig, Havin

Sonant, Harry He

Walker, Davia W.

Weinbren, M. Paul

SELECTED PHOTOS OF PRC

{LIST OF PARTICIPANTS.

?LIST OF PRHC PERSONNEL

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U.S. ATOMIC ENERGY COMMISSION - DIVISION OF BIOLOGY AND MEDICINE

BIOMEDICAL PROGRAM DIRECTORS MEETING

San Juan, Puerto Rico

February 8, 1969, 1

MONDAY, February 8

Puerto Rico Nuclear Center - Bldg. Piedras

8:30-9:00 A.M. Program of the P. R. Nuclear Center John C. Bagher, N.D.

3:00-10:00 A.M, Terrestrial Ecology Program, Part I Howard T, Odum, Ph.D.

19:00-10:15 A.M, Coffee Break

11:30 A.M, Terrestrial Ecology Program, Part II Paul Weinbren, M.D.

Schistocomineis Progran

Wedical Science & Jdiobiology Division

Resonance in Radiation Effects Program Henry J. Gonberg, Ph.D.

laren

2100+ 22h5 P.M, Radiotherapy and Cancer Division Victor A, Marcial, sD.

2ih5= 3:15 P.M. Maclear Power Progran of Puerto Rico Motesto Iriarte, Ph.D.

Puerto Rico Water

Recources Authority

3215+ 3:05 PAM, Civil Defense in Puerto Rico Juan César Cordero

Major General

U.S. aray

3:h5~ 4:00 PAM, Coffee Breske

4200+ Uzls P.M. Tour of Bio-Medical Building Amador Cobas, Ph.D.

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SUBSDAY, February 9

Puerto Rico Nuclear Center - Rfo Piedras

8:30-9:00 A.M.

9:00-9:30 AM.

9:30-10:15 A.M,

10:15-10:30 A.M,

10:30-11

11:30-11:50 A.M,

12:50- 1:00 P.M.

12:00- 3:00 P.M.

Clinical Applications Division

Agricultural Bio-Sciences Division

Radiotopes Division

Organic Chemistry

Radiation Chemistry & Photochemistry

Coffee Break

Marine Biology Program

Sugar Cane Borer Project

Sandwiches & coffee to be served

Executive Session

Sergio Irizarry, M.D.

Robert A. Iase, Ph.D.

Bavin Roig, Ph.D.

H, Harry Smzant, Ph.D.

Malcolm Daniels, Ph.D.

Prank Lowman, Ph.D.

David Walker, Ph.D.

Division of Biology

and Medicine

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TERRESTRIAL BIOLOGY PROGRAM, PART 1

TITLE: The Rain Forest Project

INVESTIGATORS: Howard T. Odum, Ph.D., Chief Scientist I, Principal Investigators
Francis K. S. Koo, Ph.D. Associate Scientist 11; George Drewry, Associate
Scientist I Robert Smith, Oak Ridge Graduate Fellow; and Visiting Scientists.

DATE INITIATED: May, 1963

PURPOSE AND SCOPE:

(A) to study effects of gamma irradiation from 10,000 Curies Cesium on the
Rain Forest system at El Verde

(3) To study some mineral cycles of the rain-forest in relation to fall-out
and atomic excavation.

(C) To characterize the circuits and metabolic energy pulses of a complex

terrestrial ecological ecosystem as to understand the consequences of irradiation and fallout storage.

CURRENT STATUS:

The Rain Forest Project at BI Verde involves irradiation of a plot of low montane forest with gamma radiation from a 10,000 Curies Cesium source. After 435 months of pre-irradiation studies and preparations at the radiation and control areas, irradiation began January 19, 1965. The source will be lowered for checks on Sunday, February 7, 1965, and a field trip for the visitors is to be arranged then. Part of the data from the pre-irradiation year, which is incorporated in the annual progress report, will be presented at the meeting.

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TERRESTRIAL BIOLOGY PROGRAM, PART II

TITLE: Radiation Induced Virulence in Indigenous Arthropod-Borne Viruses of Puerto Rico

INVESTIGATORS: M. Paul Weinbren, M.D., Chief Scientist II, Principal

Investigator; Aguétin Cajigas, M-D-, Associate Scientist, Ad Honorem

DATE INITIATED: April, 1963,

PURPOSE AND SCOPE:

The Puerto Rico Nuclear Center is to study the effects on tropical rain forest of exposure to @ 10 Kilocurie Cesium-137 gamma radiation source. The object of the portion of the investigation under discussion here is to seek evidence of change in the natural arthropod borne virus cycles occurring in the environs of the radiation site, whether resulting from change in the virus itself or in the vertebrate host or arthropod vector. Evidence of Arbovirus activity is being sought by attempting direct virus isolation

(in infant white mice and tissue cultures) from trapped arthropods and blood samples collected from vertebrates in the area. The blood samples will also be used to obtain indirect evidence of virus activity by the results of various serological tests. Although some aspects of this study might be covered by laboratory experiments, the program as designed takes advantage of a unique opportunity for study in nature. One hypothesis that we are particularly interested in testing is that of reactivation of latent virus, which has become latent through identification of its microsite network with that of the arthropod host.

cunnewe starve:

?The preliminary investigations are now necessarily completed because exposure has started. To date, 229 rats have been trapped a total of 1,02 times and over 300 blood specimens had been collected from them for virus isolation attempts and serology. 7,105 mosquitoes have been caught and processed for virus isolations. During the dengue epidemic this laboratory assisted in the investigations during which 28 isolations were made from serum and 30 from mosquitoes,

PUBLICATIONS:

"The Clinical Forms in Rift Valley Fever and Nairobi sheep Disease,"
M.A.P. Weisbren, M.D., paper presented at the Seventh International
Congresses of Hospital Medicine and Malaria, Rio de Janeiro, Brazil,
September, 1963-

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WVirus Studies conducted in the Inboratoriee of the Puerto Rico
Buclear Center by the coubined team (Puerto Rico Nuclear centscy
fuerte Rico Department of Healt, Communicable Dicense tester)",
Agustin Cajtgas, M.D., M. P. Welnbren, M.D., paper read ac te

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SCHISTOSOMIASIS PROGRAM

?the Mechanisms of Antigen-Antibody Reactions Following the
Inoculation of Mice with Irradiated ard Normal Sehistesous
mansoni cercsrise

INVESTIGATORS: M, Paul Weinbeon, M.D., Chi

Investigator;

Scientist 71

Scientist IT, Principal

Join B. Vilella, Pa.D., Aasciate

DATE INITIATED: Deconber 3, 1963

PURPOSE AND SCOPE:

Be program is based upon work by Drs. Vilella, Gonberg and Gould, and on
Dasically similar infomation published ty Gadus et al. The aitterent
groups have produced encouraging results, bat to date so fintse asscooments
of the degree of protection kava been nade, and the methods used have
Yarled widely, | The Michigan and Walter Reod groups have reported an acquired
rine after infection
by cercariae which have been danaged by exposure to gauaa irradiation, me
Gifferences in the work of the two groups seem to depend on the renee of
GMBosare to the cercariaes while Dr. Vilella et al euploys intraperitoneal
infection, Sadun and his group prefer the percitancoas root

TRS Procedures we intend to use are, at this stage, directed towards:

(2) defining useful parameters for assessing the effects produced

(2) comparing the effectiveness of different approaches to the problem.

This program is scheduled over a two year period, by which time it will be possible to decide along what lines any further research might be pursued,

current status:

State have been recruited and trained and experiments have been carried out to determine the number of paired cercariae necessary to produce a standard infection in mice.

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MEDICAL SCIENCES & RADIOBIOLOGY DIVISION

TITLE: Medical Sciences & Radiobiology Division

SUAFF: M, Poul Weinbren, M.D., Chief Scientist II, Heads Joha B. Vitellia,

Pu.D., Associate Scientist I1, Barbara Weinbren, B.M.B.Ch., Associate Scientist I

DATE INITIATED: Division of Medical Sciences activated February 7, 1962)

combined with Division of Radiobiology July 1, 1952 being the commencement of

PY1953.

PURPOSE AND SCOPE

This Division was established:

(A) To conduct training and research in radiobiology at the cellular level with emphasis on medical applications.

(B) To establish and operate tissue culture facilities for its own program and also to serve others.

(C) To explore the utilization of nuclear energy in developing new knowledge

Of tropical diseases of man.

(2) 7 organize and operate @ smal) animal latoratory needed for its own program and those of others.

comer smarty:

A thane culture facility has been established. This is staffed in the main by individuals trained here and they are now 13 a position to carry out vitually all the procedures required for the application of tissue culture to Radiobiological problems. We are now able to receive individuals for training in Hamue culture for radiobiological purposes, The tissue culture facility is being used for a number of projects among which are: (1). The investigation of the cellular level of the biological effects of neutron capture by Boron-10; (2) A number of studies on the chromosomes in cultured human Leucocytes (3) An annual program in which, using materials provided on an NIH grant, we screen specimens for virus content. These specimens are obtained from children sent into hospital with acute neurological syndromes.

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RESONANCE IN RADIATION EFFECTS PROGRAM

IMB: Resonance in Radiation Effects Program

INVESTIGATORS: Henry J. Gosberg, Ph. D., Deputy Director, PRNC} and Robert A; Luse, Ph. D., Associate Scientist IL, with the collaboration of Florencio Wazauz, Ph. D., Research Associate; Peter Paraskevoudakis, Ph. D., Associate Scientist; Francis K. S. Koo, Ph. D., Associate Scientist.

DATE INITIATED: May, 1962

PURPOSE AND SCOPE:

This project deals with the question: What are some of the unique effects of Ionizing radiation of matter? For this end, the biological and chemical effects of x-radiation in the 5-20 Kev energy range have been studied, This energy region is of considerable importance since it contains the absorption edges of the constituent atoms of most living systems.

current status:

Earlier work dealt with the metalloenzyme catalase, for which greatest biological effect (inactivation) was found with x-rays of energy at or near

the K-absorption edge of the constituent iron. In the present series, studies were extended to the metalloenzyme carboxypeptidase A and its related esterases. In these enzymes, the constituent metal can be removed by dialysis and then replaced by certain other metals. Accordingly, the original zinc-containing enzyme can be converted to esterases containing cobalt, nickel, tin, selenium, mercury, or molybdenum. A series of such enzymes, identical in composition except for the metal, are being irradiated with monochromatic x-rays of energies corresponding to the various metal K-absorption edges,

The biological studies of such x-ray effects have been extended into the area of genetics. Chromosomes in onion root tissue were labeled with a thymine acid analog, 5-bromodeoxyuridine, and then irradiated with x-rays at, above, and below the K-absorption edge of bromine. Preliminary results indicate that chromosome aberrations in the cell nucleus occur with highest frequency after irradiation at energies equal to or greater than the K-absorption edge of bromine.

In related work, effort is being directed to the effects of such monochromatic, low energy x-rays on inorganic crystals, since these crystals serve as excellent models for the more complex and less clearly defined biological macromolecules. Study of the production of color-centers in alkali halide crystals irradiated by such radiation is underway,

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PUBLICATIONS:

"Resonance in Radiation Effects", Gomberg, H. J.» Luse, R. A., and Véequez
Martinez, F., Technical Report No. 1, FRIC-12, 1963.

"Resonance in Radiation Effects", Gomberg, H. J.) Luse, R. A., and Vazquez
Martinez, F., Progress Summary Report No. 1, PRNC-14, 1963.

"Resonance in Redtation Effects of Lov Bnorgy Monochromatic X-rays on the
etailoenzyme Catalase", Goaberg, H. J, and Lase, R. A., presented at
Radiation Research Society Meeting, Miivaukee, May, 1963.

"Resonance in Radistion Effects", Technical Report No. 2, PRIC-H0, 1964,

"P-center Production with Monochromatic X-raye", véequez Martines, F.,

presonted at Conference of Nuclear Spectroscopy ana Solid State Physics,
Lina, Peri, Februsry, 1964.

"Resonant Action of Low Eneray Monochromatic X-rays on Chronosones Incorporated.

wien SoBrodeonyurtsine", Koo, TuiK.8.y and Gonberg, H. Joy Radiation Research
in press).

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RADIOTHERAPY AKD CANCER DIVISION

TITLE: Fadlotherapy ane

sacer Division

STAFE: Victor Marcial, M.D., Chief Sctentiet IZ, Heady Joub M. Tomé, M-D-,
Chie? Seientise 1; Jeanne Ubifins, M.D., Associate Scientist TT; José N.
Correa, H.D., Astociate Scientist 11; Antorio Bosch, M-D-, Assoclate
Scientist 11; Graciela Maytorena Serna, M.D-, Associate Scientist 13
Maria P. de lozano, M.S., Reearch Associate I; Zenaida Prissy MoS-
Research Associate I.

DATE GNTTIATRD: 1958

PURPOSE AND SCOPE:

?The main purpose of this Division is to treat physicians and allied
Personnel in all aspects of the application of nuclear energy to cancer.

4& second purpose is to develop and carry out a research program to improve
our knowledge in the cancer and radiation fields.

COMMENT STATUS:

This Division offers two programs in Radiotherapy Training:

(a) Radiotherapy Residency Program. The objective of this program is to
Prepare qualified radiation therapists. ?This is an approved program that
fulfills the requirements of the American Board of Radiology. Applicants
with a year of internship or equivalent clinical experience are accepted
for this training. ?The total training period lasts three years, but
trainees are required to take an additional fourth year of supervised
practice (preceptorship) before admission to the specialty examinations.
?Trainees learn: to diagnose cancer, to determine the extent and radio-
sensitivity of the tumor, to choose the appropriate treatment and to
plan and conduct radiological therapy.

(2) Special Short Term Radiotherapy Training Course. Special programs
are prepared according to the needs of the person. Participants may

engage in a research project and may participate in all teaching activities of the Radiotherapy and Cancer Division; but are not given patient responsibility.

To complement the training programs, a number of research projects are active in this Division. These include: (1) Carcinoma of the Cervix Uteri in Sterilized Women; (2) Study of Fractionation of Weekly Doses

of Cancer Patients Submitted to Irradiation; (3) Carcinoma of the Cervix Uteri Associated with Pregnancy; (4) Biochemical Changes in the Blood

of Patients Receiving Radiotherapy for Cancer-Serum Thiopyridine, Sorbic Acid and Potassium, and Urea; (5) Study of Opioid Analgesic Requirement in Radiation Therapy of Cancer of the Esophagus; (6) Controlled Study of the Split-Dose

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changes in Radioterapy of Cancer; (7) Study of Chromosome Changes in
Tumors Undergoing Radiation Therapy for Cancers (8) Lymphangiogenesis
in Cancer Patients:

PUBLICATIONS:

Patel Discussion on Metastatic Tumors with Presentation of Cases, V. A.
Molina, "Oncología A Ultrasonido Néctico de Puerto Rico", Vol. 9,
No. 10, October 1958

"Abdominal Changes in Children

» (Symposium with presentation of Cases),

Bonk Marcial, M.D. » R.A. Marcial Rojas, M.D. B. Mirabel, Modesto Ke Dioe

Bonet, M.D., L.A. Diaz Bonet, M.D. Published in "Boletín de la Asociación
Médica de Puerto Rico", Vol. 51, No. 11, November 1959

soareinone of the Base of the Tongue", V. A. Marcial, M.D., American
Journal of Roentgenology 81, No. 3, (1959)

Report on Tumors of Bone, V. A. Marcial, M.D., R.A. Marcial Rojas,
Publicaciones Médicas M-D-» J. Dévila López, M. D. E. Pérez Santiago: M.D.,
published in "Boletín de la Asociación Médica de Puerto Rico",
Tomo 2, February 1959,

[Cancer Morbidity in Puerto Rico", V. A. Marcial, M.D., Acta
Internacionales Contra el Cáncer, 1960

Economic Aspects of the Incidence of Cancer in Puerto Rico, V.
Marcial, M.D., Annals of the New York Academy of Sciences, December 1960

Carcinoma of the Penis", V.A. Marcial, M.D., et. al., published in
Radiology, August 1962; The Medical Association Bulletin, January 1965,

"Cancer Problems", V.A. Marcial, M.D., "Boletín de la Asociación
Médica de Puerto Rico", October 1962

uate Years Experience in Extoliative Cytology in Puerto Rico", Ys Av
Marcial, M-D:) O. Garefa Ranfrez, M-D. and S. A. Forster, ibe,
ploletin de la Asociaci3n Néaton?de Puerto Rico", Wels 3b, Ko.? 9,
Pages 209-293, Septenber 1962

?cancer contro) in Puerto Rico

YA. Marcial, M.D., Radiologia
Clinica 33:39-46 (1968)

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MUCLEAR POWER PROGRAM OF PURR?D RICC WATER RESOURCES AUTHORITY

TUTE: Tuclear Pover Progras of Puerto Rico Weter Resources Authority

DATE INUTIATED:

Berly in 1955, the Puerto Blco Water Resources Authority becene interested in
the developaent of nuclear power for central station application. Personnel
education and review of reactor concepts were initiated at chat early date,

Contract negotiations for # power reactor, utilizing the boiling water with integral steam superheat concept, were begun in 1958. A contract for @ boiling water reactor with integral steam superheat was signed early in 1960,

A new nuclear plant, 200,000 kw in size initially, is presently being planned for the Metropolitan Area. Bids will be opened in February, 1965,

A combined nuclear and diesel
Coast Station,

A nuclear plant is being considered for the South

PURPOSE AND SCOPE:

The purpose of the program is to produce electric power at lower cost,

CURRENT STATUS:

The BONUS Plant is undergoing tests and will
be on line.

be operational within six

The new nuclear plant is in the bidding stage. Specifications were prepared and issued last October, 1964. Bids will be opened in mid February, 1965,

The combination, nuclear power and desalination plant is being considered. No detailed work or consideration has been given yet pending on economic support from other interested parties.

PUBLICATIONS;

There are many publications concerning the BOWIS Plant among which are: "The Summary Design Report" and "The Final Hazard Summary Report"

Specifications were prepared and issued to prospective bidders for the new 200,000 kw nuclear unit, no publication has been made for the desalination project.

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TITLE: Civil Defense in Puerto

PURPOSE AND SCOPE:

The Office of the Civil Defence of the Commonwealth of Puerto Rico operates directly from the Office of the Governor. It derives its authority from Procedural guidance from appropriate Federal Legislation and specifically from Puerto Rico Public Law 183, 1 May 1951, as amended by the Legislature of the Commonwealth.

For the purposes of National supervision and guidance, Puerto Rico is located in Region One, Office of Civil Defence. Regional Offices at Hartford, Massachusetts exercise this guidance and supervision over the New England States, New York, New Jersey and the Virgin Islands, in addition to the Commonwealth of Puerto Rico.

Locally, the Office of Civil Defense is organized into a Central Office and seven Districts, or Zone Offices. The central Office is located in the Metropolitan Area; the Zone Offices are strategically situated in Aguadilla, Mayaguez, Ponce, Guayama, San Juan and San Juan. The Zone Directors, in representation of the Director, supervise the civil Defense activities of the Local Directors of the seventy-six political subdivisions of the Commonwealth,

Each Federal and Commonwealth Government Agency assigns a Civil Defense Coordinator to the Central Office. The Governor of Puerto Rico designates a Zonal Representative in each Municipality, normally a Government Agent, to insure the full implementation of the Civil Defense mission in case of need.

One of the functions of the Office of Civil Defense is that of safeguarding the life and property of the citizens of Puerto Rico, and of reducing or preventing the casualties which may be caused by enemy action, natural disaster or nuclear detonations. Specifically as concerns nuclear effects, the Civil Defense established the following objectives;

1. A Program of community fallout shelters, stocked to sustain Life and health throughout the attenuation phase of radioactive emanations. The Program is supplemented by the family and rural shelter program,

2. An island-wide program of alert systems, early warning and communications networks, supplemented by alternate warning and communications methods which include amateur short wave length radio operators,

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3. A program of public information and education, creating thereby new habits of life; which include adult education, medical self help, shelter administration and radiological defense measures.

Working in close cooperation with the Office of Emergency Planning, as well as other Federal and Commonwealth Agencies, the Office of Civil Defense plays an important role in natural disaster threat or

occurrences. It participates by directing and coordinating the rescue, recovery and survival operation? of the community, in insuring the continuity of established government and in the judicious utilization of available resources.

Civil Defense is an essential element of our national security program. In Puerto Rico, the average citizen has become conscious of the continuing requirement for this concept of nonmilitary defense against disaster, either natural or man-made-

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(CLDNECAL APPLICATIONS DIVISION)

TITLE: Clinical Applications Division

STAFF: Sergio Irizarry, M.D., Chief Scientist 11, Heads Aldo B. Lanaro,
N.D., Associate Scientist IT

DATE

INITIATED: 1958

?PURPOSE AND SCOPE:

The main purpose of the program of this Division is teaching and training
of Latin American physicians in the diagnostic and therapeutic use of
radioisotopes in medicine.

?CURRENT STATUS:

(A) During the past six months, 1,90 diagnostic procedures were
performed on 1,16 patients from the University Hospital, the Gaz Juan
City Hospital, The Rio Piedras Municipal Hospital, the Ft. González
Martínez Oncology Hospital and other referring sources making up a

total of 13 different sources that provide our patient load, for an average monthly Gagnortle and patient load of 316.6 and 197 respectively.

This service load is adequate for our training program.

(8) courses available:

Beste Course Clinical applications of radiotopes, Tate course consists

of formal lectures, demonstrations, periods of discussions and laboratory work. The main purpose is to emphasize training in the use of clinical radiotopic techniques

Orientation Course Clinical Applications of Radioisotopes for Medical Technicians. This is a non-credit semester course TUF Medical Technicians

is designed for orientation only in the medical uses of radioisotopes.

Orientation Course Clinical Use of Radioisotopes for Medical
Practitioners. This is a course for general practitioners and doctors
in other medical specialities, designed for orientation only in the
medical uses of radioisotopes

Advanced Course in a Medical Specialty. This is a course emphasizing
the application of Nuclear Techniques in the special field of Medicine.
A course is being set up to be given next June in the field of Renal
Diseases.

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Training in Clinical Use of Radioisotopes course stresses research aspects

In Clinical Medicine, units are assigned to provide research facilities
to trainees interested in clinical radioisotopes research work.

(c) research. To complement the training program

Research projects in the areas indicated are active,

following

Thyroid Research Program: Clinical Studies of Thyroid Function. (a) In vitro tests of thyroid function; (b) Anticoagulants and THYROTROPIC uptake of ^{131}I (c) Evaluation of the 2-hour ^{131}I Thyroid Uptake; (d) Correlation thyroid cancer with Werner's disease; (e) 24-hour ^{131}I uptake and tagged hormones.

Cardiovascular

Studies of cardiovascular

of the Cervix; (BT Cardiovascular)

Function-

Te] Renograa in Cancer of

Nepal States in Diabetic; (c) Renal,

Sustrotheereine) Tract and Liver Reoares Program

gastrointestinal and hepatic function® Tey Patient

Absorption. Phase I - during radiation. Phase 2 - after radiation;

{) Thyroid Glant ws indicator of intestinal absorption; (c) Rose Bengal

T+131 localization and dynamic studies.

Isotopic Localization Research Program: Dusec Localization and Improvement

?SF Bemantn Apparstas Ta) Tock ad Tsay oro SS Seprovens

and tumor love{Tiation

Radioisotope therapy Reccarch Program: Faviev of Patten

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PUBLICATIONS:

treated with

?Renogram in Cancer of the Cervix", 5. Irizarry, MeD-, As Le Rodrfguer

Rosado, M. D., PRIC~33-

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AGRIOLIVEA BIO-SCIImNCRS DIVISTON

TITLE: Agricultural Bio-Setences Division

STAFF: Robert A. Iuce, Ph.D., Assoctate Scientist, Head; Diane B, Linden,
Pa.D., Associate Scicntast II; Francis K. §. Kooy Ph-D., Ascociete
Scientist 11; Andres Maretzi, Pu.D., Associate ScLeatiat; David #.
Welker, Pe.D., Associate Scientist; J, Holdsn, Research Associate I.

DATE INITIATED: 1960

PURPOSE. AND SCOPE:

(A) maucasion and Training

1) Aim: to train students in mclear techniques which are used in
fagriculture (ani the closely related fields of plant payslology,

genetics, and agricultural biochemistry)

2) State offers courses which support advanced work: Cytogenetics, Advanced Genetics, Biochemistry of the Cell

3) State offers advanced courses in nuclear field: Nuclear Techniques in Biological Research, Radiobiology, and Special Problems in Nuclear Biology

4) M.S. program in either Agriculture or Biology includes formal class work (30 hours) and research thesis

(B) Research,

1) Effects of ionizing radiation on the genetics, physiology, and biochemistry of plants which are important economically to the tropics.

Issue: Can a high-sucrose mutant be produced through neutron irradiation of sugarcane seed material? A biochemistry mass-screening technique is in operation. Over 500 plants grown from irradiated buds are now 4 to 7 weeks old,

Koot What are the cytogenetic effects of neutron irradiation in sugarcane?

Maretzki: What are the biochemical pathways of sucrose formation

8 degradation in sugarcane and how do these differ in mutants

Produced by neutron irradiation? Enzyme levels have been determined

And Kinetics are under study

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Linden: What is the radiation response of the genetic phenomenon of paramutation? Both regulator gene and site of action found. Fadolensitive in maize. Paramutational alterations have persisted for two generations. Paramutation is hypothesized as an inactivation event, not true mutational change.

2) Application of radionuclides in the study of tropical plant and soil relationships, so as to improve agronomic practices?

Padovani: Calcium and strontium uptake by plants grown in pure and mixed stands

Roldan: Application practices and their effects.

Effects of standard fertilization on nutrient deficiencies,

Preservation of tropical fruits and pasteurization.

Effects of radiation

Linden: Canna radiation at 200K: Level

faangos for 30 days @t 50°C storage,

Grane: To study changes in vitamin levels in gama-irradiated mangos.

(©) ceoperative prograne

1) Service ganna irradiation wit Co

£60 source

inden, Cuevas

Several hundrad samples irradiated last year.

2) US-ABC Exhibit in Contrat Anerioa,

Starr serve as agricult

consultants.

PUBLICATIONS:

"A Mechanism for Redistion?Induced Back Mutation", F.X.8. Koo, Second International Congress of Radiation Hesearch, Abetract, p. 234, Auge 150.

"Blologtcal Bffect Produced by X-Rays and Thermal Neutrons in Diploid and Hexaploid Species of Avena", F.K.8. Koc, Radiation Batary, (2) 131-140, (1962).

"?Growth of Sterile Plant Roots in Sand or Soll in an Inexpensive Growth Cuambor", R.A. Luse, Solt Goctety of Anertca Proceedings, (25) LO6-408, Galy-mgier, 1962.

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THutritional Factors Stimulating the Formation of Lysine Decarboxylase 4a

Escherichia Coli", A. Marentz and M.7. Nalete, Journal of Bacteriology

(83) 1204726, April, 1962.

?Polygenic Variability induced by Thermal Neutron Irradiation", F.K.8. Koo,

Radiation Research (16) 501, Abstract, 1962.

?Additional Sources in Paramutation Induction

(48) July, 1953.

"Effects of Radiation on Paramutation

May, 1963.

Ability", D.B. Linden, Genetics

') D-B, Linden, Eadietion Research (19)

IMschanies of Bazyme Inactivation by Ultraviolet Light and the Photochemistry of ino Acids", R.A, Luee and A.D. McLaren, Photochenistry aad Photobiology, (2) 343-360, aug. 1963.

"Synergistic Bffect of 5-Bronoteoxyuridine and Canna Rays on chroscsones", F.E.8, Koo, Science, July 19, 1963.

"Agricultural Applications of the Puerto Rico Nuclear Center Co® gamma, Irradistion Facility", J. Cuevas and D.B, Linden, presented at Caribbean Food Crops Society meeting, Sarbaior, Osvober, 1956.

"Radiation Pasteurization of Mangoe", D.B. Linden, ibid,

"Betects of CoO caaca Irradiation on Com Pollen", V. Roarfgier and D.3. Minder, J. Agric. Univ. P. R., in pres

?Sone Aspects of Ascorbic Acid Biosynthesis in the West Indian Cherry", A, Maretcki (with C.?, Asenjo), presented at Third Caribbean Chenical, Syuposiun, Caracae, January, 1665.

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BADTOISONOPES STVISION

TITLE; Radioisotopes Division

SIAFF: avin Roig, Pa.D., Thief Scientist 22, Mond; H. Harcy Samant, Pa.D.,

Ghie? Scientist Ij; Malcolm Daniels, Ph.D., Ascociate Scientist 11)

José Castritida, Ph.D., Associate Scientist 1; Rosa Santana de

Tivedo, M,8., Research Associate I

DATE IVZTATED: August 19, 1957

PURPOSE AND SCOPE:

The main objective of the program te ving of suffictent training

Yo scientists in the application of radioisotopes and ionizing radiation

to the physical sciences to provide technical competence for their future work. A second objective is the offering of introductory training to Scientists, irrespective of their field of interest, in radioisotopes and ionizing radiation as a background or as complementary preparation for their participation in other programs of FRI.

CURRENT STATUS:

(A) Courses receiving University credit:

Basic Course in Radioisotope Techniques (Radiochemistry and Detection Laboratory - Prerequisite hours). Four week course now being offered four or five times a year. We have had a total of 250 participants (33 sessions) including 61 from Anciens. The present rate of participants is approximately 20 per year.

Radiochemistry Course (Chemistry 65 - 4 credit hours). A one semester course offered once a year for advanced undergraduate and graduate students.

Approximate enrollment: 4 to 6.

Maclesr Techniques in Biological Research (Biology 372 - credit hours).

Kone senester course offered once @ year for advanced undergraduate students.

Approximate enrolment: | vo 6

Radiostope Applications in Organte Shenistry (credit hours). A one senestar graduate course vo be offered for the first tine this coming year.

The Rediochenictry course sentioned above ia a prereqiielite.

(B) Courses for specia: training:

Hadiclogical Physics. A special course offered when requested te M.2.

Residents an Radiology.

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PUBLICATIONS:

The lecture material used in the Basic Course in Radioisotope Techniques is being compiled and will be published in two volunes.

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ORGANIC CHEMISTRY RESEARCH PROJECT

mma:

Chemistry Research Project

INVESTIGATORS: H. Harry Suant, Ph.D., Chief Scientist IZ, Principal

Investigator; José Castrilién, Ph.D., Associate Scientist Ty

and II Research Assistants and Graduate Students, Certain

parts of the Project count with the collaboration of Bawin

Roig, Ph.D., Chief Scientist 21; and recently, with

Dr. Seymour's. Block, Oak Ridge Research Participant.

DATE INITIATED: September, 1961

PURPOSE AND SCOPE:

The purpose of the program is to provide advanced chemical training through

Participation in individual research projects. The projects cover a

relatively wide range of subjects in order to offer a broad experience to

all members of the group, and the diffusion of the varied aspects of organic

chemistry is promoted by group seminars and discussions

CURRENT STATUS

The current research projects cover the following

following areas:

(A) the study of organic sulfur compounds with special emphasis on the physical and chemical properties of sulfoxides, i.e. self-association, hydrogen bonding formation, reduction by phosphonic compounds, formation of metallic chelates, stereochemistry, etc.

(B) Nucleophilic substitution reactions of imidates (NIH) are investigated with the purpose of developing & selective replacement of a hydroxyl group in polyhydroxy compounds.

(c) the study of organic boron compounds aims to develop compounds suitable for neutron activation therapy.

(b) The study of solvent effects in organic chemistry includes the remarkable effect of diethyl sulfoxide on the kinetics of the Wolff-Kishner reaction, the solvation of the monosodium salt of phenolphthalein, the stabilization of carbanions in diethyl sulfoxide, etc.

PUBLICATIONS:

"Rearrangements During Oxidation of 2,1-Diarylethanes", H. K. Samant and S. F. Definer, J. Am. Chem. Soc., 81, 9558 (1959)

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"Synthesis of Dibenzyl and Glycols", Honor Program Thesis, August, 1953,

"The Base-Catalyzed Formation of Imines" by H. H. Samant and B. P. Oquavarra, Ph.D. Thesis of B.P. Oquavarra, August, 1963
"The Wolff-Kishner Reaction of Hydrazones" by H. H. Samant and O. M. Harmuth, J. Am. Chem. Soc., 86, 2909 (1964).

"A Study of the Reaction of Triphenyl Phosphine and Sulfoxides", 1.8.

Thesis of O. Cox, August, 1954.

"Reaction of Sulfoxides by Triphenyl Phosphine and Carbon Tetrachloride",
H. H. Samant and J. Castrión, J. Org. Chem., in press.

"The Self-Association of Dimethyl Sulfoxide", R. Figueroa, E. Roig, and
H. H. Samant, Spectrochim. Acta, in press

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PHOTOCHEMISTRY. AND RADIATION

TIMA: Photochemistry and Radiation Chemistry Project

OWESTIGATORS: Malcolm Danieis, Fh.D., Aassociate Scientist 17) Alec
Griison, Po.D., Associate Scientist, Ad-Henoren; Bri
Wig, PriD., Holarct, Aecciate, Alsfonoren.

DADE INITIATED: NIM support Merch 1, 19625 USAS? Division of Biology
and Medicine support, Jartary, 1963.

PURPOSE AND s03PE:

(a) Anvestigation of role of excitation processes in radiation cheatetry
of aquecus solutions.

(8) Investigation cf modes of decomposition of characterietis excited
states.

{c) Investigation of nature and reactivity of excited states of DNA.
end its constituents in aqueous solution.

cuaRENT szANIS:

(A) Photolysis of Aqueous Thymine Solution of 18494 has been shown to

Secure with high quantum yield in the presence of oxygen and leads to formation of hydroxyhydroperoxide (found in radiolysis), glycol and hydrogen peroxide. The process is interpreted in terms of (1) scavenging of water photolysis of thymine, and (2) direct photolysis of the higher excited state of thymine. This work has been concluded; a preliminary account has appeared and a full presentation is in preparation.

(8) Extensive work has been carried out on the photolysis of nitrate at 313 mμ in aqueous solution i.e., via the M^+ excited state. The effects of concentration, intensity, pH, and oxygen have been investigated, as well as the inhibition by nitrate, and scavenging by arsenite, hydrogen peroxide and ethanol. This work, which is of immediate relevance in interpreting the "direct effect" in the radiolysis of nitrate solutions, is being concluded and prepared for publication.

(c) The fluorescence of aqueous solutions of heterocyclic components of D.N.A. has been investigated. A previously unreported fluorescence from cytosine has been characterized. Similar work has been carried out on thymine and adenine. Cytosine has been found to undergo « biologically important photochemical deamination at 2537 Å. The kinetics of deamination have been determined and correlated with the kinetics of self-quenching of

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luminescence. Analysis of the data suggests that both effects originate in a triplet state of cytosine, Irradiation of cytosine/thymine mixtures has produced evidence for energy transfer; a luminescence has been observed from D.N.A. in aqueous solution, an @ deamination is found to occur at 20y7h.

This work (9 being actively prosecuted; a preliminary account has been presented at the International Congress of Photobiology, Oxford, 1961, and other aspects are scheduled for the Biophysical Society Meeting, Feb. 1965.

PUBLICATIONS:

"The Radiation Chemistry of Arsenite, Pt. II. Oxygen-Free Solution", M. Daniels, J. of Phys. Chem. 65, 1475 (1958)

"Photochemically-Induced Oxidation of Arsenite: of Arsenic (III)", M. Daniels, J. of Phys. Chem. 6, 1673 (1952)

[Photochemistry of Thymine", M. Daniels and Alec Grimison, Nature,
484 (1953)

Deuterium Isotope Effect in the Hydrogen Bonding of Imidazole in
Naphthalene Solutions", Alec Grimison, J. of Phys. Chem- Vol. 962 (1963)

"Fluorescence of Cytosine in Aqueous Solutions", M. Daniels and Alec
Grimison, PRIC 42, July 1964

"The Photochemical Destruction of Cytosine at 2537Å", M. Daniels and Alec
Grimison, Biochem. and Biophys. Research Communication 16, 28 (1964),

"Radiation Chemistry of Arsenite Solutions, Pt. III, Effect of Arsenite

Concentration in Oxygen-Saturated Solution", M. Daniels, J. Phys. Chem. 68
2867 (1964)

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MARINE BIOLOGY PROGRAM

TITLE: Marine Biology Program

INVESTIGATORS: Frank G. Lowman, Ph.D., Chief Scientist I, Principal

Investigators Robert. A. Stevenson, Ph.D., Associate

Biologist 1; D. K. Paeips, Ph.D., Associate:

Enrique Avila, M.S., Research Associate 1; Total Research

Staff ~ 15 members

DATE INITIATED: January, 1962

PURPOSE AND SCOPE:

Although the research is comprised of five major projects as well as supporting areas of investigation, it functions as an integrated research program. The investigations were designed to measure the distribution and movements of selected trace elements in a restricted but complete ecological and biogeochemical system and to measure the biological and environmental factors which influence the distribution patterns of the elements.

CURRENT STATUS:

Specifically, the distributions of selected trace elements are being measured in minerals, rocks, and soils of a river watershed into the river waters

and sediments, into the marine waters at depth and distances offshore, through the marine biosphere and into the marine sediments. To obtain information on the interactions of the marine biosphere and hydrosphere, measurements are being made of (1) rates of photosynthesis (productivity), (2) effects of the rates of photosynthesis upon uptake of trace elements by phytoplankton, (3) biological half-lives for trace elements, (4) structures of food webs and (5) relative transfer of carbon, nitrogen, and trace elements through trophic levels of food webs. The effects of physical and chemical oceanographic conditions upon the distributions of trace elements and organisms are being investigated with special emphasis placed on observations of the effects of varying amounts of mineral-rich silt upon the distribution patterns of benthic marine organisms. The research projects include: (1) measurements of biological productivity, (2) analysis of trace elements, (3) measurements of concentration factors of organisms for selected radioisotopes, (4) measurements of fallout and natural radioisotopes in marine samples and (5) physical and chemical oceanographic measurements. All phases of the work are in progress. In addition, ecological studies, including food web investigations, are being done.

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PUBLICATIONS:

"Marine Biology - Progress Summary Report I", F. G. Loman, PRNC 15, (1963).

"Activation Analysis in Marine Biology", F. G. Loman, International Atomic Energy Agency ~ Proceedings of the Study Group Meeting on the Utilization of Research Reactors held at Sao Paulo, Brazil, Nov. 18, 1963.

"Trace Element Analysis of Some Marine Organisms", by R. A. Steventon, F. G. Loman, and A. T. Diecidue, International Atomic Energy Agency = Proceedings of the Fifth Inter-American Symposium on the Peaceful Application of Nuclear Energy, Valparaiso, Chile, March 9-13, 1964.

"Investigations in Trace Element Distribution in Marine Waters and Sediments", F. G. Loman, L. Quiñones, M. Miré, I. Oliver de Padovani, B. Ramos, V. Ronin and J. Bielen, International Atomic Energy Agency - Proceedings of the Fifth Inter-American Symposium on the Peaceful Application of Nuclear Energy, Valparaiso, Chile, March 9-13, 1964,

"Neutron Activation Analysis for Scandium", M. Minetti, et al,

to Analytica Chimica Acta,

to be submitted

"Scandium Analysis in Sea Water", V. Ronda de Vega, et al, to be submitted
to Journal of Marine Research,

et

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SUGAR CANE BORER PROSRO

TITLE: Induced Sterility for Population Control of the Sugar
(*Diatraea saccharalis*, Crambidae Lepidoptera) in Puerto Rico

Borer

INVESTIGATOR: David W. Walker, Ph.D., Associate Scientist IZ.

DATE INITIATED: Project initiated by Dr. Howard J. Teas, August, 1961,
continued under direction of Dr. D. W. Walker from April, 1962)

PURPOSE AND SCOPE:

The objective is to determine if the sugar cane borer can be suppressed or
eradicated by mass-release of irradiated males or females. To accomplish
this objective it has been necessary to investigate mating behavior and
to aid cooperators at the Commonwealth Experiment Station and USDA in the
development of a full medium suitable for mass-rearing. Other information
has been collected on oviposition, longevity of adults, mating behavior and
factors pertinent to a fuller understanding of the biology of this species.

CURRENT STATUS:

(A), Results of irradiation tests (preliminary tests): (1) Exposure to 20-
40 KR renders virgin male adult borers sterile by sperm death, sperms inacti-
vation and/or lethal dominants. (2) Exposure to 18-40 KX render virgin
female adult borers sterile by oocyte damage and/or dominant lethality.

(3) Egg production is not affected by irradiation of adult females or males.

(4) Life span of adults is not affected by exposure of 70 x? and below.

(5) Exposures to 8 KR, 10 KR, 12 KR and higher, cause SOS mortality and
higher to larval status and pupas of less than 5 days of age. Lethal dosage

?and sterilizing dosage are equal in innature statu

(3) Artificed rearing food media have been developed which prolonged adult life span 30%, increased egg production 10%, shortened larval growth time 25%, and permitted survival from egg to adult above 90%. The most promising food media being tested will provide adults at a cost of less than 1/5¢ each for ingredients.

(6) Mating Behavior. Mating takes place in the dark and under laboratory conditions never emerged adults will mate at any time if placed in a sieve. In nature, mating takes place as early as 8:00 pm, and still in the morning. The female attracts the male by a chemical sex attractant, (pheromone) secreted by glands on the ventral side of the eighth abdominal segment. Males search for females by an erratic flight pattern. Upon locating the female, a series of courtship behavior ensues and is followed by copulation

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() Work in progress includes: (2) Development of a Rhyacionia Line and includes food medium of choice: costarica. (2) Development of a Rhyacionia Line of this species having short larval life span, long adult life span, higher vigor, and higher reproductive potential. If possible, a line will be selected which is sufficiently different so that released individuals can be easily

@istinguished from naturally occurring individuals (in the leads)

of mass-rearing methods

(2) ruturs work witt tneinde: (2) Intensive teste to prestesly deveraine

Srrediation effects on maze sterility. Specifically to aeteruine the feasible

dose for treating tales for field release aod the type of effort. produces Os

sate (sperm death, sperm inactivation and sotnat desinanea)e (2) e aeeayeot

She? effectiveness of treated tales for competing wits noreal auice £08 acles

under laboratory end field conditions. (3) A study of leboretory anf field

population redantion Goring and afver relcase of invasiated anise,

PUBLICATIONS:

?Biology of *Diatraea Saccheralis* (FAB.) in Puerto Rico III Ovization Rate",

D, SyWelker, and M. Figueroa, *Ancais Entos, Soc, of Aner.* 57 {6}: 515-516,

96h

"Biology of *Distraea Saccharalis* (PAB.) . A description of the mating behavior", D. W. Walker, *Froc. Entom. Soc, of Wash.*, to appear March, 1955.

---Page Break---

BUGHER, JOHN C.

Director, Puerto Rico Nuclear Cent

Professor of Pathology

PIED: Pathology

EDUCATION: B.S., Taylor University, 1921; A.B., University of Michigan, 1921; M.D., University of Michigan, 1925

S. University of Michigan, 1931;

Hon. S.D., Taylor University, 1953; Yon. Sc.D., University of Michigan, 1961,

EXPERIENCE: Instructor, Mathematics and Physics, Taylor University, 1919-205

Assistant in Bacteriology, University of Michigan, 1922-25; Director, Public

Wealth, South Haven, Michigan, 1962; Sen

1 Instructor, Pathology, University

of Michigan, 1929-32; Assistant Professor, Pathology, University of Michigan,

1933-37 Rockefeller Foundation's Yellow Fever Laboratory, Columbia, 1937-43,

Director, Yellow Fever Institute, Lagos, Nigeria, West Africa, 1943-48

Biophysical Studies of Viruses, Rockefeller Foundation laboratories

» New York,

1949-51 Deputy Director, Division of Biology and Medicine, U.S. Atomic Energy

Commission, 1951-52 Director, 1952-55 Director, Medical Education and Public

Health, Rockefeller Foundation, 1955-59; Consultant on Nuclear Energy Affairs,

1959-60} Director, Puerto Rico Nuclear Center, July 1960 to present:

5 General

Advisory Committee to the U.S. Atomic Energy Commission, May 2, 1964 to

present.

+ Dr. Bugher is on loan to Puerto Rico Nuclear Center from Rockefeller Foundation.

---Page Break---

COBAS, AMADOR

Associate Director, Puerto Rico Nuclear Center

Professor of Physics

PIE

Physics

EDUCATION: B.A., (Physics), University of Puerto Rico, 1933

Graduate work

in Physics including course on Radioactivity under Madame Curie, 1933-5

M.A. (Physics), Columbia University, 1940; Ph.D. (Physics), Columbia

University, 1941,

EXPERIENCE:

Assistant Instructor Physical Sciences, University of Puerto

Rico, 1943; Instructor Physical Sciences, University of Puerto Rico,

1937-39 Resident Fellow, Columbia University, 1939-40; Assistant Professor
of Physics, University of Puerto Rico, 1940-42; Lecturer in Physics,

Columbia University, 1942-43; Associate Professor of Physics and Head

Department of Physics, University of Puerto Rico, 1947-1953; Professor of

Physics and Head Department of Physics, University of Puerto Rico, 1953-1956

Research Associate, New York University, 1947-1953 Professor of Physics and

Dean Faculty of General Studies, University of Puerto Rico, 1949-1953

Professor of Physics and Director Cosmic Ray Project, University of Puerto

Rico, 1953-1956; Visiting Professor, New York University, 1952-1953 Professor

of Physics and Director Radioisotope Applications, University of Puerto

Rico, 1956-1960; Associate Director, Puerto Rico Nuclear Center, 1950 to

present.

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DANTEIS, MALCOUL

Radiation Chemistry & Photochemistry Project

Radioisotopes Division

Associate Scientist TT

FIBID: Chentstry

EDUCATION: B.Be., King's College, University of Durham, England, 1948-515

Doctorate King's College, University of Durban, England, 1951-55,

EXPERIENCE: Research Asstetant tn Radiation cheaistry and Photocheatstry
of aqueous solutions, King's College, University of Darhan, 29657;

Resident Research Associate at Argonne National Laboratory, Illinois,

19574605 Visting Scientist in Radiation Chemistry, Brookhaven National

laboratory, July-Septeuber, 1960; Lecturer in Chemistry, University College

of the West Indies, Kingston, Jamaica, 1960-625 Associate Scientist, Radice

Asotopes Division, Puerto Rico Tuclear Center, 1962 to prove

---Page Break---

CoNBERG, mY J.

Deputy Director, Puerto Rico Nuclear Center

Professor of Physice

FIELD: Blectrical Engineering

EDUCATION: B. S., City College of Now York} M.3-2., (Electrical Engineering),

University of Michigan, 1942; Ph, D. (Stectrical Engineering), University

of Michigan, 1951.

EXPRAIEN

Detecto Scales, 1936-375 General Switen Corporation, 1:

aia

Instructor and Research Associate on High Frequency Electrical Energy,
i9l-H35 Clivilien and Officer, Naval Ordnance Laboratory, 1913-455 Assistant
Professor, Associate Professor, Professor and Chairman of Department. of
Nuclear Engineering, University of Michigan, 1986; Research Associate,
Laboratory Supervisor, Assistant Director, Director, Michigan Memorial
Phoenix Project on Feacetine Atonte Fnergy, 1946; Consultant to: Argonne
Wationad Laboretory-Reactor Division and Renote Contol Division, U. 8.
Monte Energy Couniesion Office of Isotope Development, International Co-
operation Adninsi

ton, U. 8, Department of State, Oak Ridge Institute of
Nuclear Studies and World Health Organization; Professor of Physics,
University of Puerto Rico, 1961 to presents Deputy Divector, Puerto Rico

Nuclear Center, 1961 to present.

3.

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IRIZARRY RIVERA, SERGIO

Head, Clinical Applications Division

Chief Scientist 11

Clinical Associate in Medicine

FIBID: Internal Medicine

EDUCATION: 8B,

+1 University of Puerto Rico, 1916; M.D., University of

Buffalo, 1950,

EXPERIENCE: Intern at Bayandn District Hospital, 1950-51; Medical Resident, Fajardo District Hospitl, 1951-52; Physician, Health Centers at Rfo Grande, Vega Baja, Rincém, Corozal, Department of Hoalth, 1952-53; Physician, Puerto Rico Cancer League, 1953-6; Radiotherapy Reeident, Dr. T. Gonsdle: Martinez Oncologie Hospital, 1956-58; Clinical Fellow, Internal Medicine in Cancer, Frances Delafield Hospital, 1958-60; Clinical Associate in Medicine, University Hospital, 1960 to present; Assistant Attending, San Juan, city Hospital, 1960 to present; Internist, Dr. I, Gonzdlez Martfner Oncologic Hospital, 1960 to present; Head, Clinteal Applications Division, Perto Rico Nuclear Center, 1950 to present.

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?WowMAN, FRANK O.

Directér, Marine Biology Progran

chief Scientist. 1

FIELD: Radiobiology

XDUCATION: B.8., University of Washington, 1948; Ps.D. (Marine Biology)

University of Washington, 1956.

EXPERIENCE: Research Assistant, Laboratory of Radiation Biology, 1918-53;

Assistant Professor, Laboratory of Radiation Biology, 1953-58; Associate

Profe!

professor, laboratory of Radiation Biology, 1958-61; Field leader, air

sampling teams, Nevada Test Site, 1951-52; Group leader, Oceanographic

surveys, Bikini Test Site, 1958; Associate Scientist, Agricultural Bio-

Sciences Division, Puerto Rico Nuclear Center, 1961-62; Chief Scientist I,

Marine Biology Program, Puerto Rico Nuclear Center, 1963 to present.

---Page Break---

ROBERT A.

Head, Agricultural Bio-Sciences Division

Associate Scientist I

FIELD: Biochemistry, Biophysics

EDUCATION: B.A. Kalunacoo College, 1953; Ph.D., University of California,

(Berkeley), 1961.

EXPERIENCE: Research Assistant, University of California, 1955-61;
Associate Scientist IT, Agricultural Bio-Sciences Division, Puerto Rico
Nuclear Center, 1961 to present; Associate Investigator, Resonance in

Radiation Project, February, 1962 to present;

) Agricultural

Bio-Sciences Divi

ny Puerto Rico Nuclear Center, November, 1964 to

present.

---Page Break---

MARCTAL, VICTOR

Head, Radiotherapy & Cancer Division

Scientist I

Journal of Radiation Therapy

FIBID: Radiation Therapy of Cancer

EDUCATION: B.S., University of Puerto Rico, 1945; M.D., Harvard Medical School, 1949.

EXPERIENCE: Intern, Bayamón District Hospital, 1949-50; General Practice of Modesto, 1950-52; Resident Radiation Therapy, Penrose Cancer Hospital, 1951-53; Baste Radionuclides Course, Oak Ridge Institute of Nuclear Studies, 1953-54; Fellowship for the study of Radiation Therapy in Europe of the American Cancer Society, 1953-54; Residency in Tumor Pathology (6 months) at Barnes

Hospital in Saint Louis; Residency in Radiotherapy at the Tor Institute

in Seattle, ending June 1955; Diplomate American Board of Radiology (Radio-

therapy), May, 1955 Director, Bureau of Cancer Control, Puerto Rico

Department of Health, 1955 to present; Professor of Radiation Therapy,

University of Puerto Rico Medical School, 1958 to present; Director,

Radiotherapy Department of Dr. I, Gone@lex Martinez Oncologic Hospital;
Head, Radiotherapy and Cancer Division, Puerto Rico Nuclear Center, 1958

to present.

---Page Break---

coM, HOWARD 7.

Director, Terrestrial Ecology Program I: The Rain Forest Project,

Chief Scientist 1

FIELD: Ecology, Oceanography

EDUCATION: Cadet Meteorology, Technical Training Command, USAAF,

1943; Institute of Tropical Meteorology, Puerto Rico, 1944; A.B.,

University of North Carolina, 1947; Marine Biological Laboratory, Woods

Hole, Mass., 1947;

Ph.D. (Zoology), Yale University, 1951.

EXPERIENCE: Teaching Assistant, University of North Carolina, 1942-5

Instructor, Tropical Weather School, Canso Zone, 1955; Teaching Assistant,

Yale University, 1967-18; Assistant Professor, University of Florida,

1950-54; Bniwetok Reseech, 1964; Instmuctor, Woods Hole, Mass. 1953 and

1958} Assistant Professor, Duke University, 1954-56; Director, Graduate

Advisor, Lecturer in Zoology, and Biitor, Institute of Marine Science, The

University of Texas, Port Aransas and Austin, 1956-63; Ad Honorem Professor,

Department of Biology, University of Puerto Hico, 1953 to presents Director,

Terrestrial Ecology Progran I: The Bain Porest Project, Puerto Rico Nuclear

Center, 1963 to present.

---Page Break---

ROIG VALDIVIESO, EDWIN

Head, Radloisotdpes Division

Chie? Seienties I

Professor of Chenietry

PIR: Chemistry

B.S., Chemistry, University of Puerto Rico, 1943; M.S., Ph.D.
in Chemistry, University of Pennsylvania, 1949, 1951; Radioisotope

Techniques Course, Oak Ridge Institute of Nuclear Studies, Summer 1957.

EXPERIENCE: Assistant Instructor in Chemistry, University of Puerto Rico,
1945-46; Instructor in Chemistry, University of Puerto Rico, 1946-51
Assistant Professor in Chemistry, University of Puerto Rico, 1951-53

Senior Chemist, West Indies Mining Corporation, 1952-53; Associate Profes-
sor in Chemistry, University of Puerto Rico, 1953-57; Professor in Chemistry
and Physics, College of the Sacred Heart, 1951-57; Associate Scientist,
Radioisotope Applications Division, 1957-60; Head, Chemistry Department,

University of Puerto Rico and Head, Radioisotope Applications Division,
Puerto Rico Nuclear Center, 1960-62; Chief Scientist and Head, Radioisotope

Applications Division, Puerto Rico Nuclear Center, 1962 to present.

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SOMANT, H, HARRY

Organi? Chemistry Project

Radioisotopes Division

Chief Scientist IT

Professor of Chenistry

FIED: Organic Chemtetry

EDUCATION: B.A., Ohio State University, 1940} Ph.D., Pardue University,
ght,

YRPBRIENCE: Research Chemist, Monsanto Chendeal Company?, 194-66;

Associate Professor and Professor, Dugiesne University, 1916-56; Director,

Center of Chemical Research, University of Oriente, Santiago ge cuba,

19%-61; Professor of Chumistry, University of Puerto Rico, and Chief

Scientist, Radiotsotope Applications Division, Puerto Rico Mclear Center,

1961 to present.

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WALKER, DAVID #.

Soger Gane Borer Program

Ageicultural Bio-Sciences Division

Astociate Scientist 5T

Assoclate Professor of Zioclogy

FIELD: Entomology

EDUCATION: .8., Public Health and Proventive Medicine, University of Washington, Seattie, 1950; M.8., (Bntosology), Washington State University, 19525 Pa.D., (Entomoiogy), Wachington State University, 1959.

EXPERIENCE: Chief Sanitarian and Malaria Control Officer, United Nations Relief for Palestinian Refugees Commission, Gaze, Faypt, 1949-50; Teaching Assistant in Zoology, Washington State University, 1950-51; Batonologist and Consultant on Malaria Sontrol to the Department of Health, Republic of

the Philippines, U.S, Puslic Health Service, 1952-535 Junior Entemologtet and Assistant Rntonologist, Washington State University, 195359) Associate Professor, Biology Departzent, University of Puerto Rico, 1959 to presents

Consultant, grain elevator companies, U.S. Commodity Stabilization Service,
Comonaith Experiment, Station and laJas land Project, 1954 to presents
Associate Scientist II, agricultural Mo-SeLences Division, Puerto Rico

Micloar Center, 1963 to present.

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WBDIBREN, MAURICE PAUL

Head, Medical Sciences & Radiobiology Division

Chief Scientist IT

FIEW: Microbiology

EDUCATION: B.Se., (Histology & Physiological Chemistry), 1916; B.Se.,
Hons (it

ology), University of Witwatersrand, Johannesburg, South Africa,
1947; M.R.C.S. (Bogland) 1.R.C.P. (London), Middlesex Hospital Medical,
School, London, England, 1951; M.D., (Pathology), University of
Witwatersrand, Johannesburg, South Africa, 1961.

EAPSRIGNCE: House Surgeon, 1951-52; liouse Physician, 1952-53; Senior House
Orticer (Pathology), 6 months, 1953, all with British National Health
Service; Medical Rescarch Officer at Polloayelitis Research Foundation,
Johannesburg, South Africa, 1954-55, during which time attached to the
Rockefeller Foundation Arthropod-bomne vinas Research unit: Virologist at
?the Rast African Virus Research Institute, Entebbe Uganda, 1955-59;
Rockefeller Foundation fellowship to study activities in Arthropod-torne
virus Isboratories at Bolen, Brazil; Port of Spain, Trinidad; Bogota and
Villavicencio, Coleabia; Berkeley, California; Hailton, Montana; New Haven,
Connecticut, and the Rockefeller Foundation laboratory in New York, 1957-585,
Senior Medical Officer in charge of the Arthropod-borne Virus Research unit
at the Polionyelitis Research Foundation, Johannesburg, South Africa,
1949-515 Head, Communicable Disease Unit, Division of Epidemiology, Public
Health Research Institute of the City of Mew York, 1951-62; Head, Medical
Scelences and Radiobiology Division, Puerto Rico Miclear Canter, 1962 to
present.

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U.S, ATOMIC ENERGY COMMISSION

BIOMEDICAL PROGRAM DIRECTORS MEETING

February 8.9, 1955

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ist of Pane

PERSONNE:

OFFICE OP THB DIRECTOR.

C. Bugher-.. Director

J. Gonberg. «Deputy Director

Cobar-...+.. Associate Director

Rushfora.....Jech. Asst. to Dir.

CH. Waleh.+.- Tech. Asst. to Dir.

Barton... .sscExec: Rest. to Dir

Tregarch Assistant

UTnresearch Assistant

M, Rosado... Adninictrative Asst.

I, Rivera.....-Administrative Asst.

8. P. Caseiiaa. -Aiministrative Asst.

s ?Administrative Asst.

° Uhaninistrative Asst.

zB Vtechnical Assistant

L. Rodriguez... Technical Assistant

M. P, Zurinaga. Technical Assistant

B. Rivera, ... - Technical Assistant

8. Santiago. - Technical Assistant

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Sr. Admin. Officer

?Admin, Officer

Taanin. Officer

Taanin. Officer

URearch Assistant

Tagniatrative Asst.

TAanistrative Asst.

TAdministrative Asst.

[agmintetrative Asst

TAdnietrative Acst.

"Techaieal Assistant

?Technical Asaierent

Technical Assistant

?Technical Assistant

?Technical Assistant

?Technical Assistant

Titechageal Assistant

echanical Assistant

?Technical Assistant

Bier.

2 sete:

DL Pugin:

Martine?,

L. Cardona.

Herninde2.

J. Moret:

sesesTechnies) Assistant

?technical Assistant

?technical Assistant

Uteenntesi Assistant

Technical Assistant

?Technical Assistant

?Technical Asstevant

?Technical Assistant

Ulteenndead Assistant

Technical Assistant

Technical Assistant

?echnical Assistant

?Technical

?Dechnical Agsiatant

: ?Technical Assistant

|b Barreto.. Telephone Operator

Moreno.-..+--Telephone Operator

Student Assistant

?TECUNICAL SERVICES (RIO PIEDRAS)

Research Associate

Bailéing Engineer

?Technical Assistant

?Technical Agsistant

?Technical Assistant

A, Rivera... Technical Assistant

Vi Wontafiee.... Technical Assistant

3. D. Zayag...-cTechnical Assistant

M. AL Martine2. Technical Assistant

M, Nazario.....: Technical Assistant

---Page Break---

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4H, Besselievre. Research Associate z ?Technical Assistant

J. R. Boria....-Regoarch Assistant R ?Carpenter

Hy Tirado...../ Regearch Aasiatant « iiiganttor

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F. Ginara.....1 Research Assistant E. Agostini...1 (Maintenance Worker

B. Ramirez... (Research Technician R. Aponte... /Mechante

H. Ayguabtas..-Research Technicia: EL sed

?Lab. Equip. Mechante

M. Rivera.....JResearch Techateian J. Morales... taborer

AL Gonzalez...1 Technical Aseistant PL Valent fn... Laborer

SLM. Dietah../Technieal Assistant R. Ranos, ?Laborer

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R. Montalvo. ...-Researeh Asagstant Wi, L. Arcelay.. Technical Assistant

E. Rodrfiguez... Research Assistant 8. Rate ?Mfechnical Assistant

SLM. Rivera..cReseareh Assistant

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Chief Scientist

?Associate Scientist

3, -Research Assistant

D.

Research Associate ve

L

a

MTechnical Assistant

Research Assistant

seResearch Assistant

?Research Assistant

?RADIOISOTOPE APPLICATION

+ Ohiet Scientist A, Carrasquillo. Research Assistant

?Research Assistant

?Administrative Asst.

Technical Assistant

Research Assistant

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M. Hy Vega..+.-Research Assistant

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SIM, Toné..+1s-Chief Sotent: L) Taailis....1-Researeh Technician

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?Associate Scientist Herndndez. +. Technical Assistant

[Associate Scientist ¥. Astacio... - Technical Assistant

TRegearch Associate WLM, Ramos.. =. Technical Assistant

iiikesearch Associate C1 M. Crug.+...-Clerk Typist

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[Repearch Technician L. G. Meves.--Eegearch Technician

Research Technician 2D, Ssealera,-..-Zechanical Aseistant

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Ds Bs Lindens

Research Technicians

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FL K. 8, Koo. Scientist x. Mrex. Regeareb Techutcian

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cAssociate seientiat x

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ERMESTRIAL ECOLOGY PROGRAM - PART I

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: Conga. earch Technician

. Montai Mecasica: Asstavant

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Mfechaical Assis? nt

?Techaiesl Asaieant

J. Vitelia.... Associate Solentie?

PL Liard.....s-Research Assistant a

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CUiikegeazeh Technician

SUGAR CANE BORER FROGRAM

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Véquez.:<1 Technical Assistant

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++s-Assoctate Scientist

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?reancamon outer eewrez CONTRACTOR: UNNERSIY OF PR,

SEPTEMBER, 1964 Gemnon Puerto nico

OPERATIONS + MK RIDE

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DaTon Je bom

MARINE BLY yy

---Page Break---

WOTES FOR JCB:

1+ Program changes-?The presentation scheduled for 11:30 acm. will be given after lunch. ?Buses will leave for Cecilia's aetanrane oe 21:30 am. Cocktails will be served when ve arrive, ani to exoedite table service, ve shall pass out a mineographed list of the lavcheon

Gholes during coffee break, and ask participants to indicate when

they would like, Return mimeographed form to Miss Correa at Information Desks

2. Indicate that Gylvie will be glad to reconfirm travel reservations, etc.

For group who plan to depart on Tuesday afternoon, they those letters

for her if they plan to go to the airport directly from the Center so that

we may plan special transportation for them.

3: Tila Traps--Olge Dias will be at the Field Trip desk, and will arrange

for those interested in going to Mayaguez on Wednesday.

4+ You may wish to announce the amount of money that is to be collected--

\$10 -- for @ man alone

\$25 -- 1f wife taken to Caribe Monday night

My Tour of Building--In order to have groups leave in an orderly fashion,

think we should cancel the last coffee break scheduled for 3:45 so

Mise Marta de Arce --write tags

Mra Sara Jean de Jens

Green tage

Mise Zenaida Frias

Pink tage

Miss Irma Vazquez -- Yellow tags

diy tew

---Page Break---

Puerto Rico Nuclear Center

Overated by

University of Puerto Rico

for

U.S. Atomic Energy Commission

February 2, 1965

Memorandum

to + Rfo Piedras Division Heads

From: Marie Bartony, ϕ

Subject: Tour of Bio-Medical Building 2/8/65

As agreed on Monday's meeting, February 2, participants in the Bio-Medical Program Directors meeting will be taken on a tour of the Bio-Medical building similar to the one arranged for the American Public Health Association about a year ago. The tour will be Monday, February 8, from 4:00 to 5:00 p.m., and all staff will be

expected to remain in offices and laboratories until the tour ends and the buses leave for the Da Vinei Hotel.

The guests will be given identification tags of four different colors: when they register Monday morning. At 3:00 p.m., tour guides, identified by color badge and ribbon, will join the audience

in the meeting rooms. Before closing Monday's meeting, Dr. Bugher will explain how the tour will be conducted and introduce the guests to their respective guides.

At 3:50 p.m. the guides will take their groups to the following starting points in the Bio-medical building:

Sara Joan de Jess (green tag) - Corridor leading to back

?exit to Chemistry Laboratory, end floor.

(Radioisotopes Division - Dr. Edwin Roig)

Imma Véequer (yellow tag) = First floor Lobby.

(Medical Sciences and Radiobiology? ~

Dr. Paul Welnbren)

---Page Break---

Zenaida Fries (pink tag) - Corridor leading to Cancer Hospital,

Radiation Therapy and Cancer - Dr. Victor Narcial)

Marta de Arce (white tag) - End of corridor on second floor

near door to temporary animal facilities

(clinical Applications - Dr. Sergio Irizarry)

?As soon as groups arrive, Division Heads will outline their programs

(23 minutes allowed). At the sound of the telephone chimes, the presentation must end. The guide will lead her group to the next Division Head, as shown on the diagram below:

isotopes,

Plant Anatomy & Physiology

Plant Genetics

Each Division Head will repeat his presentation four times. At the

?end of the fourth presentation, guides will return their groups to the Lobby.

uses to return guests to the Da Vinei Hotel will be parked in front

of the Bio-medical Building.

?The timing of presentations and group movements are as follows

soo = 4:13 P.M. = 1st presentation

bag = 4:30 P.M. = 2nd presentation

ais 20 P.M. = 3rd presentation

h:gB = 4:30 P.M. - Groupe move

higo = slg P.M, = 3rd. presentation

wilg els P.M, = Groups move

4.5

Pa, - ith presentation.

---Page Break---

U.S.

?ATOMIC ENERGY Com@erssToK

BLO-MEDICAL PROGRAM DIRECTORS MEETING

February 8-9, 1965

(and Mee)

(and Mre)

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BLAIR, Henry 3a

BOND, "victor P. 433

oR, J. Le 232

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puRR, W. W. 637

CLAUS, Walter D. 333

Com, Frederick P. (and Mrs) 635 ?ANDREWS, Gould

CURTIS, Howard J. 337

DAVIS, Jared J. (and Mes) 839

DEAL, 'L. Joe 637

DOWALDSON, Laure R. (and Mrs) 338

DUDA, George D. 333 ?AT THE vOLIDAY THM HOTEL

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ELMO, Rosemary 3a

ERGLIND, Kenneth L. 536 ?WOSHBAUGH, C. C.

GARDINER, Donald 4. 539

?conta, John W. 640

aim, Douglae. 542

HALL, ?athan S. (and Mrs) 732

HARLEY, Joka H 337

HARPER, Paul V. 432

ERDE, "KARL 6a

HOLLAENDER, Alexander (and Hee) 231

HuDsoN, Miller NW. (and Mre) 335,

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KORNBERG, H. A. (and Mrs) 433,

LONG, Anton 639

LANGHUM, Weight H. (and Mrs) 435,

MARTUBLIT, Leontdae 237

MARKO, Anthony 636,

MEUKLER, Jason 640

MORGAN, "Karl 2. (and Mee) 638,

NYGARD, Oddvar 71

636

333

(end Mrs) 233

6a

ROTH, Herman 533

ROTUSTEM, Aser (and Hes) 334

ROWLAND, Robert E. (and Mrs) S41

SHIPMAN, THOMAS L. (and Mes) 441

SHOUP, Charlee S. (and Mrs) 731

?OTTER, John R. (and Mes) 436

WHETE, ?Clayton? 8. 339

WOLFE, John H. (end Mrs) 833,

ELLE, Max R. 342

---Page Break---

Puerto Rico Nuclear Center

?Operated by

University of Puerto Rico

for

U.S. Atomic Energy Commission

NORE 70 vIVES:

on Monday, February 6, several short trips have been planned. Please call Mrs. Barton at the Puerto Rico Nuclear Center (707-0350) on Sunday, February 7, to let her know the trips in which you are interested.

9:30 - 11:30 am, -- A tour of several local gardens has been planned by the Puerto Rico Garden Club.

Transportation will be provided.

1:30

+ Two trips are planned for the afternoon, one to Luquillo Beach, and one to El Yunque.

Below is a description of both places which may help you decide which one you wish to visit,

LUQUILLO BEACH

Luquillo is the name of a small, pleasant fishing village about 25 miles east of San Juan (110 minutes by car on route 3, a first-class highway). It is famous for its lovely beach, which is ranked among the most beautiful in the world.

The beach itself is a mile long with clean, white sand and sparkling clear water. It fronts the Atlantic Ocean and is protected by a jetty of land, Point Barcadero, that juts into the sea.

Facilities at the beach include over 2,000 lockers housed in a modern concrete bath house. Showers and toilet facilities plus the use of a locker for the day costs 10 cents.

Picnic tables and benches are stretched along the length of the lawn that leads to the beach. Palm trees in rows of five or six are carefully planted along the lawn. Parking in the adjoining lot costs 25 cents for the day.

Luquillo Beach is maintained by the government and is open to the public from 8:00 a.m. to 6:00 p.m. on Saturdays and Sundays, from 10:00 a.m. to 6:00 p.m. on Tuesday through Fridays, and from 2:00 p.m. to 6:00 a.m. on Mondays.

?Tour buses and ,éblicos leave San Juan for Luguillo Beach at various
?times during the day.

---Page Break---

EL YUU

Puerto Rico offers one attraction that cannot be icund in any other
retort area in the Western World - its tropical rain forest at El Yunque.

Toverins nore than 3,500 feet into the clouds, E1 Yunque -- The anvil --
de part of the Caribuean National Forest that vss establishea by President
?Theodore Roosevelt in 1303 and declared an Experimental Forest in 1950. You

can see El Yunque's in,osing vilhouette against the clear tropical sky frou
almost any point in gan Juan.

only about 25 nils to the southeast of San Juan, a drive of a Little
ess than an hour will take you to the recreational area.? Frou here you can
hike to the yeak on well-narked trails.

El Yunque's wild green beauty stems from the heavy rainfall in this area. Annual rainfall averages over 100 inches. Tropical tree species grow with amazing rapidity. More than 300 species have been identified, many peculiar to Puerto Rico and El Yunque alone. Tree ferns of more than 50 varieties range along the trail leading to the top -- some delicately small, looking like green lace, and others growing to heights of more than 300 feet. Tiny delicate orchids growing on trees, rocks, and logs produce large sprays of yellow flowers that resemble a swarm of butterflies. Other plants are brilliantly false-colored.

La Mina Recreation Area is the jumping off spot for those wishing to climb to El Yunque peak. There are two stream-fed swimming pools and an excellent restaurant serving Puerto Rican dishes.

Every week-end the several trails of El Yunque are busy with small groups headed for eastern "top of the island". From the top, you can see both the Atlantic and the Caribbean as well as the small town below. The ascent to the Pinnacles, one of the trails, is climaxed by a dramatic climb up a steep flight of 100 steps to the sentry tower that dates back to early Spanish colonial days. The climb takes about 10 minutes, with rest shelters along the way.

---Page Break---

Puerto Rico Nuclear Center

Operated by

University of Puerto Rico

U.S. Atomic Energy Commission

U.S. ATOMIC ENERGY COMMISSION

BIO-MEDICAL PROGRAM DIRECTORS MEETING

February 0-3, 1969

The Da Vines Hotel opened officially only a few days ago and restaurant activities are still not available. However, you are near many hotels where breakfasts are served. For dinner, pages 45, to 20 see the QIE PASA guide, which is enclosed in the GENERAL INFORMATION kit»
Some of the restaurants in the Metropolitan Area which you may be interested in trying.

SUNDAY, February 3, 1969

Participants arriving before Sunday were asked inquiries regarding their interest in the Sunday field trip. Transportation to the rainforest, project. See the De Vinci Hotel at 1:00 pm. Arrangements to visit the Marsden Saylor Foundation may be made by calling the PRUC office (767-0350) on Sunday

seeneey Titer 6:00 sa, The trip to Mayaguez by car is three hours one-way
?and 25 minutes by Caribair Airline.

participants staying after the meetings may arrange tied trive tor
Weanectey, Feorusry 9. There will be x desk outside of the meeting room et
The Center, where theae trips can be scheduled.

HoWDAY, February 3, 1308

on Monday mornin; two buses will be parked at the Da Vinei Hotel (on
Venaie street} at 7:15 aa ie is imjortant thet these buses depart ne
vena eee oan in order to each the Center by 8:30 ea.vhen the progres
begins.

PLEASE BRING THIS FOLDER WITH YOU, THE IDENTIFICATION TAG AND TH
piu GME iN THB ENCLOSED ENVELOPE ARE 0 BE WOR ON ALL FIELD TRIPS. AND
TUNE MEETINGS IN WHICH YOU PARTICIPATE. AT THB END OF YOUR VISIT THE
Fur BADGE MUST BE RETURNED 70 THE PUERTO RICO NUCLEAR CENTER.

Lunch on Monday vill be at Cecilia's Restaurant, Brs transportation
wit eeovided. ut 5:00 9m the group will return by bus to the Da Vinci

?You (ana your wife 1f she 4a with you) are invited for cocktail® and
aime et the Sen Gerénino Roon of the Caribe Hiiton at 7:30 pa, with our

dinner & beverages are courtesy of the Center. Dinner is ?Dutch®. | Buses
leave for the Da Vinci at 7:15 am and will return at the end of the evening,

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TUESDAY, February 9, 136:

Buses will be at the Da Vinci Hotel at 7:15 am. and will leave at
7:30 am.

Sandwiches and coffee will be served for lunch.

From your travel schedules we note that a group will be returning to
Washington, D.C. on the 5:00 pm. plane, Some of you may wish to leave directly
from the Center. arrange for transportation to the airport with Miss Sylvia
Correa at the Information Desk at PRNC. For others, buses will be available
for the return trip to the Da Vinci.

Telephone Numbers:

8. ABC Puerto Rico News Office ?787-200

Puerto Rico Nuclear Center, Rio Piedras 767-0350

Puerto Rico Nuclear Center, Mayaguez 032-1414

Da Vinci Hotel 725-2323,

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