

PRNC035

PRNC 35

PUERTO RICO NUCLEAR CENTER

TERRESTRIAL ECOLOGY PROGRAM, PART I

RADIATION INDUCED VARIABILITY IN INDIGENOUS
ARTHROPOD-BORNE ANIMAL VECTORS OF PUERTO RICO

PROGRESS SUMMARY REPORT NO. 2

April, 1960

OPERATED BY UNIVERSITY OF PUERTO RICO UNDER CONTRACT
NO. AT (40-1)-1838 FOR U. S. ATOMIC ENERGY COMMISSION

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PRNC 35,

Terrestrial Ecology Program Part I

RADIATION INDUCED VARIABILITY IN INDIGENOUS

ARTHROPOD-BORNE ANIMAL VIRUSES OF PUERTO RICO

Progress Summary Report #1

March, 1964

Maurice Paul Welbren-Principal Investigator

Puerto Rico Nuclear Center

operated by the

University of Puerto Rico

for the

U.S. Atomic Energy Commission

under contract Wo, AT-(40=1)-1833

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Support for this program was received in April

1963 but the initial few months were spent in recruiting

Personnel and training then. Now we have established

2 mouse colony, holding space and a virus laboratory

in the temporary quarters and the program has been

activated, It is anticipated that the permanent small

animal facility and laboratory will be ready for

occupation by fiscal year 1966. Field operations at

the study site to date have been oriented towards

Rosquitoes and rodents, Permanent trap lines have been
aid and are set weekly to trap rodents which are marked
and released, At selected intervals the rodents are bled
for antibody studies and aise for attempted virus isolation,
Mosquitoes are caught in light traps and also when
alighting on hunan bait. After identification, the
mosquitoes are triturated in bovine plasma albumin

and tho resulting suspension inceulated inte mice to
attempt virus fsolation. To date no virus isolation have
deen nade from material collected at the £1 Verde Field
Station. Between August 19 and December 31, 153 rodents
were trapped 618 tines - of these, 41 were ceught once,
27 twice, 15 three times, 16 four tines, 12 five tines,

9 six times, 9 soven tines, 4 eight tine:

+ 10 nine times,

2 fen times, 1 eleven times, 2 twelve times, 2 thirteen

tines, 1 fourteen times and 2 fiftecn times, Each tine

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a rodent is caught it is weighed and its general condition
is noted, It is interesting to note that most animals
have a fairly restricted home range but occasionally
wander away though inevitably return to the home range,
The female mosquitoes caught on the mountain have
been processed as 29 pools. The number of each species
inoculated are listed below.

Aedes aegypti a

Aedes species indeterminate rr

Culex quinquefasciatus 1

Culex nigripalpis 775

Culex species indeterminate se.

Anopheles species 16

Nansonia species au

Uranotaenia species a

In August, 1963 a"

engue-like" illness occurred in
an epidemic scale in the town of Manati, Puerto Rico.

Manati is situated 3,5 miles inland at the mid point

Of the northern coast 26 miles west of San Juan, It is

probable that

of the disease occurred elsewhere
on the island before the epidemic at Manati; we have,
for instance, records of similar illness during

September in the staff of the Puerto Rico Nuclear Center

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at Mayaguez on the western coast, Shortly after Manat!

was declared an epidemic area cases occurred in the San

Juan area and notably in Bayanon, From here it "move

to the eastern end of the island and then down the coast with what would appear to be the last cases in the Reighborhood of Ponce which {s situated to the west of center of the southern coast,

The Puerto Rico Nuclear Center became involved in the measures taken to study the disease when the Arbovirus unit of the Medical Seiences Division was invited to join Dr. Costa Mandry's team from the Department of

Health and a team from the Conaunicable Dis:

se Center,

Atlanta, Georgia, On August 23 it was arranged that specimens could be collected from acutely i11 patients

in Wanati and 24 patients were bled by the team of the Puerto Rico Nuclear Center to which Dr. Agustin Cajigas

of the Department of Health had been assigned for duty during the investigation,

It may be noted here that this outbreak of illness has resulted in the establishment of an extremely valuable Link between the laboratories of the Department of Health and the Puerto Rico Nuclear Center which now work Together and cooperate very closely and Dr. Cajigas has been appointed to an Ad Honorem position as Associate

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Scientist in the Division. Our connection with the C.D.C. group is of long standing and we are indebted to them not only for assistance currently being received but also for help in establishing the unit here.

on August 25, Dr. Telford Mork, Chief, Virology Section at C.D.C. visited Manati with Dr. Cajigas and they managed to find and obtained specimens from 6 Individuals previously bled and 5 who claimed to have been afflicted in the past 3-4 weeks, On receipt of these specimens, at about 9:00 P.M., they were immediately processed and set up in an haemagglutination-inhibition test against Dengue type T antigen provided by C.D.C., Atlanta, The

100 A.M

erythrocytes were added to the test at

and the test read at

JOALM, on August 30, The

results are set out below, the results identified

by letters pertain to the sera from the individuals

with a "history" of disease,

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Specimen Acute serum titer convalescent

serum titer

Her 48 < 1:20

#10» 32 < 1:20

#12 man «1:20

SH 22 < 1:20 1s260

19m 18 «1:20 4:60

#22 raz @ 1:20 > 1110240

ar 11640

Bros > 1:10240

cr 1:80

DF < 1:20

EM 70 «2:20

From these results it was clear that the ϕ :

ociated with an agent which is related to Dengue

I type virus, (Until such time as an agent is adapted to

regularly kill a laboratory animal, it is not possible to

establish its exact identity). The agent which caused the

illness in Puerto Rico, in all probability is the same as

that which caused the epidemic in Jamaica a few weeks prior

to the one here, has proved unusually hard to adapt to

either laboratory mice or tissue culture, Several

different groups have been working with it but none

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have had any success in fully adapting an agent from many samples of material, though as described in the last paragraph our unit would appear to have had the greatest success.

The contribution of the Puerto Rico Nuclear Center to the overall effort lay largely in the initial preparation and screening of specimens collected in the field, in all

1,237 human blood specimens were centrifuged

the

separated and ampouled, one ml of each serum was also treated for testing by the haenagglutinationainhibition test. Aliquants of all specimens were sent to C.D.C., Atlanta both for attempted virus isolation and serological study.

Of the 1,237 sera 88 were taken in the first 6 hours of illness and in this laboratory were inoculated into infant mice and 143 taken in the first 12 hours into tissue culture to attempt virus isclation, Mosquitoe: numbering 17,943 were processed in 180 pools - the

distribution by species is shown below,

+ aegypti 6,949

C. quinquifasciatus 10,983,

©. nieripaipis 26

Culex species as

17,003

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These mosquitoes were caught by a team consisting of our own field staff augmented by some catchers from the Department of Health, all under the supervision of Mr. Leslie Beadle of the C.D.C. staff, who was also responsible for their identification. The human sera came from a variety of sources, mainly those collected by a team

from the Epidemiology Branch at C.O.C, and from an

obstetrician, Dr, Arandes, who has provided 129 paired

sera from pregnant women who had the disease in order to study any possible effect these may have had on the foetus.

From 22 acute blood specimens and from 30 pools of mosquitoes, agents have been obtained which cause transient illness in infant mice and 28 2 cytopathogenic effect in African Green monkey kidney tissue cultures.

The presence of virus may be shown in both infected mouse brain and tissue culture cells by means of the indirect fluorescent antibody technique. In the hopes

of incre

ing their pathogenicity, two strains of virus
are in continuous passage in infant mice and two more
?are in serial passage in infant mice which have been

irradi

ed with an air dose of 300 rep of X Ray
(from a 350 KVP machine) prior to inoculation in order

to decrease their natural resistance to the agent. A

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well controlled experiment has given extremely encour-
aging results in that the irradiated infant mice {inoculated
with serum from an acutely {11 patient sicken and die

and their brains give a strongly positive ri

jection by

the fluorescent antibody technique, After 2 further

passages it is hoped to achieve production of antigens

for use in serological tests which are of sufficiently

high titer to be of value in achieving from identification

of the agent by reciprocal tests with the 6 known dengue

Viruses, A haemagglutinin has been made from 2 strains of

virus, but its potency is so low that it is of little

value for practical purposes

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