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FINAL REPORT TO THE PAN AMERICAN SANITARY BUREAU REGARDING THE 1948-49 OUTBREAK OF EASTERN EQUINE ENCEPHALITIS IN THE DOMINICAN REPUBLIC*

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An epizootic due to the Eastern equine virus occurred among equines in the Province of Monte Cristi from October 1948 to February 1949 and was accompanied by an outbreak of human encephalitis. During March 1949, a similar epizootic occurred in the Province of Samana.

Monte Cristi Outbreak.—The Province of Monte Cristi is situated in the northwest corner of the Dominican Republic. Only that portion of the province was affected that extends along the Yaque River of the North from its mouth to the neighborhood of the village of Villa Sinda to the southeast. The area is roughly bounded on the northeast by the main road extending from the city of Monte Cristi to Santiago, on the southwest the river forms a rough boundary. The area extends beyond the river a kilometer or two from El Ahogado to Bohio Viejo. Most of the affected area is an irrigated rice growing area. The rice area extends roughly from Rincón to Villa Sinda. Above El Ahogado on both sides

* In accordance with a request of the Secretary of Public Health of the Dominican Republic, through its Ambassador in Washington, the Pan American Sanitary Bureau obtained through the National Institutes of Health, U. S. A., the services of three specialists: Drs. Carl M. Eklund and James M. Brennan, of Hamilton, Montana, and J. Frederick Bell, of the National Institutes of Health, who proceeded to the Dominican Republic to study the outbreak and to assist the health authorities in establishing adequate control measures. The mission was accomplished as a cooperative project of the United States Public Health Service, the Government of the Dominican Republic and the Pan American Sanitary Bureau.

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of the river is a large banana plantation, also irrigated. From Rincón to Monte Cristi and to the ocean is a relatively dry unirrigated region. Between Monte Cristi and the ocean are extensive salt flats. The mouth of the Yaque River is also only a short distance from Monte Cristi. To the northeast and southwest of the epizootic and epidemic area is high dry country.

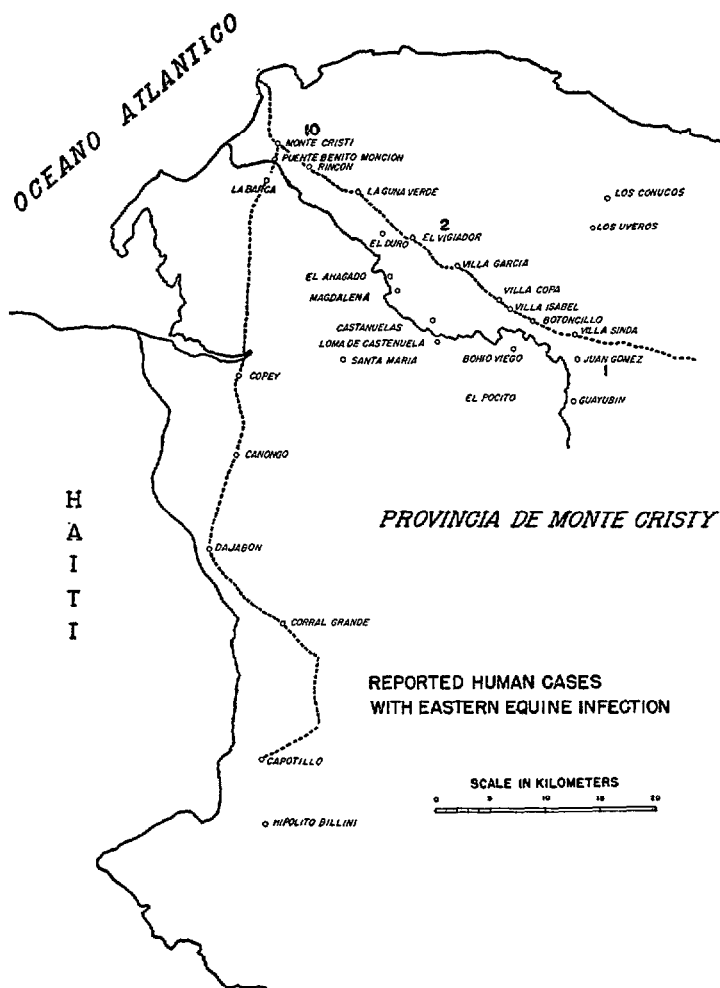
In October 1948, dead horses were found on the east bank of the Yaque River near its mouth. At first, because of the small numbers involved, little concern was aroused. During late November after the disease continued to spread, the Chamber of Commerce of Monte Cristi requested the assistance of Dr. Ramon Viñas, veterinarian of the agricultural district of Santiago. He arrived at Monte Cristi on November 24th and made a clinical diagnosis of equine encephalomyelitis probably of the Eastern type. On November 26th, Dr. Rodriguez, veterinarian of the Department of Agriculture, arrived and concurred in this diagnosis. They found the disease to be limited to an area with a 5 km. radius about the city of Monte Cristi and estimated that up to November 27th, 27 equines had died. By December 7th, the disease had spread inland to Laguna Verde and El Duro, 9 km. and 13 km., respectively, from Monte Cristi. Up to December 15th, it was estimated that 57 deaths had occurred.

During the first 15 days of December, an acute highly fatal disease appeared among young children in and near Monte Cristi. Clinically, this disease was considered to be an encephalitis caused by an equine virus, probably the Eastern type. Confirmation of this clinical diagnosis was later obtained in the laboratory of the National Health Department at Ciudad Trujillo, by positive complement-fixation tests with serum from three survivors. In addition, positive neutralization tests were obtained with these sera and an equine serum in the Infectious Disease Laboratories of the National Institutes of Health, Bethesda, Maryland.

A total of 13 cases was recognized. Details regarding these cases are given in table I and map I. The dates of onset of illness were: November, one case; December, ten; January, one; and February, one. Ten cases lived in or very close to Monte Cristi, two at or near the village of Vigiador, and one at Juan Gomez. This last person worked each day at Villa Isabel. Ten of the cases were 5 years of age or younger, two were 7 and 8 years of age, and the thirteenth case was a 20-year old woman. Only four recovered and one of these had a severe spastic paralysis. A short summary of the clinical findings was obtained in seven instances—five fatal cases and two that recovered. Onset was quite sudden with fever, vomiting, and malaise as the most common symptoms. On the second day, there was frequently an apparent improvement. The temperature increased and convulsions appeared on the second or third day and were the striking findings until death occurred

or recovery began. The time of death was given in four cases and varied from 3 to 8 days.

MAP I



Since population figures were not available for children of the various age groups, an attempt was made to arrive at an approximate attack rate by using vaccination figures as an estimate of the number of children. Vaccination was practically complete for children 11 years of age and under. In Monte Cristi, 1,472 children were vaccinated and ten cases were reported giving an attack rate of 6.7 per 1,000. Since most children affected were 5 years of age or under, the attack rate will be too low for this age group. The children at Vigador were apparently vaccinated at nearby villages, so no estimate is available as to the num-

ber of children. From the number vaccinated at nearby villages, it would appear unlikely that the number would exceed 200. So it is probable that the attack rate is about equal to that at Monte Cristi.

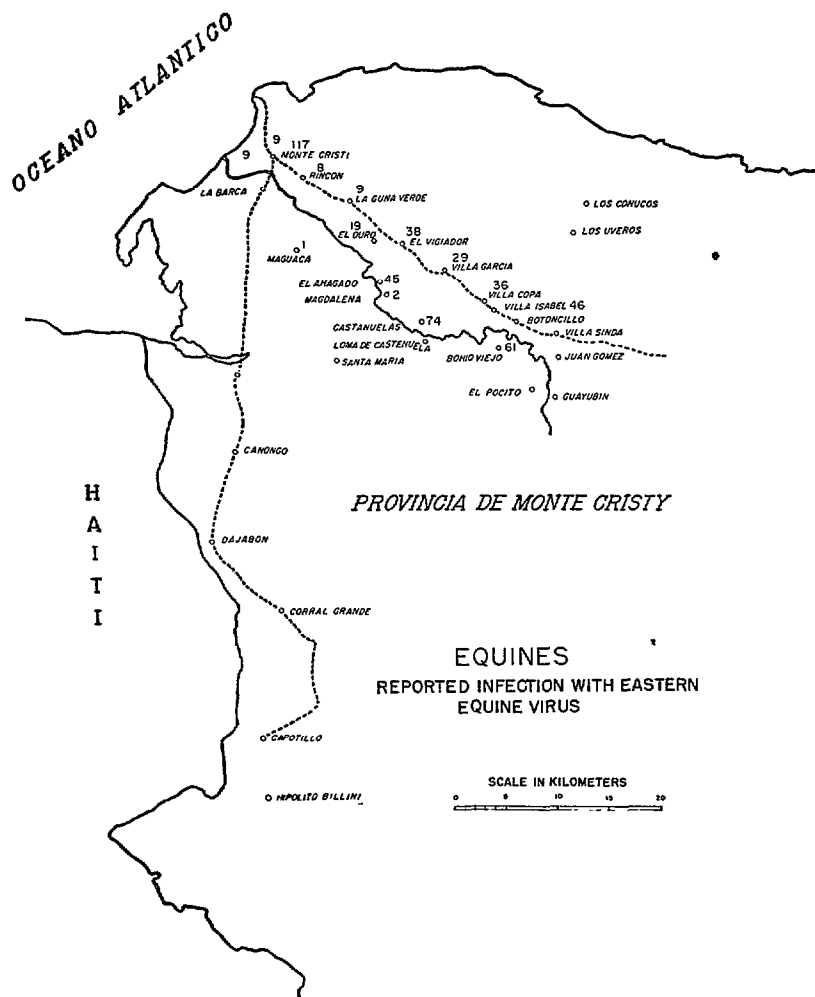
TABLE I.—*Encephalitis cases in the Province of Monte Cristi*

Identification	Sex	Age	Onset	Location	Outcome
1. J. A. E.....	♂	10 mos.	11-30-48	Barrio El Albinal (Monte Cristi)	fatal
2. W. J. S.....	♂	4 yrs.	1st wk. Dec.	Barrio La Carretera (Monte Cristi)	fatal
3. V. A.....	♂	5 yrs.	1st wk. Dec.	Barrio Las Flores (Monte Cristi)	fatal
4. N. C.....	♂	5 yrs.	1st wk. Dec.	Barrio Las Flores (Monte Cristi)	fatal
5. R. A. M.....	♂	5 yrs.	1st wk. Dec.	(City) Monte Cristi	recovered
6. C. R. C.....	♂	7 yrs.	1st wk. Dec.	(City) Monte Cristi	recovered
7. M. R.....	♀	8 yrs.	2nd wk. Dec.	Barrio El Albinal (Monte Cristi)	fatal
8. M. R.....	♀	1 yr.	2nd wk. Dec.	Vigador	fatal
9. A. A. G.....	♀	1 yr.	2nd wk. Dec.	(City) Monte Cristi	recovered
10. A. B. C.....	♀	7 mos.	2nd wk. Dec.	Barrio El Albinal (Monte Cristi)	fatal
11. G. C. G.....	♀	1 yr. 5 mos.	3rd wk. Dec.	Barrio El Albinal	recovered with sequelae
12. J. T.....	♂	1 yr. 3 mos.	2nd wk. Jan.	Near Vigador	fatal
13. A. P. V.....	♀	20 yrs.	Feb. 1, '49	Juan Gomez (worked in Villa Isabel)	fatal

Equine cases in the Province of Monte Cristi.—(Table II and map II). By February 11th, the epizootic was practically at an end. A total of 516 cases was reported to the Department of Agriculture. Although 13 cases were reported from outside the epizootic area, all had been exposed within the area and became sick soon after leaving the area. Only three equines, all mules, were said to have recovered, but since all sick animals were ordered killed when the nature of the epizootic was recognized, accurate mortality figures are not obtainable. A strain of Eastern equine virus was isolated from a brain specimen sent to Dr. Raymond Randall, Army Veterinary School, Washington, D. C. The time incidence of the epizootic is not accurately known. Since 57 cases were reported by December 15th, 459 cases presumably occurred after this

time. At Monte Cristi, 30 equines were reported to have died during November and 60 in December, leaving 27 deaths to have taken place during January and February. Estimates of the equine attack rates were obtained by using vaccination figures. Animals from several villages were vaccinated at the same time and animals from villages just

MAP II



outside the epizootic area were often vaccinated with animals from villages within the area, so that the figures are only approximate and the attack rates only give an estimate of the actual rate. It was possible to group the vaccination figures into two portions: One representing the Monte Cristi area and the other the rice growing area. At Monte

Cristi, 3,900 equines were reported to have been vaccinated and 125 equines were reported to have died, giving an attack rate of 32 per 1,000. In the rice growing area, 13,919 were vaccinated and 367 animals reported as dying, an attack rate of 26 per 1,000.

TABLE II.—*Equines reported dead in Province of Monte Cristi*

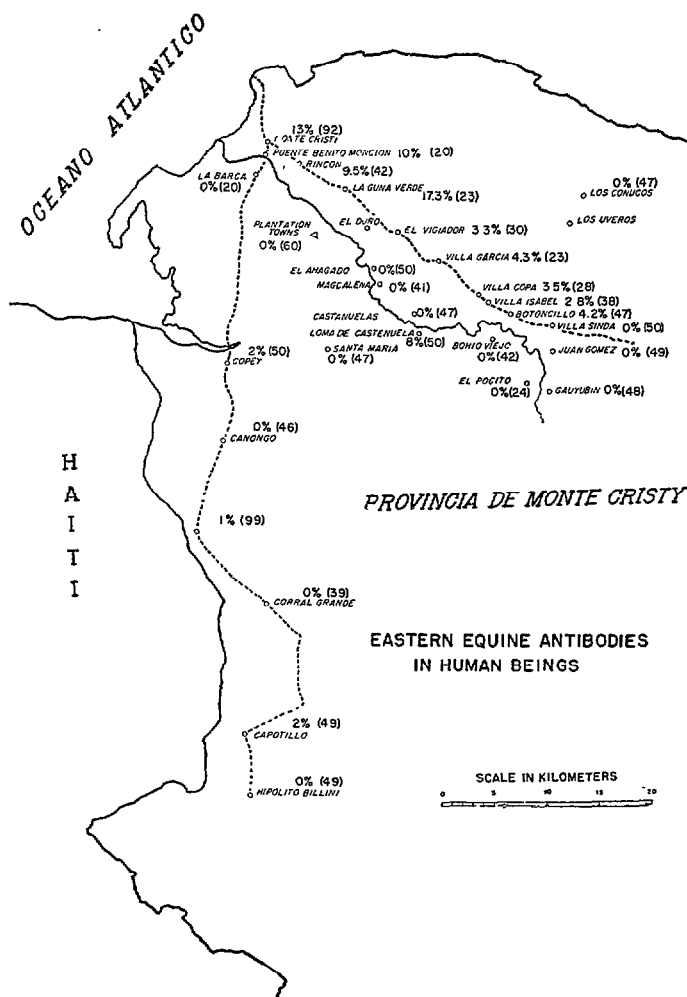
Locality	Number
1. Desembocadura del Yaque del Norte.....	9
2. Monte Cristi.....	117
3. Barrio Albinal (Monte Cristi).....	9
4. Sección de Rincón.....	8
5. Laguna Verde.....	9
6. El Duro.....	19
7. El Vigador.....	38
8. Villa García.....	29
9. Villa Copa.....	36
10. Población de Villa Isabel.....	46
11. El Ahogado.....	45
12. Castañuelas.....	74
13. Bohío Viejo.....	61
14. Magdalena.....	2
15. Maguaca.....	1
16. Hatillo de Palma*.....	4
17. Santiago Rodríguez*.....	9

* South of epidemic area and equines had been exposed in epidemic area.

Serological study of Monte Cristi outbreak.—To gain a more accurate picture of the extent of the epidemic and epizootic areas, the intensity of human and equine infection within the areas, and the degree of correlation between human and equine infection, blood samples were obtained from people, equines, and other animals both within and outside the reported area of human and equine infection. It is recognized that some of the antibodies detected may represent infection from previous years, but since no known epizootic had occurred in the area, it is probable that in most instances, and possibly in all, the presence of antibodies means infection during the present outbreak. To detect antibodies, a screen neutralization test was used. A negative serum was used to determine the titer of virus in each run, and two 10-fold dilutions of virus were used for each serum being tested, a known positive serum was included in each run, and six mice were used for each virus dilution. The titer of the virus lots used varied somewhat from run to run, so it was not possible to set a definite value in minimum lethal doses neutralized that would indicate a positive serum. The degree of neutralization considered positive varied from 50–100 M.L.D., depending on the run. It was felt wiser to set a rather high minimum value for

a positive serum and avoid including many doubtful results even though some positive sera may have been excluded.

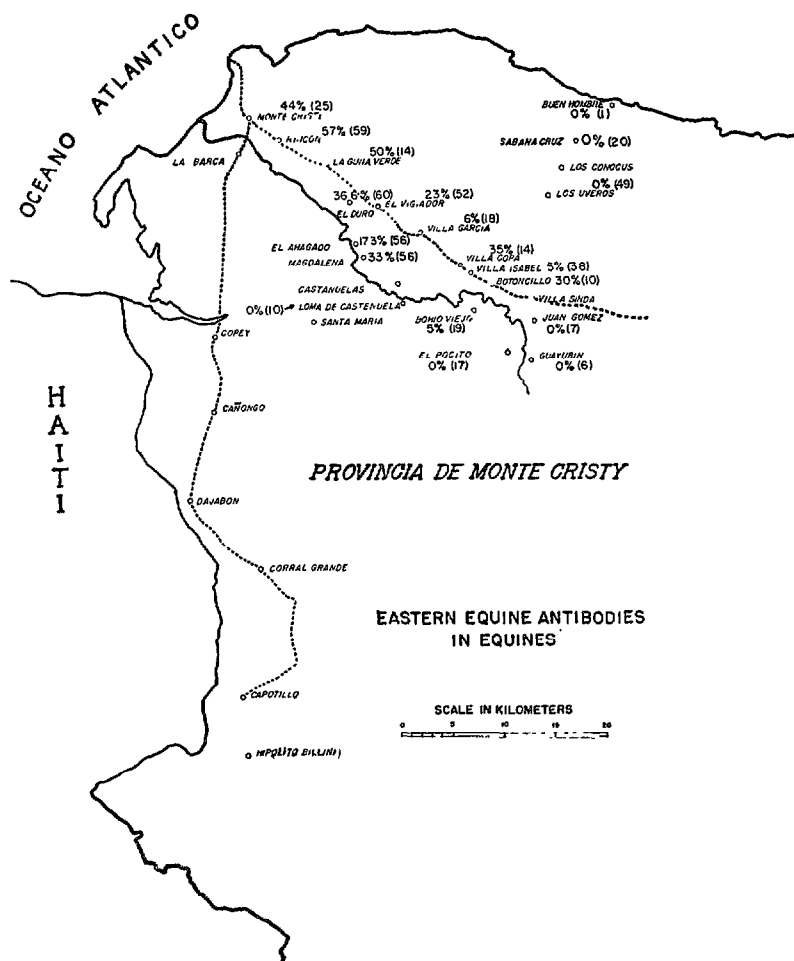
MAP III



The results are given in tables III and IV and maps III and IV. Since children 11 years of age and under had, in most instances, been vaccinated, the sera, with a few exceptions, represent a population older than this. No significant age or sex variation in the incidence of antibodies was noted. The majority of people sampled were under 40 years of age and the majority of positive results were found in this age group. A geographic pattern in the distribution of antibodies is ap-

parent. The highest incidence of antibodies among human beings, 9.5-17.3%, is found in the area extending from Monte Cristi to Laguna Verde along the road to Santiago, a distance of 9 km. There is an incidence of 3-4% for another 21 km. inland along the road. Beyond this the incidence is 0%. The villages along the river, with two exceptions, have a zero incidence of antibodies. The two exceptions are Puente Benito Moncion with a 10% incidence and Loma de Castañuelas with an 8% incidence. The former is located about 2 km. west of Monte Cristi and may be considered a suburb of it. Loma de Castañuelas is in the rice area about 20 km. inland from Monte Cristi. The villages in the higher dry area to the northeast and southwest show a very low or zero incidence of antibodies.

MAP IV



The results with equine bloods are more irregular. The villages along the main road have an incidence of antibodies roughly parallel to those with human sera but at a higher average level. The villages along the

TABLE III.—Incidence of Antibodies in Human Sera

% of sera with antibodies	Villages along road from Monte Cristi	Villages along river from Monte Cristi	% of sera with antibodies
13.0% (92)	Monte	Cristi	
	Rincón	Puente Benito Moncion	10% (20)
9.5% (42)	Laguna Verde	La Barca	0% (20)
17.3% (23)	El Vigador	Plantation towns (Banana)	0% (60)
3.3% (30)	Along northeast border of rice area	El Ahogado	0% (50)
4.3% (23)	Villa Garcia	Magdalena	0% (44)
3.5% (28)	Villa Copa	Castañuela	0% (47)
2.8% (38)	Villa Isabel	Loma de Castañuelas	8% (50)
4.2% (47)	Botoncila	Bohío Viejo	0% (42)
0% (50)	Villa Sinda	Juan Gómez	0% (49)
		El Pocito	0% (24)
		Guayubin	0% (48)

TABLE IV.—Antibodies in Sera from Equines

Percent with antibodies	Villages along road from Monte Cristi	Villages along river from Monte Cristi	Percent with antibodies
44% (25)	Monte	Cristi	
57% (59)	Rincón	La Barca	
50% (14)	Laguna Verde	El Duro	36.6% (60)
23% (52)	El Vigador	In rice area	
6% (18)	Villa Garcia	El Ahogado	17.3% (56)
	Along northeast border of rice fields	Magdalena	33% (56)
35% (14)	Villa Copa	Castañuela	
5% (38)	Villa Isabel	Loma de Castañuelas	0% (10)
30% (10)	Botoncila	Bohío Viejo	5% (19)
	Villa Sinda	Juan Gómez	0% (7)
		El Pocito	0% (17)
		Guayubin	0% (6)

river show a high incidence of antibodies as far inland as Magdalena, approximately 15 km. inland from Monte Cristi.

A small number of sera from other animal species were run (table V). Goats and cattle showed antibodies. Low titer neutralization, apparently nonspecific, appears to be present in cattle sera. In the present instance, the level of neutralization chosen is probably high enough to be significant. The sera from 19 ducks were negative.

TABLE V.—*Antibodies in animal sera other than equine*

Species	Location	No.	No. +	% +
Pato	El Ahogado	19	0	0
Vaca	El Ahogado	13	2	15.0
	Magdalena	16	1	6.0
	Villa Copa	17	6	35.0
	Rincón	1	0	0
	El Ahogado	1	0	0
Mongosta	El Ahogado	1	0	0
Huron	El Ahogado	1	0	0
	Rincón	1	0	0
Gato	El Ahogado	1	0	0
Puerco	El Ahogado	1	0	0
Pollo	Magdalena	2	0	0
Chivo	Laguna Verde	14	2	13.5
	Rincón	9	0	0

Mosquito studies in the Monte Cristi area.—(Table VI) An attempt was made to isolate virus from mosquitoes caught in the affected area. One hundred twenty-seven lots consisting of 9,023 mosquitoes were sealed in glass ampules and kept on dry ice. For inoculation into baby mice, they were divided into 252 pools. One blind passage was made

TABLE VI.—*Mosquito species examined for the presence of equine virus*

Mosquito species*	No. of lots	No. of mosquitoes
<i>Aedes scapularis</i>	14	236
<i>Aedes sollicitans</i>	22	2,151
<i>Aedes taeniorhynchus</i>	15	119
<i>Anopheles albimanus</i>	19	1,418 (approx.)
<i>Anopheles crucians</i>	8	75
<i>Culex bahamensis</i>	1	10
<i>Deinocerites cancer</i>	20	4,562
<i>Psorophora confinnis</i>	10	106
<i>Psorophora pygmaea</i>	5	21
<i>Culex (Melanoconion) sp.</i>	13	325
Total.....		9,023

* It is of some interest that *Mansonia titillans*, the mosquito implicated by Gilyard in the transmission of the Venezuelan type of equine encephalomyelitis, was found in small numbers but not examined for virus content.

from the original litter of mice. No virus could be isolated. The important mosquitoes, from standpoint of numbers, were *Deinocerites cancer*, *Aedes sollicitans*, and *Anopheles albimanus*; others of lesser numbers were *Aedes scapularis*, *Aedes taeniorhynchus*, *Anopheles crucians*, and *Culex (Melanoconion) sp.* *Deinocerites cancer*, *Aedes sollicitans*, and *Aedes taeniorhynchus* need salt water for hatching of their eggs. Catches made at the end of the epidemic period may not accurately reflect the species found or the relative numbers present during the peak of the epidemic or epizootic.

Meteorological data.—Through the courtesy of the Grenada Company, data concerning rainfall, temperature, humidity, and wind velocity for the past several years were made available. There were no marked differences in weather conditions during 1948 as compared with previous years. The rainfall for the area varied at different stations from 15 to 28 inches with an overall average of 21.5 inches. The rainfall per month for the station closest to Monte Cristi was:

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1949 Jan.
2.39	0.26	0.10	3.51	5.96	1.17	2.55	0.94	2.03	4.74	0.46	1.27	2.02

The temperature does not vary greatly during the year. At the weather station cited above, the extremes of temperature for 1948 were: February average maximum daily temperature 90°, average daily minimum 56°; September average maximum 98°, minimum 70°. The humidity does not vary greatly during the year. At the above station, the maximum humidity is in the morning and the monthly averages vary between 86–89. The minimum is at noon and the monthly averages vary from 59–74. Prevailing winds are from the southeast during the morning and from the northeast during the afternoon.

Control measures used in Monte Cristi outbreak.—For control of the epidemic of human encephalitis, two types of control were used. Children 11 years of age and under were vaccinated and mosquito nets were distributed for their use, and residual spraying of homes with D.D.T. was carried out. Vaccination was started in various villages in the period January 12th to January 22nd and completed January 29th.

Control among equines was based on vaccination. Because of difficulty in obtaining vaccine, it was not finished before March although started during January. During January, apparently all of the equines at Monte Cristi were vaccinated, and only a portion of those in the rice area were vaccinated during January and February. Over one-half of the vaccinations in the rice area were done during March.

Samana epizootic.—On March 3rd, 10 equines were reported to have died in Sanchez after being sick 2–3 days. An Eastern strain of virus was isolated from a brain obtained on March 7th by inoculation of

10-day-old chick embryos in the laboratories of the National Health Department at Ciudad Trujillo. The epizootic appeared at an end by April 1st. It occurred within and on the border of the marsh Gran Estero, a marsh about 15 km. in diameter and extending across the base of the Samana Peninsula from the Atlantic on the north to Samana Bay on the southeast. The area contains both salt and fresh water marshes and near the southern border is traversed by the Yuna River. One hundred thirty-six equines were reported to have died and 6,179 equines were vaccinated. Using these figures to calculate an attack rate, there were 22 deaths per 1,000 equines.

Vaccination of equines was started soon after the disease was recognized and was completed by the end of March. Vaccination of children 11 years of age or under was begun March 11th and finished on March 19th.

Discussion of findings.—This outbreak in the Province of Monte Cristi follows the pattern noted in the Massachusetts and Louisiana outbreaks in the United States—location near a coastal area, children predominantly affected, and an accompanying outbreak in horses with a high attack rate. The 1937 outbreak in eastern Massachusetts affected 38 people, 69% of whom were children under 10 years of age. The mortality was 65%. In the 1947 outbreak in southern Louisiana, there were ten proven cases and six clinically suggestive cases, 70% of the proven cases were children under 10 years of age and the mortality was 70%. In the area where human cases occurred in Massachusetts, 204 horses were reported affected, an attack rate of 35 per 1,000. In Louisiana 3,813 equines were reported affected with an attack rate of 70 per 1,000. It was felt that reporting was incomplete. In neither of these outbreaks was a definite mosquito species incriminated. In Massachusetts, an extensive mosquito survey was made the year following the outbreak, and it was felt that *Aedes vexans* would be the most likely vector because of its distribution and prevalence. It was felt that some cases were too far inland to justify assuming salt marsh mosquitoes as the vectors.

In the Monte Cristi outbreak, the onset of the disease near the seacoast, both in equines and human beings and a falling off in the intensity of the disease on going inland, although there were good conditions for mosquito breeding in the irrigated rice area, suggests a relationship to some factor or factors situated near the seacoast. The most obvious factors near the city of Monte Cristi are the extensive salt flats, the outlet of the Yaque River of the North and a few salt water lagoons. After heavy rains, such as occurred during May and October, there should be very favorable conditions for heavy salt marsh mosquito breeding. Even in late February and early March after a period of relatively little rain, *Aedes sollicitans* was relatively abundant. The dis-

tribution of human cases and antibodies both in human beings and equines suggests that mosquitoes breeding in the rice area were of relatively little importance. There is one exception—Loma de Castañuelas where there was an antibody incidence of 8% in human beings, a finding difficult to explain on salt marsh mosquito transmission, but also difficult to explain on basis of mosquitoes breeding in the rice area in view of the negative findings in nearby villages.

The predominance of disease among equines in the United States along the Atlantic seaboard and the Gulf of Mexico and the infrequency of infection inland makes it probable that the ecological setup found along coastal areas is the most favorable one for maintaining virus and transmitting virus to equines. One possibly important factor in such an ecological setup is the salt marsh mosquito. Laboratory experiments have shown that *Aedes sollicitans* and *Aedes taeniorhynchus* can transmit the virus. Virus has not been isolated from salt marsh mosquitoes. To date, the only virus isolation reported is by Miss Beatrice Howitt from a lot of *Mansonia perturbans*, a fresh water marsh mosquito.

Control measures.—In addition to the outbreaks mentioned above, only four human cases have been reported, three sporadic cases in Texas in the early 1940's and one in Louisiana in 1946. The infrequency of occurrence of this disease among humans does not warrant continuous preventive measures on the part of public health authorities except as it can be fitted into existing mosquito control programs. When an epidemic does occur, the high mortality and serious sequelae alarm the public greatly and action is demanded. There are two methods of control available, both expensive—vaccination and mosquito control. Vaccine in large amounts is difficult to secure rapidly. The epidemics have been characterized by a short course. In the Monte Cristi outbreak, the majority of cases had their onset within a three-week period and all but one case occurred within a six-week period; in the Massachusetts outbreak, cases had onset from the week ending August 13th to the week ending October 15th, and the majority had onset between the weeks ending August 27th to October 1st. Proven cases had onset between September 3rd and October 1st; in the Louisiana outbreak, the proven cases had onset between September 8th and October 23rd. To be effective, any measure must be applied rapidly. By the time diagnosis is established, vaccine secured and administered, the epidemic is apt to be at an end from factors unrelated to vaccination. Mosquito control measures appear to be the most suitable from the standpoint of speedy application and from present knowledge should be directed particularly against *Aedes* mosquitoes.

Rapid recognition of disease is essential for any control measure and requires access to adequate laboratory facilities for virus isolation and serological studies. The presence of any unusual prevalence of dis-

ease among equines should be investigated promptly and the nature of the disease determined. If due to an equine encephalomyelitis virus, the public health official should be alert for its occurrence among human beings. Equine disease due to the Eastern equine virus in the United States usually has a relatively low attack rate, tends to recur year after year, and is not accompanied by human disease. An occasional sick horse does not demand an extensive control program among human beings.

In equines, the frequent tendency for disease to recur justifies a vaccination program, and it is possible that such a measure may contribute somewhat to cutting down the number of infected mosquitoes.

Whether the control measures instituted in the Monte Cristi area were responsible for terminating the outbreak cannot be answered dogmatically. From the attack rates and the time that elapsed from the onset of the outbreak both in equines and human beings to its termination, it would appear that the outbreak had pretty much run its course before control measures were started. In the Samana outbreak, the prompt recognition of disease and institution of vaccination should have exerted an appreciable effect, but the high attack rate of 22 per 1,000 equines indicates that even under favorable conditions vaccination begun after the onset of an epizootic is far from a satisfactory procedure.

Origin of the outbreaks in the Dominican Republic.—The question arises as to whether this outbreak represents the introduction of the Eastern virus into the Dominican Republic from some other country. Since infection with this virus has been found in Brazil, Panama, Mexico, Cuba, and the eastern and Gulf coasts of the United States, it would appear unlikely that the virus has not previously been present. It would seem rather that favorable conditions for its spread to human beings and equines had previously not been present. The disease incidence in the United States for 1948 was the lowest in the 14 years for which records have been kept and no unusual incidence has been reported in any other country near to the Dominican Republic. There is no evidence that the year 1948 offered conditions more favorable than preceding years as far as the introduction of this agent from outside the country would be concerned.

SUMMARY

The outbreak of disease due to the Eastern equine virus among human beings and equines in the Province of Monte Cristi and among equines in the Samana Province of the Dominican Republic presents the features noted in the other outbreaks of this disease. The epidemiological evidence in the Monte Cristi outbreak points to some ecological setup associated with proximity to a seacoast as important in the origin and dissemination of the disease. Salt marsh mosquitoes appear to fit

into this ecological complex. Mosquito control measures appear to be the most suitable to check an outbreak among human beings.

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BROTE DE ENCEFALITIS EQUINA ORIENTAL OCURRIDO EN 1948-49 EN LA REPUBLICA DOMINICANA (*Sumario*)

En la Provincia de Monte Cristi de la República Dominicana ocurrió, de octubre de 1948 a febrero de 1949, una epizootia producida por el virus equino oriental, acompañada por un brote de encefalitis humana. Durante el mes de marzo de 1949 ocurrió una epizootia similar en la Provincia de Samana.

Los primeros informes de la enfermedad se recibieron en octubre de 1948. A fines de noviembre se realizó el diagnóstico de encefalitis equina oriental, que más tarde fué confirmado. Se descubrió que la enfermedad estaba limitada a una zona que tiene un radio de 5 km, con la ciudad de Monte Cristi como centro. El 7 de diciembre la enfermedad había afectado ya a las poblaciones de Laguna Verde y El Duro, a 9 y 13 km de Monte Cristi, respectivamente, calculándose en 57 las muertes equinas ocurridas hasta el 15 de ese mes.

Para esa misma fecha se informó la presencia de una enfermedad aguda y fatal entre los niños de Monte Cristi y zonas adyacentes. La confirmación del diagnóstico clínico fué hecha por el Departamento Nacional de Salud de Monte Cristi, y por los Institutos Nacionales de Higiene de Bethesda, Maryland.

Trece casos fueron reconocidos. El comienzo fué súbito con fiebre, vómitos y malestar, como los síntomas más comunes. La temperatura aumentó, apareciendo convulsiones al segundo o tercer días. La defunción ocurrió entre los 3 y 8 días. En Monte Cristi se vacunaron 1,472 niños.

El 11 de febrero la epizootia había terminado con un total de 516 casos informados por el Departamento de Agricultura de la República Dominicana. En Monte Cristi murieron 30 equinos en noviembre, 60 en diciembre y 27 entre enero y febrero. Se vacunaron 3,900 equinos en Monte Cristi solamente; en la zona arrocerá se vacunaron 13,919.

Para descubrir la presencia de anticuerpos se utilizó una prueba eliminatória de neutralización. El grado de neutralización que se consideró positivo varió entre 50 y 100 M.L.D. No se observó variación en cuanto a sexo o edad en a incidencia de anticuerpos. La incidencia más elevada de anticuerpos entre humanos—9.5 a 17.3%—se halló en la zona que se extiende de Monte Cristi a Laguna Verde, a lo largo de la carretera a Santiago—una distancia de 9 km. En el tramo siguiente de 21 km, tierra adentro, la incidencia fué de 3 a 4 %. Más hacia el interior, la incidencia fué de 0%.

Entre equinos la incidencia de anticuerpos fué mas irregular. Las poblaciones circundantes a la carretera mostraron una incidencia de anticuerpos paralela a la de sueros humanos, aunque a un nivel promedio más elevado. Las poblaciones a lo largo del río muestran una incidencia alta hasta Magdalena, aproximadamente a 15 km de Monte Cristi.

En los mosquitos capturados en la zona afectada no se descubrió evidencia de la presencia de este virus. Tampoco ocurrieron diferencias atmosféricas de lluvia, temperatura, humedad o velocidad del viento durante 1948, en comparación con años anteriores.

Para controlar la encefalitis humana se usaron dos métodos. El primero consistió en vacunar todos los niños de 11 años o menores, y distribuir mosquiteros en la colectividad. El segundo consistió de aplicar DDT de acción residual en todas las viviendas. El control en los equinos estuvo basado esclusivamente en vacunación.

El brote ocurrido en la Provincia de Monte Cristi siguió el mismo patrón observado en los brotes ocurridos en Massachusetts, y en Louisiana, Estados Unidos: (1) localidad cercana a la costa; (2) incidencia predominante en los niños; (3) brote concomitante equino.

Además se observó cierta relación con los factores ecológicos relacionados con la costa. El brote ocurrió cerca de la costa, disminuyendo en intensidad a medida que aumentaba la distancia de la costa. El factor más obvio es la presencia de pantanos salinos. La distribución de casos humanos y de anticuerpos entre humanos y equinos sugiere que los criaderos de mosquitos en las zonas arroceras tienen muy poca importancia.

El hecho de que se han informado infecciones similares con este virus en Brasil, México, Panamá y Cuba, así como en las costas oriental y sureña de los Estados Unidos, sugiere que el virus se hallaba presente en la República Dominicana, pero que las condiciones no eran favorables anteriormente a su desarrollo.

Se sugiere que el control de mosquitos es la medida más eficaz para evitar el brote humano de la enfermedad.