Reports

Eastern Equine Encephalitis Virus Isolated from Culex nigripalpus in Trinidad

Abstract. The isolation of the first strain of eastern equine encephalitis virus in Trinidad, West Indies, is described. The virus came from a pool of *Culex nigripalpus* mosquitoes collected from chicken-baited traps in May 1959.

Previous evidence for the presence of eastern equine encephalitis virus in Trinidad was based on the finding of neutralizing antibody to this virus in two separate serum specimens collected in 1954 from the same native donkey (*1*).

In May 1959, a pool of 512 *Culex nigripalpus* yielded eastern equine encephalitis virus. The mosquitoes, of which 498 were gravid and many were engorged, were collected between 2 and 9 May from two chicken-baited traps located on La Fortune and Esperanza cocoa estates, Vega de Oropouche, about 4 miles northeast of Sangre Grande.

The mosquitoes were ground in 3 ml of bovalbumin diluent, subsequently diluted 1:3 after centrifugation, and inoculated intracerebrally into a group of seven 2-day-old white mice. On the 5th postinoculation day one mouse died and the brain of a second moribund mouse was passaged intracerebrally and intraperitoneally to two further groups of suckling mice and intracerebrally to a group of adult mice. The former all sickened or died by the 2nd day, but some of the adult deaths did not occur until the 3rd day. The agent responsible for these deaths passed readily through a bacteria-tight Seitz-EK pad. On further passage the virus killed suckling and adult mice regularly within 2 days of inoculation.

The virus was reisolated from the original mosquito suspension, which was inoculated undiluted into suckling mice by the intraperitoneal route. An attempt to reisolate the virus in chick embryo tissue cultures was unsuccessful.

An acetone-ether-extracted hemagglutinin was prepared from the brains of infected suckling mice. The virus was shown by hemagglutination-inhibition tests to be a member of group A (*2*). Complement-fixation tests were performed with crude saline and acetone-ether-extracted antigens prepared from the brains of infected suckling mice. Various group A antisera were used in these tests, including eastern equine encephalitis and western equine encephalitis hyperimmune mouse sera prepared in the New York laboratories of the Rockefeller Foundation from North American strains of these viruses. With the crude saline antigen, positive reactions were obtained with eastern and western equine encephalitis antisera, and negative reactions with Semliki Forest, Sindbis, Mayaro, and Venezuelan equine encephalitis antisera. The acetone-ether-extracted antigen gave a positive reaction with the eastern equine encephalitis antiserum and a negative reaction with the western equine encephalitis antiserum.

In neutralization tests in mice the virus was neutralized by immune and hyperimmune mouse sera prepared from a North American strain of eastern equine encephalitis virus but not by immune mouse serum prepared from western equine encephalitis virus. It was also neutralized by serum obtained from the native donkey referred to above. No strains of eastern equine encephalitis virus were kept at this laboratory prior to this isolation.

One of the five chickens used as bait in the mosquito traps developed neutralizing and hemagglutination-inhibiting antibodies to the virus between 2 and 16 May (*3*).

Addendum. Since submitting this paper for publication, we have made two more isolations of eastern equine encephalitis virus, both from pools of *Culex (Melanoconion) taeniopus* collected in the traps mentioned above. Strain 1 (TRVL 25780) came from a pool of 249 mosquitoes collected between 5 and 22 Aug. 1959 and suspended in 2 ml of diluent. Strain 2 (TRVL 26263) came from a pool of 142 mosquitoes collected between 1 and 11 Sept. 1959 and suspended in 3 ml of diluent. Both strains were successfully reisolated from the original suspensions. It is noteworthy that the original *nigripalpus* strain was isolated in May, when bird migration was northward. The two *taeniopus* isolations occurred at a time when bird migrations had reversed and were headed southward. Mosquito collections from the same two traps have been made continuously since September 1958. We have no evidence of eastern equine encephalitis activity in Trinidad other than the information provided above.

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References and Notes

1. W. G. Downs, C. R. Anderson, M. Theiler, *Am. J. Trop. Med. Hyg.* **5**, 626 (1956).
2. J. Casals and L. V. Brown, *J. Exptl. Med.* **99**, 429 (1954).
3. The studies and observations on which this report is based were conducted with the support and under the auspices of the Government of Trinidad and Tobago, the Colonial Development and Welfare Scheme, and the Rockefeller Foundation.

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Instructions for preparing reports. Begin the report with an abstract of from 45 to 55 words. The abstract should *not* repeat phrases employed in the title. It should work with the title to give the reader a summary of the results presented in the report proper.

Type manuscripts double-spaced and submit one ribbon copy and one carbon copy.

Limit the report proper to the equivalent of 1200 words. This space includes that occupied by illustrative material as well as by the references and notes.

Limit illustrative material to *one* 2-column figure (that is, a figure whose width equals two columns of text) or to *one* 2-column table or to *two* 1-column illustrations, which may consist of two figures or two tables or one of each.

For further details see "Suggestions to Contributors" [*Science* **125**, 16 (1957)].

The Clock Paradox

Abstract. In Minkowski space, a coordinate system can always be chosen so that the straight line (geodesic) joining two events (not on a null line) is either parallel to the time axis or parallel to the space axis. In either case the geodesic has maximum length (time dilatation and Lorentz contraction).

In a recent report [*Science* **129**, 1359 (1959)] C. C. MacDuffee shows that, in special relativity, the equation of motion of a one-dimensional unaccelerated particle (that is, the equation of a geodesic in Minkowski space) is a straight line $x = at + b$ (where $|a| < 1$ in units such that the velocity of light is 1). He then proves that a geodesic joining two points P_1 and P_2 has maximum length (time dilatation or clock paradox).

The latter proof is considerably simplified by noting that there is no loss of generality in choosing $a = 0$. Physically this amounts to choosing an inertial system whose t-axis is parallel to the P_1P_2 geodesic; this is always possible if, as assumed, $|a| < 1$. Mathematically,