the standpoint of efficiency, cleanliness and soil fertility. An extensive discussion was given of the ley, arable-grass type of farm, on which the speaker is an eminent authority. The address was closed with a discussion of plans for governmental loans to farmers, the "loans with advice" scheme, practiced in America, being most advocated. Rehabilitation loans to specially suitable areas were also recommended.

The section papers included comprehensive discussions on agriculture in relation to national employment, the practical problems of crop production and the practical problems of animal production. Visits were undertaken by the section to the University Farm Plant Breeding Institute, to Cressing Temple, Braintree, Lord Rayleigh's Farms, Hatfield Peverel, the Henry Ford Institute of Agricultural Engineering at Chelmsford, Little Hallingbury Park, at Bishop's Stortford and the farms of Messrs. Chivers and Sons, Ltd., at Histon.

Two evening discourses were delivered to members of all sections. The first, by Dr. H. Godwin on "The History of the Fens," was given in the Arts Theater on the evening of Friday, August 19, and the second, delivered in the theater on the following Monday, dealt with "The Contribution of the Electrical Engineer to Modern Physics," by M. L. Oliphant. Meetings of the Delegates of Corresponding Societies for the Association met on Friday, August 19, and on the following Monday to discuss matters of common interest to the societies and the association. The presidential address, entitled "The Importance of National Parks in the Preservation of the Flora and Fauna of Great Britain" was delivered by Rt. Hon. the Earl of Onslow. The delegates had dinner at the Dorothy Restaurant on Friday, and a visit was organized to the University Botanic Gardens on Monday.

A university reception for members of the association was held in the Senate House and Old Schools by the vice chancellor on Thursday evening, August 18, and on the evening of August 23 the Mayor and Mayoress of Cambridge invited members of the association to a sherry party in Emmanuel College. The masters and fellows of Downing College invited five hundred members of the association to a garden party in the grounds of the college on Friday afternoon. Similar invitations, to varying numbers of members, were issued by the masters and fellows of Sidney Sussex, Christ's and Queen's Colleges.

The masters and fellows of Trinity and St. John's Colleges invited a limited number of members of the association to informal conversaziones on Friday and Monday evenings, respectively. A dance was held in the ballroom of the Dorothy Café on Saturday evening, while the Cambridgeshire Branch of the English Folk Dance and Song Society invited members of the association to a party held in King's College Fellows' Garden, on the afternoon of Thursday, August 18.

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SPECIAL ARTICLES

EQUINE ENCEPHALOMYELITIS PRODUCED BY INOCULATION OF HUMAN ENCEPHALITIS VIRUS

FOTHERGILL *et al.*[1] and Webster and Wright[2] have reported the recovery of a filterable virus from the brains of children, of a nature very similar to equine encephalomyelitis virus (Meyer). A sample of one strain of the virus was submitted by Dr. Fothergill to the Pathological Division of the Bureau of Animal Industry through Colonel R. A. Kelser, U. S. Army Veterinary Corps, on September 24, 1938.

The virus, represented by portions of mouse brain in glycerine solution, was triturated on the day of receipt in a Ten Broeck tissue grinder, and an approximate 1.5 per cent. suspension in physiological salt solution was prepared. The suspension was cultured on serum agar slants and in beef infusion broth, which subsequently remained free of bacterial growth. Following culture and during the procedures of inoculating the trial horses, the brain suspension was kept in a container of iced water.

Three horses, one normal, an eastern-type[3,4,5,6] immune and a western-type immune were injected intracerebrally under local novocain anesthesia with 1 cc of the prepared suspension on September 24. Immediately following, on the same day, six guinea pigs were injected intracerebrally with 0.1 cc of the same suspension. All inoculations were completed by 1 P.M. On September 25 in the late afternoon the control horse had a temperature of 104.2° F. and the western immune a temperature of 101.8° F. On the days following, typical, progressive symptoms of encephalomyelitis (congested, "muddy" and icteric mucosae; maximum temperatures of 105.4°F. and 104.0° F.,

[1] Leroy D. Fothergill, John H. Dingle, Sidney Farber and M. L. Connerley, *New England Jour. Med.*, 219: 12, 411, 1938.

[2] Leslie T. Webster and F. Howell Wright, SCIENCE, 88: 2283, 305–306, 1938.

[3] L. T. Giltner and M. S. Shahan, *North American Veterinarian*, 14: 11, 25–27, 1933.

[4] M. S. Shahan and L. T. Giltner, *Jour. Am. Vet. Med. Asn.*, 86: n.s. 39, 6, 764–772, 1935.

[5] Carl Ten Broeck and Malcolm H. Merrill, *Proc. Soc. Exp. Biol. and Med.*, 31: 217–220, 1933.

[6] B. F. Howitt, *Proc. Soc. Exp. Biol. and Med.*, 35: 4, 526–528, 1937.

depression, stupor, anorexia, myopalmus, dehydration with rapid loss of flesh, splanchnic ridge, progressive weakness, paralysis and final collapse in recumbency) developed in both these animals. The normal animal (No. 1100) was sacrificed when completely prostrate on the third day after inoculation, September 27. The western-immune (No. 1011—vaccinated 5/12 and 5/19/38 with formolized western type encephalomyelitis chick embryo tissue vaccine and exposed intracerebrally to western [Iowa-1937-1] virus 8/25/38—survived, after showing only a slight, transitory, febrile reaction and mild indisposition) was dead on the morning of the fourth day after inoculation, September 28. The eastern-immune (No. 1042—exposed intralingually 6/28/38 to eastern virus [South Carolina-1937-1]—developed typical, severe encephalomyelitis, recovering without treatment) remained normal and continues to be so at this writing.

All the guinea pigs injected with the suspension of mouse brain likewise developed symptoms of typical encephalomyelitis (eastern type virus infection) and died, or were destroyed for harvesting of virus when prostrate, on the third to fourth days following injection. A subsequent, bacteriologically sterile passage of the virus from two representative guinea pigs in the group was effected. Suspensions of brain tissue from the two horses (1100 and 1011) also produced typical, bacteriologically sterile encephalomyelitis in guinea pigs when inoculated intracerebrally.

The symptoms in the inoculated animals, the comparatively brief incubation period, the acute course of the disease, the immunity against the injected virus in the eastern-type-encephalomyelitis-immune horse and the equal susceptibility of the normal and the western-type-encephalomyelitis-immune horses add conclusive evidence that the virus recovered by Dr. Fothergill from a human case is indistinguishable from eastern-type equine-encephalomyelitis virus. It may be further noted now that all five of the strains of equine-encephalomyelitis virus which have been recovered by the Bureau from Massachusetts horses during the August–September, 1938, epizootic have been definitely determined to be of eastern type through exposure of guinea pigs immunized against eastern and others immunized against western type equine vira.[7]

The addition of man to the list of species susceptible to equine-encephalomyelitis virus again brings to the fore the problems of epizootiology in connection with the equine disease and justifies further consideration and investigation of the role which the many other known susceptible species[8, 9] might have in the spread of the disease amongst horses, as well as to or from the human family.

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[7] Unpublished work.

[8] L. T. Giltner and M. S. Shahan, SCIENCE, 78: 2012, 63–64, 1933.

[9] L. T. Giltner and M. S. Shahan, *Jour. Am. Vet. Med. Asn.*, 88: n.s. 41, 3, 363–374, 1936.

THE BEHAVIOR OF THE VIRUS OF YELLOW FEVER IN THE MOSQUITO, AËDES TRISERIATUS[1]

THE extrinsic incubation period of yellow fever was described by Corré, and the time limits of this period were determined with a very considerable degree of accuracy by Carter[2] in 1898 before this disease was known to be transmitted by the mosquito, *Aëdes aegypti*. The conclusions of Carter were based on data obtained from his observations of epidemics of yellow fever under natural circumstances. Within the past decade methods have been developed for the study of yellow fever under experimental conditions, more particularly by the infection of monkeys and mice.

In 1904, Dr. Smith,[3] of New Jersey, raised the question whether the mosquito *Aëdes triseriatus* (Say, 1823) prevalent in that state might conceivably serve as a vector of yellow fever. This mosquito is neoarctic in its distribution, and it has been described as occurring from Maine as far southward as Florida and westward to Montana, an area which lies outside the endemic zone of yellow fever. Our experiments were conducted with mosquitoes (*A. triseriatus*) from the region of Ithaca, N. Y. One of us (Baker) succeeded in establishing a colony of this species in a greenhouse insectary at Cornell University. The first experiment in transmission was conducted at the Harvard Medical School in the autumn of 1935, using the technique which we have ordinarily employed with *A. aegypti*.[4] About 35 mosquitoes (*A. triseriatus*) were given an infective feeding on a monkey (*Macacus rhesus*) dying of yellow fever. After an incubation period of 17 days, at about 28° C., 7 of these mosquitoes were living and 6 fed on a monkey. Six days later there was an indefinite febrile reaction (104.1° F.) on one day only, and the monkey remained in excellent condition. One month after the mosquitoes had fed arrangements were being made to inject yellow fever virus for an immunity test. Fortunately a delay of a few days occurred

[1] From the Department of Tropical Medicine, Harvard Medical School, Boston, Mass., and the Department of Entomology, Cornell University, Ithaca, N. Y.

[2] H. R. Carter, *New Orleans Med. and Surg. Jour.*, 52: 617–636, 1900.

[3] J. B. Smith, "Report of the New Jersey State Agricultural Experiment Station, Trenton, New Jersey." MacCrellish and Dingley, State Printers: Trenton, N. J., 1904.

[4] A. W. Sellards, *Am. Jour. Trop. Med.*, 12: 79–92, 1932.