

# An epizootic attributable to western equine encephalitis virus infection in emus in Texas

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- Western equine encephalitis virus has been identified as the cause of disease in turkeys, pheasants, and chukars.
- Titers to western equine encephalitis virus have been detected in serum from chickens and free-flying birds, but clinical manifestations have not been reported.
- An epizootic attributable to western equine encephalitis virus in ratites may not be accompanied by a concurrent increase in the number of horses with encephalomyelitis attributable to western equine encephalitis virus.

Specimens from 4 dead, 4 ill, and 5 clinically normal emus in 8 flocks located in the western third of Texas were submitted to the Texas Veterinary Medical Diagnostic Laboratory during a 3-week period in July 1992. In addition, blood and serum samples from ratites for western equine encephalitis (WEE) virus antibody testing were received from veterinarians from many areas of Texas.

Morbidity of emus in the affected flocks varied from 15 to 50% and 17 of 193 (8.8%) emus in the 8 flocks died. Affected emus were 3 months to 3 years old. Clinical signs varied from mild to severe and included anorexia, sternal recumbency, head tilt, unnatural positioning of the head on the back, acute onset of paralysis, muscle tremors, ataxia, and lateral recumbency with kicking and paddling. When prompted, emus in sternal recumbency would rise, stagger, and immediately sit down. Severely affected emus were observed by the owners to have been apparently healthy, but 10 to 12 hours later, they were found dead or debilitated and laterally recumbent. Recumbent emus often died within 24 hours; however, some lived for 2 weeks and a few survived because of intensive supportive treatment, including IV administration of

fluids and antibiotics. Less severely affected emus had signs of depression and were anorectic for 2 to 7 days; they recovered without treatment and did not have residual clinical problems.

Pathologic examination of 4 emus from 4 flocks revealed gross lesions that consisted of modest amounts of ingesta in the proventriculus and ventriculus in 2, hepatic subcapsular hematoma in 1, and 3 to 5 ml of pale-yellow, clear, pericardial fluid that contained a fibrin clot in 3.

Histologic examination revealed extensive vasculitis with associated tissue necrosis and inflammatory cell infiltrate in tissues of the heart, lungs, liver, spleen, kidneys, proventriculus, ventriculus, small intestine, large intestine, brain, meninges, skeletal muscles, trachea, and esophagus. Vasculitis was characterized by variable, focal, segmental, and transmural necrosis with an infiltrate consisting of predominantly plasmacytes, a moderate number of lymphocytes, and a few heterophilic leukocytes. Lesions in the brain were minimal and consisted of infiltrates of plasmacytes, lymphocytes, and a few heterophilic leukocytes in perivascular and meningeal tissues. Pooled tissue homogenates of heart, brain, lung, spleen, and kidney from each of 4 emus were inoculated in embryonating chicken eggs via the allantoic route and in Vero cell cultures. Bacterial pathogens were not isolated by use of routine aerobic and anaerobic bacterial culturing.

Virus was isolated from 3 of the pooled tissue homogenates in the chicken egg and Vero cell cultures. Isolates were identified by use of hyperimmune equine serum produced against eastern equine encephalitis virus and WEE virus, using a constant serum volume and adding various amounts of virus to determine a neutralization index for the Vero cell cultures. Isolates from tissue specimens of 3 emus were identified as WEE virus. Identity of the isolates was confirmed by another laboratory.<sup>a</sup>

Serum samples from the emus were tested for antibodies to WEE virus according to a protocol<sup>b</sup> designed for hemagglutination inhibition tests used for the detection of antibodies to equine encephalitis virus.

From the Texas Veterinary Medical Diagnostic Laboratory Systems, 6610 Amarillo Blvd W, Amarillo, TX 79116-3200 (Ayers), and Texas Veterinary Medical Diagnostic Laboratory Systems, #1 Sipple Rd, College Station, TX 77841-3040 (Lester, Angulo).

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<sup>a</sup>The National Veterinary Services Laboratory, Ames, Iowa.

<sup>b</sup>Arbovirus group A reference hemagglutination inhibition reagents V04, US Department of Health and Human Services, Centers for Disease Control and Prevention, Atlanta, Ga, May 1978.

litis viruses. Ten of the 13 emus from the 8 flocks had titers ranging from 20 to 1,280. Samples submitted from 281 ratites in Texas that were tested for antibodies to WEE virus during an 8-month period in 1992 yielded 105 (37%) with positive test results (titers > 40 to 1,280). Additionally, 16 of 64 (25%) samples from ratites in states adjacent to Texas had positive test results for WEE virus. Thus, of 345 serum samples tested, 121 (35%) had positive results for WEE virus. Titers to WEE virus were detected in serum from ostriches, but clinical disease has not been reported.

The epizootic developed during a period of unseasonably high rainfall (50 cm reported at Lubbock, Tex, during a 2-month period; typical annual rainfall, 45 to 50 cm), with higher than anticipated numbers of mosquitoes. A parallel increase in the number of horses with encephalomyelitis attributable to WEE virus was not reported.

The WEE virus was first isolated from infected horses in California in 1930.<sup>1</sup> Although WEE virus does not induce clinically recognized disease in domesticated poultry or game birds as often as has been reported for eastern equine encephalitis virus, several outbreaks attributable to WEE virus have been recorded. Severe losses in a turkey flock were attributed to infection with WEE virus,<sup>2</sup> and outbreaks attributed to WEE virus have been reported in pheasants<sup>3</sup> and chukars.<sup>4</sup> On the basis of the

detection of antibody titers, WEE virus also is believed to infect chickens and many free-flying birds, but clinical manifestations have not been reported.<sup>5</sup>

Western equine encephalitis and eastern equine encephalitis viruses are restricted to the Western Hemisphere, but ratites are an Old World species that only recently have been imported to the United States. Innate lack of immunity to the viruses may have contributed to the severe manifestation of clinical signs in emus; comparatively, many birds native to North America are known to be clinically normal carriers.<sup>5</sup> The increased rainfall and resultant increase in the number of mosquitoes during the summer of 1992 in Texas were believed to have been factors contributing to this epizootic.

## References

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2. Woodring FR. Naturally occurring infection with equine encephalomyelitis virus in turkeys. *J Am Vet Med Assoc* 1957;130:511-512.
3. Faddoul GP, Fellows GW. Clinical manifestations of eastern equine encephalomyelitis in pheasants. *Avian Dis* 1965; 9:530-534.
4. Ranck FM, Gainer JH, Hanley JE, et al. Natural outbreak of eastern and western encephalomyelitis in pen-raised chukars in Florida. *Avian Dis* 1965;9:8-20.
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## Books Received

*Receipt of these books is acknowledged. Listing should be regarded as a return of courtesy to the sender. Books that appear to be of particular interest will be reviewed as space permits.*

*Resources of Biomedical and Zoological Specimens*. Third Ed. Compiled by The Registry of Comparative Pathology; Charlotte L. Kirk, Editor. 72 pages. Registry of Comparative Pathology, Armed Forces Institute of Pathology, Washington, DC 20306-6000. 1994. Price: Free.

*Antimicrobial Therapy in Veterinary Medicine*. Second Ed. Edited by John F. Prescott and J. Desmond Baggot. 612 pages; illustrated. Iowa State University Press, 2121 S State Ave, Ames, IA 50014-8300. 1993. Price \$64.95.

*Early Methods of Animal Disease Control. Scientific and Technical Review*. Vol 13 (2). June 1994. 614 pages; illustrated. International Office of Epizootics, 12 rue de Prony, 75017 Paris, France. 1994. Price \$46.00.

*They Dreamed of Horses. Careers for Horse Lovers*. By Kay Frydenborg. 104 pages; illustrated. Walker and Co, 435 Hudson St, New York, NY 10014. 1994. Price \$15.95.

*Rodents and Rabbits: Current Research Issues*. Proceedings of a conference sponsored by SCAW and WARDS, Washington, DC, May 21, 1993. Edited by Steven Niemi, Joseph Venable, Helene Guttman. 81 pages; illustrated. Scientists Center for Animal Welfare, 7833 Walker Dr, Ste 340, Greenbelt, MD 20770. 1994. Price \$30.00.