The Ecology of West Nile Virus in South Africa and the Occurrence of Outbreaks in Humans

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ABSTRACT: This paper reviews studies done on West Nile virus (WNV) in South Africa, mainly between 1962 and 1980 on the temperate inland plateau (Highveld and Karoo). The virus is maintained in an enzootic transmission cycle between feral birds and the ornithophilic mosquito *Culex univittatus*. About 30 avian species have been shown to be involved without mortality. Humans, and other mammals, although they may have antibodies, are considered blind-alleys in the transmission cycle except perhaps some dogs. *Cx. univittatus* also transfers infection to humans, almost invariably causing only a mild illness. Its usually low anthropophilism may explain why annual human infection on the Highveld is limited to sporadic cases. Besides multiple isolations from field collections of *Cx. univittatus,* this mosquito is both highly susceptible to the virus and an efficient transmitter. *Culex theileri* is a minor vector. In the summer of 1974 there was a large epidemic in the dry Karoo after unusual rains: there were many human cases, the infection rate in *Cx. univittatus* was 39.0/1000, and postepidemic immune rates in humans and birds were high. In 1984 there was an epizootic in Gauteng Province in the Highveld with an infection rate in *Cx. univittatus* reaching 9.6/1000 and more human infections than usual. The much lower immune rates in the KwaZulu-Natal coastal lowlands than on the plateau and the single isolation from *Cx. neavei,* which replaces *Cx. univittatus* in the lowlands, are explained by the low susceptibility of *Cx. neavei* to the virus. Genetic relatedness of isolates from different countries showed two lineages, with one lineage comprising only African isolates, including 25 South African strains, which had a sequence homology of 86.3–100%. This suggests that the viral enzooticity does not depend on annual importation of virus in migrant birds.

KEYWORDS: West Nile virus; South Africa; ecology; human outbreaks

INTRODUCTION

This paper reviews the studies done on West Nile virus (WNV) in South Africa, mainly between 1962 and 1980, but also some work done before and after this period. Most of the studies were carried out in the inland plateau region (FIG. 1). This is an area with a temperate climate 400–2000 meters above sea level comprising the Karoo (the western two-thirds) and the Highveld (the eastern third). The Karoo is

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