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SHORT REPORT: RIFT VALLEY FEVER IN WESTERN AFRICA: ISOLATIONS FROM *Aedes* MOSQUITOES DURING AN INTEREPIZOOTIC PERIOD

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Abstract. Thirteen strains of Rift Valley fever virus were isolated from *Aedes vexans* and *Ae. ochraceus* mosquitoes collected in October and November 1993 in northern Senegal. Entomologic and serologic data show that the risk of a new epizootic is increasing in this region.

The only known outbreak of Rift Valley fever (RVF) in western Africa occurred in 1987 in southern Mauritania.¹ The RVF virus is mainly transmitted by *Culicidae* and by aerosol from infected blood. It causes abortions and mortality during epizootics in domestic ruminants. In humans it causes clinical syndromes ranging from an uncomplicated form with fever to hemorrhagic disease. In eastern and southern Africa, temporary ground pools are the main breeding sites during interepizootic periods of RVF vectors such as *Aedes mcintoshi*.²

Following the Mauritanian outbreak, an epidemiologic study on RVF was initiated in Senegal. Understanding the maintenance cycle for RVF virus during interepizootic periods is the major epidemiologic question and mainly an entomologic problem. Based on observations from eastern Africa, monthly entomologic surveys were conducted from 1991 to 1993 in the Barkedji region of Senegal. In this area, located in the sahelian shrubby savannah, there were temporary ground pools that flood immediately after the first rains in July and dry up in February.³

Mosquitoes were collected by three different methods: Centers for Disease Control (CDC) light traps, animal bait traps, and captures on human beings. They were sorted and pooled by species in the field and stored in liquid nitrogen. *Aedes pseudoscutellaris* continuous cell lines were inoculated with the pools and suckling mice were inoculated intracerebrally. The strains were isolated only on mosquito cell lines and were identified using immune ascitic fluid pools at the World Health Organization Collaborative Center at the Pasteur Institute of Dakar.⁴

A total of 141,221 mosquitoes belonging to 39 species were used for inoculation (Table 1) during the three-year survey. The RVF virus was isolated from mosquitoes collected in October and November 1993 around three ground pools 6 km away from each other. Thirteen strains were isolated from *Ae. vexans* and *Ae. ochraceus*. Seven strains were

isolated from 38 pools of *Ae. vexans* (1,187 females) collected in October 1993. The seven positive pools (333 mosquitoes) were formed from specimens collected in three CDC light traps near a cattle drove and located in two different ground pools. Three strains were isolated from 10 pools of *Ae. vexans* (35 females) collected in November 1993 in three locations: two positive pools were formed from specimens collected in CO₂-CDC light traps and the third one from females collected in a trap near a cattle drove. Three strains were isolated from 30 pools of *Ae. ochraceus* (852 females) captured in October 1993 in two locations: two positive pools were formed from specimens collected in a trap near a cattle drove and the third one from females collected in a CO₂-CDC light trap.

Of 14 species of *Aedes* identified in the Barkedji area, seven belonging to the subgenera *Neomelanicion* or *Aedimorphus* and having zoophilic trophic preferences might be involved in RVF virus transmission (Table 2). *Aedes mcintoshi*, the main vector in eastern Africa, is uncommon whereas *Ae. vexans* is the most abundant. Fifteen eggs of *Ae. vexans* from two samples among 50 collected in surface soil of the dried temporary ground pools in April 1991 during the dry season hatched experimentally after the first flooding. The most abundant collection of *Ae. mcintoshi* and *Ae. vexans* were made three and six weeks, respectively, after the first rain.

The trophic preference of 72 *Ae. vexans* collected in 1992 and 1993 with light traps or chicken, bovine, and sheep bait traps and evaluated by enzyme-linked immunosorbent assay,⁵ showed that they fed preferentially on sheep (44%), but

TABLE 1

Number of mosquitoes collected and number of inoculated pools in Barkedji, Senegal from 1991 to 1993

| Years | No. of mosquitoes | No. of pools of mosquitoes | No. of pools of <i>Aedes</i> |
|-------|-------------------|----------------------------|------------------------------|
| 1991 | 34,327 | 1,042 | 338 |
| 1992 | 42,804 | 1,534 | 352 |
| 1993 | 94,810 | 2,023 | 304 |
| Total | 171,941 | 4,599 | 994 |

TABLE 2

Number and proportion of *Aedes* collected, number of inoculated pools, and number of Rift Valley fever (RVF) virus-positive pools in Barkedji, Senegal from 1991 to 1993

| Species | No. | % <i>Aedes</i> | No. of pools | No. RVF strains |
|------------------------------|--------|----------------|--------------|-----------------|
| <i>Ae. vexans</i> | 18,578 | 80.4 | 493 | 10 |
| <i>Ae. mcintoshi</i> | 560 | 2.4 | 58 | 0 |
| <i>Ae. ochraceus</i> | 2,185 | 9.5 | 126 | 3 |
| <i>Ae. minutus</i> | 194 | 0.8 | 35 | 0 |
| <i>Ae. fowleri</i> | 21 | 0.1 | 9 | 0 |
| <i>Ae. dalzieli</i> | 10 | 0.1 | 5 | 0 |
| <i>Ae. argenteopunctatus</i> | 32 | 0.1 | 12 | 0 |
| Other <i>Aedes</i> species | 1,526 | 6.6 | 256 | 0 |
| Total | 23,106 | 100 | 994 | 13 |

also on bovines (21%), horses (14%), and chickens (10%). Specimens were also caught on humans.

Four strains of RVF virus were previously isolated in 1974 and 1983 by the Institut Pasteur of Dakar from *Ae. dalzieli* caught in eastern Senegal by ORSTOM. Despite intensive captures since 1983, the RVF virus was never again found in mosquitoes in Senegal.

These isolations and the recent seroconversions among sentinel sheep from the same area show that a new outbreak may occur in the next few years. Entomologic and serologic surveillance of this area will be developed.

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