OPERATIONAL AND SCIENTIFIC NOTES

THE OCCURRENCE OF *AEDES GROSSBECKI* IN TEXAS

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Aedes grossbecki Dyer and Knab is distributed throughout the eastern United States and has been recorded as far west as Missouri, Arkansas, and Louisiana (Carpenter and LaCasse 1955). Although mosquito surveillance activities have been underway since 1964 in Harris County and earlier in other areas of the state there has been, until present, no reported record of *Ae. grossbecki* occurring in Texas. Distribution records, as reported by Hill, Smittle, and Philips (1958) and updated by Fournier and Snyder (1977), do not include *Ae. grossbecki.*

Several adult female *Ae. grossbecki* were collected by workers at Harris County Mosquito Control District during landing rate counts on April 20, 1966 in Crosby, Texas. Identification was confirmed by Robert L. Barrow and Robert E. Bartnett. In the 2-month period from March to April 1979 a total of 11 adult female *Ae. grossbecki* were collected in New Jersey light traps operated by the district. Four adult females were collected as early as March 15 from 3 locations in the county. The last occurrence of adult females was on April 16 when 2 were collected from Spring, Texas. Three specimens were sent to the National Museum of Natural History, Smithsonian Institution (USNM) and confirmed as *Ae. grossbecki* by Dr. Richard Darsie. Additional specimens will be placed in the USNM. All collections were from the southern sections of the east Texas pine and hardwood forests. Harris County is level or slightly rolling prairie with timber stands occurring along the numerous bayous and creeks (Spaight 1882). These areas are composed of loblolly pine (*Pinus taeda*, willow oak (*Quercus phillos*), post oak (*Quercus stellata*), and southern red oak (*Quercus falcata*). A variety of mammals is present in each location. Other species associated with *Ae. grossbecki* in light trap collections were *Ae. canadensis, Ae. vexans,* and *Culiseta inornata.* Efforts to collect larvae have so far been unsuccessful. Little information has been compiled, to the present, regarding the bionomics and importance of this mosquito as a disease vector. Continued efforts will be made in the future to determine the type and extent of larval habitat preferred by *Ae. grossbecki* in Harris county.

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A SYSTEM FOR THE INDUCTION AND MAINTENANCE OF ANESTHESIA FOR *CULICOIDES*

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Because of their small size, the sorting and identification of adult biting midges, *Culicoides* spp., requires an effective immobilization technique. Individuals that are chilled and placed on a cold table tend to become trapped and obscured by condensation. If gas anesthesia is used, vapors of chloroform or ether may be harmful to the insect (Busvine 1957) and the entomologist. Excessive levels of car-

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bon dioxide, such as those encountered by directing a stream of gas directly from a pressurized cylinder, may also have adverse effects on insects (Edwards and Patton 1965; Harris et al. 1965). Since a relatively low concentration of CO_2 in air will induce and maintain anesthesia in insects (Patton et al. 1968) we have developed a system for immobilizing *Culicoides* with controlled levels of CO_2.

The entire system (Figure 1) can be assembled using standard laboratory materials. The gas stage is constructed as follows: A fritted ceramic plate (available from chemistry supply houses) approximately 80 mm in diameter is covered with fine-mesh nylon fabric affixed to the margin by cement. The rim from a plastic petri dish is then cemented around the perimeter of the plate. Next, the two halves of a 100 x 15 mm plastic petri dish are cemented together. A hole equal to the diameter of the ceramic plate is then cut in the surface of the smaller dish, and the rimmed ceramic place cemented into it, fabric-covered surface up.

A Bunsen burner with an adjustable air-flow sleeve is used to regulate levels of CO_2 gas in air (Patton et al. 1968). Plastic tubing with an inside diameter of at least 1.2 cm (0.5 inches) is used for gas lines. A Y-connector is placed in the gas line between the Bunsen burner and the gas stage (Figure 1). Plastic couplings are used at the ends of the gas lines to connect them to the gas stage and to a mouth aspirator.

Careful adjustment is required to obtain the desired level of CO_2 gas at both the gas stage and the side-branch tube. The system is calibrated with both couplings in place and a mouth aspirator inserted into the side tube. Gas from either line is directed into a 100-ml graduated cylinder. The cylinder is quickly inverted into a beaker filled with 10% potassium hydroxide solution agitated with a stirring bar. Since CO_2 is readily absorbed by KOH (Umbreit et al. 1964), the percentage of CO_2 in the gas mixture is equivalent to the volume of KOH solution that rises into the cylinder. Adjustment of the Bunsen burner air-flow sleeve will change the concentration of gas in both lines. Variation in gas concentration between the 2 lines can be minimized by shortening or lengthening the individual lines and by enlarging or narrowing the coupling diameters. Gas lines should be kept short and straight to minimize backpressure.

The arrangement of this system allows biting

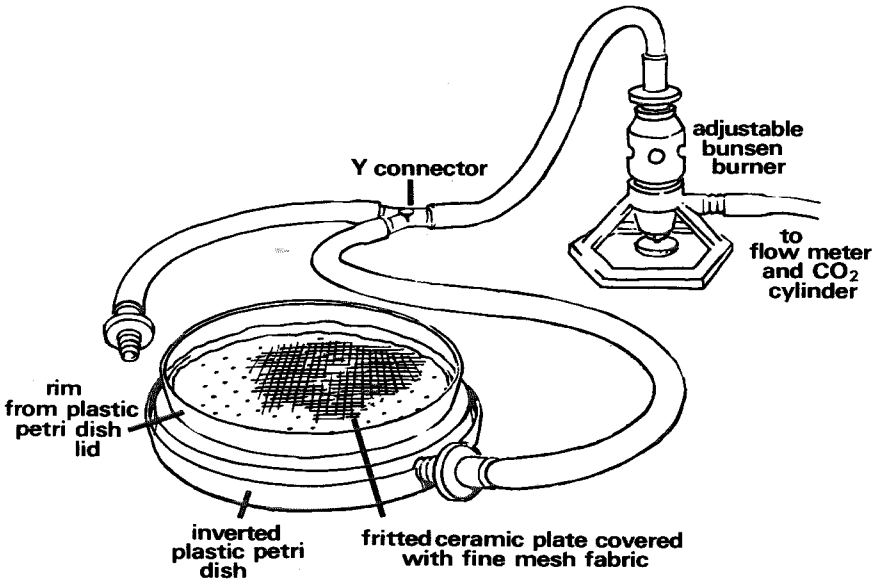

Figure 1. System for the induction and maintenance of CO_2 anesthesia.

midges contained within an aspirator to be anesthetized with CO_2 gas from the side tube, while previously anesthetized individuals remain immobilized on the surface of the gas stage. The gas stage is readily placed under a dissecting microscope for examination of anesthetized individuals. In our experience, CO_2 concentrations of 40 to 45% are needed to induce and maintain anesthesia in biting midges This concentration is higher than the reported safe levels of CO_2 for other insects (Edwards and Patton 1965; Harris et al. 1965); we have, however, sorted and identified large numbers of field-captured *Culicoides* at this level of CO_2 with no apparent adverse effects on subsequent survival or blood-feeding behavior.

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INITIAL RECORD OF *ANOPHELES ALBIMANUS* IN THE PENINSULA OF BAJA CALIFORNIA, MEXICO

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During collections made in San José del Cabo, Baja California Sur (BCS), Mexico on January 23, 1979 significant numbers of *Anopheles albimanus* Wiedemann were taken along with lesser numbers of *An. pseudopunctipennis* Theobald. The captures were made by the writer at dusk (1818–1830 hours), with Mr. Antonio Bourgé of Saneamiento Ambiental Xitlali, S.A. serving as bait. The 15 min collection yielded 29 *An. albimanus*, 5 *An. pseudopunctipennis* and 62 *Culex erraticus* (Dyar and Knab). The site was the margin of a lagoon 3 to 4 acres in area on the outskirts of the town. Later in the evening (1850–1920 hours) the writer collected 27 *An. albimanus*, 13 *An. pseudopunctipennis* and 13 *Culex (erraticus* and *coronator)* from the posts and wire screen of a goat corral some 200 meters from the human bait site. The following day larvae of the 2 anopheline species were taken in marginal vegetation of the lagoon, along with larvae of *Cx. coronator*. A temporary pool near the lagoon yielded larvae and pupae of *An. pseudopunctipennis* and of *Cx. restuans* and *Cx. interrogator*.

On January 25 and 26 nocturnal collections with human bait were attempted near an estuary at Nopoló, 8 kms. south of Loreto, B.C.S. but were negative, probably due to strong winds and low temperatures. Larvae of *An. pseudopunctipennis* and of *Cx. tarsalis* were taken on January 26 among algae in the same estuary.

Several species and subspecies of anophelines have been reported from the Peninsula of Southern California but the listings include no *An. albimanus*. Aitken (1942) reported *An. pseudopunctipennis pseudopunctipennis* Theobald (=*An. pseudopunctipennis), An. pseudopunctipennis franciscanus* McCracken (=*An. franciscanus)* and *An. maculipennis freeborni* Aitken (=*An. freeborni*). Downs and Bordas (1949) included entomological data from their malaria survey in Lower California (now the State of Baja California Sur), including San José del Cabo, Santiago, Todos Los Santos and Mulegé. They concluded: "*Anopheles pseudopunctipennis* var. *typicus* is the sole anopheline and the vector of malaria in the region." They mentioned heavy production of *An. pseudopunctipennis* in San José del Cabo, including the lagoon involved in the recent collections of *An. albimanus*. Downs et al. (1951) described a three months' exploration of the B.C.S. area in jeep by one author (ACC) and concluded: "Additional entomological surveys confirmed the presence of *An. p. pseudopunctipennis* as the sole anopheline in the territory. We were not able to confirm Aitken's report of finding *An. p. franciscanus* at Coyote Cove, Concepción Bay, south of Mulege," Brookman and Reeves (1953) reported *An. freeborni* and *An. franciscanus* from