Table 1. Survival of aquatic stages of *Aedes dorsalis* reared at constant 25°C in 3 lots of 30 larvae for each experiment.

		Individuals alive at end of each stage				
Experiment	No. of larvae	*Instar 1* %	*Instar 2* %	*Instar 3* %	*Instar 4* %	*Pupa* %
1	90	100	100	100	99	96
2	90	100	98	96	92	90
3	90	100	100	93	92	91
4	90	100	100	100	98	93
Total	360	100	99	97	95	93

rests on a wet bat of cellucotton in an enameled pan (300×220×55 mm) elevated at one end so that the water table at the low end stands well above the bottom of the bat. Capillarity in the cellucotton provides a gradient from saturation at the bottom to barely moist at the top. Females may be maintained in a lighted room where the air temperature is about 25°C and the surface for oviposition is 24–26°C.

A single blood meal is sufficient for each oviposition effort. A plastic box (20×20×20 mm) containing a wad of cellucotton soaked with a solution of honey (10%) when placed on the screened top of the cage provides carbohydrate nutrition. The honey-soaked cellucotton can be maintained in a moist condition with deionized water. About 150–200 eggs may be deposited per female within 4–5 days after a blood meal. However, when temperature and moisture level of the ovipositional mat are not suitable, eggs may be retained for days or weeks after maturation. When deposited, many long-retained eggs may be abberrant.

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References Cited

Blakeslee, T. E., P. T. Rigby, G. Paul and G. Bomotti. 1966. Maintenance of a laboratory colony of *Aedes dorsalis* (Meigen) by induced copulation. Calif. Vector Views 13(5):39–40.

Borg, A. and W. R. Horsfall. 1953. Eggs of floodwater mosquitoes. II. Hatching stimulus. Ann. Entomol. Soc. Am. 46:472–8.

Horsfall, W. R., H. W. Fowler, Jr., L. J. Moretti and J. R. Larsen. 1973. Bionomics and embryology of the inland floodwater mosquito, *Aedes vexans*. University of Illinois Press. Urbana, Chicago. 211p.

Kardatzke, J. T. 1976. Maintenance and transportation of female mosquitoes collected in the field. Mosquito News. 36:527–9.

McDaniel, I. N. and W. R. Horsfall. 1957. Induced copulation of aedine mosquitoes. Science 125:745.

Novak, R. J. and K. K. Liem. 1975. Induced copulation of mosquitoes: Effect of humidity on insemination. Mosquito News. 35:409–410.

OCCURRENCE OF *AEDES HENDERSONI* IN MANITOBA

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The adults of *Aedes triseriatus* (Say) reported by Brust and Kalpage (1967) were examined by Dr. D. M. Wood, Biosystematics Research Institute, Ottawa, Canada and were found to be *Aedes hendersoni* Cockerell. Larvae had been collected from tree holes in Winnipeg in 1965, and reared to adults. In the fall of 1971, mosquito eggs were collected from these same tree holes by removing pieces of rotting wood from inside the tree hole. The eggs were cold—conditioned at 5°C for 3 months and then hatched. Larvae were reared to adults while

the author was at the Vector Biology Laboratory, University of Notre Dame, Notre Dame, Indiana. The adults were identified by Dr. George B. Craig, Jr. to be *Aedes hendersoni.*

At the present time, it is not known if *Aedes triseriatus* occurs in Manitoba or not. From the distribution of this species shown by Zavortink (1972), Manitoba could be within the species range.

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References Cited

Brust, R. A. and K. S. Kalpage. 1967. New records for *Aedes species* in Manitoba. Mosquito News 27 (1):117–118.

Zavortink, T. J. 1972. Mosquito Studies (Diptera: Culicidae). XXVIII. The New World species formerly placed in *Aedes* (Finlaya). Cont. Amer. Entomol. Inst. 8(3):1–206.

A COMPARISON OF INSECTICIDE GRANULE SPREADERS

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In the Metropolitan Mosquito Control District (Minnesota) many mosquito breeding sites, especially intermittently wet upland depressions and densely vegetated marsh areas, are not accessible by truck-mounted treatment equipment but are too small to be economically treated by air. Such sites must be treated by field personnel using hand-operated or backpack insecticide granule spreaders. During the summer of 1977, field tests were conducted to compare the time efficiencies of 4 insecticide granule spreaders in common use.

The machines tested included 3 hand-operated spreaders: the Cyclone® Heavy Duty Hand Broadcast Seed Sower Model 2, the Horn® Seed Sower, and the Seymour Universal® No. 75. The Echo (Kioritz)® DM-9, the 4th machine tested, is a motorized back pack model. A total of 272 observations were made for sites of sizes 0.5, 1.0, 1.5 and 2.0 acres. All tests used the same standard sand insecticide granule formulation. A summary of the data is given in Table 1.

Table 1. Mean time in minutes required to treat one site with granules.

	Site Size (Acres)			
Spreader	0.5	1.0	1.5	2.0
Horn	6.89	9.77	14.17	17.56
Echo (Kioritz)	8.50	9.00	15.00	16.20
Cyclone	8.97	13.05	21.00	21.71
Seymour	9.46	14.39	26.33	27.63

An analysis of variance of the mean time to treat a site showed, as expected, that treatment time depended on site size ($p=.0002$) as well as spreader type ($p<.005$). Further analysis indicated that the Echo and Horn spreaders were not significantly different ($p>.5$). This is interesting since the Echo is motorized while the Horn is not. Both, however, were significantly faster than the Seymour and Cyclone spreaders ($p<.0005$). An interaction graph (Figure 1) shows these differences to be more exaggerated for larger sites. In addition, there is some indication that the Horn may be slightly better than the Echo for very small sites.

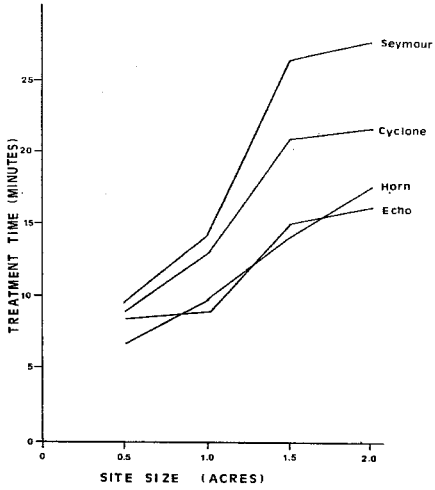

Figure 1. Relative efficiency of four insecticide spreaders.

The authors wish to thank all MMCD employees who took part in these tests.