THE COMPARATIVE EFFICIENCY OF SIX TRAP TYPES FOR THE COLLECTION OF TABANIDAE (DIPTERA)[1, 2]

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ABSTRACT. Six types of traps were evaluated for their efficiency in the collection of Tabanidae. Specific trap designs affected both the numbers of tabanids collected and the species representation. The traps ranked in decreasing order of efficiency, were: Stoneville malaise trap with CO_2, a canopy trap with CO_2, Stoneville malaise trap without CO_2, a modified canopy trap with CO_2, a California malaise trap without CO_2, a modified canopy trap without CO_2, a canopy trap without CO_2, a Plexiglas® trap with CO_2, and a Plexiglas trap without CO_2.

The results of a study (Roberts 1972) of several types of malaise traps indicated that tabanid collections were affected by several factors such as color and contrast with background, size and shape of the trap opening, and overall size of the trap. Since that report, additional studies have been made with several types of traps that have been used by other investigators.

The primary purpose of the present report is to present the data obtained in comparative field tests with six types of traps for the collection of tabanids.

MATERIALS AND METHODS. The traps used in this study were a Stoneville malaise trap (Roberts 1972; Fig. 1), a California malaise trap (Anderson et al. 1974; Fig. 2), a canopy trap (Catts 1970; Fig. 3), a modified canopy trap (Adkins et al. 1972; Fig. 4), a modified Plexiglas® trap (Schreck et al. 1970; Fig. 5), and a modified Manning trap (Hansens et al. 1971; Fig. 6).

All the traps except the Manning trap were compared in one study during July, 1974. There were two of each type except the California malaise trap. One of each pair was baited with CO_2 released at a rate of 100 ml/min. The statistical design used was a randomized latin square wherein traps, trap sites, and days were, respectively, treatments, columns, and rows. Thus all traps were tested at all trap sites.

The Manning trap was compared with the Stoneville malaise trap on three separate occasions (June, 1972; May, 1973; July; 1973) in conjunction with other trap studies that were also arranged in the randomized latin square design. In each of the three series, these two traps were not baited with CO_2.

The studies were conducted in the Delta Experimental Forest, Stoneville, MS. The trap sites were the shoulders of roads within the area and were a minimum of 0.48 km apart. Collections were started

Fig. 1. Stoneville malaise trap.

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[2] Mention of a proprietary product in this paper does not constitute an endorsement of this product by the USDA.

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Fig. 2. California malaise trap.

each day between 1:00 and 1:30 pm (Central Daylight Time) and terminated the following morning between 10:00 and 10:30 am. The numbers of each species of Tabanidae (females only) were recorded. Analyses were made on the transformation of the data to the log (X+1).

All the traps were furnished with the same type of collection head since in the previous study (Roberts 1972) the data showed that the configuration of the head affected the collection of tabanids.

RESULTS AND DISCUSSION. The species of Tabanidae collected in sufficient numbers for statistical analysis are listed in Tables 1 and 2. In addition, statistical analysis was made of the total tabanids collected without regard to species.

The most efficient trap, based on the number of flies collected was the Stoneville malaise trap baited with CO_2; the least efficient was the unbaited Plexiglas trap.

The two canopy traps baited with CO_2 were as efficient as the unbaited Stoneville malaise trap in total numbers of tabanids collected. Except for *T. lineola,* which was collected in significantly greater numbers in the canopy trap than in the malaise and modified canopy traps, neither canopy trap collected significantly greater numbers of any species than the malaise trap.

Table 1. The species and total number of female tabanids collected in each test trap.

Species	Total numbers of female tabanids collected in indicated trap type [a]								
	1	2	3	4	5	6	7	8	9
Tabanus									
abdominalis F.	2059a [b]	218c	465b	434b	168c	125c	6d	11d	6d
fuscicostatus Hine	1475a	1338a	765a	258bc	334b	169cd	558b	166d	27e
lineola F.	303a	217a	123b	95b	106b	71c	25d	0e	0e
proximus Walker	524a	137b	176b	154b	56c	86c	41c	4d	2d
subsimilis Bellardi	1510a	1001ab	620bc	413c	864bc	331d	217e	16f	1g
wilsoni Pechuman	31a	7c	22ab	4c	9bc	2c	0c	0c	0c
Chrysops									
flavidus Wiedemann	2019a	706bc	782b	1013b	414c	475c	83d	46e	6f
Total: all tabanids	8093a	3702b	3009b	2429bc	1984c	1300d	942e	258f	45g

[a] 1 — Stoneville Malaise trap with CO_2; 2 — Canopy trap with CO_2; 3 — Stoneville Malaise trap without CO_2; 4 — Modified canopy trap with CO_2; 5 — California Malaise trap without CO_2; 6 — Modified canopy trap without CO_2; 7 — Canopy trap without CO_2; 8 — Plexiglass trap with CO_2; 9 — Plexiglass trap without CO_2.

[b] Comparative numbers followed by the same letter are not significantly different at the 5% level.

Table 2. Comparative collections [a] of tabanids in Malaise (A) and Manning (B) traps.

Species	Series 1 [b]		Series 2 [c]		Series 3 [d]	
	A	B	A	B	A	B
Tabanus						
fuscicostatus	489a	811b	74a	164b	91a	276b
lineola	122a	158a	11a	18a	19a	12a
proximus	0	1	0	0	17a	59b
subsimilis	313a	125b	433a	180b	276a	81b
sulcifrons Macquart	0	0	0	0	343a	430a
venustus Osten Sacken	27a	76b	61a	29a	4a	5a
wilsoni	310a	61b	175a	19b	0	0
Chrysops						
flavidus	403a	9b	565a	18b	31a	5b
Total: all tabanids	1669a	1267b	1335a	441b	797a	871a

[a] Comparative values followed by the same letter are not significantly different at the 5% level.
[b] Total of 9 collections.
[c] Total of 8 collections.
[d] Total of 11 collections.

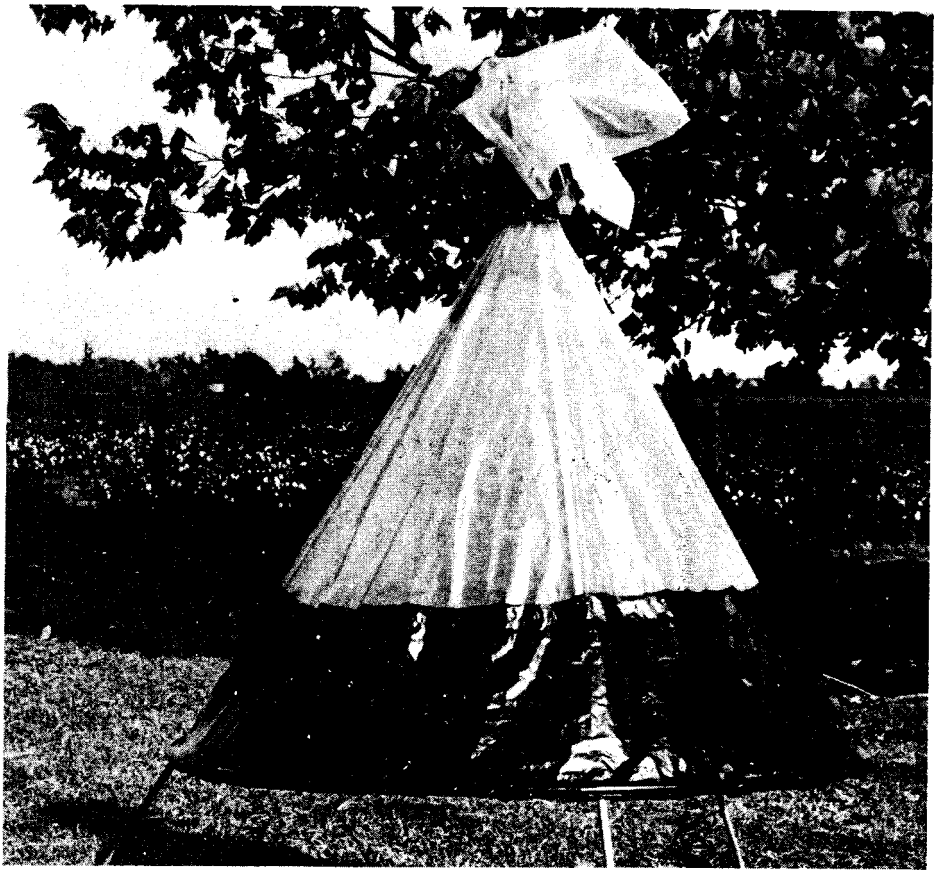

Fig. 3. Canopy trap.

The difference between the total tabanids collected in the two types of canopy traps baited with CO_2 was statistically nonsignificant. On a species basis, significantly greater numbers of *T. fuscicostatus, T. lineola,* and *T. subsimilis* were collected in the canopy trap; *T. abdominalis* was collected in significantly greater numbers in the modified canopy trap.

A comparison of the two types of canopy traps when they were both unbaited shows that the modified trap was more efficient in the collection of *T. abdominalis, T. lineola, T. subsimilis, C. flavidus,* and total tabanids but less efficient in the collection of *T. fusciocostatus.*

The California malaise trap is a larger version of the Stoneville trap. It was 12 ft tall and had four 6-ft-wide by 4-ft-high openings. However, it lacks the corner baffles of the Stoneville trap, and it was constructed of a white nylon netting. In total numbers of flies collected, the California trap was significantly less efficient than the unbaited Stoneville trap. On a species basis, 4 species were collected in significantly fewer numbers, but 3 were collected in statistically equivalent numbers to those collected in the Stoneville trap.

The Plexiglas trap was included in this study on the basis of information (C. E. Schreck, personal communication) relative to the collection of *T. nigrovittatus* Macquart during mosquito trapping studies. However, in the present studies, this trap was not efficient in collecting tabanids.

The 3 series of studies with the Manning trap showed definite species preferences for this type of trap. This trap was much more efficient in the collection of *T. fuscicostatus* but very inefficient in the collection of *C. flavidus* and *T. wilsoni.* Although

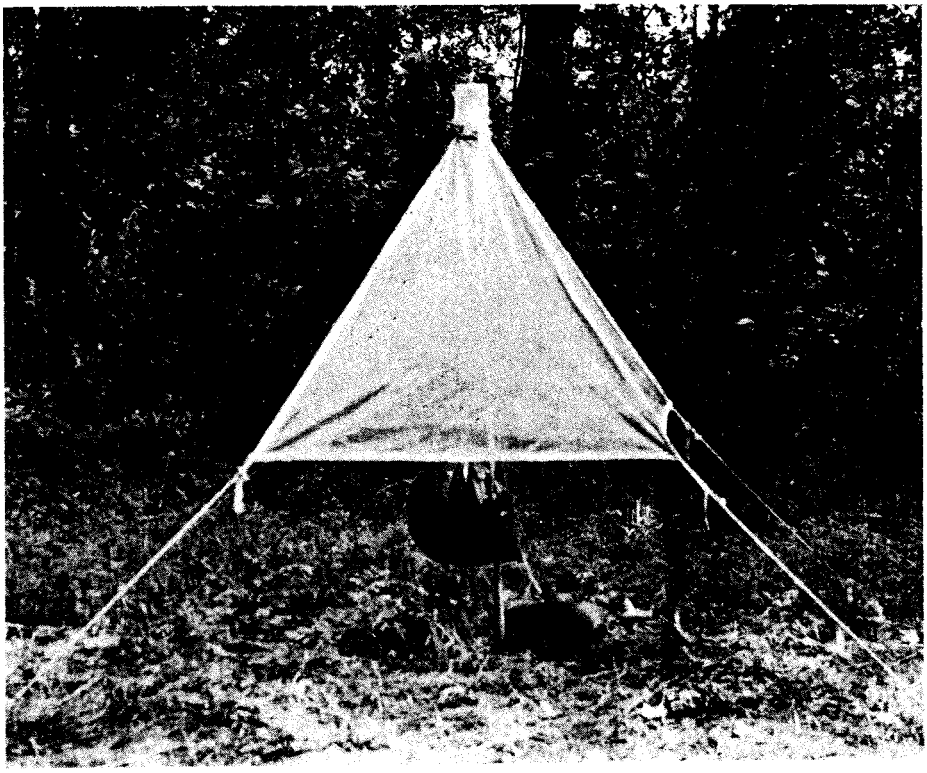

Fig. 4. Modified canopy trap.

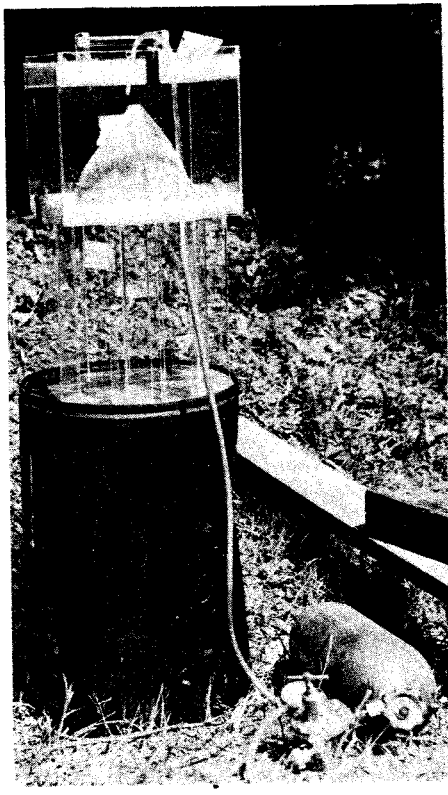

Fig. 5. Plexiglas trap.

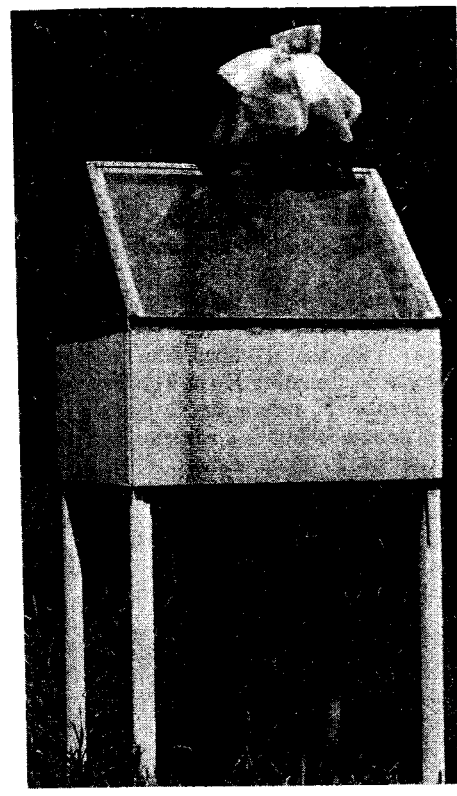

Fig. 6. Manning trap.

there was no significant difference between traps in the collection of *T. lineola,* the malaise trap was more efficient in the collection of *T. subsimilis.* In series 3, the only one for which the collection of *T. proximus* was analyzed, the Manning trap was more efficient in collecting this species. *Tabanus venustus,* collected in all 3 series, only occurred in significantly greater numbers in the Manning trap in series 1. In the other two series, collection numbers were statistically equivalent.

The malaise trap collected significantly more tabanids in 2 of the 3 series. In the third series, the two traps collected equivalent numbers.

The data obtained in the present study demonstrate the effect of trap design on the numbers and species of Tabanidae collected. When data from traps used in survey, ecological, and population studies are to be analyzed, the effects of the trap design on the collections should be considered.

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OBITUARY

Richard J. Schroeder

Richard J. Schroeder died suddenly of a heart attack on 29 August 1975. Dick was 52. Born in Cleveland, Ohio on 27 December 1922, he was educated in the Cleveland area and attended Fenn College, where he majored in engineering. After serving in the Air Force during World War II, he returned to Cleveland and entered the pest control industry, working for the Cleveland Chemical Pest Control Company. In 1965 he went into business as owner-operator of Southern Mill Creek Products of Ohio, Inc. From about this time, Dick took a keen interest in the control of arthropods of public health importance, especially mosquitoes.

He was a member of AMCA, the Ohio Mosquito Control Association, and the Ohio Pest Control Association. He served as President of OPCA in 1965 and held the office of Secretary-Treasurer of the OMCA from 1971 until the time of his death. He was also active in the Lions Club and served a year as a local President. Dick was respected by those who knew and worked with him for his warm friendship, honesty, and devotion to perfection in the performance of mosquito control. He was always enthusiastic and happy to help novices solve mosquito control problems. As a member of the business community, Dick was uncommonly interested in and had a strong sense of obligation to customers and professional associates alike. He was indeed a rare individual and will be sincerely missed by all who knew him. He is survived by his wife, Jean, son Richard, and daughter Margaret.—Richard Lee Berry