THE SEASONAL APPEARANCE OF TABANIDAE AS DETERMINED BY MALAISE TRAP COLLECTIONS[1]

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ABSTRACT. The first tabanid specimens of the season were collected in a Malaise trap April 4 and the last on October 21, 1969. A total of 12 species of *Tabanus* and one species each of *Chlorotabanus, Chrysops, Hybomitra,* and *Leucotabanus* were collected. However, the initial dates of collection of species in the survey trap lagged behind the dates of their appearance in other Malaise traps in the area; the final date of collection in the survey trap occurred prior to the actual disappearance of the species. The numbers collected were low and eight species of Tabanidae found in collections from the other traps were not found in the survey trap. The major reasons for these discrepancies were the color and the site of the survey trap.

The Malaise trap (Townes, 1962) has shown potential as a survey tool in studies of Tabanidae (Smith *et al.,* 1965; Pechuman and Burton, 1969; Easton *et al.,* 1968). Also, in preliminary studies at the Livestock Insects Investigations Laboratory at Stoneville, Mississippi, in 1968 with this type of trap (Roberts, 1970a), I had found that it could be used to study habitat, meteorological effects, diurnal activity, potential adult attractants, and seasonal incidence of adult populations. Therefore, in 1969, studies were planned to further evaluate the Malaise trap. The present paper reports the results obtained when it was used as a survey tool.

MATERIALS AND METHODS. The Malaise survey trap was constructed of green and natural saran screen according to Townes (1962). The trap site was located in a cleared strip about 30 feet wide and 0.2 mile long oriented north and south in the Delta Experimental Forest of the Delta Branch Experiment Station. A redgum and cottonwood plantation extended along the west side of the cleared strip and the survey trap was located about 10 feet from the east edge of the forest at about the midpoint of the long axis of the strip.

The Delta Experimental Forest was described by Putnam and McKnight (1949); it is a tract of 2580 acres located in the first bottoms of the Yazoo-Mississippi River Delta and is representative of much of the 30 million acres of bottomland forest in the deep South. The soil is Sharkey clay, which is sometimes called "buckshot," a type that is generally unprofitable for agriculture. The ridges, flats, and sloughs are all very wet during the winter and spring since the ridges are only about 2 to 6 feet higher than the sloughs. On the ridges, sweetgum and water oaks (willow oak, Nuttal or bottomland red oak, and water oak) predominate, but there is an admixture of numerous other species. The flats are mainly occupied by a mixture of hackberry (sugar berry), white elm (American elm), and blue ash with varying and occasionally large proportions of water oaks, bitternut hickory (water hickory), overcup oak, and rock elm (cedar elm). The sloughs, which comprise only a small part of the forest area, grow principally bitternut hickory, overcup oak, persimmon, and water locust with a little bald cypress mixed in.

From past collection records and field observations, adult tabanids appear in the area on or about the first of April, so the collections from the survey trap were started about 2 weeks before this date. From March 10 until June 9, collections were picked up daily, Monday through

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Friday, between 0900 and 0930, and the Monday collections, therefore, consisted of all specimens trapped since the previous Friday; from June 10 until September 19, collections were picked up daily, Monday through Sunday, and from September 19 until November 17, two days after the first killing frost when trapping was discontinued, the early season schedule was followed. In this report, unless otherwise indicated, numbers collected refer only to female specimens.

Also, during most of the season, April 14 to October 9, other studies were being made with Malaise traps in the forest and adjacent pastures. Although the purpose was to investigate carbon dioxide attractancy, effect of trap site and trap color on collections, populations around pastured cattle, and collections from traps baited with a steer compared with collections from traps baited with carbon dioxide, some of the data could be used to supplement the data from the survey trap to establish the seasonal range and species of Tabanidae in this area.

RESULTS AND DISCUSSION. The first tabanid was collected in the survey trap April 4; the last specimen was collected October 21. During this 7-month period, 16 species distributed in the genera *Tabanus, Chlorotabanus, Chrysops, Hybomitra,* and *Leucotabanus* were collected. The genus *Tabanus* was represented by 12 species; the other genera were each represented by 1 species.

Table 1 lists the species collected in the survey trap with the dates the first and last specimens were collected in the survey trap and in all other Malaise traps used in the area in 1969 and the total number of each species. Figure 1 shows the seasonal range of each species collected in the survey trap (heavy bars). The thin bars, which extend this seasonal range, are based on the data obtained from the other Malaise trap studies.

Approximately 6 weeks after the start of the study, sufficient data had been accumulated from the other Malaise traps to show that the collections from the survey trap did not accurately represent the

TABLE 1.—Species, dates of collection, and numbers collected in Malaise traps in 1969.

	Dates of collection				No. collected (% of total)	
	Survey trap		All other traps			
Species	First	Last	First	Last	Survey trap	All other traps
Tabanus						
abdominalis F.	6/10	8/23	6/4	9/16	141 (4.8)	7,397 (3.0)
americanus Forster	6/13	6/18	5/15	8/1	2 (.06)	218 (.09)
atratus F.	5/30	8/1	5/9	10/9	5 (.17)	280 (.1)
calens L.	9/4	10/6	7/31	10/9	6 (.2)	478 (.2)
equalis Hine	5/22	6/23	5/21	7/8	13 (.4)	822 (.3)
fuscicostatus Hine	5/15	9/16	5/10	10/1	396 (13.5)	39,076 (16.1)
lineola F.	5/3	9/1	4/26	10/9	217 (7.5)	14,940 (6.2)
proximus Walker	6/18	9/13	6/7	10/9	57 (1.9)	2,375 (1.0)
subsimilis Bellardi	4/16	10/21	4/14	10/6	1,193 (41.1)	83,382 (34.4)
sulcifrons Macquart	7/25	10/6	7/21	10/13	66 (2.2)	8,999 (3.7)
venustus Osten-Sacken	6/2	9/13	5/14	9/28	4 (.14)	149 (.06)
wilsoni Pechuman	5/27	6/27	5/14	7/14	14 (.5)	3,266 (1.3)
Chlorotabanus						
crepuscularis (Bequaert)	6/10	7/21	5/28	8/29	18 (.6)	684 (.3)
Chrysops						
flavidus Wiedemann	5/3	10/13	4/22	10/13	374 (12.9)	38,279 (15.8)
Hybomitra						
lasiophthalma (Macquart)	4/4	5/26	4/4	6/17	364 (12.5)	41,493 (17.1)
Leucotabanus						
annulatus (Say)	6/16	8/27	6/12	8/29	33 (1.1)	62 (.02)

populations of adult tabanids. The main discrepancy was the period during which the species were present (initial date of adult appearance and the date of the end of adult activity of an individual species). A second discrepancy was the small number collected in the survey trap compared with the larger number collected in other forest locations. However, the low numbers of the more abundant species collected in the survey trap tended to reflect the peak periods of adult activity. Moreover, when the percentages of the total catch of each species in the survey trap and in the other traps are compared (Table 1), the species were represented in nearly the same proportion in the survey trap and in the other traps. A third discrepancy was the absence of eight species: *Tabanus cymatophorous* Osten-Sacken, *T. mularis* Stone, *T. stygius* Say, *T. trimaculatus* Palisot de Beavois, *Hybomitra hinei wrighti* (Whitney), *H. nigricans* (Wiedemann), *Chrysops callidus* Osten-Sacken, and *C. montanus* Osten-Sacken in collections from the survey trap that were collected in other traps.

The three discrepancies were the results of at least two factors, the most obvious being trap site. The site chosen seems to have been either a flyway that was not used regularly or one that was

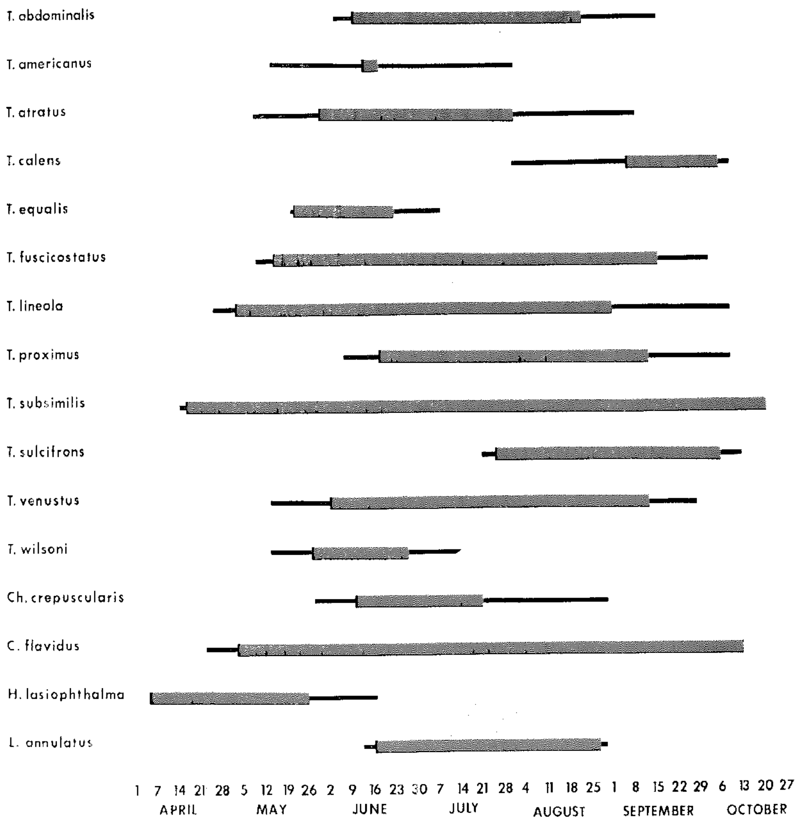

FIG. 1.—Seasonal range of Tabanidae collected in the Malaise survey trap (heavy bars) augmented by data from other Malaise traps (thin bars) in the Delta Experimental Forest, 1969. (*T.=Tabanus; Ch.=Chlorotabanus; C.=Chrysops; H.=Hybomitra; L.=Leucotabanus*).

not used until the population of a species reached some minimum level. The second factor was the difference in the attractiveness of traps caused by color. At the time the survey trap was placed in operation, the effect of trap color was not known. When this effect became known from other studies, it was not feasible to change the survey trap. I reported the effect of color on collections of tabanids earlier (Roberts, 1970b). Briefly, Malaise traps constructed entirely of natural saran screen collected 100 times more tabanids than a trap constructed of gray plastic screen and 10–15 times more than a trap constructed of both green and natural saran screen, as was the survey trap; all the other Malaise traps used in 1969 were constructed of the natural saran screen.

The degree of accuracy of the Malaise trap in determining the exact seasonal distribution of populations of tabanids is therefore affected by the location, color, and number of traps. If the ultimate objective of a survey is the determination of the initial appearance of the species, the final disappearance of the species from the field, and population fluctuations, then more traps and traps placed in various types of habitat are needed. Also, baited traps, for example, with carbon dioxide, might be helpful in a survey, especially in detecting those species that occur in low numbers and for relatively short periods. However, additional study is needed to correlate the numbers trapped with the total populations.

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