

THE SEASONAL DISTRIBUTION OF SOME TABANIDAE (DIPT.) IN PANAMA

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A number of students of the Tabanidae have recorded their observations on the seasonal activity of these flies, but with a few exceptions their observations were made in temperate regions, and were for the most part based on limited or rather haphazard collections. In North America, Hine (1903, 1906) gives data for a few species of *Chrysops* and *Tabanus* found in Louisiana and Ohio, showing that some species, as *T. lasiophthalmus*, are on the wing early in the year (May and June), while others, as *T. sulcifrons*, do not appear until later (August and September). Mosier and Snyder (1919) studied the Tabanids of the Paradise Key area in southern Florida, and give tables showing dates of capture of the various species. *T. americanus* and *T. trijunctus* are extraordinarily abundant, the former from March to June, the latter for a very short period of two or three weeks in late March and early April. Other species, as *T. lineola*, *T. costalis* and *Chrysops flavida*, fly almost throughout the year. Webb and Wells (1924) working mainly with *T. punctifer* and *T. phaenops* found the former to be most abundant from about July 1 to August 20, while the latter did not reach maximum abundance so early, but was on the wing into September. Cameron (1926) working with the Tabanidae of the Canadian Prairie Provinces, where the summer season is comparatively short, found a few species (*T. lasiophthalmus* and *T. illota*) on the wing as early as late May, while *T. septentrionalis*, the latest flying species, was taken well into September. Most of the species had a rather short season of flight, generally from a month to six weeks. Stone (1930) gives a table showing the seasonal distribution of 37 species found in the vicinity of Ithaca, New York. Schwardt (1931), studying the biology of *T. lineola*, believed that the species, unlike most Nearctic Tabanidae, was double brooded, as although adults were on the wing from May 4 to October 9, there were two maxima with a period of scarcity in late July.

Philip (1931), dealing with the Minnesota species, gives charts showing the seasonal distribution of the various species. Here again some species, such as *Chrysops moechus*, *C. indus*, *T. metabolus* and *T. lasiophthalmus* are early species, others, like *T. actaeon* and *C. sackeni*, are more abundant in the latter part of the summer, while *C. excitans*, *C. montanus*, *T. atratus* and a few others have a long flight season. The present author (Fairchild, 1937) in a list of the Florida species, has given dates of earliest and latest capture for a number of species occurring about Monticello in the northern part of the state. A few species were on the wing as early as late March, and several occurred at least to the middle of September, when collecting ceased. *Chrysops divisa* and *C. brimleyi* were early spring forms, the former not being taken after April 30. *T. annulatus* had a short season from July 10 to August 18, and *T. hinei* was taken only from August 30 to September 21. *C. flavida* and *vittata*, *T. turbidus* and *mularis*, on the other hand, have long flight seasons, from April or May into September.

In Greece, Shannon and Hadjinikolaou (1936) give some notes on the seasonal distribution of some Macedonian species. Thus *Tabanus quatuornatus* appears to have a short season in spring (April-June), while *T. autumnalis* extends its season of flight from April to October. In the genus *Haematopota*, of seven species all but *H. fraseri* have very short flight seasons, that species having been taken from May to October. Efflatoun (1930) in discussing the Egyptian species finds an essentially similar situation. *Tabanus alexandrinus* having a short early spring season (March-April), while *T. agrestis* and *T. taeniola* are on the wing from April to October.

In the tropics, Mitzmain (1913) in an intensive study of *Tabanus striatus* in the Philippines, states that the fly first appears on the wing about the middle of August, but does not reach great numbers until October. From then until March it is very abundant, which indicates that the species is predominantly a dry season form, as the Manila area has a winter dry season. Neave (1915) in his classic study of the Tabanidae of Southern Nyasaland, concluded that all the species were single brooded. Most of the species on which he gives information fly only during the rainy season, which is said to occur from November to March. *Dorcaloemus fodiens* and the two species of *Silvius* recorded have very short seasons,

not over a month, the first in April, the latter in October and December. *Chrysops longicornis*, *wellmani* and *magnifica* all fly nearly throughout the rains. *Haematopota mactans* also flies during the whole rainy season, while the other three species of the genus all have quite short flight seasons. Of the species of *Tabanus*, only *T. taeniola* has a long season, from October to May, the other species mostly being limited to a couple of months. The same author also gives notes on a few African species in earlier papers (Neave, 1911, 1912).

Without doubt a thorough search of the literature would disclose considerably more information on seasonal distribution, but the work reviewed above all tends to show that the majority of Tabanids, both in temperate and tropical regions, are single brooded, and that each species has a rather definite flight season which may be very short. The exceptions seem to be species which either complete more than one life cycle during the year, or in which the length of the cycle is so irregular due to great variation in the length of the larval stage, that adults are emerging throughout the year.

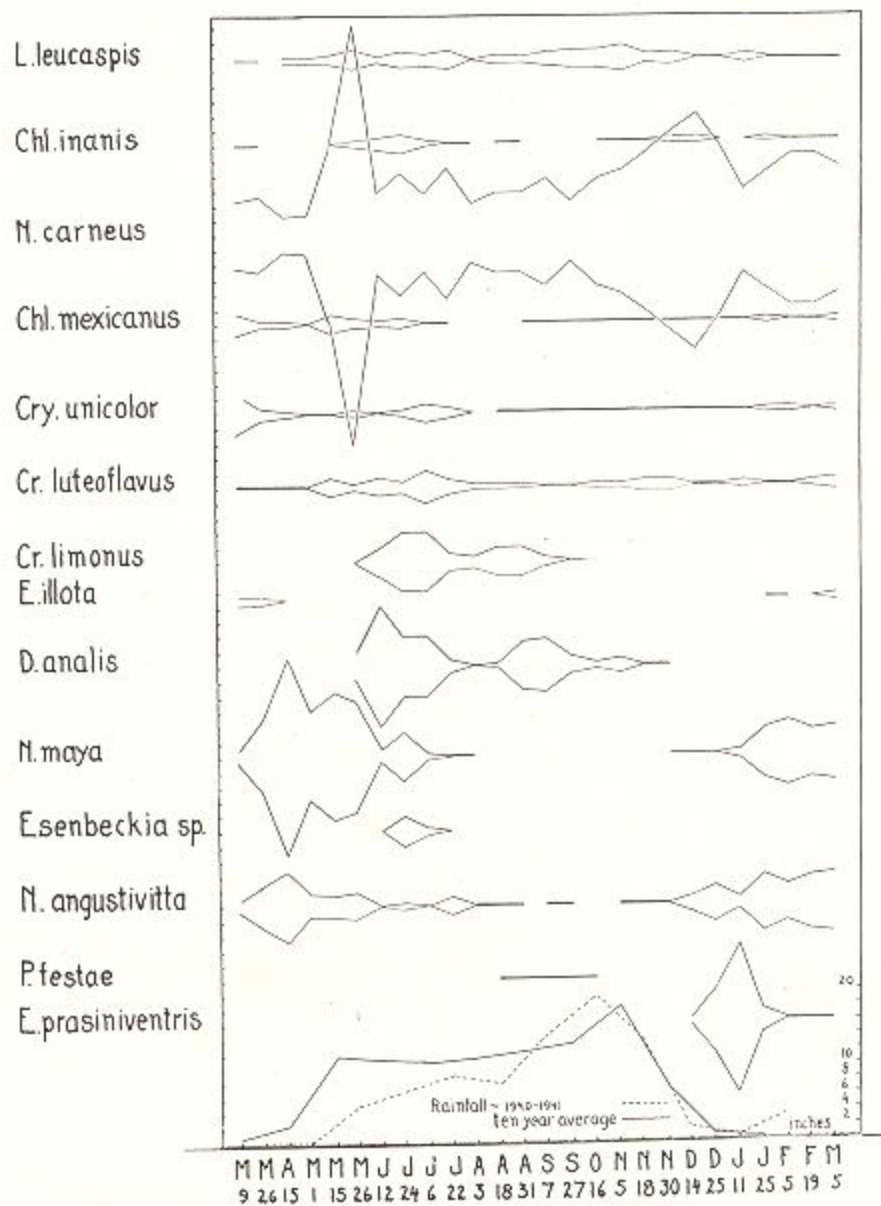
The present investigation was undertaken to see if the above generalization was applicable to the Tabanidae found in Panama. For this purpose the services of a relatively reliable native collector were secured, and beginning on March 9, 1940, collections were made approximately every two weeks until March 5, 1941. The collector was paid a small sum for each fly brought in, except that if more than 700 or 800 were taken the price per fly was reduced. Collections were made using horses for bait, and occasionally cattle also. Each collection represents the result of approximately two days collecting, but in some cases this was exceeded. Collections were made about the home of the collector, a small settlement of a few families at Moja Pollo, on the banks of a small tributary of the Chagres river of the same name. The locality is between Madden Dam and Gamboa in the Chagres valley, and lies on the Atlantic side of the Continental divide. The area is one of mostly second growth scrub forest with but a little of the original forest remaining. About the mouth of the Moja Pollo there is a large area of swamp and much floating vegetation. The climate, as recorded at the weather station at Madden Dam, a few miles upriver, is fairly uniform as regards temperature. The mean annual temperature is about 77° F., the absolute maximum being 98° and minimum 59°. On the whole, the

lowest temperatures are reached in January and February, the highest in April and May, the greatest daily range being during the dry season. The rainfall by months for the period during which collections were made, and the ten year monthly averages are shown at the bottom of the accompanying figure. As can readily be seen, the year is rather sharply divided into a wet and a dry season, the rains generally beginning in May and lasting through December.

During the year 26 collections were made, and a total of 11,997 Tabanids taken, representing 35 species. Nearly half (49.1%) of all flies taken belonged to one species, *Tabanus* (*Neotabanus*) *lineola* var. *carneus* Bell., while the next most abundant species, *T.* (*Neotabanus*) *maya* Beq., accounted for 12.5% of the total. Eleven other species together accounted for but 35% of the catch, while the remaining 21 species made up the balance of 3%. A list of the species taken, with the numbers of each is given below:

<i>Esenbeckia prasiniventris</i> Macq.	411	<i>Stenotabanus plenus</i> Hine	2
" <i>illota</i> Will. var.	55	<i>Tabanus</i> (<i>Phaeotabanus</i>) <i>medius</i> Krob.	26
" sp.	67	" (<i>Bellardia</i>) <i>pseudoculus</i>	
" <i>translucens</i> Macq.	1	" Fchld.	105
<i>Pityocera festae</i> Gig.-Tos.	14	" (<i>Bellardia</i>) <i>albocirculus</i>	
<i>Chrysops variegata</i> de Geer.	32	" Hine.	30
" <i>malaena</i> Hine.	1	" (<i>Hybomitra</i>) <i>quadri-</i>	
" <i>calogastra</i> Schin.	1	" <i>punctatus</i> Fab.	9
<i>Dichelacera analis</i> Hine.	766	" (<i>Neotabanus</i>) <i>lineola</i> var.	
" <i>marginata</i> Macq.	1	" <i>carneus</i> Bell.	5661
<i>Psaliidia fulminea</i> Hine.	2	" (<i>Neotabanus</i>) <i>lineola</i> var.	
<i>Chlorotabanus mexicanus</i> Linn.	221	" <i>stenocephalus</i> Hine.	190
" <i>inanis</i> Fab.	136	" (<i>Neotabanus</i>) <i>maya</i> Beq.	1441
<i>Cryptotylus limonus</i> Town.	425	" (<i>Neotabanus</i>) <i>angustivitta</i>	
" <i>luteoflavus</i> Bell.	351	" Krob.	859
" <i>unicolor</i> Wied.	278	" (<i>Neotabanus</i>) <i>amplifrons</i>	
<i>Diachlorus curvipes</i> Fab.	1	" Krob.	39
<i>Lepiselaga crassipes</i> Fab.	93	" (<i>Neotabanus</i>) <i>fumalipennis</i>	
<i>Selasoma tibiale</i> Fab.	2	" Krob.	5
<i>Leucotabanus leucaspis</i> Wied.	412	" (<i>Tabanus</i>) <i>ferrifer</i> Wlk.	49
" <i>canthorax</i> Fchld.	6	" (<i>Tabanus</i>) <i>importunus</i>	
" <i>flavinotum</i> Krob.	3	" Wied.	125

In the accompanying figure an attempt has been made to show the seasonal abundance of a number of the more common or characteristic species. The vertical distance between horizontal lines indicates the number of specimens taken at each of the 26 collecting periods, each unit of the scale along the left margin indicating 25 specimens. A single line indicates 5 specimens or less. The month and first day of the collecting period are shown at the lower margin.



It will be readily seen that the species fall roughly into three groups:

- (a) Those without a definite flight season (*L. leucaspis* to *Cr. luteoflavus*).
- (b) Those with a flight season corresponding in the main to either the wet (*Cr. limonus*, *D. analis*) or the dry (*N. maya*, *N. angustivitta*) seasons.
- (c) Those with a very short and definite season which may be either in the wet or the dry season (*E. illota*, *E. sp.*, *E. prasini-ventris* and *P. festae*).

Of those species not shown in the graph, many are represented by too small a number of specimens for a statement to be made. *Lepiselaga crassipes*, *N. lineola* var. *stenocephalus*, *N. amplifrons* and *Chrysops variegata* appear to fall in group "a." The two species of *Bellardia* and *Phaetotabanus medius* seem to be strictly wet season forms, while *T. ferrifer* and *T. importunus* have a period of maximum abundance in April and May, with another appearance in small numbers in September to December. These last two species are the only ones which show indications of two distinct broods, but whether due to two life cycles a year, or two separate broods with an annual cycle must await a careful study of the life history.

It is interesting to note that *T. lineola* and related forms are the dominant group numerically, and that *lineola* itself is almost uniformly abundant throughout the year. In North America also, it is a long season form, while *T. taeniola*, an apparently related African species, seems to have similar habits. Although the *Pangoniinae* are rather poorly represented in Panama, all, with the exception of the species of *Chrysops*, seem to have very short flight seasons. While collecting in Brazil, the present author got a similar impression in regard to the species of *Esenbeckia* and *Fidena*, though no uniform data were secured. Neave (1915) seems also to have found the *Pangoniinae* which he collected (*Dorcaloemus fodiens* and two species of *Silvius*) to be very short season species.

It was unfortunately not possible to secure data on the time of day at which the various species were most active, but the collector reported that very few Tabanids were taken after 8 A. M. or before 4 P. M. From personal observation, it is estimated that fully 60% of the species are crepuscular, a situation in marked contrast to that found in North America. Some, like the species of *Chlorotabanus* and *Esenbeckia illota*, are

practically nocturnal, while *Esenbeckia prasiniventris*, *T. ferrifer* and the species of *Neotabanus* are on the wing during the whole day, though perhaps less active during the hours from 10 A. M. to 3 P. M.

SUMMARY

The author reports a year's collecting of *Tabanidae* at two week intervals from a single station in Panama. The nearly 12,000 specimens taken represent 35 species of which a list is given. The seasonal distribution of 14 species is shown in graphic form, and the fact that the species may be grouped as to duration and time of flight period is noted. A brief review of literature is given, and some comparisons made with results obtained in other localities. The suggestion that types of seasonal distribution to a certain extent follow taxonomic groupings is put forward.

REFERENCES

- Cameron, A. E. 1926. Bionomics of the Tabanidae (Diptera) of the Canadian Prairie. Bull. Ent. Res., XVII, Pt. 1, pp. 1-42, Pl. I-V.
- Effiatoun, Bey, H. C. 1930. A Monograph of Egyptian Diptera. Part III. Tabanidae. Mém. Soc. Roy. Ent. d'Egypte. IV, fasc. 1, pp. 1-114, 2 col. plates.
- Fairchild, G. B. 1937. A Preliminary List of the Tabanidae (Diptera) of Florida. Florida Entomologist, XIX, 4, pp. 58-63, and XX, 1, pp. 10-11.
- Hine, J. S. 1903. Tabanidae of Ohio. Ohio Acad. Sci., Special papers, No. 5; pp. 1-63, Pl. I-II.
- Hine, J. S. 1906. A Preliminary Report on the Horseflies of Louisiana, with a Discussion of Remedies and Natural Enemies. State Crop Pest Comm. of Louisiana, Circular No. 6, pp. 1-43, 20 text figs.
- Mitzmain, M. B. 1913. The Biology of *Tabanus striatus* Fabricius, the Horsefly of the Philippines. Philippine Journ. Sci., VIII, Sect. B, No. 3, pp. 197-221, Pl. I-VII.
- Mosier, C. A., and Snyder, T. E. 1919. Notes on the Seasonal Activity of Tabanidae in the Lower Everglades of Florida. Proc. Ent. Soc. Washington, XXI, No. 8, pp. 186-196, Pl. 17.
- Neave, S. A. 1911. Report on a Journey to the Luangwa Valley, Northeastern Rhodesia, from July to September, 1910. Bull. Ent. Res., 1, pt. 4, pp. 303-317; 7 figs and map.
- Neave, S. A. 1912. Notes on the Bloodsucking Insects of Eastern Tropical Africa. Bull. Ent. Res., III, pp. 275-323, Pl. X-XI.
- Neave, S. A. 1915. The Tabanidae of Southern Nyasaland with Notes on their Life Histories. Bull. Ent. Res., V, pt. 4, pp. 287-320, pls. XXVII-XXX.
- Phillip, C. B. 1931. The Tabanidae (Horseflies) of Minnesota, with Special Reference to their Biologies and Taxonomy. Univ. Minnesota Agric. Exp. Sta. Techn. Bull. No. 80, pp. 1-128, Pls. I-IV.
- Schwardt, H. H. 1931. The Biology of *Tabanus lineola* Fabr. Ann. Ent. Soc. Amer., XXIV, No. 2, pp. 409-416.
- Shannon, R. C., and Hadjinicolaou, J. 1936. List of Tabanidae (Dipt.) of Greece. Acta Inst. Mus. Zool. Univ. Atheniensis, I, fasc. 6-7, pp. 160-172.
- Stone, A. 1930. The Bionomics of some Tabanidae (Diptera). Ann. Ent. Soc. Amer., XXIII, 2, pp. 261-304; 12 text figs.
- Webb, J. L., and Wells, R. W. 1924. Horseflies: Biologies and Relation to Western Agriculture. U. S. Dept. Agric., Dept. Bull. No. 1218, pp. 1-36, 18 text figures.