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MAINE AGRICULTURAL AND FOREST EXPERIMENT STATION
University of Maine

The Horse Flies and Deer Flies of Maine (Diptera, Tabanidae)

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FOREWORD

Any listing of insects found in the state of Maine would not be complete without mentioning briefly something about the climate and natural resources of the area. Maine lies astride the 45th parallel and is the eastern most point of land in the continental United States. It is largely rural, heavily forested, and it encompasses innumerable lakes, ponds, streams and bogs. Roughly 90% of the land mass is forested and of this portion 45–50% is of the spruce-fir type. Northern hardwoods (beech, birch and maple) dominate the ridges and much of the upland and make up the second most common forest type. Pines and other species are scattered throughout.

Settlers and colonists have been involved in the advance and retreat of open and developed land for hundreds of years and have introduced various plants and animals in the course of their activities. Small farms supporting a variety of livestock and crops have long been a common sight in the state. Various species of wildlife have intruded upon the state from the north and from the south or left the state entirely with the resultant changes.

The climate of Maine is temperate and variable, but averages on the cold side for the northeastern United States. Rainfall is ample and averages around 40 inches annually. Snowfall is expected most years throughout the state, but usually forms a fairly constant blanket over northern and interior sections of the state from December through April. In extreme southwestern Maine and in coastal sections of the state, conditions favor life forms more in common with southern New Hampshire and eastern Massachusetts. In the mountains and northern interior sections of the state, colder climates favor only the hardier species, more like those of Quebec and northern New Brunswick. The most northerly part of the state near the border with Quebec is under the influence of the St. Lawrence River. The coldest climate in Maine occurs in the northern interior portions of the state and on the tops of a few mountains, especially Mt. Katahdin in north central Maine where a limited arctic alpine fauna and flora exists.

Naturalists since the early 1800s have traveled to Maine to sample its interesting fauna and flora, and tourists and hunters have long sought refuge in Maine to provide a renewal with the wild spaces. Most of Maine revels in the wild state, and problems associated with extensive development are just beginning to override the relatively undisturbed condition of things. It is, therefore, important that much of our natural areas be surveyed to document the presence of the different life forms, which undoubtedly will change as development progresses. This list should serve as another step in the effort to catalogue the life forms of the area.

ACKNOWLEDGMENTS

Most entomologists who have collected insects in Maine have collected at least a few Tabanidae, often in self defense. The longest series we have seen were collected by the late C.P. Alexander, D.J. Borror, A.E. Brower, John F. Burger, R.T. Carde, Frank D. Fee, J.B. Huether, Terry Mingo, and Karl Valley. The authors of this paper have collected Tabanidae rather extensively in Maine.

We also wish to acknowledge with appreciation the kindness of Mariam Bennett who gave us permission to collect specimens in the Colby College bog and the late Roy Knudson who allowed us to set up tabanid traps on his property in the town of Mercer, Somerset County. Especially appreciated is the hospitality Jean and James McIntyre extended to the senior author on his collecting trips to Maine.

Special thanks go also to Charlene Donahue who spent many slow and painstaking hours going over the various drafts of this paper bringing comments, corrections, and changes together in a usable format. And thanks to Betty Barry who was able to bring this material to the printed page.

Junior Author's Note

On March 30, 1992, I was saddened by the passing of the senior author Dr. LaVerne L. Pechuman. His expertise, enthusiasm, versatility and warm and caring ways will be greatly missed. I first met Verne at Cornell University in Ithaca, New York, as a graduate student in 1963, and we continued our association over the years. The idea for this list evolved in the late 1960s and gained momentum as Verne travelled to Waterville more frequently to visit his daughter and her husband, Jean and James McIntyre.

Although this list was in its final stages at the time Verne became ill, there was a hold up in publication. While most of the text has been left as Verne saw it, a few distribution records have been added especially from the collection at the University of New Hampshire. John F. Burger and A.W. Thomas reviewed the manuscript and made corrections and a number of useful suggestions for improvement in style. The only major taxonomic change, however, was elevation of *Tabanus hinellus* Philip to species rank rather than leave it as the coastal form of *T. lineola*. John Burger and Donald S. Chandler were very helpful in securing Maine records from the extensive University of New Hampshire collection at Durham. An excellent *In Memoriam* was published by E. Richard Hoebeke (1992).

INTRODUCTION

The economically important group horse flies and deer flies (Tabanidae) has been little studied in Maine. Johnson (1925) lists 41 species from Maine by geographical areas with a few specific localities. Proctor (1946) lists 36 species found on Mt. Desert Island. Knutson et al. (1954) list a number of Maine localities for *Chrysops*. Shaw (1959) records species from Mt. Desert Island. Dearborn et al. (1982) list many of the species found in Maine with an indication of the general geographical area where each is found. Casual references to species found in Maine are scattered through the rather extensive literature on North American Tabanidae.

Maine is the type locality for a few species. *Chrysops fugax* Osten Sacken (now placed as synonym of *ater* Macquart) is from Norway; *Atylotus pemeticus* (Johnson) (now placed as a synonym of *intermedius* (Walker)) is from Southwest Harbor; and *Hybomitra aurilimba* (Stone) is from Paris. Part of the type series of *H. minuscula* (Hine) is from Orono, and *Chrysops calvus* Pechuman and Teskey is from Jonesboro, Edinburg, Passadumkeag, and the Mt. Katahdin area.

The distribution of Maine Tabanidae is of special interest because of the number of species with more southern ranges which reach their northeastern limit in Maine. A few northern species reach their southern limit in the state. This paper includes all of the species known or likely to be found in Maine with specific localities by county (see map on page 20) for the more unusual species and for species not found throughout the state.

LIFE HISTORY

Most Maine Tabanidae probably require one year to develop from egg to adult although larger species may take up to four years. Most species lay eggs in a mass on vegetation over water or in swampy areas, and the larvae are found in mud or moss on the edge of ponds and streams and in swamps. Some species are restricted to sphagnum bogs, and the larvae of one Maine species, *Tabanus fairchildi* Stone, lives in swiftly flowing streams. The larvae of two Maine species, *T. quinquevittatus* Wied. and *Hybomitra microcephala* (O.S.), are known to be terrestrial. Three species found in Maine, *Chrysops atlanticus* Pech., *C. fuliginosus* Wied., and *Tabanus nigrovittatus* Macq., are coastal and associated with salt marsh situations. Tabanids pass the winter in the larval stage, and adults emerge the following season. Adults of most species are active on warm sunny days, and only the females suck blood.

Teskey (1990) covers virtually all of the species that are likely to occur in Maine and provides keys to species as well as information on their taxonomy, biology and distribution. More detailed larval information was provided by Teskey (1969). Pechuman (1981) also discusses the family (primarily adults) in detail for the Northeast. Another valuable reference for many of our species was published by Pechuman et al. (1983).

ECONOMIC IMPORTANCE

The major importance of Tabanidae in Maine results from their bloodthirsty attacks on humans and other mammals. Tabanidae have been shown, however, to act both as mechanical and biological vectors of a number of disease organisms of humans and other mammals in other parts of the world. Although no association has been made with regard to human disease in Maine, there has been some evidence of transmission of disease organisms in wildlife. Much work needs to be done in this regard.

As Maine prides itself on its support of the tourist industry, it is imperative that a significant effort be made to understand one of the more important natural deterrents to a successful tourist business. This also should include the impact of tabanids on wildlife in support of the sport of hunting.

In general species of deer flies (*Chrysops*) are more important pests of man and more abundant than all other species. They attack humans and cause considerable irritation to anglers, loggers, road workers, horseback riders, and others who spend time in wooded or swampy areas. *Chrysops fuliginosus* is a pest of bathers on ocean beaches. It sometimes is necessary to seek shelter from these flies at the height of the flight season.

Some species of horse flies such as *Hybomitra illota* (O.S.) and *H. epistates* (O.S.) also attack humans, and *Tabanus nigrovittatus* has been known to drive bathers from the beaches. However, most *Hybomitra* and *Tabanus* species devote much of their attention to wild and domestic animals.

Unfortunately there are few control measures that are effective against tabanids other than simple avoidance. While repellents are effective against many biting flies, they generally seem to have little effect on either horse flies or deer flies. Some of the newer synthetic pyrethroids show the most promise in providing personal relief. Physically trapping flies to seasonally reduce populations in limited areas has been used in some parts of the country. Notable trapping efforts have been conducted against *Tabanus nigrovit-*

tatus in coastal Massachusetts and a number of species in livestock raising areas of the prairie provinces of western Canada. Trapping has been somewhat successfully used against *T. nigrovittatus* in Maine (Granger 1970). Avoidance of peak activity periods, use of adequate light-colored clothing to shield the body from bites, and use of head nets also seem to help.

As will be noted in the dates of collection given with each species, from early June to mid-August some species of deer fly and/or horse fly is at the peak of its activity with the resulting annoyance. The period of greatest activity of coastal species that plague our beaches is from the second week of July through the first week of August. Table 1 provides a quick reference to periods of peak activity for nuisance species in Maine.

COLLECTION METHODS AND MATERIAL STUDIED

Most specimens of *Chrysops* were netted as they attacked the collector. *Atylotus* were taken by sweeping vegetation in sphagnum bogs. *Hybomitra* and *Tabanus* were taken in canopy traps (Pechuman 1981) baited with dry ice. Long series of tabanids were collected in salt marsh areas of Georgetown and Phippsburg in the 1960s using various modifications of the canopy trap (Granger 1970). Since male tabanids do not suck blood, they were not taken in canopy traps, which attract only females. The few males collected were taken on flowers, hovering in patches of sunlight, or while resting on dirt roads. Some tabanids were collected in light traps.

Specimens of Tabanidae from Maine are scattered through many collections in North America and Europe. The largest numbers are found in the collections of the Maine Forest Service, Augusta; University of Maine, Orono; Cornell University; Ohio State University; Museum of Comparative Zoology, Harvard University; University of New Hampshire, Durham; and the National Museum of Natural History, Washington, DC.

CLASSIFICATION

The classification of Tabanidae used in this paper follows that of Pechuman (1981). A total of 76 species have been recorded from Maine with an additional 11 species expected to occur. Table 2 illustrates the breakdown by subfamily, tribe, genud, and species with the number in parentheses representing species that are expected to occur in Maine, but that have not been collected.

Table 1. Peak periods of activity for Maine species of Tabanidae that are most likely to bite humans.

Table 2. Classification and number of species of Maine Tabanidae.

Classification	Number of species
PANGONIINAE	
Pangoniini	
Stonemyia	2 *
CHRYSOPSINAE	
Bouvieromyiini	
Merycomyia	1 *
Chrysopsini	
Chrysops	28(4)
TABANINAE	
Haematopotini	
Haematopota	(1)
Tabanini	
Atylotus	7 *
Hybomitra	21(3)
Tabanus	16(4)

*Species in these three genera are not generally pests in Maine.

FAMILY TABANIDAE

Subfamily PANGONIINAE, Tribe Pangoniini

Stonemyia **Brennen 1935**

Stonemyia rasa (Loew). KENNEBEC: Augusta, 21, 24 July, 7 Aug.; Vassalboro, 11 Aug. WASHINGTON: Steuben, 24 July. YORK: W. Lebanon, 31 July/6 Aug. Both sexes frequently are found on flowers, especially *Spiraea latifolia*. *S. rasa* does not range as far north as *S. tranquilla,* and neither species sucks blood.

Stonemyia tranquilla (Osten Sacken). This species is found throughout Maine. The extreme dates of collection: June 25–August 26. We have only two records before July 17; 96% of the records occur in the last two weeks of July and the month of August.

Subfamily CHRYSOPSINAE, Tribe Bouvieromyiini

Merycomyia **Hine 1912**

Mercomyia whitneyi (Johnson). Only two specimens of this rarely collected species are known from Maine. D.J. Borror collected a female on a window at Audubon Nature Camp, Hog Island, Lincoln County on 13 Aug. 1952, and Frank Shaw (1959) collected a male hovering over the top of

Sargent Mt., Mt. Desert Island, Hancock County on 27 July 1955. We have seen both specimens.

Subfamily CHRYSOPSINAE, Tribe Chrysopsini

Chrysops **Meigen 1803**

Chrysops aberrans Philip. FRANKLIN: Chesterville, 3 Aug. KENNEBEC: Augusta, 21, 24 July; Austin Bog, Belgrade, 19 July; China, 11, 25 July; Mt. Vernon, 25 July, 1 Aug.; Wayne, 24 Aug. LINCOLN: 12, 23, 28 July, 2, 6, 7, 20 Aug. OXFORD: Brownfield, 28 July; Denmark, 2 Aug.; Passadumkeag Bog, 30 July; Plymouth, 27 July. SOMERSET: Town of Mercer, 1 Aug. WALDO: Knox, 16 July; Unity, 12, 23, 24, 27 July. WASHINGTON: T5 ND, 8 Aug. YORK: W. Newfield, 2–3 Aug. In addition, Knutson et al. (1954) report *C. aberrans* from localities in Cumberland, Hancock, and Washington counties. It is an aggressive species and troublesome to anyone in wooded areas in July. It has not as yet been collected in northern Maine.

Chrysops amazon Daecke. We have not seen this species from Maine. Knutson et al. (1954) report it from Casco, Cumberland County, 19 June 1951.

Chrysops ater Macquart. This black species is found throughout Maine and is aggressive and pestiferous in June. Extreme dates: May 5–July 18; 9% of the records are in May, 80% in June and 11% in July. Many older records for *C. carbonarius* from northeastern United States actually refer to *C. ater*.

Chrysops atlanticus Pechuman. The only specimens we have seen are a fairly long series from Reid State Park, Georgetown, Sagadahoc County, 12, 19, 24 July 1967. This appears to be the furthest north the species has been taken. In southern New England it is an important pest of people using the beaches.

Chrysops callidus Osten Sacken. LINCOLN: 3, 17, 23, 29 July, 3 Aug. KENNEBEC: Belgrade, 10 July; China, 25 June, 11 July. PENOBSCOT: Plymouth, 27 July. PISCATAQUIS: Sangerville, 9 July. SOMERSET: Mercer, 16 July. WALDO: Unity, 11, 12, 18, 23, 24, 27 July. YORK: Lebanon Center, 10 July. Proctor (1946) reports this species from Salisbury Cove, Mt. Desert Island, Hancock County, July 24–Aug. 7. Knutson et al. (1954) record it from Morrill, Waldo County, 15 July. Although not a rare species in Maine, *C. callidus* never seems to be the pest that it becomes further south. It

has not been taken in northern Maine, and it reaches its northern limit in the United States in the lower two-thirds of Maine.

Chrysops calvus Pechuman & Teskey. AROOSTOOK: Crystal, 6 June. FRANKLIN: Dryden, 15 June–15 July. HANCOCK: Mt. Desert Island, 16 June. OXFORD: 6 mi. S of Wilsons Mills, 5 June. PENOBSCOT: Bangor, 28 May; Edinburgh, 27 June; Millinocket, 1 July; Passadumkeag, 28 June. PISCATAQUIS: Baxter State Park, 1 July; Mt. Katahdin, 24 June, T4 R11, 1 July. WASHINGTON: Jonesboro, 13 June. Many records of *C. niger* in the literature actually refer to *C. calvus*.

Chrysops carbonarius Walker. As with similar *C. ater*, *C. carbonarius* is found throughout Maine, but is less common than the former. Extreme dates: May 12–July 30. Although it flies in May and June with *C. ater*, its main flight season begins a little later and usually lasts a little longer; <5% of the records are in May, 75% of the collections are in June and 20% in July.

Chrysops cincticornis Walker. This large, rather aggressive black species with orange hairs on the sides of the thorax, is found throughout Maine, but is less common northward. Extreme dates: June 1–Aug. 6. The main flight season begins at the end of the third week in June and runs approximately through the second week in July; 75% of the collection records are during this period.

Chrysops cuclux Whitney. This rather small black species is found throughout Maine. It rarely is abundant enough to be a pest, but adds to the general annoyance caused by the more abundant *C. ater,* which flies at about the same time. Extreme dates: June 4–July 17; 70% of the collection records are included in the last two weeks of June and the first week of July.

Chrysops delicatulus Osten Sacken. LINCOLN: 13 July, 9 Aug. KENNEBEC: Mt. Vernon, 9, 25 July. OXFORD: Denmark, 2 Aug. PISCATAQUIS: Baxter State Park, 6 Aug. WASHINGTON: 36 MD, 2 Aug. YORK: Ogunquit, 7 July. To the above may be added from Knutson et al. (1954), Bethel, Oxford County, 12 July and Naples and Richville, Cumberland County, 12 and 11 July respectively. Throughout most of its range, *C. delicatulus* is rather local in distribution. It never seems to be very abundant in Maine.

Chrysops dimmocki Hine. This species seems to reach the northern limit of its range in southern New Hampshire, but it may be present in York County.

Chrysops excitans Walker. This large aggressive species occurs statewide and often causes much annoyance to anglers and those in wooded areas during its flight season. Extreme dates: June 7–July 27; 85% of the collections fall during the last two weeks of June and first two weeks of July, and of these, 63% were taken the last two weeks of June.

Chrysops frigidus Osten Sacken. This rather small species is found statewide. It is not especially aggressive, but can be a source of annoyance on some occasions. It is most common in and near sphagnum bogs, but is not restricted to this habitat. Extreme dates: June 7–Aug. 1. The main flight period begins about mid-June and continues well into July. Our records show 34% of the collections in June and 65% in July.

Chrysops fuliginosus Wiedemann. HANCOCK: Ironbound Island, 22 June; Southwest Harbor, 5, 9 July. LINCOLN: numerous records ranging from June 15 to Aug. 1; Damariscotta, 26 June, 2 July; Medomac, 12 July. SAGADOHOC: Reid State Park, Georgetown, numerous records, June 27 to July 22. WASHINGTON: Jonesport, 7 Aug. This is a coastal species and probably breeds in every salt marsh in Maine. It is a severe annoyance to bathers during its flight season.

Chrysops geminatus Wiedemann. OXFORD: Brownfield, 28 July; Denmark, 2 Aug. PENOBSCOT: Orono. YORK: 8 mi. N of Berwick, 9 July; Eliot, 18 July; Kennebunk, 22 July; 4 mi. SW of Kennebunk, 7 July; W. Lebanon, 22 June and 16 July. Knutson et al. (1954) report it from Portland, 14 July and Richville, 12 July, both in Cumberland County. This little species reaches the northeastern limit of its distribution in the lower portion of Maine.

Chrysops hinei Daecke. This species has been taken near the coast to northeastern Massachusetts. Late season collecting may show that it is present in southwestern Maine.

Chrysops indus Osten Sacken. HANCOCK: Penobscot, 4 June. KENNEBEC: China, 25 June. PENOBSCOT: Greenfield, 27 June; Lagrange, 30 June. PISCATAQUIS: Sangerville, 9 July. SOMERSET: Mercer, 7 June. This does not seem to be a common species in Maine and apparently reaches the northeastern limit of its distribution in the state.

Chrysops lateralis Wiedemann. This is a common and troublesome species throughout the state. Extreme dates: June 15–Aug. 25. The main flight period is during the last three weeks of July. Our records show 79% of the collections occur during this three-week period.

Chrysops macquarti Philip. CUMBERLAND: Casco, 2–5 Aug. KENNEBEC: Waterville, 9, 16 July. OXFORD: Brownfield, 28 July; Rumford, 1 Aug. PENOBSCOT: Plymouth, 27 July. SOMERSET: Mercer, 1 Aug. WALDO: Unity, 24 July. WASHINGTON: 14 mi. W of Wesley, 25 Aug. YORK: Berwick, 23 July; Cornish, 7 July; Kennebunk, 22 July; Lebanon Center, 10 July; W. Lebanon, 22/30 June; Ogunquit, 9 July; Old Orchard Beach, 4 July. Knutson et al. (1954) report this species (as *C. univittatus*) from Bethel, Oxford County, 12 July and Richville, Cumberland County, 12 July. *C. macquarti* reaches its northern limits in central Maine. It is local in distribution, and we have never seen it in pest proportions in Maine.

Chrysops mitis Osten Sacken. This rather large aggressive species is found throughout the state, but is quite local in the southern counties. Extreme dates: May 30–July 25. 70% of the collection records are in June.

Chrysops moechus Osten Sacken. PENOBSCOT: Plymouth, 27 July. SOMERSET: Hartland, 23 July. WALDO: Unity, 12, 27 July. YORK: Hollis, 23 July; Kennebunk, 22 July; Wells, 21 July. Johnson (1925) reports *C. moechus* from Waterville, Kennebec County, 20 July. Knutson et al. (1954) record it from North New Portland, Somerset County, 13 July. *C. moechus* is another species that reaches its northern limits in central Maine. We have never seen it abundant enough to be a pest.

Chrysops montanus Osten Sacken. PISCATAQUIS: Baxter State Park, 6 Aug. Knutson et al. (1954) report it from Bethel, Oxford County, 12 July and Richville, Cumberland County, 12 July. Shaw (1959) collected this species at Carter's Nubble, Mt. Desert Island, Hancock County, 10 July. *C. montanus* is not commonly collected in Maine.

Chrysops niger Macquart. A common species throughout the state. On occasion it is abundant enough to reach pest proportions. Extreme dates: June 18–Aug. 4; 35% of the records are for the last two weeks in June and 64% for July. Many records of *C. niger* in the literature actually refer to *C. calvus*.

Chrysops nigripes Zetterstedt. Knutson et al. (1954) report this species from Maine based on a published record. We have seen the specimen and it is *C. zinzalus*.

Chrysops pudicus Osten Sacken. This species is known from counties in New Hampshire adjoining York County, it probably is present in the latter county, but we have seen no specimens.

Chrysops sackeni Hine. FRANKLIN: Freeman-Kingfield, 15 July. KENNEBEC: Augusta, 21 July; Austin Bog, Belgrade, 23, 24 June, 19 July; Colby Bog, Belgrade, 16, 19 July; China, 11 July; Waterville, 9 July; Mt. Vernon, 12 July. LINCOLN: 20 June, 7 July. SOMERSET: Mercer, 16 July. WALDO: Unity, 12 July. The northeastern distribution of this species does not extend to northern Maine. Although local in distribution, it can be quite abundant and bothersome where it is found.

Chrysops shermani Hine. CUMBERLAND: Otisfield, 27 Aug. FRANKLIN: Mt. Blue, 15–25 Aug.; Weld. HANCOCK: Humpback Brook, 28 June. KENNEBEC: China, 17 July; Waterville, 9 July. OXFORD: Byron. PENOBSCOT: Edinburgh, 27 June; Lagrange, 30 June; 5 mi. S of Macwahoc 6 Aug. PISCATAQUIS: Upper Abbot, 9 July. SOMERSET: T8 R19, 10–11 July. Knutson et al. (1954) record *C. shermani* from Old Speck Mt., Oxford County, 18 July. There are no records for extreme northern Maine, but it probably is present there. Rarely is *C. shermani* abundant enough in Maine to be considered a pest.

Chrysops sordidus Osten Sacken. AROOSTOOK: Allagash, 17, 23 June; Round Pond Mt. (T13 R12), 11 July; T11 R17, 16 June; Ashland, 17 June, 13 July. FRANKLIN: Davis Twp. (T3 R3), 14 July; Sandy River Twp. (T2 R1), 20 June; Mt. Abram (T4 R1), 27 June; Rangeley, 27 June; Grants, 7 July; Madrid, 13 July. OXFORD: Upton, 19 June. PISCATAQUIS: Mt. Katahdin, 19-23 June, 1, 2, 5 July; Klondike Basin, 7 July. SOMERSET: Sandy Bay Twp., 20 June; Mayfield (T2 R2), 1 July. WASHINGTON: Jonesboro, 25 June. This is a northern species reaching its southern limit in northern Maine, northern Vermont, New Hampshire, the Adirondacks and Tug Hill Plateau in New York. It rarely is abundant enough to be considered a pest. This species is sometimes very abundant locally and may hover noiselessly at shoe-top level, but rarely seems to bite humans in such cases.

Chrysops striatus Osten Sacken. FRANKLIN: Chesterville, 3 Aug. KENNEBEC: Augusta, 21 July; Austin Bog, Belgrade, 23, 24 June, 19 July; Colby Bog, Belgrade, 16, 19 July; Belgrade, 3 July; China, 11, 17, 25, July; Mt. Vernon, 9, 11, 23, 25 July. LINCOLN: 3, 4, 5, 12, 16, 18, 19 July, 6 Aug. PENOBSCOT: Plymouth, 27 July. SAGADOHOC: 26 July. WALDO: Unity, 24 July. Knutson et al. (1954) include Burnham, Waldo County, 13 Aug. and Orono, Penobscot County for this species. *C. striatus* flies with the similar *C. aberrans* and may attack in such numbers that it is necessary at times to find shelter.

Chrysops univittatus Macquart. This is a common pest species throughout Maine, but is less common northward. Extreme dates: July 7–Sept. 15. Although this species has a long flight season, 70% of our records are during the last two weeks in July. Knutson et al. (1954) refer to this species as *C. wiedemanni* Krober.

Chrysops vittatus Wiedemann. Generally distributed, but is less common northward. Extreme dates: June 19–September 15 with 71% of the records in July and 14% in August. *C. vittatus* is rarely the aggressive pest in Maine that it is in southern New England, usually being outnumbered by *C. aberrans* and *C. striatus*.

Chrysops zinzalus Philip. FRANKLIN: Saddleback Lake, 18–20 July 1916, 2000–3000 ft. HANCOCK: Seawall Bog, Mt. Desert Island, 28 July 1970. KENNEBEC: China, 11 July 1977. OXFORD: Wilson's Mills, 24 June 1982. As may be noted from the above records, only four known specimens have been collected from Maine over a 60-year period. *C. zinzalus* is known in the Northeast only from Maine, northern Vermont, and the Adirondacks of New York. In eastern Canada it has been taken in Quebec, New Brunswick and Nova Scotia.

Subfamily TABANINAE, Tribe Haematopotini

Haematopota Meigen 1803

Haematopota rara (Johnson). This species probably is present in Maine since it has been taken in New Hampshire, Nova Scotia, and New Brunswick.

Subfamily TABANINAE, Tribe Tabanini

Atylotus Osten Sacken 1876

Atylotus bicolor (Wiedemann). FRANKLIN: Weld. KENNEBEC: Waterville, 2 Aug. 1984. LINCOLN: 15 July 1940. OXFORD: Norway. SAGADAHOC: Reid State Park, Georgetown, 28 June–19 Aug. 1967–71. The collection of many specimens of this species with salt marsh breeding Tabanidae at Reid State Park indicate that it may breed in areas adjacent to the salt marsh.

Atylotus duplex (Walker). CUMBERLAND: Portland, 9 July 1909. HANCOCK: Great Head, Mt. Desert Island, 27 July 1956. PENOBSCOT: Howland, 20 July 1981; Orono.

Atylotus hyalicosta Teskey. PENOBSCOT: Howland, 20 July 1981. PISCATAQUIS: Chesuncook, 20 July. SAGADAHOC: Reid State Park, Georgetown, 26 Aug. 1967.

Atylotus intermedius (Walker). HANCOCK: From Mt. Desert Island, Northwest Harbor, 22 July 1918 (allotype of *A. pemeticus* Johnson), Southwest Harbor, 20 Aug. 1920 (holotype of *A. pemeticus*), Ship Harbor, 20 July 1956, Mt. Cadillac, 17 July 1920. OXFORD: Spectacle Mt., Gilead, 31 July 1936.

Atylotus ohioensis (Hine). HANCOCK: Sunken Heath, Mt. Desert Island, 24 Aug. 1940.

Atylotus sphagnicolus Teskey. HANCOCK: Southwest Harbor, Mt. Desert Island, 5 June 1937. KENNEBEC: Austin Bog, Belgrade, 23 June 1978. KNOX: Appleton, 17 Aug. OXFORD: Wilson's Mills, 19, 24 June 1982. PENOBSCOT: Bangor, 24 June 1938; Millinocket, 12 July 1923, 5–23 July 1968; Orono.

Atylotus thoracicus (Hine). AROOSTOOK: Easton. CUMBERLAND: Harrison, 30 July 1963; HANCOCK: two localities on Mt. Desert Island, 21 July–12 Aug. KENNEBEC: Colby Bog, Belgrade, 19 July–26 Aug.; Manchester 22 July 1960; Sidney bog, 13 July 1946. OXFORD: Wilson's Mills, 8 July 1954, 28 July 1949. PENOBSCOT: Bangor, 24 June 1938, Millinocket, 7 July 1968; Passadumkeag Bog, 30 July 1967. *A. thoracicus* is strictly a sphagnum bog species and probably is present in most Maine bogs. It is not known to bite humans.

Hybomitra Enderlein 1922

Hybomitra affinis (Kirby). This large species is found throughout Maine. It is a northern species, not reported from

southern New England. Its large size and abundance make it a major pest of domestic and wild animals. Extreme dates: June 7–July 22. It is sometimes confused with *H. aurilimba*, but the flight periods of the two overlap only slightly. Extreme flight dates for *H. aurilimba* are July 4 to August 6 with only three collections before July 14; there is only one collection of *H. affinis* after July 13. Sixty-one percent of the collection records for *H. affinis* are in June.

Hybomitra arpadi (Szilady). Only one definite record of this species is known from Maine: Mt. Katahdin, Penobscot County, 9 July 1950, 5267 ft. (A.E. Brower). The specimen is a male which can be distinguished readily from related *H. affinis* and *H. trepida*; females are sometimes difficult to differentiate. *H. arpadi* is found in New Hampshire and New Brunswick, and additional Maine records probably will result from further collecting.

Hybomitra astuta (Osten Sacken). AROOSTOOK: T15 R15, 10 Aug. HANCOCK: Mt. Desert Island (several localities), 28 July, 5, 6, 8, 25 Aug. KENNEBEC: Colby Bog, Belgrade, 6 Aug. KNOX: Appleton Bog, 11 Aug. PENOBSCOT: Greenfield, 13, 19 Aug., Lincoln, 21 Aug.; Orono, 10, 18 Aug.; T1 R7, 12 Sept. PISCATAQUIS: Greenville, 21–29 July; Kokadjo, 9 Aug.; Mt. Katahdin, 25 July. OXFORD: Norway, Lincoln Plt. (Bog S of Wilsons Mills), 15 Aug. This late flying species never seems to be abundant enough to be a pest.

Hybomitra aurilimba (Stone). FRANKLIN: Weld, 4 July. HANCOCK: Mt. Desert Island (2 localities), 21, 27, 31 July, 6 Aug. KENNEBEC: Augusta, 8, 13, 14, 25 July; China, 11, 25 July; Waterville, 19 July. OXFORD: Paris, 14 July (holotype). PENOBSCOT: Orono, July. SAGADAHOC: Reid State Park, Georgetown. SOMERSET: Mercer, 23 July. WALDO: Unity, 12, 27 July. WASHINGTON: T30 MD, 17 July. YORK: W. Lebanon, 24/30 June. The males of *H. aurilimba* frequently are taken as they hover in spots of sunshine along dirt roads and in forest clearings. See *H. affinis* for flight dates.

Hybomitra brennani (Stone). Although not reported from Maine, it probably is present in the state. It is known from Coos and other northern counties of New Hampshire and Vermont. Early season collecting in the counties of Oxford and Franklin may produce this rarely collected species.

Hybomitra cincta (Fabricius). FRANKLIN: Allen's Mills, 18 July. HANCOCK: Proctor (1946) reports this species from 2 localities on Mt. Desert Island; 26 July, 3 Aug. KENNEBEC: Mt. Vernon, 20 July. PENOBSCOT: Passadumkeag, 5 Aug. PISCATAQUIS: Mt. Katahdin, 25, 27–29 July, 3 Aug. YORK: Biddeford, July; Lebanon Center, 10 July; W. Lebanon, 17/23 July. This brightly colored species is not commonly collected. It has not been taken in northern Maine. The species was observed biting cows and horses at both Mt. Vernon and Biddeford on several occasions, but in both cases seemed disinterested in humans nearby.

Hybomitra daeckei (Hine). Stone (1940) records this species from Medomak, Lincoln County, 21 June 1938. The specimen is in the Ohio State University Collection, and we were able to examine it through the kindness of Dr. Charles A. Triplehorn. The specimen is a teneral male and identification is not certain, but in our opinion it is *H. frontalis* (Walker). We have not seen *H. daeckei* from north of Long Island, NY.

Hybomitra epistates (Osten Sacken). Found throughout the state. Extreme dates: June 7–Sept. 2, with 85% of the records falling during the last week in July to through the third week in August. At times *H. epistates* is abundant enough to be a pest of livestock and it occasionally attacks humans.

Hybomitra frontalis (Walker). HANCOCK: 2 mi. S of Trenton, 24 July; Proctor (1946) records this species as *H. septentrionalis* from three localities on Mt. Desert Island, July 15–Aug. 23. KENNEBEC: Augusta, 20, 25 July. LINCOLN: 17, 22, 25, 26 June, 3, 4, 5, 7, 8, 10, 17 July; Damariscotta, 17 July; Medomak, 4 July. PENOBSCOT: Mt. Chase, 21 July. PISCATAQUIS: T10 R9, 16 Aug. SAGADAHOC: Reid State Park, Georgetown, 20, 27 June, 4, 10, 11, 12, 15, 16, 19, 20, 22, 24 July, 2, 27 Aug. This is a wide-ranging northern form, which in Maine is most abundant in coastal areas although there are some inland records. We have not seen it from New England south of Sagadahoc County. *H. frontalis* can be a major pest, but in Maine it is so outnumbered by *Tabanus nigrovittatus*, where the two fly together, that it is scarcely noticed.

Hybomitra frosti Pechuman. AROOSTOOK: Ashland, 18 July. KENNEBEC: Augusta, 3, 5 Aug.; Colby Bog, Belgrade, 6 Aug. KNOX: Appleton Bog, 11 Aug. PENOBSCOT: Orono,

1 Aug.; Patten, 23 July. PISCATAQUIS: T5 R10, 9 Aug. SOMERSET: Jackman, 27 Aug. WASHINGTON: T4 ND. *H. frosti* is usually found in or near sphagnum bogs. It appears to be of no economic importance.

Hybomitra hinei (Johnson). YORK: W. Lebanon, 24/30 June, 1/7 July.

Hybomitra illota (Osten Sacken). AROOSTOOK: Houlton, 2 July. FRANKLIN: Tim Pond, 15 July. HANCOCK: Tremont, 11 July. KENNEBEC: Augusta, 27 June; China, 31 May, 25 June, 17 July; Mt. Vernon, 23 June. LINCOLN: 16, 17 June. PENOBSCOT: Greenfield, 27 June; Orono, 7 July. SAGADAHOC: Reid State Park, Georgetown, 17 June, 7 July. SOMERSET: Mercer, 6, 7, 8 June; T8 R9, 3–4 July. WALDO: Unity, 12 July. WASHINGTON: Princeton, 14 June. Although *H. illota* often occurs in rather large numbers and attacks humans as well as other mammals, it never seems to reach the abundance of such species as *H. affinis*, *H. epistates* and *H. nitidifrons nuda*.

Hybomitra lasiophthalma (Macquart). This species is found throughout Maine and is a pest of considerable importance during its flight season. Extreme dates: July 1–July 22: 68% of the records are in June (60% during the last three weeks) and 32% in July.

Hybomitra liorhina (Philip). Since this species is known from several localities in Nova Scotia and New Brunswick, in the future it may be found in Aroostook and Washington counties in Maine.

Hybomitra longiglossa (Philip). HANCOCK: Southwest Harbor, 25 July. KENNEBEC: South China, 12 June. OXFORD: Wilson's Mills, 15 June. PENOBSCOT: Bangor 28 May.

Hybomitra lurida (Fallen). AROOSTOOK: Ashland, 11 June; T2 R2, 1 July. KENNEBEC: Colby Bog, Belgrade, 7 June. PENOBSCOT: Bangor, 20 June, Orono. PISCATAQUIS: T3 R9, 9 June. SAGADAHOC: Reid State Park, Georgetown, 26 June, 10 July. SOMERSET: Mercer, 6, 7 June; Parlin Pond, 24 June. WASHINGTON: Deblois, 21 June; Marion, 30 June. YORK: W. Lebanon, 24/27 May. Most records for this early season species are in June. It attacks both humans and other mammals, but rarely is abundant enough to be a serious pest.

Hybomitra microcephala (Osten Sacken). AROOSTOOK: Carr Pond, 24 July. FRANKLIN: Weld, 3 Sept. HANCOCK: Mt.

Desert Island (several localities), 28 July, 1, 2, 7, 8 Aug., 12 Sept. KENNEBEC: Augusta, 5 Aug.; Colby Bog, Belgrade, 6 Aug. LINCOLN: 18 Aug.; Alna, 14 Sept.; Bristol, 3 Aug. PENOBSCOT: Indian Purchase 4; Millinocket, 22 July. PISCATAQUIS: Greenville, 21–29 July. WASHINGTON: Dennysville, 12 July "reared from spruce duff" YORK: W. Lebanon, 24 July, 27 Aug. This late flying species rarely is abundant enough to be considered a pest although it attacks humans as well as other mammals.

Hybomitra minuscula (Hine). AROOSTOOK: Easton, 25 June; Crystal (Thousand Acre Bog), 8 Aug. HANCOCK: Mt. Desert Island (several localities), 16, 23, 25, 26 July, 1, 2, 8, 15 Aug. KENNEBEC: Augusta, 3 Aug.; Austin Bog, Belgrade, 23, 24 June, 19 July; Colby Bog, Belgrade, 16, 19 July; Sidney Bog, 13 July. KNOX: Appleton Bog, 11 Aug. LINCOLN: 5 Aug. OXFORD: Lincoln Plt. (Bog S of Wilsons Mills), 4 Aug. PENOBSCOT: Orono, July; Passadumkeag Bog, 30 July; Plymouth Bog, 27 July. This small, bog-inhabiting species rarely attacks humans.

Hybomitra nitidifrons nuda (McDunnough). This species is generally distributed in Maine. Extreme dates: May 28–July 15, with 85% of the records in June. This early season form can be a pest of considerable importance to wild and domestic animals.

Hybomitra pechumani Teskey and Thomas. This medium-sized species is found throughout Maine. Extreme dates: June 1–Aug. 9. It is most active in July, with 75% of the records falling in that month. It is an aggressive species attacking humans and other mammals. Most records of *H. typhus* in the literature refer to this species.

Hybomitra sodalis (Williston). This rather striking black and white species is found throughout Maine. Extreme dates: June 17–Aug. 4. Most collections were made in July; 86% of the collections were during the last three weeks of July. Although a common species, it rarely reaches pest proportions. The males frequently are found on flowers. Early Maine records for *H. (Tabanus) trispila (us)* actually refer to *H. sodalis*.

Hybomitra trepida (McDunnough). This species is found throughout Maine. It can be quite abundant at times, but seems to be local in distribution. Extreme dates: June 5–July 24, with 78% of the collections made during the last two weeks of June and the first week of July.

Hybomitra typhus (Whitney). KENNEBEC: Austin Bog, Belgrade, 23 June, 19 July; China, 11, 17 July. PENOBSCOT: 10 mi. NE of Millinocket, 7 July; Orono. SOMERSET: Mercer, 16 July. WALDO: Unity, 12 July. YORK: Kennebunk, 22 July. There are no records from northern Maine, but since it has been taken at several localities in New Brunswick, it is probably present there. *H. typhus* is less commonly collected than *H. pechumani* with which it was confused until 1979.

Hybomitra zonalis (Kirby). HANCOCK: Echo Lake, Mt. Desert Island, 13 July. KENNEBEC: China, 11 July; Mt. Vernon, 23 June, 9 July. KNOX: Isle Au Haut, 16 July. LINCOLN: 6, 10, 13, 14, 22 July. PENOBSCOT: Bangor, 20 June; Greenfield, 27 June; Seboeis River Gorge, T7 R7, 11 July; Shin Pond, 11 July. PISCATAQUIS: Mt. Katahdin, 17 July, 22 July (1,100 ft. elevation), Aug. SAGADAHOC: Reid State Park, Georgetown. SOMERSET: Dole; Pittston Farm. WALDO: Unity, 12, 18, July. This attractive-appearing form is a northern species not often reaching pest proportions in Maine. During one season this species was abundant enough to be considered a pest of cattle and horses at Mt. Vernon.

Tabanus Linnaeus 1758

Tabanus atratus Fabricius. Black Horse Fly. Johnson (1925) reports this species from two general areas in Maine. We have seen only a single specimen labeled Orono with no further data. We would expect this species to be present in York County. Also in the salt marsh areas of southern Maine we would expect two variants of *T. atratus*, *fulvopilosus* Johnson and *nantuckensis* Hine.

Tabanus catenatus Walker. CUMBERLAND: Bridgeton, 17 Aug.; Brunswick, 28 July; Peaks Island., 4 Aug.; *nr* Portland, 6 Aug. FRANKLIN: Kingfield, 28–29, 30–31 July; Weld, 10 Aug. KENNEBEC: Augusta, 26, 27, 28, 29 July, 15 Aug.; Monmouth, 13 Aug.; Salmon Lake, Belgrade; E. Vassalboro, 28 July, 10 Aug. KNOX: Rockport, 29 July. LINCOLN: 19 Aug.; Medomak, 17 Aug. PENOBSCOT: Howland, 20 July; Millinocket, 4, 5 Aug. SAGADAHOC: Reid State Park, Georgetown. SOMERSET: Bingham. YORK: Appledore Island, Isle of Shoals, 3–5, 6, 17 Aug.; Saco, 30 July, 25 Aug. This large brown species flies late in the season and is crepuscular or nocturnal.

Tabanus fairchildi Stone. AROOSTOOK: Allagash, 23 July. FRANKLIN: Kingfield, 4–5 July. KENNEBEC: Augusta, 15 July. SOMERSET: Bingham, 8 July; Moscow, 19 June. Proctor (1946) records this species from Corfield, Mt. Desert Island, Hancock County, 30 June. This does not seem to be a common species in Maine. The larvae are unusual in that they live in fast-flowing streams. Collecting near such habitats will probably turn up more specimens of *T. fairchildi*. Johnson's (1925) record of *T. vivax* from Ocean Point, Lincoln County, June 28, probably refers to this species.

Tabanus fulvicallus Philip. KENNEBEC: Colby Bog, Belgrade, 2 Aug. 1984. Only one other New England record is known for this rarely collected species.

Tabanus hinellus Philip. This species was originally considered a coastal form of *T. lineola,* but is now considered by many to be a distinct species. Early records may be confused. It probably breeds in salt marshes. SAGADAHOC: Reid State Park, Georgetown, 12, 15, 17, 18, 20, 24 July. YORK: Kennebunk, 14, 26 July.

Tabanus limbatinevris Macquart. This species is not known from Maine, but since it has been collected in two southern New Hampshire counties, it may eventually be found in York County.

Tabanus lineola Fabricius. Striped Horse Fly. This species has often been confused with *T. hinellus*, but the two are now considered distinct. *Tabanus lineola* is darker and with a narrower frons. It is usually found inland and is a freshwater breeder although it may also occur in coastal areas. CUMBERLAND: Portland. KENNEBEC: China, 25 July; Waterville, 22, 24 July. LINCOLN: Jefferson, 5, 13 July. WALDO: Unity, 27 July. YORK: W. Lebanon, 17/23 July.

Tabanus marginalis Fabricius. FRANKLIN: Rangeley, 31 July. KENNEBEC: Waterville, 9, 10 July. OXFORD: Lincoln Plt. (Bog S of Wilsons Mills), 4 Aug. PENOBSCOT: Millinocket, 18 July. SAGADAHOC: Reid State Park, Georgetown, 19 July, 11 Aug. SOMERSET: Mercer 22 July; Seboomook, 11 July. WALDO: Unity, 12 July. YORK: Kennebunk, 14 July. This species is reported by Shaw (1959) (as *nivosus* Osten Sacken) from Seawall, Mt. Desert Island, Hancock County, 24 July 1955. We suspect that this species is more common in Maine than the records indicate. In the older literature the species is known as *T. nivosus* Osten Sacken.

Tabanus nigripes Wiedemann. KENNEBEC: China 25 July 1981. One specimen. This is the furthest north in New England that this species has been taken.

Tabanus nigrovittatus Macquart. Salt Marsh Greenhead Fly. This species is known from every coastal county in Maine and has been collected from July 4 to August 25; 68% of the collection records are included in the last two weeks of July and the first week in August. The bane of bathers, its painful bites drive many people from the beaches. As its common name indicates, it breeds in salt marshes. Some work has been done in Maine in the use of traps to reduce populations (Granger 1970). Recently a somewhat larger, grayer form has been recognized. This is *T. conterminus* Walker and characters separating it from *T. nigrovittatus* may be found in Sofield et al. (1984).

Tabanus novaescotiae Macquart. HANCOCK: Mt. Desert Island (three localities), 15, 17 Aug., 1, 6 Sept. LINCOLN: 14, 20 Aug.; Bremen-Waldoboro, 16 Aug.; Pemaquid Pt., Aug. SAGADAHOC: Popham State Park, Phippsburg, 14, 18 Aug.; Reid State Park, Georgetown, 26 July, 18, 20, 26 Aug. SOMERSET: Brighton, 20 Aug. WALDO: Liberty, 1 Sept. WASHINGTON: Eastport, 14 Aug.; 5 Sept. YORK: S. Berwick, 22 Aug.; W. Newfield, 1 Aug.; W. Lebanon, 14/20, 21/27 Aug. This rather large, late flying species rarely is abundant enough to be considered a pest.

Tabanus pumilus Macquart. YORK: Cornish, 15 July; W. Lebanon, 24/30 June, 22/28 July. Rare in Maine. A southern species with general distribution south of Maine.

Tabanus quinquevittatus Wiedemann. YORK: Berwick, 9 Aug. 1952. This is a pest in southern New England, but we have only one Maine specimen taken by A.E. Brower.

Tabanus reinwardtii Wiedemann. This species is not commonly collected in Maine. Johnson (1925) records it from Monmouth, Kennebec County, July 18. The only specimens we saw were a male from Dryden, Franklin County, 15–31 July 1965 and a female from Indiantown, Washington County, 10 Aug. 1946. The adults have obscure habits, and the species is probably more widespread than the few records indicate.

Tabanus sagax Osten Sacken. This species is collected only occasionally throughout its range. We did not see it from Maine, but since it has been collected in other localities in New England, it may be present in Maine.


Aroostook
Piscataquis
Somerset
Franklin
Penobscot
Washington
Hancock
Oxford
Kennebec
Waldo
Knox
Andro-
scoggin
Lincoln
Saga-
dahoc
Cumber-
land
York

Tabanus similis Macquart. AROOSTOOK: Sinclair, 22 July. CUMBERLAND: Brunswick, 3 July, 25 Aug. HANCOCK: Bar Harbor, 25 June. KENNEBEC: Augusta, 21 June, 10, 15, 17, 23 July; China, 11 July; Mt. Vernon, 23 June; Waterville, 23 June, 19 July. LINCOLN: 19 June. PENOBSCOT: Bangor, 24 June; Orono, 9 July. SOMERSET: Mercer, 16 July. WALDO: Unity, 12, 27 July. WASHINGTON: Dennysville, 14 July. YORK: Saco, 23 June. Shaw (1959) reports this species (as *T. lineola scutellaris*) from Tremont, Mt. Desert Island, Hancock County 29 July 1955. This species is sometimes quite numerous, but is less of a pest of wild and domestic animals than some of the *Hybomitra* species. For many years it was treated as a subspecies of *T. lineola*.

Tabanus sparus sparus Whitney. This little species was not seen from Maine. It is found in southern New Hampshire and probably is present in York County.

Tabanus stygius Say. Johnson (1925) records this species from the lower Kennebec River valley. We saw no specimens.

Tabanus superjumentarius Whitney. We saw no specimens from Maine. However, it is present in southeastern New Hampshire and probably is present at least in York County.

Tabanus vivax Osten Sacken. KENNEBEC: Waterville, 2, 3, 4 Aug. PENOBSCOT: Orono, 18 July; Millinocket, 9 July. PISCATAQUIS: Mt. Katahdin, 19 July, 4600 ft. SOMERSET: Mercer, 16, 22, 23 July. WALDO: Unity, 27 July. *T. vivax* never seems to appear in large numbers. Until 1938 the name *vivax* was applied by most workers to the species now known as *T. fairchildi*.

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