

# A Study of the Population of Insects Emerging as Adults from Medway Creek at Arva, Ontario

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**ABSTRACT:** Between April 14 and October 15, 1959, 8,399 adult insects were trapped in five tent-traps set out on Medway Creek. The orders represented were Ephemeroptera (0.04%), Trichoptera (0.3%), Hemiptera (0.04%), Coleoptera (0.05%), Diptera (99.56%), Hymenoptera (0.01%). Midges of the family Chironomidae constituted 99.62% of the Diptera. Other families of Diptera, present in much smaller numbers, were Ceratopogonidae, Mycetophilidae, Empididae, Ephyridae, Borboridae, Lauxaniidae and Muscidae. The numbers and seasonal occurrences, including times of maximum emergence, are reported for each species.

Medway Creek flows through London Township, Middlesex County, Ontario and joins the Thames River at the city of London. About one mile north of London, at the village of Arva on Provincial Highway No. 4, the creek has been dammed to provide a power supply for a flour mill (Fig. 1). Above the dam the creek widens out to form a narrow lake extending between the Seventh and Eighth Concession Roads of London Township. At its lower end the lake is surrounded by fields and at its upper end by deciduous woods. There are two bends in the lake, an upper and a lower one. In the upper bend there are two narrow islands which divide the creek into three channels. Above the upper bend the creek has several narrow bays extending into the surrounding woods. During the summer of 1959 a study of the aquatic insects emerging from the creek was undertaken and the present paper is a report on this project.

*Acknowledgment.*—The writer gratefully acknowledges the assistance of Mr. A. G. Carmichael and Mr. J. Shute who aided during the summer of 1959 in collecting insects from traps, in sorting and counting specimens and in recording data. Dr. E. Shute provided docking facilities for the boat and permitted access to the collection area. The map in Figure 1 was traced from an aerial photograph provided by the London and Suburban Planning Board.

## METHODS

The emerging insects were trapped in five tent-traps anchored on the water at five locations on the creek (Fig. 1, 1-5). Trap 1 was located in the middle of the creek a few feet above the dam. Trap 2 was in the center of a wide bay in the lower bend of the creek. Trap 3 was in the middle of the creek midway between the upper and lower bends of the creek. Trap 4 was in the most easterly of the three channels in the upper bend. Trap 5 was just above the upper bend. Each trap enclosed four square feet of water surface. The structure of a trap and the methods of collecting insects from it are described by Judd (1957).

On February 25 the whole surface of the lake was frozen over and no water was flowing over the dam. On March 1 the whole surface was still frozen over and water was flowing freely over the whole width of the dam from under the edge of the ice. These conditions prevailed until March 30 with the whole lake still frozen over except at the edge of the dam. The torrent of water passing over the dam during this period is pictured in a photograph in the London Free Press of March 20, 1959. After March 30 thawing occurred rapidly and by April 2 the whole creek was free of ice and water was flowing freely through it. The traps were anchored in place on April 14 and removed from the water on October 15. In the period between these dates the traps were visited each day by boat and insects were collected from them. The depth of water at each trap was also measured each day.

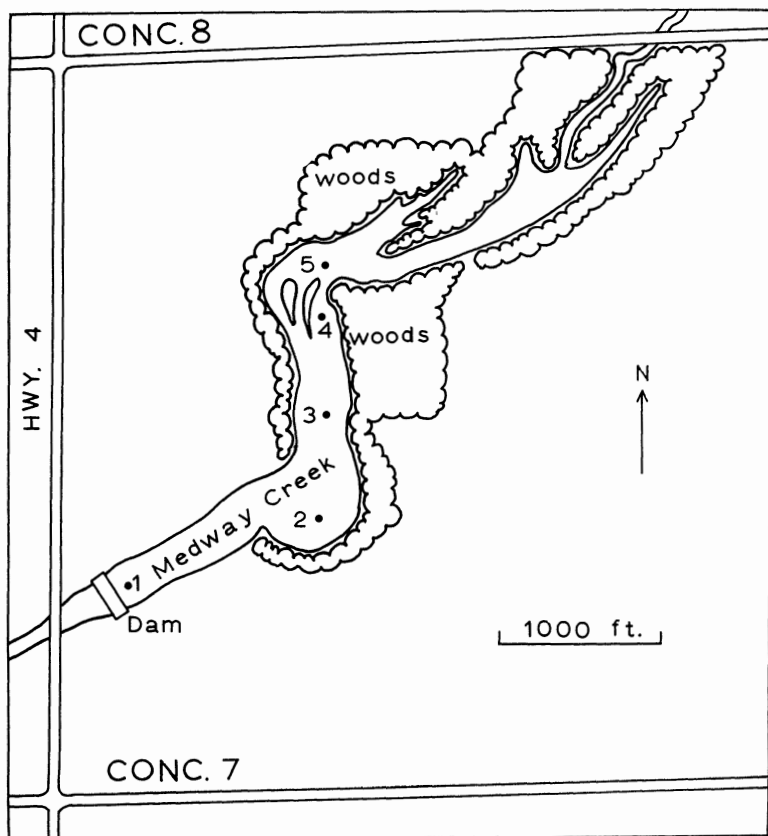


Fig. 1.—Map of Medway Creek showing location of the five tent-traps (1-5).

The bottom of the creek was composed of gravel embedded in clay. At the sites of the five traps there was no vegetation either rooted on the bottom or floating in or near the traps. Beneath Trap 3 there was a dead, submerged tree stump with radiating buttress roots. The depth of water at the five traps fluctuated equally (Fig. 2). In order of decreasing depth of water at their sites the traps were Nos. 1, 3, 5, 2 and 4. The depth at Trap 1 was close to 92 inches till the first week of June. After that it fell rapidly several times when the dam was opened (Fig. 2). It reached a maximum of 99 inches on October 10 when there were heavy rains, beginning on October 8. The depth at Trap 4 was close to 25 inches till the first week of June. After that it fell rapidly several times when the dam was opened. During two periods, August 13-17 and September 16-22, there was no water present, and the trap rested on the mud (Fig. 2). During the flood on October 8 this trap was washed away. The depths at the three other traps fluctuated equally, with maximum depths of 56, 53 and 48 inches occurring at the three traps 3, 5 and 2 respectively on October 10.

The various groups of insects were identified by the following taxonomists who, unless otherwise noted, are staff members of the Entomology Research Institute, Department of Agriculture, Ottawa:

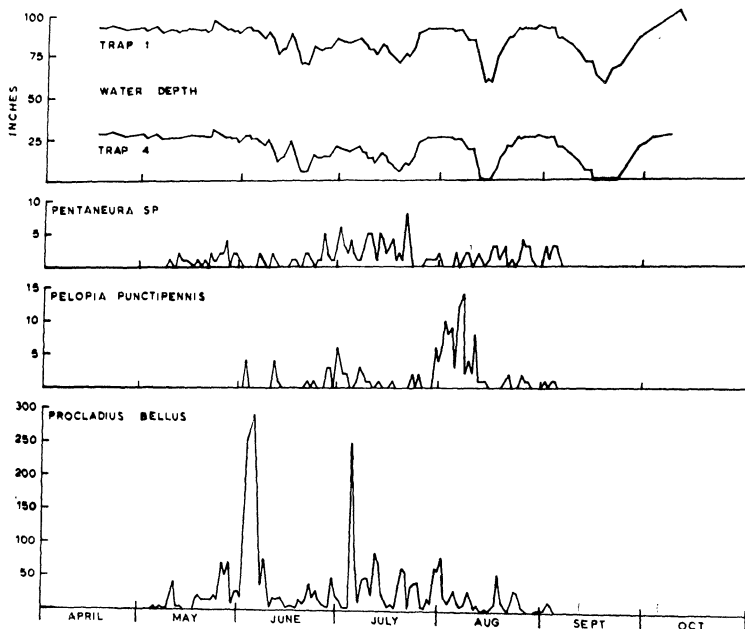


Fig. 2.—Water depth at Traps 1 and 4; periods of emergence of adult insects.

TABLE I.—Number of insects of the six orders collected in the traps

Group	Trap 1		Trap 2		Trap 3		Trap 4		Trap 5		No.	% of Diptera	No.	% of Total
	No.	%	No.	%	No.	%	No.	%	No.	%				
Ephemeroptera .....	0	0	0	0	3	75	1	25	0	0			4	0.04
Trichoptera .....	18	69.6	2	7.6	5	19.0	1	3.8	0	0			26	0.3
Hemiptera .....	0	0	1	25	1	25	1	25	1	25			4	0.04
Coleoptera .....	0	0	1	20	3	60	1	20	0	0			5	0.05
Diptera .....														
Chironomidae .....	1,008	12	1,795	22	2,277	27	1,554	19	1,687	20	8,321	99.62		
Ceratopogonidae .....	1	4	3	12	9	38	9	38	2	8	24	0.24		
Mycetophilidae .....	0	0	1	100	0	0	0	0	0	0	1	0.01		
Empididae .....	1	100	0	0	0	0	0	0	0	0	1	0.01		
Ephydriidae .....	0	0	0	0	1	20	2	40	2	40	5	0.05		
Borboridae .....	2	50	0	0	2	50	0	0	0	0	4	0.04		
Lauxaniidae .....	0	0	0	0	0	0	0	0	1	100	1	0.01		
Muscidae .....	0	0	0	0	1	50	0	0	1	50	2	0.02		
Total Diptera .....	1,012	12	1,799	22	2,290	27	1,565	19	1,693	20	8,359	100.0	8,359	99.56
Hymenoptera .....	0	0	0	0	0	0	0	0	1	100			1	0.01
TOTALS .....	1,030	12	1,803	22	2,302	27	1,569	19	1,695	20			8,399	100.00

W. J. Brown (Coleoptera), J. G. Chilcott (Borboridae, Empididae, Ephydriidae, Muscidae), F. P. Ide, University of Toronto (Ephemeroptera), L. A. Kelton (Hemiptera), G. E. Shewell (Lauaxaniidae), Lois K. Smith (Hymenoptera), J. R. Vockeroth (Mycetophilidae), G. B. Wiggins, Royal Ontario Museum, Toronto (Trichoptera), W. W. Wirth, United States Department of Agriculture (Ceratopogonidae, Chironomidae).

Specimens are retained in the collection of the Department of Zoology, University of Western Ontario except as noted in the "Account of Species Collected," as follows: Canadian National Collection (CNC), Royal Ontario Museum (ROM), United States National Museum (USNM).

#### ACCOUNT OF TOTAL CATCH

The numbers of insects in the six orders collected from the traps are presented in Table I. During the whole period that the traps were in operation, April 14 to October 15, 8,399 insects were trapped. Most of the insects are species whose larvae or nymphs live submerged and whose adults emerge from the water, but a few, e.g., Mesoveliidae, are insects that dwell on emergent aquatic vegetation. The great majority (99.6%) were Diptera and among these the Chironomidae predominated (99.6%). All other groups were present in much smaller numbers. The area of water surface covered by each trap was 4 sq. ft., so the total area from which insects were collected was five times this area, 20 sq. ft. Over the whole season 8,399 insects were trapped, an average yield of 420 insects per sq. ft. The average catch per sq. ft. for the five traps, respectively, was 258, 451, 576, 392, 424 insects. The most productive trap, Trap 3, had beneath it the submerged stump which likely provided in its crevices shelters for the larvae and nymphs of insects which emerged in the trap.

#### ACCOUNT OF SPECIES COLLECTED

The five bracketed numbers following the name of each species are the numbers of that species trapped, respectively, in the five traps.

##### EPHEMEROPTERA

###### HEXAGENIIDAE

*Hexagenia occulta* Walk.—1 ♂ (0 : 0 : 1 : 0 : 0); June 3. Needham *et al.* (1935) record this species from Ontario.

###### BAETIDAE

*Baetis intercalaris* McD.—2 ♀ ♀ (0 : 0 : 2 : 0 : 0); June 7, 8. Burks (1953) records that this species occurs in Ontario.

*Centroptilum* (? *caliginosum* McD.)—1 ♀ (0 : 0 : 0 : 1 : 0); June 23. Needham *et al.* (1935) give a record of *C. caliginosum* from Quebec.

##### TRICHOPTERA

###### HYDROPTILIDAE

*Agraylea* sp.—2 caddis flies (1 : 1 : 0 : 0 : 0) (ROM); June 5, 8.

*Hydroptila* sp.—1 ♂, 1 ♀ (0 : 1 : 1 : 0 : 0) (ROM); June 6, August 20.

Hydroptilidae—2 ♀ ♀ (2 : 0 : 0 : 0 : 0) (ROM); June 25, July 21.

## HYDROPSYCHIDAE

*Cheumatopsyche* sp.—3 ♀♀ (3 : 0 : 0 : 0 : 0) (ROM); June 8, August 8, September 1.

*Hydropsyche* sp.—6 ♀♀ (4 : 0 : 1 : 1 : 0) (ROM); May 22 - August 11.

## PSYCHOMYIIDAE

*Nyctiophylax vestitus* (Hagen)—5 ♂♂, 4 ♀♀ (7 : 0 : 2 : 0 : 0) (ROM); June 8 - July 7. This species was trapped on South Walker Pond by Judd (1960) at London.

*Polycentropus cinereus* Hagen—1 ♂, 1 ♀ (1 : 0 : 1 : 0 : 0) (ROM); May 1, June 6. This species was trapped on South Walker Pond at London by Judd (1960).

## HEMIPTERA

## MESOVELIIDAE

*Mesovelia mulsanti* White—1 ♀, 3 nymphs (0 : 1 : 1 : 1 : 1); nymphs June 9, July 24, August 11, adult, August 17, Trap 4. The nymphs were trapped in traps which were over water at the time of trapping and the adult was in Trap 4 when there was no water in the trap (Fig. 2) and the trap was resting on the mud. This species was trapped previously by Judd (1957, 1960) in the vicinity of London in August and September.

## COLEOPTERA

## DASCYLLIDAE

*Ectopria nervosa* Lec.—3 beetles (0 : 0 : 2 : 1 : 0); June 6, 30, July 1. Beetles of this genus were trapped on South Walker Pond at London by Judd (1960).

## STAPHYLINIDAE

Aleocharinae—1 beetle (0 : 0 : 1 : 0 : 0); July 30. Usinger *et al.* (1956) refer to various rove beetles, particularly of the subfamily Aleocharinae, occurring in the vicinity of water.

## CURCULIONIDAE

*Miccotrogus picirostris* Fab.—1 beetle (0 : 1 : 0 : 0 : 0); June 11. McGaha (1952) records several weevils, not in the genus *Miccotrogus*, as feeding on aquatic plants. Other species of weevils have been trapped over water in the vicinity of London by Judd (1957, 1960).

## DIPTERA

## CHIRONOMIDAE

*Pentaneura monilis* (L.)—4 ♂♂ (1 : 0 : 0 : 3 : 0); June 28, July 25, 30, August 4. This species was trapped in much larger numbers on the Dundas Marsh at Hamilton (Judd, 1953) and on South Walker Pond at London (Judd, 1960) and was also taken in smaller numbers from Redmond's Pond at London (Judd, 1961).

*Pentaneura* sp.—62 ♂♂, 122 ♀♀ (15 : 5 : 27 : 87 : 50); May 9 - September 4, maximum July 21 (7 insects), Figure 2.

*Pelopia punctipennis* (Mg.)—93 ♂♂, 52 ♀♀ (9 : 52 : 33 : 8 : 43); June 2 - September 4, maximum August 14 (14 insects), Figure 2. This species was also trapped in the Dundas Marsh at Hamilton (Judd, 1953) and at London (Judd, 1957) with maximum numbers emerging in the first two weeks of August.

*Anatopynia dyari* (Coq.)—9 ♀♀ (4 : 0 : 0 : 5 : 0); June 20, July 20, 21, September 6. This species was trapped previously on ponds in the vicinity of London by Judd (1957, 1960, 1961).

*Procladius bellus* (L.)—1,854 ♂♂, 1,776 ♀♀ (291 : 654 : 1,141 : 464 : 1,080); May 7 - September 5, maxima June 7, July 7 (275, 249 insects), Figure 2. This species was trapped in the Dundas Marsh at Hamilton (Judd, 1953) and on ponds in the vicinity of London (Judd, 1957, 1960, 1961) and was well distributed through the season at all localities.

*Procladius culiciformis* (L.)—387 ♂♂, 531 ♀♀ (56 : 239 : 193 : 245 : 185); April 29 - September 19, maximum July 1 (36 insects), Figure 3. This species was trapped in the Dundas Marsh at Hamilton (Judd, 1953) and on ponds in the vicinity of London (Judd, 1957, 1960, 1961) and was well distributed through the season at all localities.

*Hydrobaenus* sp.—34 ♂♂, 72 ♀♀ (39 : 5 : 21 : 33 : 8); April 18 - September 1, Figure 3. Midges of this genus emerged mainly in spring and early summer as they did at other localities in the vicinity of London (Judd, 1957, 1960, 1961).

*Cricotopus bicinctus* (Mg.)—173 ♂♂, 59 ♀♀ (64 : 49 : 69 : 34 : 16); May 5 - September 8, maximum June 19 (13 insects), Figure 3. Maximum emergence of this species occurred before the end of June as it did in the populations in other ponds in the vicinity of London (Judd, 1957, 1960).

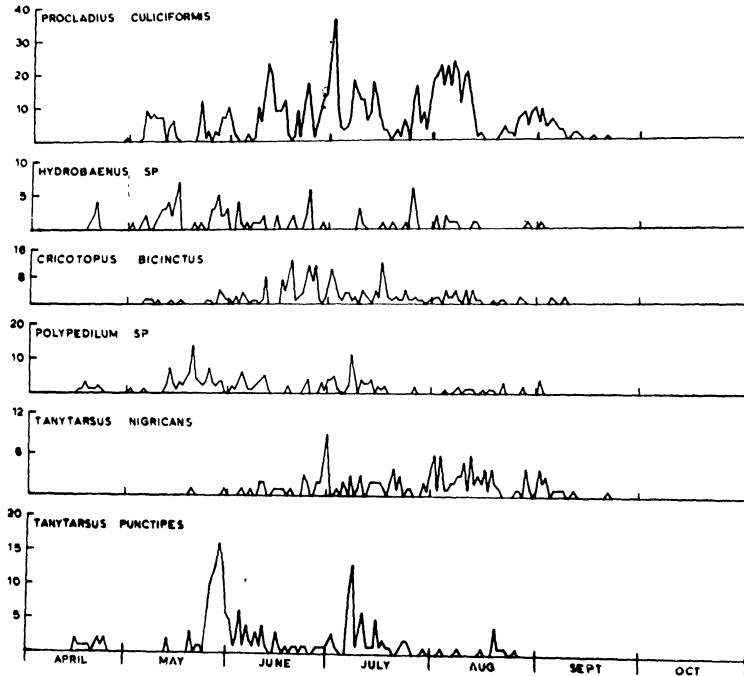


Fig. 3.—Periods of emergence of adult insects.

*Cricotopus trifasciatus* (Panzer)—11 ♂♂ (2 : 2 : 3 : 4 : 0); June 11 - August 27. This species was trapped in the Dundas Marsh (Judd, 1953) and on ponds in the vicinity of London (Judd, 1957, 1960) and was well distributed through the season.

*Polypedilum fallax* (Joh.)—36 ♂♂ (7 : 10 : 14 : 3 : 2); May 28 - August 12. This species was also trapped in comparatively small numbers at London in 1954 by Judd (1957).

*Polypedilum scalaenum* (Schrank)—5 ♂♂, 8 ♀♀ (6 : 0 : 7 : 0 : 0) (1, USNM); May 28 - August 20. This species was not trapped previously in the vicinity of London. Townes (1945) records that it is a common species in Europe and has been collected in Ontario.

*Polypedilum* sp.—201 ♂♂ (28 : 24 : 62 : 63 : 24); April 15 - September 1, maxima May 20, July 7 (14, 11 insects), Figure 3.

*Tanytarsus nigricans* (Joh.)—59 ♂♂, 93 ♀♀ (18 : 35 : 35 : 47 : 17); May 20 - September 21, maximum June 30 (9 insects), Figure 3. This species was trapped in the Dundas Marsh (Judd, 1953) and in ponds in the vicinity of London (Judd, 1957, 1960, 1961) and was well distributed through the season at all localities.

*Tanytarsus punctipes* (Wied.)—209 ♀♀ (21 : 31 : 65 : 79 : 13); April 15 - August 25, maxima May 29, July 8 (16, 13 insects), Figure 3. This species was trapped previously in ponds in the vicinity of London by Judd (1960, 1961).

*Tendipes riparius* (Meigen)—15 ♂♂, 16 ♀♀ (1 : 9 : 12 : 5 : 4); June 6 - August 26. This species was trapped previously in ponds in the vicinity of London by Judd (1960, 1961).

*Tendipes nervosus* (Staeger)—49 ♂♂, 42 ♀♀ (29 : 5 : 21 : 21 : 15); May 5 - August 20, maximum May 7 (13 insects), Figure 4. This species was previously trapped in ponds in the vicinity of London by Judd (1960, 1961).

*Glyptotendipes lobiferus* (Say)—20 ♂♂, 13 ♀♀ (11 : 14 : 4 : 2 : 2); April 24 - August 29. This species was trapped on the Dundas Marsh at Hamilton (Judd, 1953) and on ponds in the vicinity of London (Judd, 1957, 1960, 1961) and was well distributed through the season.

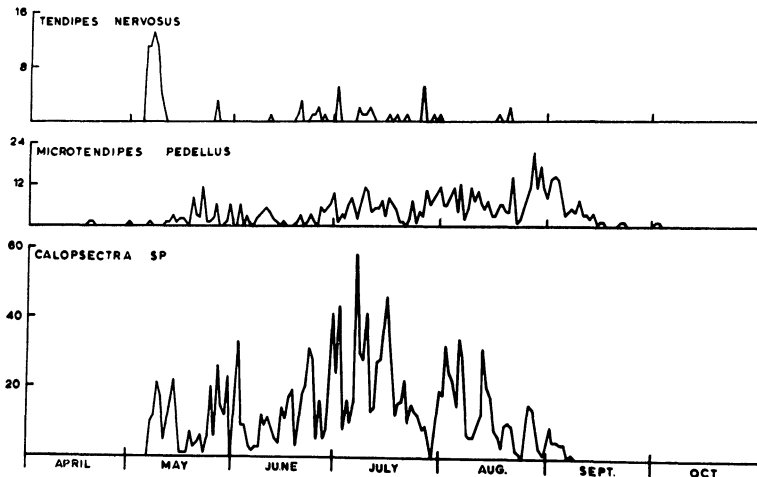


Fig. 4.—Periods of emergence of adult insects.

*Glyptotendipes brachialis* (Coq.)—8 ♂♂, 2 ♀♀ (1 : 1 : 8 : 0 : 0); June 24 - July 31. This species was trapped on ponds in the vicinity of London (Judd, 1957, 1960, 1961) with maximum emergence occurring in June.

*Microtendipes pedellus* (DeGeer)—435 ♂♂, 176 ♀♀ (103 : 148 : 181 : 95 : 84); April 18 - October 2, maximum September 2 (14 insects), Figure 4. This species was trapped previously on ponds in the vicinity of London (Judd, 1960, 1961) with maximum emergence occurring towards the end of the summer.

*Stenochironomus hiliaris* (Walker)—5 ♂♂, 1 ♀ (5 : 0 : 1 : 0 : 0); May 27 - July 23. This species was trapped previously on South Walker Pond (Judd, 1960).

*Calopsectra* sp.—620 ♂♂, 1,069 ♀♀ (297 : 512 : 380 : 356 : 144); May 7 - September 7, maximum July 16 (46 insects), Figure 4. These small, green midges were the most common emergents and occurred most commonly in midsummer. *Calopsectra* was previously trapped on ponds in the vicinity of London by Judd (1960, 1961).

#### CERATOPOGONIDAE

*Atrichopogon* sp.—1 ♀ (0 : 0 : 0 : 0 : 1); July 20. Midges of this genus were trapped in larger numbers by Judd (1960, 1961) on South Walker Pond and Redmond's Pond in the vicinity of London.

*Bezzia glabra* (Coq.)—1 ♀ (0 : 0 : 1 : 0 : 0); June 14. This species was trapped previously by Judd (1953, 1960) on the Dundas Marsh at Hamilton and on South Walker Pond at London.

*Bezzia* sp.—4 ♂♂, 8 ♀♀ (1 : 2 : 3 : 6 : 0) (1 ♂, 2 ♀♀ USNM); June 1 - August 14.

*Culicoides* sp. (*piliferus* group)—1 ♀ (0 : 1 : 0 : 0 : 0); May 26. *C. piliferus* was trapped by Judd (1960) on South Walker Pond in 1956.

*Jenkinshalea magnipennis* (Joh.)—3 ♂♂, 3 ♀♀ (0 : 0 : 3 : 3 : 0) (1 ♂, 1 ♀ USNM); June 7 - July 19. Johannsen (1943) records this species from the eastern United States.

*Johannsenomyia caudellii* (Coq.)—1 ♂, 2 ♀♀ (0 : 0 : 2 : 0 : 1) (1 ♂, 1 ♀ USNM); June 8, 9, 12. This species is recorded from the eastern United States by Johannsen (1943).

#### MYCETOPHILIDAE

*Mycetophila ocellus* Walk.—1 ♂ (0 : 1 : 0 : 0 : 0) (CNC); June 2. Curran (1934) records that flies of this family occur in damp and swampy places and Judd (1953) trapped another species of fungus-gnat on the Dundas Marsh at Hamilton.

#### EMPIDIDAE

*Hemerodromia nocturna* Mel.—1 ♀ (1 : 0 : 0 : 0 : 0); July 10. Usinger *et al.* (1956) refer to reports of larvae and pupae of various species of *Hemerodromia* being found in brooks and streams and Peterson and Davies (1960) found adult *Hemerodromia* attacking female black flies over a stream in Algonquin Park, Ontario.

#### EPHYDRIDAE

*Hydrellia tibialis* Cresson—2 ♂♂, 2 ♀♀ (0 : 0 : 1 : 1 : 2) (1 ♂, 1 ♀ CNC); June 13, July 3, 9. Several species of *Hydrellia* have been reared from aquatic plants (Berg, 1949) and various species have been trapped by Judd (1953, 1957, 1960) at Hamilton and London.

*Ochthera mantis* (DeGeer)—1 ♀ (0 : 0 : 0 : 1 : 0); August 17. *O. mantis* was previously trapped on the Thames River at London by Judd (1957) and Peterson and Davies (1960) found it in a swarm of black flies in Algonquin Park.

#### BORBORIDAE

*Leptocera wheeleri* Spuler—3 ♂♂, 1 ♀ (2 : 0 : 2 : 0 : 0) (2 ♂♂, 1 ♀ CNC); August 8, 10, 12, 15. This species was previously trapped in the vicinity of London and South Walker Pond (Judd, 1960).

#### LAUXANIIDAE

*Homoneura philadelphica* (Macq.)—1 ♂ (0 : 0 : 0 : 0 : 1); September 15. Shewell (1938) reports that flies of this family are found mostly not far from brooks, streams and swamps and that *H. philadelphica* is common and widely distributed in Quebec and Ontario.

#### MUSCIDAE

*Lispe albitarsis* Stein—2 ♀♀ (0 : 0 : 1 : 0 : 1); July 6, 7. This species was previously trapped on the Thames River at London by Judd (1957).

### HYMENOPTERA

#### ICHNEUMONIDAE

*Cratichneumon flavipectus* (Prov.)—1 ♂ (0 : 0 : 0 : 0 : 1); September 21. Usinger *et al.* (1956) record several species of ichneumonid wasps that are parasites of aquatic insects, particularly caterpillars. Heinrich (1960) records *C. flavipectus* from Ontario and says that "much too little is known about the hosts of one of the most strikingly differentiated groups of the nearctic Ichneumoninae, the genus *Cratichneumon*" and he reports that some are known to be parasites of caterpillars.

### ADDENDUM

In addition to the insects mentioned above a few other beetles were found in the traps. These are species which normally pass their whole life cycle in the water and do not emerge as adults from the water. All the species collected are reported as native to North America by Usinger *et al.* (1956).

### COLEOPTERA

#### DYTISCIDAE

*Deronectes griseostriatus* (Deg.)—1 beetle (1 : 0 : 0 : 0 : 0); July 17.

#### HYDROPHILIDAE

*Berosus striatus* (Say)—1 beetle (1 : 0 : 0 : 0 : 0); June 5.

*Berosus* sp.—1 beetle (0 : 1 : 0 : 0 : 0); May 29.

*Tropisternus lateralis nimbatus* Say—1 beetle (0 : 0 : 0 : 0 : 1); June 24.

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