Chironomidae (Diptera) of Cedar Bog, Champaign County, Ohio[1]

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ABSTRACT. **Chironomidae (Diptera) were collected from Cedar Bog, Champaign County, OH. Cedar Bog is an alkaline fen formed by numerous springs that collect to form Cedar Run. An attempt was made to collect all life history stages and to rear late instar larvae and pupae under laboratory conditions. Ninety-six taxa were collected from the fen. Twelve taxa were recognized as new species. Taxa for which this study represent a significant range extension are: *Bethbilbeckia floridensis* Fittkau & Murray, *Paramerina smithae* (Sublette), *Radotanypus florens* (Johannsen) n. comb., *Odontomesa ferringtoni* Sæther, and *Rheocricotopus* (*s.s.*) *effusoides* Sæther.**

Ohio J. Sci. 92 (5): 147–152, 1992

INTRODUCTION

The family Chironomidae (commonly known as midges) is an abundant and diverse group of flies which are an important component in most aquatic habitats. Larval densities can exceed 50,000/m^2. Natural lakes, ponds, and streams almost always have 50 species and often more than 100 species. The number of chironomid species usually accounts for at least 50% of the combined macroinvertebrate composition (Coffman and Ferrington 1984). Because of their high diversity and abundance they are useful as water quality indicators (Paine and Gaufin 1956, Roback 1974, Simpson and Bode 1980). In the past, chironomids have been difficult to use in ecological studies because of difficulties with even generic level identification. The taxonomic scheme most often used within the U.S. was based solely on the adult males and resulted in large genera that contained many different larval types. The generic concept based on immature stages was often much narrower than that erected for the adults (Pinder 1983). In recent years, taxonomic work based on all life history stages (larva, pupa, adult) has progressed to the point where comprehensive generic keys and diagnoses are available for all stages of Holarctic Chironomidae (Wiederholm 1983, 1986, 1989). Even so, many species remain undescribed (or described only from the adult) and many habitats inadequately collected. Therefore, it remains important to collect and rear chironomids from various habitats to know better our fauna and provide reared specimens for taxonomic revisions (Cranston and Oliver 1987, Resh and Unzicker 1975). Very little comprehensive collecting has been done within Ohio to rear larval specimens from particular habitats in order to document the chironomid fauna. Publications by Boesel (1972, 1974) were based on reared material, whereas other papers by Boesel (1983, 1985) and by Boesel and Winner (1980) primarily evaluated adult collections.

The purpose of the present study was to collect and rear Chironomidae from aquatic habitats within Cedar Bog, an alkaline fen located in west central Ohio. This is the first chironomid study of an alkaline fen in North America. Wrubleski (1987) reviewed chironomid studies of primarily Canadian peatlands and marshes. Studies of small to medium-sized cool streams within the Nearctic have been conducted by Coffman (1973), Boerger (1981), Hudson (1983), Singh and Harrison (1984), and Berg and Hellenthal (1991). Williams (1966) collected macroinvertebrates from Cedar Bog but collected only four chironomid taxa, none of which were identified to species.

STUDY AREA

Cedar Bog is an alkaline fen located in Champaign County, OH, about 7.6 km (4.7 mi) southwest of Urbana (40°03'N, 83°47'W). The area is protected as the Cedar Bog Nature Preserve under the supervision of the Ohio Historical Society. It is formed by numerous springs that collect to form the West Branch Cedar Run and East Branch Cedar Run, which then unite south of Woodburn Road to form Cedar Run. The drainage flows in a southerly then southwesterly direction until its confluence with the Mad River north of County Line Road. The groundwater that feeds Cedar Bog passes through thick deposits of carbonate rich glacial outwash where it dissolves calcium, magnesium, and bicarbonate. This material is precipitated as marl when it reaches the surface (Forsyth 1974, Aptekar and Townsend 1989). A continuous and uniform supply of cool alkaline ground water provides a cool, moist microclimate that maintains a fen flora with components ordinarily found in northern, southern, or prairie habitats (Frederick 1974a,b). The most noticeable relict species is the northern white cedar (*Thuja occidentalis*) from which the fen derives its name.

The average monthly water temperature within Cedar Run during 1966 ranged from 3.7°C in January to 17.4°C in August (Frederick 1974b). The temperature of groundwater discharging into springs within Cedar Bog during the summer ranges between 11.5 and 12.5°C (Ricketts et al. 1989, unpubl. data). Water in open shallow areas such as the marl meadow habitat, which are common adjacent to the East Branch Cedar Run, can become heated by the sun to 30°C (Williams 1966). Water within the East Branch itself exhibits thermal stratification as a result of a warmwater influx from the adjacent marl meadow. Williams (1966) recorded August water temperatures of 26.1°C at a water depth of 2.6 cm (1 in), 16.4°C at a water depth of 20.5 cm (8 in), 15°C at a substrate depth of 2.6 cm (1 in), and 12.2°C at a substrate depth of 7.7 cm (3 in) with an air temperature of 30.6°C.

Williams (1966) measured pH, DO, and alkalinity at three locations on East Branch Cedar Run, one on West

[1]Manuscript received 21 May 1992 and in revised form 28 October 1992 (#92-14).

Branch Cedar Run, and one on Cedar Run near the mouth. Values of pH ranged from 7.4 to 8.6 (means ranged from 7.7 to 8.0), DO ranged from 6.4 to 11.8 mg/l (means ranged from 7.8 to 10.9 mg/l), and alkalinity ranged from 260 to 360 mg/l (means ranged from 304.5 to 319.5). Ricketts et al. (1989) reported water chemistry parameters for three springs adjacent to East Branch Cedar Run. The range of mean values were: pH from 7.08 to 7.09, conductivity from 400 to 425 µmhos/cm, Ca from 115 to 117 mg/l, Mg from 33 to 34 mg/l, and DO from 5.85 to 6.05 mg/l. These water chemistry parameters categorize Cedar Bog as a strongly minerotrophic wetland (Andreas and Bryan 1990, Bryan and Andreas 1986, 1988).

The stream channel substrate within Cedar Bog was composed primarily of unconsolidated marl with organic silt deposits in slack water areas such as the margins. The stream is essentially a continuous run habitat. Woody debris and aquatic macrophytes provide the few stable substrates. The only gravel/rubble riffle is located at Woodburn Road on the East Branch Cedar Run and is of anthropogenic origin.

MATERIALS AND METHODS

Chironomidae were collected by a variety of methods. Larvae and pupae were collected by handpicking available substrates and by examining debris collected with a dipnet and placed in an enamel pan. Late instar larvae and pupae were transported live to the laboratory for rearing. In the laboratory they were placed individually into vials with either fen water or distilled water and kept in a water bath. Emerged adults were preserved in alcohol along with their larval and pupal exuviae for later slide mounting. Pupal exuviae were collected from the water surface by handpicking. Adult chironomids were collected adjacent to the sites with an insect net. The 1991 collections were made by placing modified Hester-Dendy artificial substrates within the stream for a period of six weeks. At the time the artificial substrates were collected, qualitative collections from the natural substrates were made using a dipnet and handpicking (Ohio EPA 1989). All specimens were preserved in 70% ethyl alcohol except the artificial substrates which were preserved with formalin. Larval specimens were cleared in 10% KOH solution and slide mounted in water for initial identification. Voucher specimens were slide mounted in Euparal™ (ASCO Laboratories, Manchester, England). Larval and pupal exuviae and adult specimens were mounted directly in Euparal after first clearing the adult body in 10% KOH solution.

Representative voucher specimens of most taxa are deposited in the Ohio Historical Society, Columbus, OH, collection. In addition, some specimens were retained by Bohdan Bilyj of the Freshwater Institute, Winnipeg, Manitoba; Donald R. Oliver of the Biosystematics Research Centre, Ottawa, Ontario, CAN; Friedrich Reiss of the Zoologisch Staatssammlung, Munich, Germany; and Ole A. Sæther of the University of Bergen, Norway, with the remaining material being retained in the collection of the author.

The following collection sites are given a grid designation from Frederick (1974b) which was expanded by the Ohio Historical Society to aid in the location of sites within the fen.

East Branch Cedar Run was sampled about due west of the preserve manager's house (D-5, 40°03'36"N, 83°47'38"W) on 2 April, 14 May, and 9 July 1989; at the boardwalk upstream from Woodburn Road (D-7, 40°03'25"N, 83°47'40"W) on 9 July 1989; at Woodburn Road (E-9, 40°03'20"N, 83°47'41"W) on 15 April 1989; and downstream from Woodburn Road (E-9, 40°03'19"N, 83°47'42"W) on 15 April and 9 August 1989 and on 20 September 1991.

Cedar Run was sampled upstream from Dallas Road (G-15, 40°02'55"N, 83°47'52"W) on 20 June 1987, 2 October 1988, 22 September 1989, and 20 September 1991.

A spring tributary to East Branch Cedar Run south of Woodburn Road on the west side (E-9, 40°03'19"N, 83°47'42"W) was sampled on 15 April, 14 May, 9 July, and 9 August 1989.

A marl meadow (D-5, 40°03'36"N, 83°47'38"W) was sampled on 9 July 1989. The water temperature was 26.5°C.

A swamp located north of Woodburn Road adjacent to the boardwalk (E-7, 40°03'23"N, 83°47'42"W) was sampled on 4 June 1989. Water temperature readings ranged from 17.2°C to 18.7°C.

RESULTS

The 96 chironomid taxa collected from Cedar Bog are listed below along with the collection location, life history stages collected (L = larva, P = pupa, M = male adult, F = female adult; life stages not separated by a comma represent associated specimens; life stages placed in a separate parenthesis are visible within the earlier life stage), number of individuals collected, and dates collected.

Tanypodinae

Apsectrotanypus johnsoni (Coquillett): spring (LPF) 3 on 14-V-89, 4 on 9-VIII-89; E. Br. Cedar Run (LPF) 4 on 15-IV-89, 10 on 14-V-89, 6 on 4-VI-89, 10 on 9-VII-89; Cedar Run (LPF) 5 on 20-VI-87, 1 on 2-X-88, 8 on 22-IX-89.

Bethbilbeckia floridensis Fittkau & Murray: spring (LPF) 1 on 15-IV-89.

Conchapelopia fasciata Beck & Beck: E. Br. Cedar Run (LPMF) 3 on 4-VI-89. *Conchapelopia* larvae which were not readily identifiable to species were collected from: spring 6 on 15-IV-89, 2 on 14-V-89, 3 on 9-VIII-89; E. Br. Cedar Run 2 on 4-VI-89, 2 on 9-VIII-89, 2 on 20-IX-91; Cedar Run 3 on 20-VI-87, 2 on 22-IX-89, 3 on 20-IX-91.

Conchapelopia pallens (Coquillett): adj. spring (M) 1 on 14-V-89.

Conchapelopia rurika (Roback): E. Br. Cedar Run (LPF) 1 on 9-VII-89.

Larsia canadensis Bilyj: E. Br. Cedar Run (LPM) 1 on 4-VI-89.

Larsia decolorata (Malloch): E. Br. Cedar Run (LPMF) 2 on 14-V-89, 1 on 4-VI-89; Cedar Run (P) 1 on 2-X-88; marl meadow [LPF(M)] 2 on 9-VII-89. This species represents *L. indistincta* Beck & Beck which was synonymized by Roback (1971) but will be resurrected by the revision being prepared by B. Bilyj (pers. comm.).

Larsia n. sp. 1 (B. Bilyj, pers. comm.): spring (LPF, M) 4 on 14-V-89, 2 on 9-VII-89, 1 on 9-VIII-89.

Macropelopia decedens (Walker): spring (L) 1 on 14-V-89; E. Br. Cedar Run (L) 2 on 14-V-89, 2 on 4-VI-89, 9 on 9-VII-89; Cedar Run (LPF) 6 on 22-IX-89.

Meropelopia americana (Fittkau): spring (LPMF) 2 on 15-IV-89, 1 on 9-VII-89; E. Br. Cedar Run (LPM) 1 on 14-V-89, 2 on 20-IX-91. *Meropelopia* larvae which were not readily identifiable to species were collected from: spring 1 on 9-VII-89, 12 on 9-VIII-89; E. Br. Cedar Run 2 on 2-IV-89; Cedar Run 1 on 20-VI-87; marl meadow 1 on 9-VII-89.

Meropelopia flavifrons (Johannsen): spring (P) 1 on 9-VIII-89.

Natarsia baltimoreus (Macquart): adj. spring (M) 1 on 9-VII-89; E. Br. Cedar Run (LP) 1 on 4-VI-89; Cedar Run (P) 1 on 20-VI-87.

Paramerina fragilis (Walley): Cedar Run (P) 1 on 2-X-88; swamp (PM) 1 on 4-VI-89.

Paramerina smithae (Sublette): swamp (LPMF) 2 on 4-VI-89.

Procladius (*Holotanypus*) sp.: E. Br. Cedar Run [LPF(M)] 37 on 2-IV-89, 7 on 14-V-89, 10 on 9-VII-89, 1 on 20-IX-91; Cedar Run (LPF) 21 on 22-IX-89.

Radotanypus florens (Johannsen) **n. comb.**: spring (LPMF) 6 on 15-IV-89, 26 on 14-V-89, 1 on 9-VIII-89; E. Br. Cedar Run (LPMF) 9 on 15-IV-89, 3 on 14-V-89, 1 on 9-VII-89, 1 on 20-IX-91; Cedar Run (LPF) 5 on 22-IX-89.

Trissopelopia ogemawi Roback: spring (LPF) 1 on 9-VII-89, 7 on 9-VIII-89; adj. spring (M) 2 on 14-V-89, 1 on 9-VII-89; E. Br. Cedar Run (LPF) 1 on 14-V-89, 2 on 9-VII-89, 12 on 20-IX-91; Cedar Run (L, P) 1 on 20-VI-87, 1 on 2-X-88, 7 on 20-IX-91.

Zavrelimyia bifasciata (Coquillett): spring (LPF) 1 on 15-IV-89.

Zavrelimyia sinuosa (Coquillett): spring (LPM) 2 on 9-VIII-89; Cedar Run (LPF) 2 on 2-X-88. According to B. Bilyj (pers. comm.) *Z. sinuosa* is a species complex of three species.

Zavrelimyia thryptica (Sublette): spring (LPM) 1 on 14-V-89; adj. spring (M) 1 on 14-V-89. According to B. Bilyj (pers. comm.) *Z. thryptica* is a species complex of three or four species.

Diamesinae

Diamesa nivoriunda (Fitch): E. Br. Cedar Run (L) 5 on 15-IV-89; adj. E. Br. Cedar Run (M, F) 7 on 2-IV-89, 3 on 15-IV-89.

Prodiamesinae

Odontomesa ferringtoni Sæther: E. Br. Cedar Run (L) 1 on 20-IX-91; Cedar Run (LPMF) 9 on 22-IX-89.

Prodiamesa olivacea (Meigen): spring (L) 1 on 9-VIII-89; Cedar Run (L, P) 2 on 2-X-88, 1 on 22-IX-89.

Orthocladiinae

Brillia flavifrons (Johannsen): adj. E. Br. Cedar Run (M) 1 on 15-IV-89, 1 on 14-V-89; Cedar Run (P) 1 on 2-X-88.

Bryophaenocladius nr. *psilacrus* Sæther: adj. swamp (M) 1 on 4-VI-89.

Camptocladius stercorarius (De Geer): adj. spring (M) 1 on 14-V-89.

Chaetocladius stamfordi (Johannsen): spring (L, P) 6 on 15-IV-89, 1 on 14-V-89, 1 on 9-VIII-89; adj. E. Br. Cedar Run (M) 3 on 2-IV-89, 1 on 15-IV-89, 1 on 14-V-89.

Corynoneura lobata Edwards: spring (LPF) 8 on 9-VIII-89; E. Br. Cedar Run (LPM) 2 on 2-IV-89, 1 on 15-IV-89, 1 on 14-V-89, 7 on 20-IX-91; Cedar Run (LPMF) 2 on 2-X-88, 4 on 20-IX-91.

Corynoneura n. sp. 5 (O. Sæther, pers. comm.): spring (LPM) 1 on 15-IV-89, 4 on 9-VIII-89.

Cricotopus (*s.s.*) *annulator* Goetghebuer: adj. spring (M) 1 on 9-VII-89.

Cricotopus (*s.s.*) *bicinctus* (Meigen): E. Br. Cedar Run (LPM) 1 on 9-VII-89, 8 on 9-VIII-89; Cedar Run (LPM) 2 on 2-X-88, 3 on 22-IX-89.

Cricotopus (*s.s.*) *varipes* Coquillett: adj. spring (M) 1 on 14-V-89.

Doncricotopus prob. *bicaudatus* Sæther: E. Br. Cedar Run (L, P) 1 on 14-V-89, 2 on 20-IX-91; Cedar Run (L, P) 4 on 2-X-88, 1 on 22-IX-89.

Gymnometriocnemus (*s.s.*) *subnudus* (Edwards): adj. swamp (M) 1 on 4-VI-89.

Heterotrissocladius marcidus (Walker): spring (LPMF) 20 on 15-IV-89, 7 on 14-V-89, 3 on 9-VII-89, 17 on 9-VIII-89; E. Br. Cedar Run (L) 2 on 2-IV-89, 2 on 15-IV-89, 3 on 9-VII-89, 8 on 20-IX-91; Cedar Run (LPM) 14 on 2-X-88, 9 on 22-IX-89, 4 on 20-IX-91.

Hydrobaenus sp.: E. Br. Cedar Run (L) 1 on 2-IV-89.

Limnophyes brachytomus (Kieffer): adj. E. Br. Cedar Run (M) 1 on 15-IV-89.

Limnophyes minimus (Meigen): adj. spring (M) 2 on 15-IV-89, 1 on 14-V-89.

Limnophyes natalensis (Kieffer): adj. swamp (M) 1 on 4-VI-89.

Orthocladius (*s.s.*) *robacki* Soponis: E. Br. Cedar Run (LPM) 2 on 15-IV-89, 4 on 14-V-89. *Orthocladius* (*s.s.*) larvae which were not readily identifiable to species were collected: E. Br. Cedar Run 5 on 2-IV-89, 4 on 15-IV-89, 2 on 20-IX-91; Cedar Run 1 on 22-IX-89.

Orthocladius (*Symposiocladius*) *lignicola* Kieffer: spring (L) 1 on 9-VIII-89.

Paracricotopus sp.: spring (L) 3 on 9-VIII-89; adj. spring (M) 1 on 14-V-89.

Parakiefferiella n. sp. 1: Cedar Run (L) 1 on 20-IX-91.

Parakiefferiella n. sp. 2: E. Br. Cedar Run (L, P) 2 on 14-V-89, 3 in 20-IX-91.

Parakiefferiella n. sp. 5: spring (LPMF) 2 on 15-IV-89, 1 on 14-V-89; E. Br. Cedar Run (LPM) 2 on 15-IV-89; Cedar Run (LPMF) 10 on 22-IX-89.

Parametriocnemus hamatus (Johannsen): spring (LPMF) 5 on 15-IV-89, 1 on 14-V-89, 3 on 9-VIII-89; E. Br. Cedar Run (LPF) 13 on 15-IV-89, 5 on 4-VI-89, 1 on 20-IX-91; Cedar Run (LPF) 22 on 2-X-88, 2 on 22-IX-89, 8 on 20-IX-91.

Parametriocnemus lundbecki (Johannsen): spring (LPMF) 2 on 15-IV-89, 1 on 14-V-89, 11 on 9-VII-89, 36 on 9-VIII-89; E. Br. Cedar Run (LPMF) 4 on 2-IV-89, 11 on 15-IV-89, 1 on 14-V-89, 5 on 4-VI-89, 1 on 9-VII-89, 11 on 20-IX-91; Cedar Run (L, P) 1 on 20-VI-87, 1 on 2-X-88, 11 on 20-IX-91.

Paraphaenocladius poss. *exagitans* (Johannsen): adj. E. Br. Cedar Run (E-9) (M) 1 on 14-V-89.

Paraphaenocladius n. sp. near *irritus* (Walker) and *pseudirritus* Strenzke: spring (LPM) 1 on 15-IV-89.
Pseudorthocladius (*s.s.*) *tricanthus* Sæther & Sublette: adj. E. Br. Cedar Run (D-5) (M) 1 on 14-V-89.
Psilometriocnemus triannulatus Sæther: adj. E. Br. Cedar Run (E-9) (M) 1 on 14-V-89.
Rheocricotopus (*Psilocricotopus*) *glabricollis* (Meigen): E. Br. Cedar Run (PF, M) 5 on 14-V-89.
Rheocricotopus (*Psilocricotopus*) *robacki* (Beck & Beck): E. Br. Cedar Run [LP(F)] 13 on 15-IV-89, 6 on 20-IX-91; Cedar Run [LP(F)] 8 on 20-VI-87, 5 on 2-X-88, 3 on 22-IX-89, 5 on 20-IX-91.
Rheocricotopus (*s.s.*) *effusoides* Sæther: E. Br. Cedar Run (LPF) 1 on 2-IV-89, 5 on 14-V-89.
Smittia poss. *edwardsi* Goetghebuer: adj. spring (M) 2 on 9-VIII-89; adj. swamp (M) 1 on 4-VI-89.
Smittia poss. *lasiops* (Malloch): adj. spring (M) 4 on 15-IV-89; adj. E. Br. Cedar Run (M) 8 on 2-IV-89.
Smittia poss. *leucopogon* (Meigen): adj. spring (M) 1 on 14-V-89.
Smittia sp. 6: adj. spring (M) 1 on 9-VIII-89.
Thienemanniella xena (Roback): E. Br. Cedar Run (L) 1 on 9-VIII-89, 1 on 20-IX-91; Cedar Run (LPMF) 9 on 20-VI-87, 2 on 22-IX-89.
Thienemanniella n. sp. 1 (O. Sæther, pers. comm.): Cedar Run [L(P)] 4 on 20-IX-91.
Tvetenia bavarica group (*sensu* Simpson and Bode 1980, Bode 1983): E. Br. Cedar Run (LPF) 5 on 15-IV-89, 1 on 9-VIII-89; Cedar Run (L) 9 on 20-VI-87, 1 on 20-IX-91.

Chironominae

Chironomini

Chironomus (*s.s.*) poss. *decorus* Johannsen: adj. spring (M) 2 on 9-VII-89; swamp (LPMF) 32 on 4-VI-89.
Chironomus (*s.s.*) poss. *riparius* Meigen: swamp (LPF, M) 3 on 4-VI-89.
Cryptochironomus sp.: spring (L) 1 on 9-VIII-89; E. Br. Cedar Run (L, P) 1 on 14-V-89, 5 on 9-VII-89; Cedar Run (LPF) 1 on 22-IX-89.
Cryptotendipes pseudotener (Goetghebuer): E. Br. Cedar Run (LPMF) 55 on 14-V-89, 15 on 4-VI-89, 7 on 9-VII-89; Cedar Run (L, P) 6 on 2-X-88, 21 on 22-IX-89, 1 on 20-IX-91.
Dicrotendipes fumidus (Johannsen): E. Br. Cedar Run (LP, M) 52 on 14-V-89, 1 on 4-VI-89, 8 on 9-VII-89, 1 on 20-IX-91; Cedar Run (L) 1 on 20-VI-87; marl meadow (L, P) 2 on 9-VII-89.
Microtendipes pedellus group (*sensu* Pinder and Reiss 1983): E. Br. Cedar Run (L) 1 on 20-IX-91.
Paracladopelma nais (Townes): Cedar Run (LPMF) 1 on 2-X-88, 3 on 22-IX-89.
Paracladopelma undine (Townes): E. Br. Cedar Run (LPF, M) 5 on 15-IV-89, 2 on 9-VII-89; Cedar Run (LPF) 3 on 22-IX-89.
Paralauterborniella nigrohalterale (Malloch): spring (L) 8 on 14-V-89; E. Br. Cedar Run (L, P) 11 on 15-IV-89, 2 on 14-V-89, 7 on 4-VI-89, 1 on 20-IX-91; Cedar Run (LPMF) 10 on 22-IX-89.
Paratendipes albimanus (Meigen): spring (L, M) 2 on 14-V-89, 1 on 9-VIII-89; E. Br. Cedar Run (P) 1 on 9-VII-89; Cedar Run (L) 1 on 22-IX-89, 1 on 20-IX-91; marl meadow (L) 3 on 9-VII-89; adj. swamp (M) 1 on 4-VI-89.
Phaenopsectra flavipes (Meigen): E. Br. Cedar Run (L) 1 on 20-IX-91; Cedar Run (LP) 4 on 20-IX-91.
Phaenopsectra obediens (Johannsen): adj. spring (M) 1 on 15-IV-89, 3 on 14-V-89, 1 on 9-VIII-89; adj. swamp (M) 1 on 4-VI-89.
Polypedilum (*s.s.*) *albicorne* (Meigen): E. Br. Cedar Run (L, M) 1 on 14-V-89 at Woodburn Rd., 1 on 20-IX-91; Cedar Run (L) 6 on 20-IX-91.
Polypedilum (*s.s.*) *aviceps* Townes: adj. spring (M) 1 on 14-V-89; E. Br. Cedar Run (L) 1 on 20-IX-91; Cedar Run (L, P) 3 on 20-VI-87, 2 on 2-X-88, 12 on 20-IX-91.
Polypedilum (*s.s.*) *convictum* (Walker): E. Br. Cedar Run (L) 2 on 20-IX-91; Cedar Run (L) 1 on 20-IX-91.
Polypedilum (*s.s.*) *fallax* group (*sensu* Maschwitz 1975, Simpson and Bode 1980): Cedar Run (L) 1 on 20-IX-91.
Polypedilum (*s.s.*) *pedatum* Townes: adj. spring (M) 6 on 14-V-89; adj. E. Br. Cedar Run (M) 1 on 4-VI-89
Polypedilum (*s.s.*) poss. *trigonus* Townes: spring (L) 1 on 14-V-89.
Polypedilum (*Tripodura*) *halterale* group: spring (L) 1 on 15-IV-89; E. Br. Cedar Run (L) 1 on 2-IV-89, 1 on 14-V-89, 1 on 9-VII-89. The *P.* (*T.*) *halterale* group as used in this paper is defined as the *Tripodura* species whose larval antenna has a short third and a long fourth segment.
Polypedilum (*Tripodura*) *scalaenum* (Schrank): adj. spring (M) 1 on 9-VIII-89. Larvae belonging to the *P.* (*T.*) *scalaenum* group were collected from: spring 2 on 14-V-89, 1 on 9-VIII-89. The *P.* (*T.*) *scalaenum* group as used in this paper is defined as the *Tripodura* species whose larval antenna has short or vestigial third, fourth, and fifth segments.
Stenochironomus (*s.s.*) *hilaris* (Walker): adj. spring (M) 1 on 9-VII-89.
Stictochironomus sp.: Cedar Run (L) 1 on 20-IX-91.

Tanytarsini

Cladotanytarsus vanderwulpi group (*sensu* Pinder and Reiss 1983, 1986): E. Br. Cedar Run (L) 1 on 20-IX-91; Cedar Run (L, P) 28 on 20-IX-91.
Micropsectra nigripila (Johannsen): spring (LPM) 1 on 14-V-89, 54 on 9-VII-89, 14 on 9-VIII-89; E. Br. Cedar Run (LPF, M) 101 on 14-V-89, 1 on 4-VI-89, 2 on 9-VII-89; Cedar Run (P) 1 on 20-VI-87; marl meadow (LPM) 3 on 9-VII-89; swamp (LPF, M) 49 on 4-VI-89.
Micropsectra polita (Malloch): adj. spring (M) 4 on 15-IV-89, 1 on 14-V-89; adj. E. Br. Cedar Run (M) 4 on 15-IV-89, 1 on 14-V-89 at Woodburn Rd., 1 on 4-VI-89; Cedar Run (PM) 1 on 20-VI-87.
Micropsectra sp. 3: adj. spring (M) 1 on 9-VIII-89.
Paratanytarsus n. sp. 1 (F. Reiss, pers. comm.): E. Br. Cedar Run (LPF, M) 2 on 2-IV-89, 2 on 15-IV-89, 12 on 4-VI-89, 1 on 9-VII-89, 3 on 9-VIII-89, 9 on 20-IX-91; Cedar Run (LPMF) 34 on 2-X-88, 13 on 22-IX-89, 64 on 20-IX-91.
Rheotanytarsus distinctissimus (Brundin): E. Br. Cedar Run (L) 1 on 20-IX-91; Cedar Run (L, P) 6 on 20-IX-91.
Rheotanytarsus n. sp. near *akrina* Roback: E. Br. Cedar Run (L) 2 on 9-VIII-89; Cedar Run (LPMF) 5 on 20-VI-87, 13 on 22-IX-89.

Stempellinella n. sp. near *flavidula* (Edwards): Cedar Run (LP) 1 on 20-IX-91.
Stempellinella n. sp. 1: E. Br. Cedar Run (L) 1 on 9-VII-89, 1 on 20-IX-91; Cedar Run (LP) 1 on 2-X-88, 2 on 20-IX-91.
Tanytarsus n. sp. near *curticornis* Kieffer: E. Br. Cedar Run (L) 1 on 20-IX-91; Cedar Run (LPF) 1 on 2-X-88, 8 on 20-IX-91.
Tanytarsus sp. 1: adj. E. Br. Cedar Run (M) 2 on 14-V-89.
Tanytarsus sp. 2: Cedar Run (LPF) 1 on 22-IX-89.
Tanytarsus sp.: E. Br. Cedar Run (L) 1 on 14-V-89, 3 on 9-VII-89, 8 on 20-IX-91; Cedar Run (L, P) 1 on 2-X-88, 2 on 22-IX-89, 2 on 20-IX-91.

DISCUSSION

This is the first study documenting the chironomid fauna of an alkaline fen in the Nearctic. The immature stages of 75 taxa were collected from the study area. The remaining 21 taxa were collected only as adults, of which 13 belonged to mostly terrestrial or semiaquatic genera whose immature stages require special collecting methods not used during this study. Sixty-three taxa were given species names while the remaining taxa for which at least adult male specimens were collected belong to genera in need of taxonomic revision. Twelve taxa were recognized as new species, of which four have been examined by the taxonomists listed after the name in the species list and will be described by them in future publications. Specimens from this study will be made available to taxonomists as they begin work on the various taxa.

Taxa whose specific name was based in part on associated material from other locations within Ohio were *Prodiamesa olivacea, Orthocladius* (*Symposiocladius*) *lignicola, Parakiefferiella* n. sp. 1, *Parakiefferiella* n. sp. 2, *Thienemanniella* n. sp. 1, *Phaenopsectra flavipes, Polypedilum*(*s.s.*) *albicorne, Polypedilum*(*s.s.*) *convictum, Rheotanytarsus distinctissimus, Stempellinella* n. sp. near *flavidula, Stempellinella* n. sp. 1, *Tanytarsus* n. sp. near *curticornis,* and *Tanytarsus* sp. 2. The use of *Polypedilum* (*s.s.*) *convictum* follows Boesel's (1985) synonomy of *P.* (*s.s.*) *obtusum* Townes with *P.* (*s.s.*) *convictum.*

The majority of taxa collected from Cedar Bog have been collected from other springs and small streams within Ohio (unpubl. data). Aquatic taxa not collected elsewhere in Ohio were *Asectrotanypus johnsoni, Bethbilbeckia floridensis, Larsia canadensis, Larsia* n. sp. 1, *Paramerina smithae,* and *Radotanypus florens.* Cedar Bog may be a refugium for these species, providing special environmental conditions not present at other non-fen sites within Ohio.

The present study represents a significant range extension for several taxa based primarily on distributions listed in Oliver et al. (1990) and Hudson et al. (1990). *Bethbilbeckia floridensis* has been reported only from Florida, Georgia, and South Carolina; *Paramerina smithae* has been reported only from west of the Mississippi River, and *Rheocricotopus* (*s.s.*) *effusoides* has been reported only from South Dakota.

Radotanypus florens is currently placed in the genus *Apsectrotanypus.* Roback (1971) synonymized *Anatopynia* (*Anatopynia*) *submarginella* Sublette with *A. florens* [as *Psectrotanypus* (*Apsectrotanypus*) *florens*]. With the discovery of associated pupal specimens from Colorado by Len Ferrington (University of Kansas), Fittkau and Murray (1985) removed *A. submarginella* from synonomy and erected the new genus *Radotanypus.* Epler (1986) later described the larva of *R. submarginella.* Based on larval and pupal morphology, the reared specimens from Cedar Bog clearly belong to *Radotanypus* and Bohdan Bilyj (pers. comm.) has identified the adults as *A. florens.* Therefore *A. florens* should be transferred to *Radotanypus.* Johannsen (1908) recorded *R. florens* (as *Tanypus florens*) from New York as well as Washington and Colorado, but Roback (1971) was not able to locate the eastern specimens, and the species has not been reported from the eastern Nearctic since. This study confirms the existence of *R. florens* in the eastern Nearctic.

This is the first record of *Odantomesa ferringtoni* other than the type location in Colorado. The larvae are inseparable from what Sæther (1985) described as *O.* sp. A., but the pupae and adult females are separable. Sæther (pers. comm.) believes he may have included some larval specimens of *O. ferringtoni* in his description of *O.* sp. A. This species has been collected in three other counties within Ohio from flocculent silt deposits in cool water streams (unpubl. data).

The genus *Paracricotopus* has only been reported from Alabama, Georgia, South Carolina, North Carolina, and Pennsylvania. The Cedar Bog specimens were collected from a spring with substrates of soft marl and silt sediments and woody debris. This is an atypical habitat for the genus which until now has only been collected from thin water film flowing over bedrock substrates (hygropetric). *P. millrockensis* Caldwell has been collected from hygropetric habitats at other locations within Ohio (unpubl. data). The species inhabiting Cedar Bog may be undescribed but since pupal specimens are lacking the species identity remains undetermined.

This report represents a baseline record of the chironomid fauna of Cedar Bog. Future study of this site should involve the use of emergence traps and possibly pupal drift nets placed over representative fen habitats throughout the emergence season in order to obtain information on densities and emergence patterns. Such an intensive collection scheme surely would add to the taxa list and provide the adults for some of the taxa for which only immatures were collected. Additional rearing should be conducted to provide all life history stages of taxa not reared in this study.

ACKNOWLEDGEMENTS. I thank Bohdan Bilyj for helping with the Tanypodinae identifications; Don Oliver, Ole Sæther, and Friedrich Reiss for taxonomic assistance on several other taxa; Peter Langton for the loan of larval specimens of *Stempellinella flavidula;* Broughton Caldwell, Jeff DeShon, and John Epler for commenting on an early draft of this manuscript; and the Ohio Historical Society for giving me permission to collect from their property.

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